UNIVERSITY OF HUELVA

DOCTORAL THESIS

Financial Behavior, Financial Knowledge and Retirement Decisions: The Role of Homeownership and Financial Assets

Author:
Laura Oliva Rodríguez

Supervisors:
Dr. Juan M. Nave Pineda
Dr. David Toscano Pardo

A thesis submitted in fulfillment of the requirements for the degree of Philosophy in the Doctoral Programme: Economics, Business, Finance and Computing Science

in the

Department of Economics

2024

Declaration of Authorship

I, Laura Oliva Rodríguez, declare that this thesis titled, "Financial Behavior, Financial Knowledge and Retirement Decisions: The Role of Homeownership and Financial Assets" and the work presented in it are my own. I confirm that:

- This work was done wholly while in candidature for a PhD at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made it explicit, and they are aware and authorize its use.

“Reserve your right to think,
because even to think wrongly is better than not think at all.”

Hypatia of Alexandria

UNIVERSITY OF HUELVA

Abstract

Faculty of Business Sciences and Tourism

Doctoral Programme: Economics, Business, Finance and Computing Science

Financial Behavior, Financial Knowledge and Retirement Decisions: The Role of Homeownership and Financial Assets

by Laura Oliva Rodríguez

This doctoral thesis addresses a series of investigations in the field of financial behavior and retirement planning, analyzing how home ownership and financial assets influence individuals' financial decisions. Specifically, it focuses on three aspects: (I) the evolution and development of research on financial behavior, studied through a bibliometric analysis; (II) the relationship between financial knowledge and financial behavior, paying special attention to the moderating role of home ownership in this relationship; and (III) the effect of financial asset preferences on early retirement decisions in the private-public pension system, specifically the UK context.

To empirically address these issues, a methodology is employed that combines various approaches, including bibliometric analysis, econometric modeling, and the study of data from different large-scale surveys. The results obtained show the dynamic nature of research on financial behavior, as well as the moderating effect of home ownership on the relationship between financial knowledge and behavior. Furthermore, a correlation is shown between the possession of sophisticated financial assets and the tendency towards early retirement in the UK pension system.

Therefore, this doctoral thesis not only contributes to the existing literature in the field of financial behavior and retirement planning, but also provides a broad theoretical framework for understanding its relationship with home ownership and financial assets. These contributions open new avenues for future research, addressing a deeper understanding of the factors that influence financial behavior and how these could significantly improve people's quality of life.

UNIVERSIDAD DE HUELVA

Resumen

Facultad de Ciencias Empresariales y Turismo

Doctorado en Economía, Empresa, Finanzas y Computación

Comportamiento financiero, conocimiento financiero y decisiones de jubilación: El papel de la propiedad de vivienda y los activos financieros

por Laura Oliva Rodríguez

Esta tesis doctoral aborda una serie de investigaciones en el campo del comportamiento financiero y la planificación de la jubilación, analizando cómo la propiedad de vivienda y los activos financieros influyen en las decisiones financieras de los individuos. En concreto, se centra en tres aspectos: (I) la evolución y el desarrollo de la investigación sobre el comportamiento financiero, estudiado mediante un análisis bibliométrico; (II) la relación entre el conocimiento y el comportamiento, prestando especial atención al papel moderador de la propiedad de vivienda en esta relación; y (III) el efecto de las preferencias de activos financieros en las decisiones de jubilación anticipada en los sistemas de pensiones privados-públicos, de forma específica se analiza el sistema de Reino Unido.

Para abordar empíricamente estas cuestiones se emplea una metodología que combina diversos enfoques, incluyendo análisis bibliométrico, modelización econométrica y estudio de datos provenientes de diferentes encuestas a gran escala. Los resultados obtenidos muestran la naturaleza dinámica de la investigación sobre el comportamiento financiero, así como el efecto moderador de la propiedad de vivienda en la relación entre conocimiento y comportamiento financiero. Además, se muestra una correlación entre la posesión de activos financieros sofisticados y la tendencia a la jubilación anticipada en el sistema de pensiones de Reino Unido.

Por todo ello, esta tesis doctoral no solo contribuye a la literatura existente en el ámbito del comportamiento financiero y la planificación de la jubilación, sino que también proporciona un amplio marco teórico para comprender su relación con la propiedad de vivienda y la tenencia de activos financieros. Estas contribuciones abren nuevas vías para futuras investigaciones, abordando una comprensión más profunda de los factores que influyen en el comportamiento financiero y como estos podrían mejorar significativamente en la calidad de vida de las personas.

Acknowledgements

I would like to begin by expressing my deepest gratitude to my thesis advisor, David, who has been an invaluable guide throughout my academic journey since I started my master's degree. His constant support and ability to find the positive side in any situation have motivated me to keep going, even in moments of doubt. David is undoubtedly one of the most hardworking and generous people I have had the pleasure of knowing. I admire not only his intelligence but also his humanity, something I will always carry with me. Thank you for offering me so much, both academically and personally. His dedication and patience have been fundamental to my growth as a researcher.

I also want to express my gratitude to my co-advisor, Juan Nave, for his invaluable advice and unique perspective. His experience and knowledge have been key to reaching this point.

I extend my thanks to my colleagues at the University of Seville, whose support and encouragement have been unwavering. In particular, I want to acknowledge María Agustí and Francisco Acedo, who have been a pillar throughout this process. I have relied not only on their academic expertise but also on their unconditional friendship and support at all times.

Finally, my most sincere gratitude goes to my family. Without them, this dream would not have been possible. To my parents, to whom I owe everything, thank you for your unconditional love, constant support, and unwavering faith in me. They have made enormous sacrifices so that I could pursue my dreams, and there are not enough words to express how much that means to me. To my partner Isidro, for always being by my side during the toughest moments, and to my friends, for their unwavering support.

To all those mentioned, and to those who, although not specifically named, have contributed in some way to this journey, my most sincere thanks. This achievement is as much yours as it is mine.

Contents

List of Figures

List of Tables

Introduction

The financial behavior of individuals and their retirement planning are topics of increasing importance in the current economic context, especially in mixed public-private pension systems. Understanding how people make financial decisions, particularly in relation to retirement and financial asset management, is fundamental for designing effective policies and promoting long-term financial well-being.

In this context, this thesis aims to explore three fundamental aspects of financial behavior and retirement planning:

- The conceptual framework and evolution of research on financial behavior, through a comprehensive bibliometric analysis.
- The relationship between financial knowledge and financial behavior, with particular emphasis on the moderating effect of home ownership.
- The influence of financial asset preferences on early retirement choices within the context of a mixed public-private pension system.

The first chapter provides an overview of the field of financial behavior through a comprehensive bibliometric analysis. This approach identifies key trends, influential authors, and emerging areas in this rapidly evolving field. The intellectual structure of the field is mapped, and the most prominent research fronts are identified.

The second chapter examines how home ownership moderates the relationship between financial knowledge and financial behavior. Using data from the Spanish Financial Competence Survey, it analyzes how home ownership influences the practical application of financial knowledge.

The third chapter investigates the effect of financial asset preferences on early retirement decisions in the context of the UK's mixed pension system. Based on data from the English Longitudinal Study of Ageing, it analyzes how the composition of an

individual's financial asset portfolio affects their decision to retire early.

This thesis contributes to the existing literature in several ways:

1. It provides an updated and comprehensive view of the state of the field of financial behavior.

2. It explores the moderating role of home ownership in the relationship between financial knowledge and behavior.

3. It offers new perspectives on how risk preferences, reflected in financial asset portfolios, influence retirement decisions in mixed pension systems.

The results of this research have significant implications for public policymakers, financial educators, and individuals navigating an increasingly complex financial landscape. By deepening the understanding of how people make financial decisions, especially in relation to retirement, this work can contribute to the development of more effective strategies to promote financial literacy and improve long-term financial outcomes.

1. Contribution of this thesis

Although there are current studies on financial knowledge and financial behavior, none have delved as deeply into housing tenure and financial assets as the present study. In this way, this thesis expands the existing knowledge in the field of financial behavior and retirement planning through novel findings and unique perspectives. This is achieved through:

Firstly, our bibliometric analysis of the financial behavior field not only provides an updated view but also reveals previously under-explored interdisciplinary connections. This detailed mapping highlights the growing importance of behavioral economics and neuroscience in understanding financial decisions, opening new avenues for future research.

Secondly, while previous studies have examined the relationship between financial knowledge and financial behavior, our work sheds light on the crucial role of home ownership as a moderator of this relationship. The results from the analysis of the Spanish Financial Competence Survey suggest that home ownership acts as a catalyst,

amplifying the impact of financial knowledge on economic decisions. This finding challenges the traditional view of financial education and underscores the need to consider socioeconomic factors in the design of educational programs.

Thirdly, our investigation into financial asset preferences and early retirement decisions offers a new perspective in the context of mixed pension systems. By analyzing data from the English Longitudinal Study of Ageing, we have uncovered patterns suggesting a complex relationship between asset portfolio composition and the propensity for early retirement. These findings challenge some previous assumptions about retirement decision-making and highlight the importance of considering individual risk preferences in pension policy formulation.

Fourthly, in the field of financial planning and retirement, this work contributes to a better understanding of how individuals make financial decisions over time. The analysis of the relationship between financial market participation and retirement decisions provides valuable insights for the design of public policies and financial education strategies.

Lastly, our integrated approach to analyzing financial behavior, home ownership, and retirement decisions provides a more holistic view of how individuals navigate today's complex financial landscape. The results underscore the interconnectedness of these financial decisions and challenge the tendency to examine them in isolation.

2. Chapter overview

This work encompasses the aforementioned contributions across three distinct chapters. The first chapter presents a bibliometric analysis of the field, while the two subsequent chapters are devoted to the analysis of financial behavior and retirement planning.

Chapter 1 offers a comprehensive bibliometric analysis of the financial behavior field. Employing co-citation and co-word techniques, we examine the evolution and current trends in financial behavior research. The analysis reveals an exponential growth in publications and citations since the early 21st century, with an increasing focus on topics such as financial education, investment decision-making, and retirement planning. The most influential works and emerging research areas are identified, providing an up-to-date and thorough overview of the field.

Chapter 2 investigates the relationship between financial knowledge and financial behavior, with a particular emphasis on the moderating role of homeownership. Utilizing data from the Spanish Financial Competence Survey (ECF2016), we apply weighted regression models and extended ordered probit to analyze this relationship. Our findings suggest that homeownership acts as a significant moderating factor in the relationship between financial knowledge and financial behavior. Specifically, we find that financial knowledge has greater potential to improve the financial behavior of renters compared to homeowners.

Chapter 3 explores the relationship between individuals' risk preferences, as reflected in their financial asset portfolios, and retirement age within the context of the UK's public-private pension system. Using data from the English Longitudinal Study of Ageing (ELSA), we construct various financial asset portfolios and analyze their impact on retirement age. Our results indicate a clear positive influence of financial asset holdings on retirement age, with significant differences emerging based on the risk profile of the assets. We find that portfolios with riskier diversification strategies exhibit a more pronounced impact on retirement age, leading to earlier retirement.

These chapters provide novel insights into financial behavior and retirement planning, with important implications for the formulation of financial education, housing, and pension policies. The work contributes to the existing literature by offering an updated view of the field, empirically demonstrating the moderating role of homeownership in financial behavior and shedding light on how risk preferences influence retirement decisions in a mixed pension system.

3. Publications

As a result of this dissertation, the following works have been developed:

- **Chapter 1**: Agustí, M.A. & Oliva, L. (2024). Financial Behavior Analysis: A Literature Review and Bibliometric Analysis. Under consideration in ***Journal of Economics Surveys*.**

- **Chapter 2**: Nave, J. M., Oliva, L., & Toscano, D. (2023). Financial knowledge and financial behavior: The moderating role of home ownership. ***Finance Research Letters*, *57*,** 104208.

- **Chapter 3**: Nave, J. M., Oliva, L., & Toscano, D. (2024). Early retirement and financial asset preferences in the private-public pension system. Under consideration in ***Humanities and Social Sciences Communications.***

Chapter 1. Financial Behavior Analysis: A Literature Review and Bibliometric Analysis

1. Introduction

Understanding the underlying reasons for decision-making in the financial field is an element of great importance nowadays. The emergence of new instruments, the incorporation of new technologies that put different forms of savings and investment within reach, among other reasons, has added complexity to an already complicated field (Jain *et al*., 2021). If we add to this fact that people do not always make rational financial decisions, as traditional economic theories suggest, the complexity increases considerably. An example of this is that on many occasions people prefer to invest in real estate and gold instead of financial instruments, contrary to what is predicted by conventional economic models (Goyal & Kumar, 2020; Thaler, 2015).

When we approach this problem from an academic perspective, we face a similar problem. Addressing the study of financial behavior means facing an extensive and eclectic field of study, a field that has been generated from various approaches that have made it a fragmented and complicated field. This diversity in its structure makes it difficult to know which are the most important themes, its theoretical pillars, making it difficult to foresee how the field will evolve in the future (Barberis, 2018).

In the current context, which is constantly changing, systematic literature reviews help us not only to understand the current state of research, but also to identify the most influential trends, highlight leading authors in the field and understand how international collaborations are shaping our understanding of financial behavior. The study of the intellectual structure and evolution of a scientific discipline can be useful from different perspectives, this is for researchers, students and professionals alike (Borkhovich, Bricker & Simkins, 1994; Locke & Perera, 2001).

In this way, researchers can use this information to place their work in the

appropriate context of the discipline, discover new research opportunities and detect those areas that are losing relevance. In addition, it allows them to synthesize the most influential literature and understand the connections between key studies in study (Casillas & Acedo, 2007). For students, having a clear vision of the conceptual structure of the discipline is very useful, as it helps them gain perspective, understand how different theoretical approaches relate and identify the most important publications in each line of thought (Small, 1973). In the professional field, this type of analysis offers a guide to understanding the historical evolution of concepts and perspectives within the discipline, determining which topics have received more academic attention, which are the most solid theoretical foundations and which emerging areas deserve special attention for their practical application in the business environment (White & Griffith, 1981; Ramos-Rodríguez & Ruíz-Navarro, 2004).

In recent years, the number of works that have tried to carry out this type of study has increased considerably. Most have opted for the use of bibliometric analyses over subjective literature reviews. In line with this trend, to better understand this phenomenon and as an introduction to the following chapters of this thesis, we propose to conduct a bibliometric analysis that allows us to identify both the theoretical sources that have prevailed over these last decades, as well as the research fronts that have been emerging and dominating different scientific publications (Zupic & Čater, 2015).

Within the spectrum of bibliometric techniques, achieving this objective involves working with two very similar techniques, although with different objectives: co-citation analysis and co-word analysis. The first serves to analyze the works that act as a structure in the development of literature, that is, the identification of the different scientific paradigms underlying the advancement of a field. The second allows us to analyze the research fronts that are developing, complementing the previous study by providing a dynamic vision.

For all these reasons, the structure of this chapter first shows a general description of what bibliometric analysis methods entail. After showing our analysis proposal for the field of financial behavior, the results obtained from the techniques that allow us to delve into the scientific structure will be presented, the results are shown. The chapter concludes with a detailed analysis of two well-differentiated areas that stand out from the general study of the field. On the one hand, the study of financial culture and education. This area has had a great impact and has attracted the attention of many

researchers for a long time. On the other hand, we will analyze a specific behavior, with much less impact, but with a striking boom in recent years, such as decisions associated with retirement. This field, due to the increase in life expectancy, has raised the issue that people are taking it more seriously, seeking a situation of financial tranquility in that stage of life.

2. Bibliometric Analysis

The study of financial behavior has evolved significantly in recent decades, becoming an interdisciplinary field that combines economics, psychology, and sociology (Statman, 2019). This approach allows for a better understanding of how people make financial decisions. In this context, bibliometrics, as an approach that allows for evaluating and monitoring the development of a research topic by organizing and linking basic information from publications, such as citations, authors, co-authors, journals, and keywords (Ferreira, 2018; Koseoglu *et al*., 2016), is established as a basic tool. This bibliometric analysis also includes different methods that can be applied; for example, bibliographic coupling, co-citation analysis, and co-word analysis (Van Eck & Waltman, 2009).

As previously mentioned, bibliometric analyses have become a fundamental tool for evaluating the current state and understanding the evolution of various research fields. The study of financial behavior has also received attention using this methodology. Specifically, the works of Costa *et al*. (2019) or those of Ingale & Paluri (2022) are two recent examples of this fact. In their works, they identified the main trends and research areas in the field of financial behavior using these techniques. However, Costa *et al*. (2019) evaluate a much more extensive field, considering financial behavior, but also economic and accounting behavior. Although their analysis is very extensive, the combination of works and themes may lead to conclusions that move us away from our specific purpose, which is the understanding of financial behavior.

On the other hand, Ingale & Paluri (2022) narrow their analysis to the field of financial culture and education. In our case, this field will constitute one of the sections framed within financial behavior in general. It is precisely the existence of this gap that encourages us to carry out this work of framing and contextualizing the different analyses that we will conduct in the following chapters.

These studies are clear examples of the usefulness of using quantitative methods to examine published literature, from which trends, collaboration patterns, and emerging areas within a discipline can be identified (Zupic & Čater, 2015), among other results. In the field of finance and economic behavior, bibliometric analyses have gained popularity in recent years, offering a panoramic view of existing research.

Recently, several bibliometric studies have been conducted in several areas related to financial behavior. For example, Huston (2010) examined the evolution of the concept of financial literacy, while Fernandes *et al*. (2014) conducted a meta-analysis on the effectiveness of financial education interventions. In the specific field of financial behavior, De Bondt *et al*. (2008) applied bibliometric techniques to track the development of behavioral finance, and more recently, Barberis (2018) offered a comprehensive review of the literature on psychology and finance.

To address this need for continuous updating and analysis, this thesis chapter uses bibliometric analysis tools to provide a current and comprehensive view of the field. In a recent article, Donthu *et al*. (2021) summarize the procedure for proposing a bibliometric analysis. The widely known steps include defining the database, establishing search criteria, refining and narrowing the search, performing a generic data analysis, and carrying out the bibliometric evaluation according to the selected techniques.

Thus, as authors such as Agustí & Orta (2023) indicate, one of the first decisions in the development of a bibliometric analysis is the selection of data sources. Although there are several databases that can provide relevant information (for example, Scopus, Google Scholar, etc.), numerous researchers consider the Web of Science (WoS) to be a reliable data source for systematic literature review studies, with advantages over other information sources (Norris & Oppenheim, 2007).

2.1 Analysis of the Financial Behavior Field

After selecting the database, we would proceed to conduct the generic search. In our case, we conducted a broadly defined search that included all documents containing the term “financial behavi*” within the TOPIC field in WoS. This field involves searching for the term in both the title and the main elements of the document (abstract or keywords). This search was carried out during July 2024, without a pre-established time limit.

Initially and without refinement, we obtained a total of 2,166 documents. After a thorough review of the documents obtained, we proceeded to refine them.

The main refinement of the obtained documents was based on research areas, to exclude those works linked to topics that contained the term but showed a spurious relationship. Therefore, we included only the research areas in Education and Educational Research, Social Sciences and other topics, Family Studies, Psychology, and Business Economics. Thus, after refining the results and the types of documents to articles, we finally worked with 1,048 documents as shown in Figure 1.1:

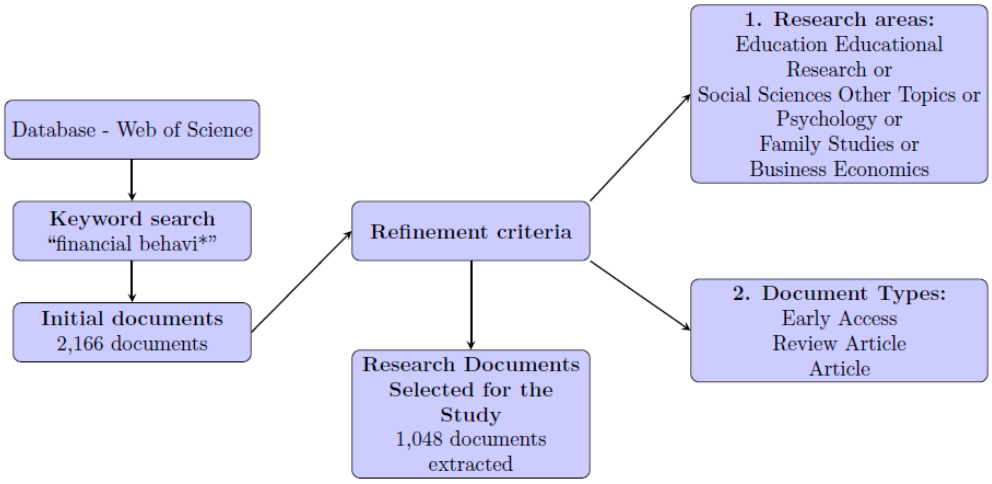

Figure 1.1. Flowchart for Selection of documents for Bibliometric Analysis on Financial Behavior

The results obtained were systematically checked to ensure that all documents corresponded to the field of study we had defined. The next step in any bibliometric analysis is the presentation of descriptive results that show the composition and distribution of the documents that will form the basis of the analysis.

In this regard, a frequency analysis has been prepared considering the number of articles published per year, as well as the citations received by these. Thus, Figure 1.2 clearly shows the progressive increase in research carried out on the effects of financial behavior over the last decade:

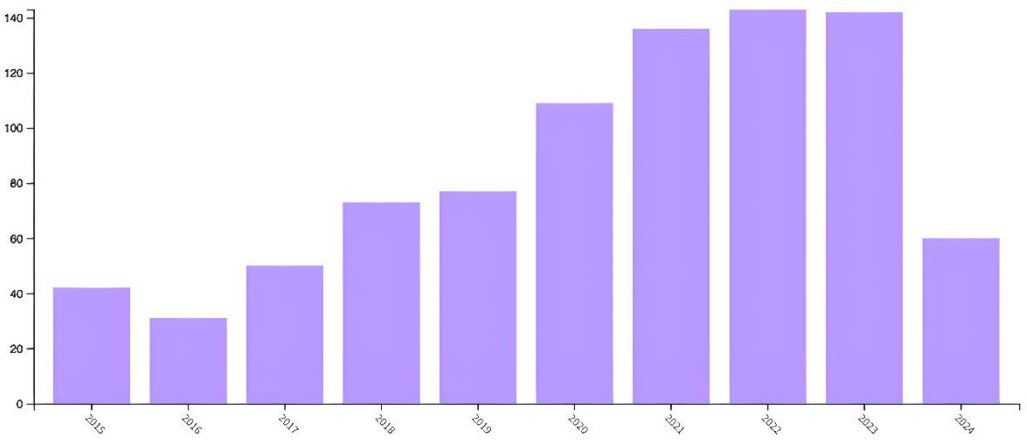

Figure 1.2. Annual Evolution of Publications on Financial Behavior (2015-2024)

As can be observed in the graph, there is a general upward trend in the number of publications from 2015 to 2023, with some variations. Although there is a slight decrease between 2015 and 2016, from that year onwards, a constant and significant growth is observed. This increase accelerates notably in the following years, reaching its peak in 2022 and 2023, with more than 140 publications in each year. It is interesting to note a slight decrease in 2024, although this could be attributed to the fact that the year has not yet concluded or to a possible delay in the indexing of the most recent publications.

This continued increase in the number of publications suggests a growing interest in the field of financial knowledge and its effects. Factors such as the global financial crisis, the increasing complexity of financial products, or the growing awareness of the importance of financial education could be driving this trend, as indicated by authors Lusardi & Mitchell (2014) in their study.

Another element that may justify the acceleration in the number of publications from 2020 onwards could be related to the impact of the COVID-19 pandemic on personal finances and the global economy, which has possibly stimulated greater interest in research on financial knowledge (Goodell, 2020; Putri *et al.*, 2020).

Regarding the number of citations and publications on this topic, Figure 1.3 presents a global view of the evolution of the field of financial knowledge from 1971 to 2024, showing both the number of publications and the citations received:

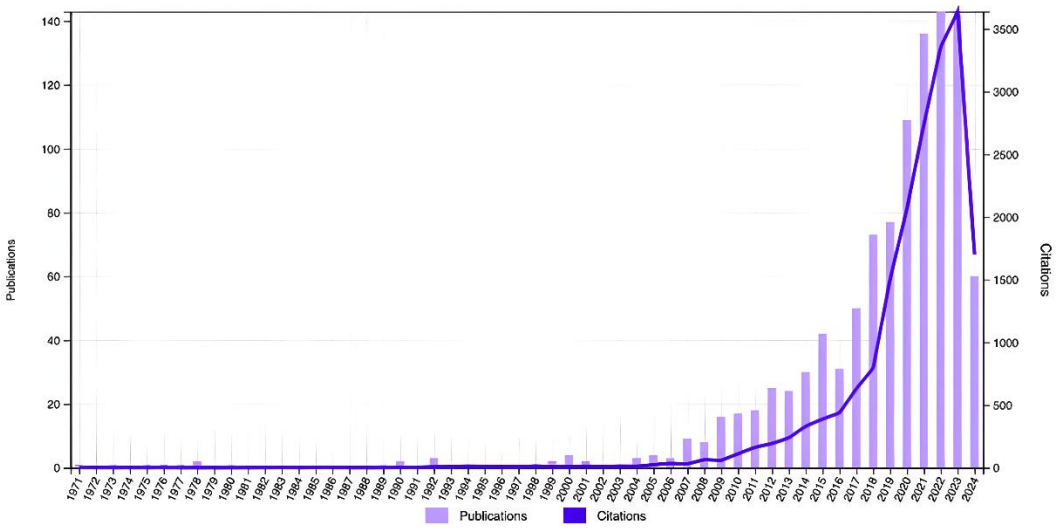

Figure 1.3. Temporal Evolution of Publications and Citations in the Field of Financial Behavior (1912-2024)

What stands out in this graph is the exponential growth in both publications and citations starting from the early years of the 21st century. This trend suggests an increase in interest and relevance of the study of financial behavior over the last two decades, as noted by De Bondt *et al*. (2008) in their review of behavioral finance. The differences between the number of publications and received citations are noteworthy. While publications begin to increase steadily from the early 2000s, citations show a more pronounced growth from 2010-2015. This reflects the gradual evolution of work related to behavioral finance (Barberis & Thaler, 2003).

Hirshleifer (2015), in his review of the importance of financial behavior in understanding markets and economic decisions, suggested an increase in the field's significance. This fact is corroborated by our results in the years following his work. As shown in Figure 1.2, around 2022-2023, a higher peak in citations can be observed. This increase indicates not only a rise in the quantity of related research but also in its impact and relevance in this field.

From a historical perspective, the graph reveals that although this field of study originated in the 1970s, it remained relatively underdeveloped until the late 1990s. This takeoff coincides with significant events associated with economic cycles, crises, or various global events, such as the 2008 financial crisis, which likely stimulated greater interest in financial behavior (Shefrin, 2015).

On the other hand, based on data obtained from Web of Science, table 1.1 shows the

most cited studies on financial behavior. The analysis of these results indicates that the most influential article, with 832 citations, is by Fernandes *et al.* (2014), which examines the relationship between financial literacy, education, and financial behaviors. This work, along with others such as Allgood & Walstad (2016) and Jorgensen & Savla (2010), further emphasize the importance of financial education. Other related topics include factors such as optimism in economic decisions (Puri & Robinson, 2007), financial behavior of young people and college students (Shim *et al.*, 2009; Xiao *et al.*, 2009), or financial well-being (Bruggen *et al.*, 2017), among others.

Table 1.1. List of Most Cited Publications

Title	Authors	Source Title	Publication Year	Total Citations
Financial Literacy, Financial Education, and Downstream Financial Behaviors	Fernandes, Daniel; Lynch, John G., Jr.; Netemeyer, Richard G.	Management Science	2014	832
Optimism and economic choice	Puri, Manju; Robinson, David T.	Journal of Financial Economics	2007	380
Financial Socialization of First-year College Students: The Roles of Parents, Work, and Education	Shim, Soyeon; Barber, Bonnie L.; Card, Noel A.; Xiao, Jing Jian; Serido, Joyce	Journal of Youth and Adolescence	2010	352
Financial well-being: A conceptualization and research agenda	Bruggen, Elisabeth C.; Hogreve, Jens; Holmlund, Maria; Kabadayi, Sertan; Lofgren, Martin	Journal of Business Research	2017	335
Who is in control? The role of self-perception, knowledge, and income in explaining consumer financial behavior	Perry, VG; Morris, MD	Journal of Consumer Affairs	2005	256

The effects of perceived and actual financial literacy on financial behaviors	Allgood, Sam; Walstad, William B.	Economic Inquiry	2016	248
Associations between a one-shot delay discounting measure and age, income, education and real-world impulsive behavior	Reimers, Stian; Maylor, Elizabeth A.; Stewart, Neil; Chater, Nick	Personality and Individual Differences	2009	238
Behavioral consistency in corporate finance: CEO personal and corporate leverage	Cronqvist, Henrik; Makhija, Anil K.; Yonker, Scott E.	Journal of Financial Economics	2012	227
Consumer Financial Capability and Financial Satisfaction	Xiao, Jing Jian; Chen, Cheng; Chen, Fuzhong	Social Indicators Research	2014	221
Financial Literacy of Young Adults: The Importance of Parental Socialization	Jorgensen, Bryce L.; Savla, Jyoti	Family Relations	2010	212
Institutional investment patterns and corporate financial behavior in the united-states and Japan	Prowse, Sd	Journal of Financial Economics	1990	194
Acting for Happiness: Financial Behavior and Life Satisfaction of College Students	Xiao, Jing Jian; Tang, Chuanyi; Shim, Soyeon	Social Indicators Research	2009	184
Hierarchical determinants of capital structure	Kayo, Eduardo K.; Kimura, Herbert	Journal of Banking & Finance	2011	170
Does self-control predict financial behavior and financial well-being?	Stromback, Camilla; Lind, Therese; Skagerlund, Kenny; Vastfjall, Daniel; Tinghog, Gustav	Journal of Behavioral and Experimental Finance	2017	168

2.2. Review of the Field Through Bibliometric Analysis

However, these results do not allow us to understand either the theoretical foundations of the field or the development of its associated research lines. Therefore, in this thesis, we propose conducting a complementary bibliometric analysis to provide a more comprehensive view of the existing scientific work in the area encompassing financial behavior.

We perform this study using VosViewer and Bibliometrix software (Moral-Muñoz et al., 2020). Although Bibliometrix software offers a greater number of options, such as the construction of strategic maps using centrality and density measures and the use of strategic diagram analysis for all articles, we have chosen to compare the cluster generation solution with VosViewer software due to its ability to obtain temporal evolution of the network, a feature not offered by Bibliometrix. The use of both software packages is common in the literature, as demonstrated by the works of Guleria & Kaur (2021), Oyewola & Dada (2022), and Brahimi & Haneya (2023).

Thus, in our analysis, we propose the use of two complementary methodologies: co-citation analysis and co-word analysis, to identify the structure of the field of financial behavior. Both co-citation and co-word analyses present a very similar methodology, although the interpretation is more complex in the case of co-citations because what is analyzed is the content of an article and not an isolated word. The methodological basis focuses on studying the co-occurrence relationships, or joint appearance, of two units of information in a document (references, keywords, cited authors, co-authors, etc.). Therefore, the closer two related elements are to each other, the closer they will be located on the map.

The process for both co-word and co-citation analyses is analogous. First, the source documents are identified, in our case the 1,048 articles identified in the Web of Science (WoS) based on the search criteria. The information from these documents is downloaded, including the keywords, which will be used in the co-word analysis, and the references used in each of them, for the co-citation analysis.

2.2.1. Co-Word Analysis

In the realm of academic research, each publication is typically characterized by a set of keywords or descriptive terms, either proposed by the authors or assigned by bibliographic databases, which serve to delineate and synthesize the content of the work (Börner *et al*., 2003; Zupic & Čater, 2015). This is based on the premise that if two studies share similar terms, they are likely to address related themes, or their contents may present certain similarities.

We can approach the descriptive analysis of these keywords from different perspectives. Thus, the word cloud presented in Figure 1.4 gives us an idea about the most studied areas in the field of financial behavior. The size of each word reflects its frequency in the analyzed articles:

Figure 1.4. Word Cloud of Keywords: Trends in Financial Behavior Research

The frequency analysis of keywords used in the articles showed that the term "literacy" appeared 225 times, followed by "education" (158), "knowledge" (148), "behavior" (146), "impact" (82), "attitudes" (67), "income" (62), "debt" (56), "socialization" (55), and "capability" (52). In addition to these keywords, economic or financial variables such as "wealth" (40), "credit" (35), "savings" (24), and "retirement" (16) were observed. Psychological or behavioral variables like "self-control" (23), "overconfidence" (22), and "happiness" (15) were also prominent. If we consider the temporal distribution of the importance of these words, as reflected in Figure 1.5, we can broadly observe the thematic evolution of research in the field of financial behavior from 1971 to 2024:

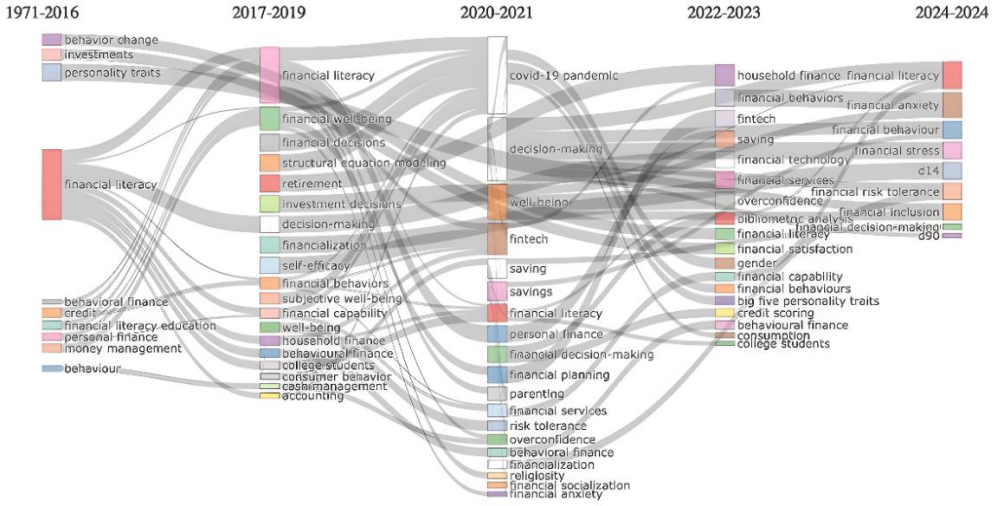

Figure 1.5. Thematic Evolution in Financial Behavior Research: 1971-2024

In the initial period of 1971-2016, we observe concepts such as “financial literacy”, accompanied by other key topics like “behavioral finance”, “credit”, “financial literacy education”, or “behavior”, among others, as the pillars upon which research in financial behavior has been built. The 2017-2019 period shows an expansion and diversification of topics. Thus, while “financial literacy” remains an important theme, new areas of interest emerge, such as “financial well-being”, “retirement”, and “investment decisions”. During this period, themes related to psychological aspects of financial behavior also appear, such as “self-efficacy” and “subjective well-being”.

The 2020-2021 period coincides with the onset of the COVID-19 pandemic. This stage also shows new themes such as “Fintech” or “savings”, reflecting financial concerns and changes in economic behavior during the global crisis. In the 2022-2023 period, we observe an even greater diversification of research topics. New concepts emerge, such as “financial anxiety”, “financial technology”, and “financial inclusion”. There is also a growing interest in the relationship between “gender” and “big five personality traits” with financial behavior. Finally, although the 2024 period is brief, it shows the continuity of fundamental themes such as “financial literacy”, “financial anxiety”, “financial behavior”, “financial risk tolerance”, “financial inclusion”, or “financial decision-making”, among others.

However, this analysis only examines words individually, and while it offers a global view, it does not allow for the identification of themes or topics. This is why co-word analysis is performed. The co-word analysis process follows a well-structured methodology (Börner *et al.*, 2003; Callon *et al.*, 1991; van Eck & Waltman, 2014; Cobo *et*

al., 2011). After identifying relevant documents, the process involves extracting the bibliometric network, calculating similarity relationships between terms, and grouping these to identify the main themes in the field of study. To evaluate the similarity relationships between terms, various metrics exist (van Eck & Waltman, 2009). After a comparative analysis, these authors concluded that the association strength index offers robust results and is particularly suitable for this type of study.

Regarding the visualization of results, clustering techniques or dimension reduction methods have traditionally been employed (Acedo *et al.*, 2006; Boyack & Klavans, 2010). However, recent trends point towards analyzing the network in its entirety, beyond individual groups. In this context, Cobo *et al.* (2011), based on the work of Callon *et al.* (1991), propose the use of two dimensions to characterize each theme: centrality and density. This results in the creation of a 'Strategic Diagram', a two-dimensional space that visually represents the structure of the research field.

Centrality measures the external interaction of each thematic network, indicating the relevance of the theme in the global field of study. On the other hand, density determines the internal cohesion of the thematic network, reflecting the degree of development of the theme. Based on Callon *et al.* (1991), these measures can be mathematically defined as follows:

Centrality measures the external interaction of each network and identifies the relevance of the theme. From an analytical perspective, it can be defined as:

- Centrality (c):

$$c = 10 * \sum e_{kh}$$

Where k and h are two elements of the matrix that measure the degree of strength of the external links of a set with other elements. Those themes, or topics, with higher centrality are connected to other themes, becoming a nexus between different topics.

Density determines the internal cohesion of the network and should be interpreted as the degree of development of the theme. It is defined as:

- Density (d):

$$d = 100\left(\sum e_{ij}\right)/W$$

Where i and j are reference words belonging to the group and w is the number of key references (nodes) that form the theme. Density measures the internal strength of all links between references, that is, the degree of internal cohesion of the theme. The words that make up this group are closely related, showing the coherence of the theme.

The combination of these two values allows the representation of the research field in a two-axis strategic diagram, which delineates four main categories of themes:

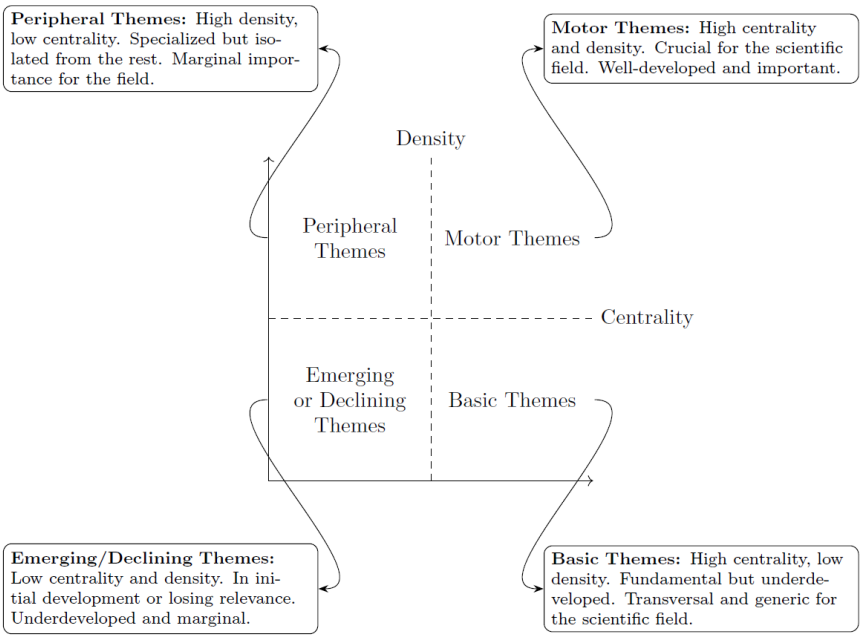

Figure 1.6. Strategic diagram (adapted from Cobo et al., 2011)

- **Motos themes:** Located in the upper-right quadrant, these are characterized by high centrality and density. These themes are highly evolved and decisive for structuring the scientific field. They act as drivers of the discipline, showing strong connections with other relevant concepts in the area.

- **Peripheral themes:** Found in the upper-left quadrant, these encompass highly specialized and peripheral topics. They present good internal development but are relatively isolated from the main research core. Their importance for the general advancement of the field is limited, although they are significant in their specific

nich.

- **Emerging or declining themes:** Situated in the lower-left quadrant, these themes exhibit low centrality and density. They represent research areas in initial stages of development or in the process of losing relevance. Their position indicates a marginal state in the current research landscape, with potential to evolve or disappear.

- **Basic themes:** Found in the lower-right quadrant, these themes are transversal and fundamental to the scientific field. Although they have high centrality, their low density suggests limited internal development. They are important as a conceptual basis for the field but require further deepening and structuring.

For all these reasons, understanding this type of strategic diagram provides a considerable advantage in terms of interpretation. Unlike techniques such as multidimensional scaling, which offer a broader but often confusing view of the field, this approach allows for a more direct and accessible interpretation (Acedo *et al.*, 2006).

2.2.1.1. Interpretation of Co-Word Analysis Results

The set of publications examined in this study spans from the earliest contributions recorded in the Web of Science (WoS) in 1994 to the most recent documents indexed in June 2024. It is important to examine that, while WoS is a widely respected and used source, it may not capture all works related to our topic of interest, although it does include the majority.

As a preliminary step in our analysis, we carried out the elaboration of a Thesaurus, that is, we conducted a process that involved refining and normalizing key terms. To do this, we proceeded to group words with minimal variations (such as plurals) and conducted an exhaustive search for synonyms or duplicates, paying special attention to those terms with higher frequency of occurrence and number of associated documents, always trying to avoid biases to include the largest number of terms. Figure 1.7 presents an evolutionary view of the most frequent terms in the literature on financial behavior from 2010 to 2024:

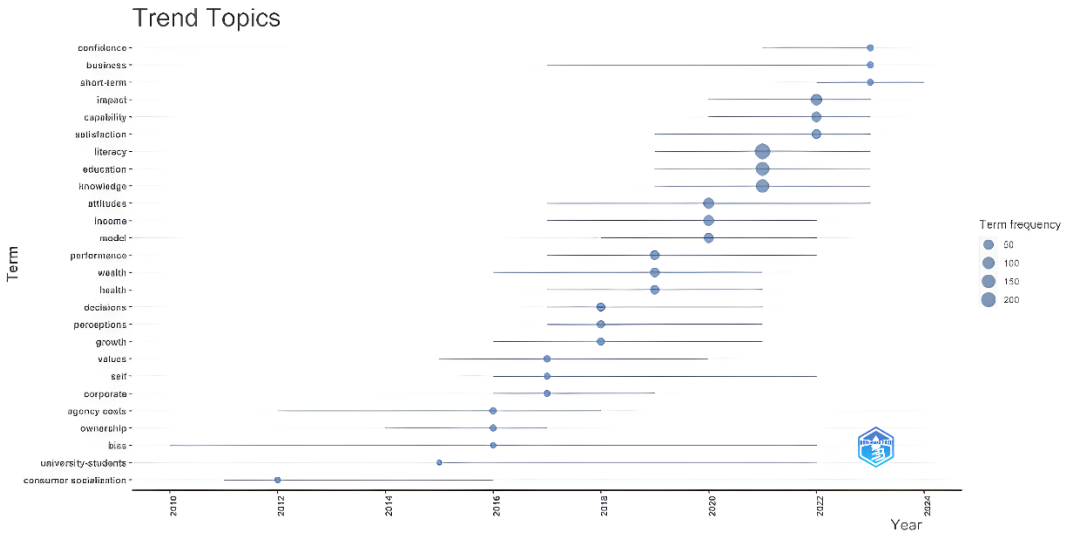

Figure 1.7. Temporal Evolution of Key Themes in Financial Behavior Research (2010-2024)

An analysis of Figure 1.7 reveals that the most frequent terms (represented by larger circles) include key words such as “literacy”, “education”, and “knowledge”. This suggests and aligns with works like those of Lusardi & Mitchell (2014), indicating that variables such as financial literacy and education are fundamental to financial decision-making and improving financial behavior. Other terms such as “confidence”, “business”, and “short-term” appear as more recent themes, suggesting a shift in focus towards more specific aspects of financial behavior in recent years. This trend is consistent with observations by Fernandes *et al.* (2014), who highlight the importance of examining specific psychological factors in financial behavior.

Additionally, terms like “impact”, “capability”, and “satisfaction” also show an increasing trend in recent years, which may indicate a greater interest in the outcomes and effects of financial behavior, as well as individual capabilities for making financial decisions. This evolution aligns with research by Xiao & O'Neill (2016), who emphasize the importance of studying financial behavior outcomes along with financial satisfaction. On the other hand, terms such as “agency costs”, “ownership”, and “bias” appear earlier in the timeline and with less frequency. These topics, although important, have given way to more recent ones or have been incorporated into broader conceptual frameworks. Baker & Wurgler (2013) discuss how these traditional concepts of behavioral finance have been integrated into more comprehensive theories of financial behavior.

The presence of “university-students” and “consumer socialization” at the bottom of the image is notable, indicating a continuous, albeit perhaps less dominant, interest in

the financial behavior of specific populations and in the socialization processes that influence financial attitudes. Shim *et al.* (2009) have highlighted the importance of studying financial behavior in young populations and how financial attitudes develop through socialization. If we focus on the analysis of the strategic map following Cobo *et al.* (2011) in the field of financial behavior shown in Figure 1.8, four main thematic areas can be identified:

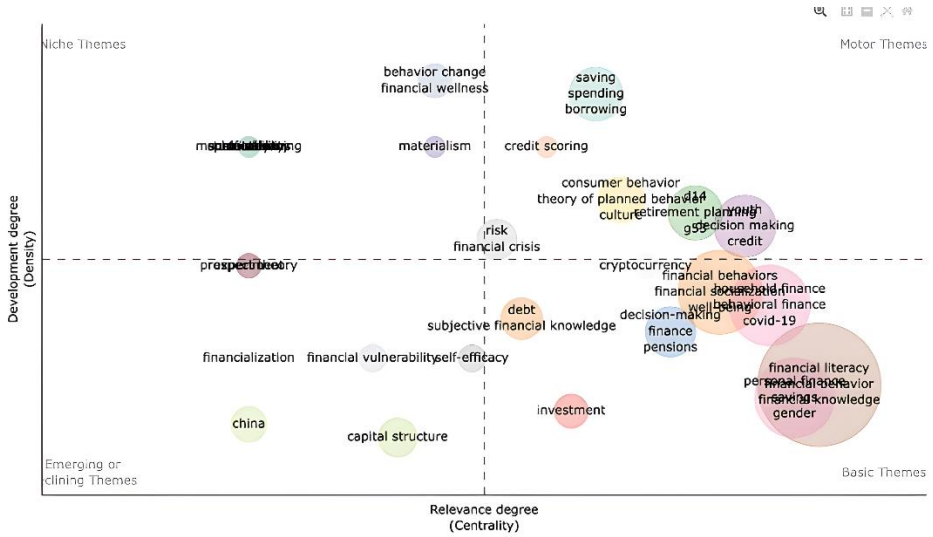

Figure 1.8. Strategic Map of Financial Behavior

Motor Themes (upper-right quadrant): In the first circle, we find central and developed concepts such as “saving”, “spending”, “borrowing”, and “credit scoring”, which follow a line of fundamental financial behaviors and credit evaluation. Other terms like “consumer behavior” and “theory of planned behavior” indicate the importance of understanding consumer behavior. Additionally, the inclusion of “retirement planning” and “decision making” underscores the significance of long-term financial planning and decision-making processes in current research.

- **Basic Themes** (lower-right quadrant): This quadrant shows “financial literacy” as the most prominent concept, suggesting that, although it is a fundamental topic, there is still ample room for its development and exploration. Closely related, other words such as “personal finance”, “financial behavior”, and “financial knowledge” form a core of basic concepts. Moreover, the term “gender” stands out in this quadrant, indicating a growing interest in examining gender differences in financial behavior.

- **Peripheral Themes** (upper-left quadrant): Here we encounter concepts such as "mental accounting" and "materialism", indicating an interest in more specific psychological aspects of financial behavior. Furthermore, the presence of "behavior change" and "financial wellness" in this quadrant indicates a focus on interventions to improve financial well-being, although these topics have not yet reached the centrality of the motor themes.

- **Emerging or Declining Themes** (lower-left quadrant): Concepts such as "financialization" and "financial vulnerability" appear here. Their position suggests that these are topics that could be gaining relevance or, conversely, losing importance in the field. The presence of "China" as a specific theme in this quadrant is particularly interesting, as it could indicate a growing interest in financial behavior in this emerging market.

Finally, it is important to note the position of some cross-cutting themes such as "financial crisis" and "risk", which are situated near the center of the diagram, suggesting their general relevance in the field and influence on multiple research areas. The appearance of "cryptocurrency" in an intermediate position could indicate its emergence as a topic of growing interest, reflecting technological changes in the financial landscape.

The underlying network of relationships between the different words can be observed in Figure 1.9. The analysis conducted using VOSviewer demonstrates that these themes are grouped into distinct clusters, providing a general structure to the field. In this map, clusters are identified by different colors, with each node representing a keyword and its size indicating the frequency of occurrence. The lines connecting the nodes illustrate the relationships between terms, with thicker lines indicating stronger connections.

What stands out at first glance are the terms "financial literacy" and "financial behavior" at the center of the map as the most frequent concepts. This is justified by the search strategy employed. Around these, a yellow cluster is organized, related to financial literacy topics that encompass key aspects such as financial education. Towards the left of the map, a red cluster groups terms associated with economic aspects and financial decision-making. Thus, keywords such as "gender", "impact", "risk", "investment", "debt", or "decision" stand out, indicating a focus on factors influencing financial decisions and risk management.

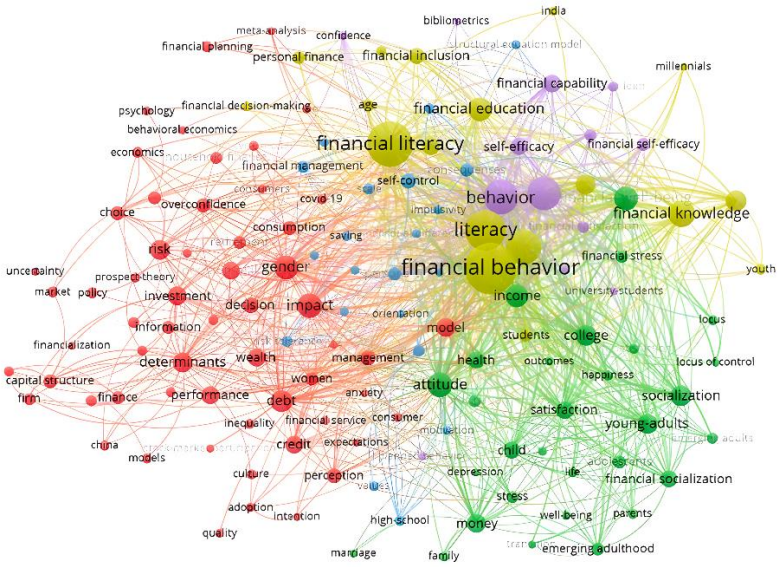

Figure 1.9. Co-occurrence Map of Keywords in Financial Behavior Research

In contrast, the lower right side of the map is dominated by a green cluster that focuses on social and educational aspects of financial behavior. In this case, terms such as “income”, “attitude”, “college”, “socialization”, “young adults”, or “money”, among others, stand out. This group indicates a significant interest in how financial knowledge is acquired and developed, especially among young people and in educational contexts.

Also dispersed throughout the map, a blue cluster connects psychological aspects with financial capability. Thus, terms such as “financial management”, “self-control”, “consequences”, or “motivation” suggest a line of research that explores psychological factors influencing people's ability to manage their finances. Finally, in the upper right part, a small purple cluster focuses attention on specific demographic groups, mainly “behavior”, “knowledge”, “millennials”, or “youth”. The presence of these terms indicates an interest in how financial behavior varies across different generations, possibly in response to changing economic and technological contexts.

If we consider the temporal distribution of the map, shown in Figure 1.10, we can observe the dynamic evolution of research in financial behavior:

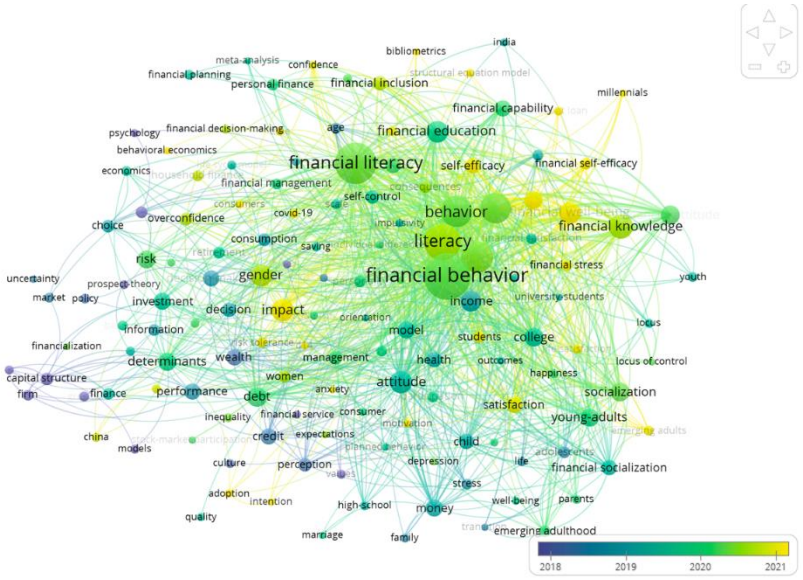

Figure 1.10. Temporal Evolution of Research Trends in Financial Behavior (2018-2021)

Like the previous map, the structure shows clusters of different colors, and the connections between nodes illustrate the relationships between terms. The difference in this case is that the color scale at the bottom indicates the temporality of the topics, ranging from blue in the 2018 period to yellow in 2021. As can be observed in the map, we see that in green color corresponding to the 2020 period, terms such as “financial behavior”, “financial literacy”, “behavior”, or “literacy” stand out. Terms in bluer shades, such as “wealth”, “credit”, and “perception”, located mainly in the left and lower parts of the map, represent older topics (close to 2018).

In contrast, terms in greener and yellower shades, such as “financial knowledge”, “gender”, “financial stress”, or “financial self-efficacy”, located in the upper and right parts of the map, indicate more recent research topics (towards 2020-2021). The appearance of the item “covid-19” in green color is also noteworthy, indicating its emergence as a study topic in the most recent years of the analysis. Similarly, terms related to demographic groups and life stages, such as “young adults”, “college”, “students”, and “emerging adulthood” are observed in green tones (towards 2020), suggesting a growing interest in how financial behavior develops and changes throughout the life cycle, especially in the early stages of adulthood.

Finally, a trend towards researching aspects related to financial well-being is observed. Thus, terms such as “well-being”, “happiness”, or “life satisfaction” appear in green and yellow tones (2020-2021), indicating a more recent focus on how financial

behavior relates to overall well-being and quality of life of individuals.

2.2.2. Co-Citation Analysis

The co-citation analysis methodology has been widely used in various research fields, including finance and economic behavior (Barberis, 2018; De Bondt et al., 2008). This method is based on the number of times two documents or authors are cited together in the same work (Small, 1974) and aims to identify groups of closely related documents that can be considered to belong to the same "research front" (Price, 1965). In the context of financial behavior, this analysis seeks to identify the theoretical pillars that have enabled the development of this area of study.

The identification of these pillars is carried out based on the premise that the more often two documents are cited together, the closer the relationship between them (White & Griffith, 1981). However, it is important to be cautious in interpretation, as this relationship does not necessarily imply that two documents coincide in approach, methodology, or conclusions; this "relationship" only means that the authors address similar general issues within the field of financial behavior.

The co-citation analysis process is analogous to that performed for co-words. The set of documents analyzed presents a total of 36,854 documents identified in their references. While the complete network of co-citations can be analyzed, identifying fundamental currents is usually done by selecting those documents with the greatest impact. Thus, we ultimately end up with a total of 52 references from which different research fronts will be identified.

2.2.2.1. Interpretation of Co-Citation Analysis Results

Figure 1.11 shows the co-citation map in the field of financial behavior, encompassing psychological and sociological aspects as well as practical applications in financial education and economic decision-making. Several clusters of different colors (red, green, blue, and yellow) can be observed, related to the existence of distinct subfields or lines of research.

In the center of the map, towards the right, is the red cluster, which highlights works related to financial literacy, pensions, and financial planning. Authors such as Lusardi, with multiple publications (2007, 2011, 2014, 2015), are leaders in the field. Their research covers topics such as economic education and financial planning for retirement,

being fundamental to the development of financial knowledge. This cluster also features studies by Kahneman (1979) in econometrics, Barber (2001), and Campbell (2006).

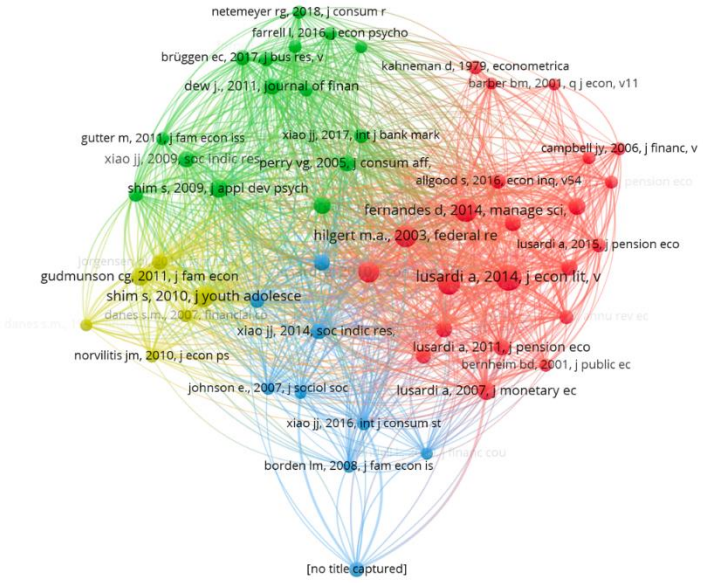

Figure 1.11. Intellectual Structure and Evolution of the Financial Behavior Research Field: A Co-citation Analysis (1979-2018)

The green cluster, located in the upper left, focuses on psychological aspects and the development of financial behavior. Here we find works such as those by Farrell (2016) in economic psychology, Bruggen (2017) in business research, and Shim (2009) in applied developmental psychology. In the lower part, the blue cluster groups studies that address sociological and consumer aspects of financial behavior. Here, works such as those by Johnson (2007) in social sociology or Xiao (2014, 2016) in consumer studies stand out, suggesting a focus on how social factors influence financial decisions. Lastly, the yellow cluster, although less dense, focuses on studies about financial behavior in young people and adolescents. Works such as those by Shim (2009) and CG. (2011) are highlighted, investigating how young people make financial decisions and how financial education can influence these decisions.

2.3. Analysis of Subcurrents within the Field of Financial Behavior

In the previous sections, the field of financial behavior has been analyzed from a broad perspective. In the following section, we will separately address the themes that will constitute the axis of subsequent chapters. Specifically, we examine the relationship between financial behavior and financial culture and education. This topic was identified as a basic theme in Figure 1.8, occupying an important position in the lower right quadrant. It is a topic of importance for the scientific field, but of an eclectic nature, with little internal coherence due to the multitude of existing approaches yet maintaining strong relationships with other themes within the field.

Similarly, a motor theme will also be analyzed, upper right quadrant in Figure 1.8, specifically the theme of retirement decision and decisions associated with the pursuit of financial well-being in this stage of life. These types of themes are considered important for the construction of the scientific field. The links with other themes show their key and reference role, and their internal coherence indicates the focus of the analyzed theme, which highlights its importance.

In these analyses, although we will not address the different themes with the depth of the previous analysis, it is important for any researcher to know what are the fundamental elements that will serve as a reference when proposing any type of study linked to a specific area. Thus, we propose a descriptive bibliometric analysis.

2.4. Relationship between Financial Behavior, Knowledge, and Financial Literacy

To delineate the new field of study, we begin with the search from the previous section, that is, starting from “financial behavi*”. From there, we narrow the search with new keywords including the terms “literac*” or “educat*” or “format*” or “knowledge*”. Additionally, we identify studies that relate financial behavior to financial knowledge and literacy, aspects that will be studied in Chapter 2 of this thesis. Thus, after refining the results and document types to articles, we ultimately work with 604 documents as shown in Figure 1.12:

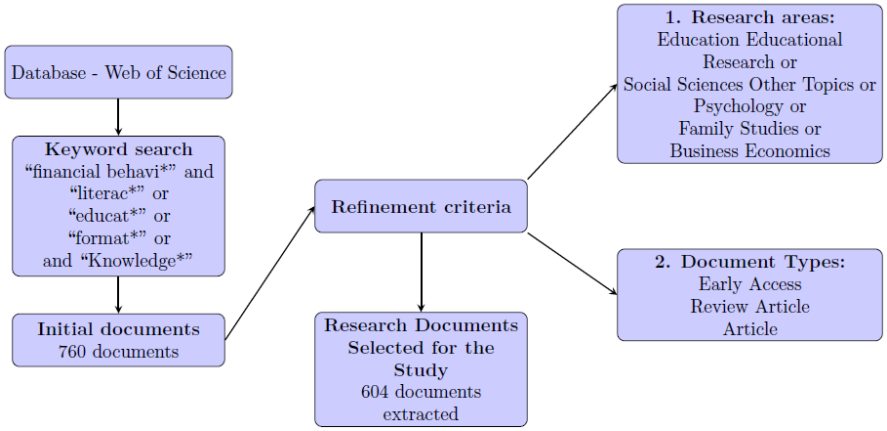

Figure 1.12. Flowchart for Selection of Documents for Bibliometric Analysis on Financial Behavior, literacy, education, format and knowledge

The analysis of the obtained results allows us to see (Figure 1.13) how the temporal frequency of these publications clearly shows the progressive increase in research conducted on the effects between financial behavior, knowledge, and financial literacy over the last decade:

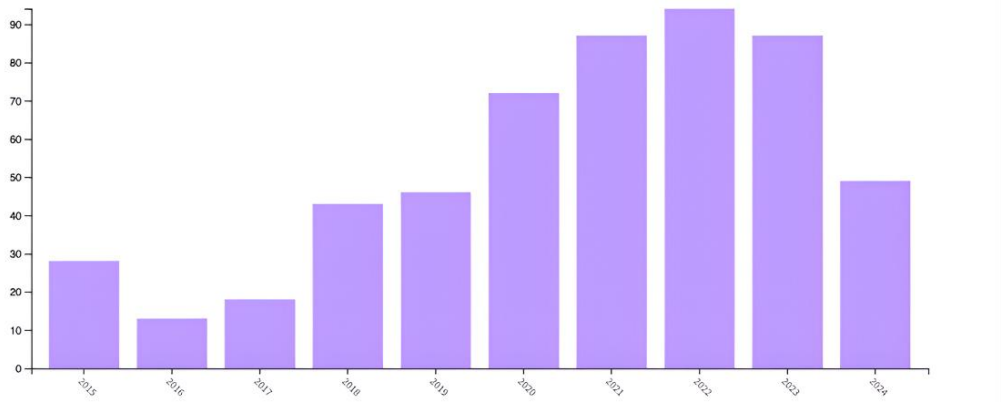

Figure 1.13. Annual Evolution of Publications on Financial Behavior, Knowledge, and Financial Literacy (2015-2024)

As observed in the image, there is a general upward trend in the number of publications on the effects between financial behavior, knowledge, and financial literacy from 2015 to 2022. This fact demonstrates the pertinence and relevance of this field of study during the last decade (Lusardi & Mitchell, 2014; Fernandes *et al.*, 2014). Although there is a slight decrease in 2016, there is no apparent cause for this reduction. In fact, from that year onward, a constant and significant growth is observed up to the present day. This increase accelerates in the following years, reaching its peak in 2022 with 128 publications (Stolper & Walter, 2017; Hasler & Lusardi, 2017). Meanwhile, in Figure 1.14,

we can see the relationship between the number of publications and the number of citations received in this new search for financial behavior, knowledge, and literacy since 1997:

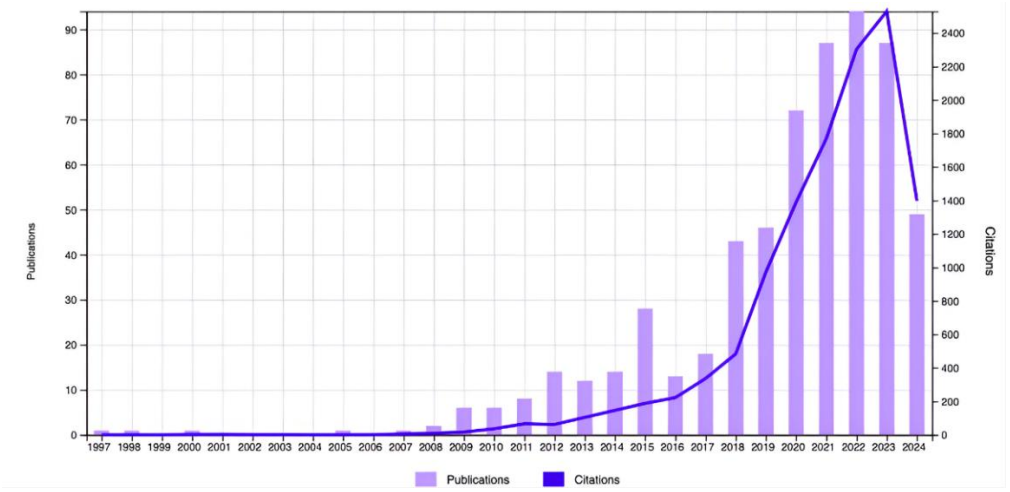

Figure 1.14. Temporal Evolution of Publications and Citations in the Field of Financial Behavior, Knowledge, and Literacy (1912-2024)

This figure shows us exponential growth in both publications and citations starting from the 2000s. Thus, from 2007 onwards, interest and relevance in these types of concepts increased, especially in the last two decades (Baker & Ricciardi, 2014; Barberis, 2018). We can see the highest peak in citations around 2022-2023, reaching approximately 2800 citations. This increase indicates not only a rise in the quantity of related research but also in its impact and relevance in this field (Hirshleifer, 2015; Thaler, 2016). If we look at Figure 1.15, we can see the journals with the most content in financial behavior, knowledge, and financial literacy:

Figure 1.15. Main Scientific Journals Publishing on Behavior, Knowledge, and Financial Literacy

We see that journals such as Journal of Family and Economic Issues have the highest number of publications in these areas, with 38 articles, followed by Journal of Financial Counseling and Planning with 37 and Journal of Consumer Affairs with 30. Other relevant publications include International Journal of Bank Marketing and International Journal of Consumer Studies with 26 and 18 articles respectively. We also find Frontiers in Psychology and Managerial Finance with 12 publications each, followed by Review of Behavioral Finance and International Journal of Social Economics with 10 articles each. Finally, Young Consumers closes the list of the most prominent journals with 9 publications. Meanwhile, in Figure 1.16, we see the authors who have published the most in these areas:

Figure 1.16. Most Prominent Authors in Research on Behavior, Knowledge, and Financial Literacy

In this figure, we see that Xiao JJ stands out as the most productive author with 26

publications. Serido J follows with 19 publications. Shim S occupies the third place with 17 publications, while Birkenmaier J has contributed 10 articles. Zhu AYF and Sabri MF share the fifth place with 9 publications each. Cwynar A has published 8 publications, and Collins JM, Mahdzan NS, Fan L, and Owynar close the list of the most prominent authors with 7 publications each.

2.5. Financial Behavior in the Context of Retirement

Finally, in a third phase, we conducted a specific search combining "financial behavi*" with "retir*". This approach allowed us to focus on research related to financial behavior in the context of retirement (Chapter 3 of this thesis):

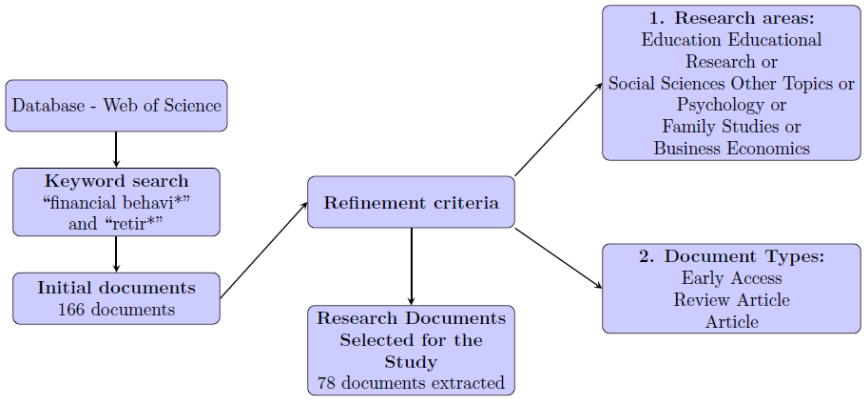

Figure 1.17. Flowchart for Selection of Documents for Bibliometric Analysis on Financial Behavior and Retirement

Figure 1.18 shows the frequency analysis of these combined terms over the last decade:

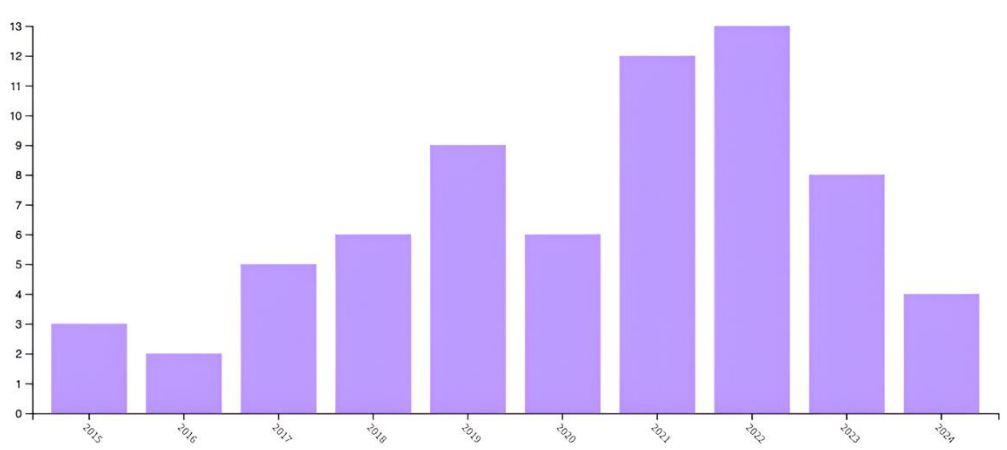

Figure 1.18. Annual Evolution of Publications on Financial Knowledge and Retirement (2015-2024)

As in the previous phases, the graph shows a general upward trend in the number of publications on financial behavior in the context of retirement from 2016 to 2022, with some variations, reflecting a growing interest in research on financial planning for retirement during the last decade (Lusardi & Mitchell, 2011; Hershey *et al.*, 2013). The increase is particularly notable in 2021 and 2022, reaching its peak in 2022 with approximately 13 publications. This increase could be attributed to growing concerns about financial security in retirement and population aging in many countries (Benartzi & Thaler, 2013; Boisclair *et al.*, 2017).

Regarding the number of citations and publications on this topic, Figure 1.19 presents a global view of the evolution of the field of financial knowledge from 1971 to 2024, showing both the number of publications and citations received:

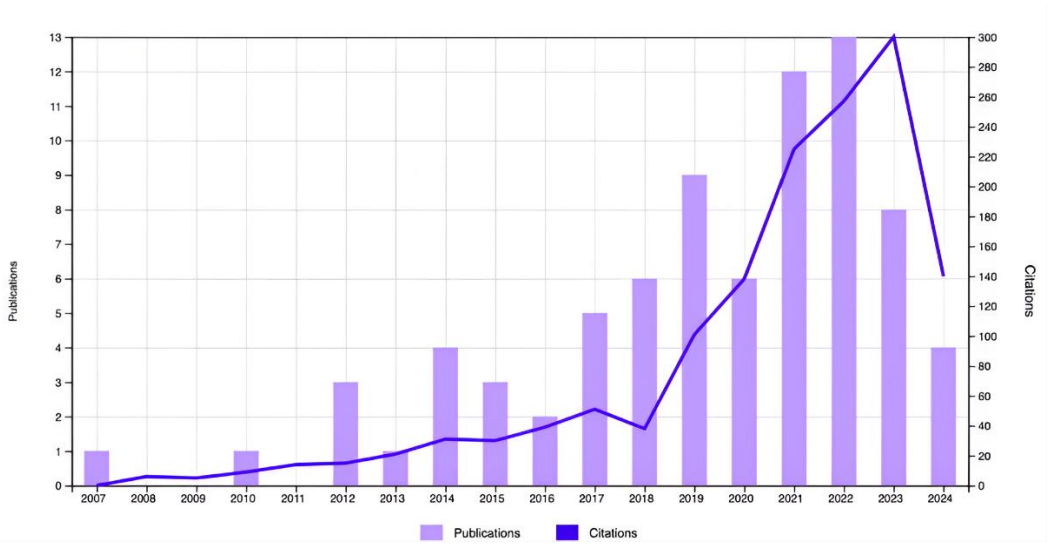

Figure 1.19. Temporal Evolution of Publications and Citations in the Field of Financial Behavior and Retirement (1912-2024)

In this case, growth with some ups and downs is shown in both publications and citations starting from the 2010s. This trend suggests an increase in interest and relevance of the study of financial behavior related to retirement in recent years (Lusardi and Mitchell, 2014; Benartzi and Thaler, 2013). The graph shows a higher peak in citations around 2022, reaching approximately 300 citations. This increase indicates not only a rise in the quantity of related research but also in its impact and relevance in this field (Hershey *et al.*, 2013).

If we look at Figure 1.20, we can see the journals with the most content in financial behavior combined with retirement. In this figure. we see that the Journal of Consumer

Affairs leads publications in these areas with 6 articles, closely followed by the Journal of Financial Counseling and Planning with 5. Family Consumer Sciences Research Journal, Journal of Consumer Policy, Frontiers in Psychology, and International Journal of Consumer Studies contribute 3 publications each. The Journal of Behavioral Finance, Managerial Finance, and Review of Behavioral Finance contribute 2 articles each. Finally, Akademika completes the picture with 1 publication.

Figure 1.20. Main Scientific Journals Publishing on Financial Behavior and Retirement

Meanwhile, in Figure 1.21, we see the authors who have published the most in these areas:

Figure 1.21. Most Prominent Authors in Research on Financial Behavior and Retirement

In this figure, we see that Topa, Gabriela and Walstad, William B. stand out as the most productive authors with 3 publications each. They are followed by Alcaide, Teresa

Carmen, Wagner, Jamie, and Birkenmaier, Julie, each with 2 publications. The rest of the authors, including Ketkaew, Chavis, Illiashenko, Pavlo, Chin, Phaik Nie, Hogreve, Jens, and Adam, Anokye Mohammed, have contributed 1 publication each.

3. Conclusions of the Bibliometric Analysis

The present bibliometric study aimed to analyze the intellectual structure of research published to date in the field of financial behavior, with special emphasis on its relationship with financial knowledge, financial literacy, and the context of retirement. With this, we advance in understanding the nature of these relationships, beyond the contributions made by previous works (Lusardi & Mitchell, 2014; Fernandes et al., 2014) and avoid subjective appraisals (Baker & Ricciardi, 2014; Barberis, 2018).

By applying bibliometric methods, it is possible to know not only the "state of the art" of a discipline but also to identify the different research fronts that continue to emerge, and to facilitate researchers in identifying new lines of research, as well as locating their work within the field (Zupic & Čater, 2015). Furthermore, we offer a dynamic perspective compared to most bibliometric analyses that tend to overlook the temporal variable linked to the evolution of a topic, by analyzing long periods of time without considering the evolution of the field of study.

The analyses presented in the previous sections introduce us to the study of financial behavior as a dynamic, multiparadigmatic field with continuous expansion, as can be seen in the number of published articles. In this sense, scientific production and the number of citations received by these publications show exponential growth, which highlights the currency and constant updating of this field of study.

From the analyses carried out, and from comparison with previous review studies (Lusardi & Mitchell, 2014; Fernandes et al., 2014; Stolper & Walter, 2017), it is clear that, while the most cited articles within the area are maintained, new more current topics are also being incorporated, especially considering the application of financial knowledge and financial literacy in specific contexts such as retirement (Benartzi & Thaler, 2013; Boisclair et al., 2017). This change can also be observed in the analysis of research trends to date. Thus, the co-word analysis shows some origins of the field of study, with lower scientific production, where topics associated with financial literacy, education, and knowledge prevail around the concept of financial behavior. Although

these fields are not abandoned, as can be observed in the networks of the formed clusters, it is true that new areas are incorporated such as those related to financial well-being, financial technology, and financial inclusion. The preponderant role of studies associated with the impact of the COVID-19 pandemic on financial behavior is notable, which has increased its presence due to recent global events.

Moreover, the theoretical pillars on which these works are based also show a change worth highlighting. Thus, we see that, if in the first period it is the articles that delimit the field of study and define the basic concepts of financial behavior, as we progress in time those pillars focus more on practical applications, their determining role in financial decision-making, and their linkage with more current topics such as financial anxiety, financial technology, and financial inclusion.

With this, we highlight the importance of individuals having adequate financial knowledge and literacy to make informed decisions. The growing attention to issues related to gender, personality traits, and subjective well-being in relation to financial behavior is noteworthy. The diversity of topics and sources makes us once again highlight the complexity and multidimensionality of financial behavior. This fact demonstrates that it is a living field of study, which requires greater attention and which we estimate will continue to develop in the coming years.

This bibliometric review is not without limitations, although these can open new opportunities for future research. Thus, the selection of articles from a single data source (Web of Science) may create the omission of some relevant work. Therefore, it is interesting to consider doing a combined search in databases that can complement the content of WoS. Likewise, although the empirical approach to data analysis is widely validated, the introduction of techniques that complement the mapping of information will allow the identification of associations between elements that the techniques used do not make possible.

Chapter 2. Financial knowledge and financial behavior: The moderating role of home ownership

1. Introduction

The financial well-being of individuals depends on their actions. Hence, understanding the relationship between financial knowledge and financial behavior is an issue of critical importance (Robb & Woodyard, 2011). Since Campbell (2006) noted that householders make mistakes in their personal financial dealings due to poor financial knowledge, the empirical literature has focused on searching for this relationship (Ingale & Paluri, 2020). This literature has provided strong evidence of high levels of financial knowledge being associated with better financial behaviors (Hira, 2012; Klapper *et al.*, 2013; and Xiao *et al.*, 2014).

However, as Vestman (2019) points out, financial behavior is also highly conditioned by household characteristics, including homeownership. Specifically, this author finds that homeowners tend to have greater financial market participation than renters. Similarly, Kuroki (2019) shows that American homeowners tend to be more satisfied with their financial decisions than tenants. In this sense, most households that access a home ownership do so through a mortgage. Thus, a long-term contractual relationship is established between the new owners and the financial institutions. This relationship may condition the future financial discipline of the acquirers. In this case, better financial behavior should be observed in homeowners than in renters for the same level of financial knowledge or, analogously, a lower association between financial knowledge and financial behavior there should be in homeowners than in tenants.

From a country-specific perspective, high national home ownership percentages should increment financial behavior indicators and, simultaneously, reduce the part of them that is explained by financial knowledge, arising different unconditional relationships between financial knowledge and financial behavior in different countries. In this context, our research is focused on the role of home ownership in the relationship between financial knowledge and financial behavior.

As usual, we employ single-country-level data in our empirical analyses (Kuroki,

2019; Vestman, 2019; Razen *et al*., 2021; Sekita *et al*., 2022; Yamori & Ueyama, 2022). By using single-country data, we avoid heterogeneity in the weight of the explanatory factors of financial behavior and financial knowledge due to country-specific cultural and social issues, something which has been revealed by in multi-country analyses (Cupák *et al*., 2021; Aristei & Gallo, 2022). Specifically, we use survey data from adult Spanish citizens. In Spain, the home ownership rate that measures the share of dwellings that are owner-occupied stands at 76% (Eurostat, 2022). As of December 2022, this percentage is more than ten points higher than the average of those of the countries that make up the European Union, which justifies that our country-specific analysis is focused on the Spanish economy.

2. Background

Financial well-being is a critical component of individuals' overall quality of life, encompassing their financial security, stability, and satisfaction with their financial situation (Warmath, 2021). As supported by a substantial body of research, financial well-being is significantly associated with financial literacy. The relationship between financial literacy and financial well-being is based on the premise that individuals with financial knowledge are more likely to utilize financial services, adopt positive financial behaviors, and ultimately attain higher levels of financial well-being Choung (2023). Studies consistently demonstrate that variances in financial knowledge acquired early in life can elucidate a considerable portion of financial and overall well-being in adulthood, emphasizing the critical role of financial literacy in shaping individuals' financial outcomes (Panos & Wilson, 2020, Xiao & Porto, 2017).

Financial literacy, defined as the ability to understand and effectively use various financial skills, has been a central focus in studies related to financial well-being (Lusardi & Mitchell, 2011). It is considered a fundamental element in managing financial resources efficiently for a lifetime of financial well-being (Li & Wang, 2020). The Organization for Economic Co-operation and Development (OECD) has highlighted the importance of financial literacy in promoting financial well-being. Their framework for financial education emphasizes the need to equip individuals with the knowledge and skills necessary to make informed financial decisions, ultimately leading to enhanced financial well-being (Setyorini *et al.*, 2021). This underscores the crucial role that financial literacy plays in empowering individuals to make sound financial choices and take control of their financial futures.

The academic evidence suggests that financial knowledge significantly affects financial behaviors, i.e., higher levels of financial literacy is associated with more prudent financial decision-making as Purwidianti *et al.* (2022) highlights. For financial behavior we encompass the actions and decisions individuals make regarding their finances, including saving, investing, and spending habits. It is a multidimensional construct influenced by various factors, including financial literacy (Allgood & Walstad, 2016) and the studies have demonstrated that financial literacy positively impacts financial behaviors, resulting in improved financial decision-making and outcomes (Allgood & Walstad, 2016, Hwang & Park, 2022). In these studies, have also been demonstrated that demographic factors such as age, gender, income, and education can influence the connection between financial literacy and financial behavior (Xiao *et al.*, 2015 and Grohmann 2017).

For instance, age can impact the connection between financial literacy and financial behavior, with older individuals potentially demonstrating different financial behaviors based on their financial knowledge (Mutlu & Özer, 2021), or, in the same line, Xue et al. (2020) find a positive link between financial literacy and financial well-being among elderly Australians, indicating that higher levels of financial literacy are linked to increased financial satisfaction and well-being during retirement. Similarly, gender has also been identified as a factor that can affect how financial literacy translates into financial decision-making, with variations in financial behaviors between men and women based on their financial knowledge levels (Sorgente & Lanz, 2019).

Additionally, income and education levels have also been shown to play a critical role in determining the extent to which financial literacy influences financial behaviors, with higher income and education often linked to more effective utilization of financial knowledge in decision-making processes (Schmeiser & Seligman, 2013 and Huston 2010). Follow this evidence, individuals with higher income levels may have greater access to financial resources and opportunities, allowing them to apply their financial literacy in a more strategic manner to achieve their financial goals. Similarly, individuals with higher education levels tend to possess a deeper understanding of financial concepts and principles, enabling them to make informed financial decisions based on their knowledge and skills (Morgan & Trinh, 2019).

In the relationship between financial literacy, financial behavior, and financial well-being an emerging literature focus on the role played by homeownership. Research has

emphasized the importance of homeownership in influencing how financial literacy translates into financial behaviors and impacts individuals' financial well-being (Xu *et al.*, 2015). Studies have demonstrated that homeownership is correlated with increased financial stability and wealth accumulation, which can have a positive effect on individuals' overall financial well-being (Garg & Singh, 2018). The interaction among financial literacy, homeownership, and financial behavior is also influenced by demographic factors such as we mentioned previously.

For instance, higher income and education levels are associated with more effective utilization of financial knowledge in decision-making processes, including decisions related to homeownership (Al-Bahrani *et al.*, 2018). This work suggests that individuals with higher income and education levels may be better prepared to navigate the complexities of homeownership, make informed financial decisions regarding property ownership, and leverage their financial literacy to enhance their financial well-being. Furthermore, research has indicated that financial literacy empowers individuals to make sound financial decisions related to homeownership, contributing to their overall financial stability and well-being (Choung, 2023).

Moreover, the correlation between financial literacy, homeownership, and financial well-being extends to broader societal implications such as economic empowerment and financial inclusion. Studies have suggested that financial literacy can act as a tool to promote financial well-being, enabling individuals to effectively manage their finances, including homeownership-related expenses, and avoid financial hardships that may impact their overall well-being (Bangun & Kurniyati, 2022). By enhancing financial literacy and encouraging responsible financial behavior, individuals can attain greater financial security and resilience, particularly concerning homeownership.

3. Data and variables

We use data from the Survey of Financial Competence conducted by the supervisor of the Spanish Securities Markets (CNMV) and the Spanish Central Bank (Banco de España). This survey serves as a reference to evaluate the Spanish financial education strategy and its programs, which are designed and implemented under the auspices of the Organization for Economic Co-operation and Development (OECD) and its International Network on Financial Education (INFE).

Following the instructions of Bover *et al.* (2019), the ECF survey methodology is based on a model questionnaire that has been used in numerous countries under the coordination of the OECD. This standardized approach ensures comparability of results between different nations, thus offering a global perspective on the financial competencies of the adult population.

The ECF questionnaire, as the authors explain, focuses on evaluating various aspects of the financial knowledge, attitudes and behaviors of representative samples of the adult population. In addition to investigating the financial products they know, own or have recently acquired, they delve into fundamental financial concepts such as interest capitalization, risk diversification and inflation, both at the individual level and for the household as a whole.

Consequently, we use micro data from the first and, to date, the only wave of this survey on the Spanish adult population (ECF2016). Descriptions and methods of the ECF2016 are detailed in Bover *et al*. (2019), while its main results are shown in Bover *et al*. (2018). From the unique ECF2016 database we directly collect values for some of the variables used in our analyses. Others, not directly observable, such as the components of individual financial literacy, are proxied by combining data using the OECD/INFE toolkit for measuring financial literacy and financial inclusion (OECD, 2018).

Table 2.1. Summary statistics.

This table shows the survey items included and their contribution to the generated scores. Panel A shows the results for the full sample, consisting of 6,584 observations. Panel B focuses on the subsample of homeowners, with a total of 5,294 observations. Finally, Panel C presents the statistics for the subsample of tenants, which consists of 1,290 observations:

Panel A: Whole sample

	Mean	St. Dev.	Min.	P25	Median	P75	Max.
Financial Behavior	5.48	1.49	0	5	6	7	9
Financial Knowledge	4.56	1.60	0	3	5	6	7
Age	46.65	15.66	17	35	47	58	80
Gender	0.50	0.50	0	0	1	1	1
Income	3.11	1.32	1	2	3	4	6
Educ level	4.50	2.11	1	3	4	6	9
Unemployed	0.13	0.34	0	0	0	0	1
Alone	0.27	0.44	0	0	0	1	1
Financial Attitude	3.47	0.90	1	3	3.67	4	5

Panel B: Homeowners subsample

	Mean	St. Dev.	Min.	P25	Median	P75	Max.
Financial Behavior	5.51	1.45	0	5	6	7	9
Financial Knowledge	4.64	1.59	0	4	5	6	7
Age	48.35	15.62	17	38	49	60	80
Gender	0.51	0.50	0	0	1	1	1
Income	3.26	1.30	1	2	3	4	6
Educ level	4.51	2.12	1	3	4	6	9
Unemployed	0.11	0.32	0	0	0	0	1
Alone	0.26	0.44	0	0	0	1	1
Financial Attitude	3.50	0.88	1	3	3.67	4	5

Panel C: Tenants subsample

	Mean	St. Dev.	Min.	P25	Median	P75	Max.
Financial Behavior	5.36	1.65	0	4	6	7	9
Financial Knowledge	4.21	1.61	0	3	4	5	7
Age	39.67	13.79	18	29	37	49	79
Gender	0.48	0.50	0	0	0	1	1
Income	2.50	1.25	1	1	2	3	6
Educ level	4.44	2.07	1	3	4	6	9
Unemployed	0.21	0.41	0	0	0	0	1
Alone	0.32	0.47	0	0	0	1	1
Financial Attitude	3.32	0.93	1	2.67	3.33	4	5

The dependent variable, individual *Financial Behavior* is built from items related to budgeting, active saving, avoiding borrowing to make ends meet, choosing products, monitoring financial affairs, striving to achieve goals, making considered purchases, and

paying bills on time. It ranges between 0 and 9 and a high score indicates better financial behavior in the sense that it helps to increment their wealth and/or their well-being.

Our variable of interest, individual *Financial Knowledge*, is proxied by a range from 0 to 7 through the sum of the correct answers to seven questions about financial knowledge. This measure shows a high level of individual financial knowledge when it reaches the higher values in the range.

We measure controls directly from primary data in the case of age, gender, household annual income and educational level. These variables, commonly used in the previous literature, are categorized as follows: *Age* is a continuous variable computed from the date of birth of individuals starting at 18; *Gender* is a dichotomous variable that takes value 1 when the responder is a man and 0 when it is a woman; *Income* is a categorical variable that takes values from 1 (for amounts of annual household income less than 9,000 euros) to 6 (for amounts of annual household income over 67,500 euros), following the same increasing pattern shown by the answers in the survey; and *Education* is a variable that categorizes individuals in nine groups depending on their educational level, with the highest score (9) corresponding to doctorate studies.

From the individuals' answers about their labour status, we construct the dichotomous variable *Unemployed* that takes value 1 when an individual is unemployed and seeking work, and 0 otherwise. Similarly, from individuals' answers about their household structure we construct the dichotomous variable *Alone* that takes value 1 when an individual does not live with a partner or children and 0 otherwise. Finally, for *Financial Attitude* we construct a measure by averaging the individuals' answers to three questions that admit five different answers, from 1 (completely agree) to 5 (completely disagree). Ranging thus from 1 to 5. Higher scores are given to individuals with larger saving motivation, showing a larger attitude towards planning their financial future.

Figure 2.1 presents the distribution of the dependent variables *Financial Behavior*, the variable of interest *Financial Knowledge*, and the control variable *Financial Attitude* among tenants (Renters) and homeowners (Owners). The box plots display the variability of these variables in both groups, represented by the colors blue for tenants and reddish for homeowners. The dashed gray line indicates the mean of each variable for each group. Thus, it can be observed how homeowners tend to have higher values in these variables compared to tenants. The variability in these values is greater among

homeowners for the *Financial Behavior* and *Financial Attitude* variables, while for *Financial Knowledge*, tenants show greater dispersion.

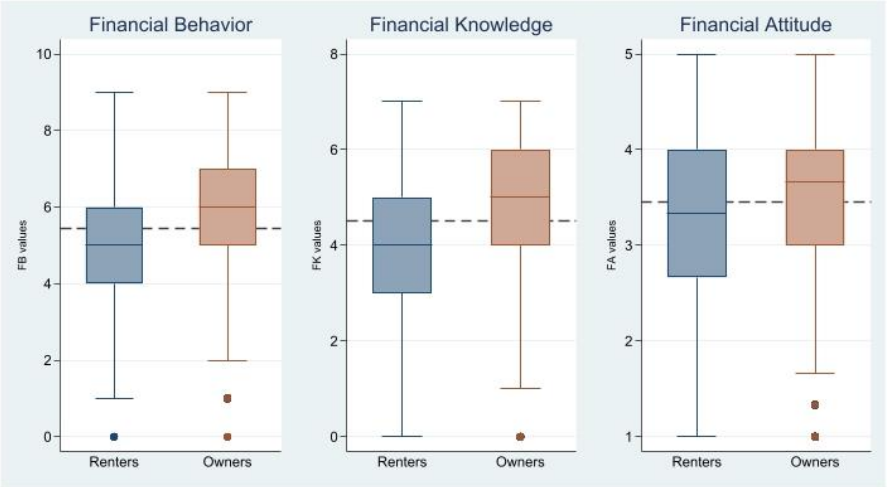

Figure 2.1. Distribution of Financial Behavior, Financial Knowledge, and Financial Attitude among Renters and Owners

Of the 8,554 responders to the ECF2016, we retain only the raw data of those individuals whose responses allow us to compute all the variables involved in our analyses, amounting to 6584 observations, of which 5294 are homeowners and 1290 are tenants. Table 2.1 shows the main statistics of the nine variables for the whole sample and for the homeowners' and renters' subsamples. These statistics show that our dependent variable has a relatively high mean, a reduced standard error, and a symmetric distribution. On the other hand, our variable of interest has a lower mean, a higher standard error and a slightly negatively skewed distribution.

Table 2.2 shows the correlation between variables, measured by Pearson's coefficient. From a univariate perspective, we observe that the independent variable and the interest variable has a significant correlation, suggesting a relationship between them. On the other hand, significant Pearson's correlation coefficients between the independent variable and all the control variables justify, now empirically, their inclusion in the analysis. Finally, the coefficients of correlation between the seven control variables do not portend multicollinearity problems in the posterior multivariate analysis. We can observe in the Pearson's correlation coefficients of the subsamples that the linear relationship between financial behavior and financial knowledge may be weaker for renters.

Table 2.2. Correlations

This table shows the Pearson correlation coefficients between the variables used in the empirical analyses. In Panel A for the whole sample of 6,584 observations. In Panel B for the subsample of homeowners of 5,294 observations. In Panel C for the subsample of tenants of 1,290 observations.

Panel A: Whole sample

	F. Beh.	*F. Know.*	*Age*	*Gender*	*Income*	*E. level*	*Unemp.*	*Alone*
F. Know.	0.194*							
Age	-0.131*	0,015						
Gender	0,007	0.231*	0,00					
Income	0.274*	0.414*	-0.043*	0.114*				
Educ level	0.258*	0.411*	-0.210*	-0.033*	0.500*			
Unemp.	-0.082*	-0.096*	-0.130*	-0.035*	-0.259*	-0.076*		
Alone	-0.064*	-0.038*	-0.386*	0.073*	-0.106*	0,021	0.061*	
F. Attitude	0.270*	0.074*	-0,016	-0.087*	0.074*	0.112*	-0,007	-0.111*

Panel B: Homeowners subsample

	F. Beh.	*F. Know.*	*Age*	*Gender*	*Income*	*E. level*	*Unemp.*	*Alone*
F. Know.	0.199*							
Age	-0.132*	-0,023						
Gender	0,017	0.241*	-0,002					
Income	0.265*	0.406*	-0.115*	0.121*				
Educ level	0.251*	0.410*	-0.235*	-0.032*	0.516*			
Unemp.	-0.074*	-0.084*	-0.122*	-0.049*	-0.226*	-0.057*		
Alone	-0.066*	-0.047*	-0.425*	0.065*	-0.091*	0,024	0.073*	
F. Attitude	0.265*	0.075*	-0.033*	-0.083*	0.069*	0.121*	-0,005	-0.119*

Panel C: Tenants subsample

	F. Beh.	*F. Know.*	*Age*	*Gender*	*Income*	*E. level*	*Unemp.*	*Alone*
F. Know.	0.1618*							
Age	-0.1951*	0.0585*						
Gender	-0,0341	0.1878*	-0,0101					
Income	0.3064*	0.3887*	-0,0209	0.0778*				
Educ level	0.2854*	0.4240*	-0.1368*	-0,0387	0.4892*			
Unemp.	-0.0896*	-0.0891*	-0.0662*	0,0179	-0.2975*	-0.1364*		
Alone	-0,0492	0,0268	-0.2182*	0.1276*	-0.1128*	0,0154	0,0065	
F. Attitude	0.2783*	0,0300	-0,0405	-0.1075*	0,0107	0.0741*	0,0238	-0.0611*

* Significance level at 5%

4. Methods

In the empirical analyses, we use multivariate weighted regression models. Weighted regression models enable us to achieve unbiased population estimates. The ECF2016 database includes a set of cross-sectional weights to compensate unequal probability of the sampled individuals due to geographical stratification and differential unit non-response. According to the user guide of the ECF2016 database (Banco de España, 2021), these weights are the inverse of the probability that an individual is in the sample, and their sum is an estimate of the total number of individuals in the population at the beginning of the last quarter of 2016.

First, we run a weighted least squares regression of *financial behavior* on *financial knowledge* and the set of control variables. However, it could be argued that the scale used as a measure of individual financial behavior has an ordinal qualitative nature, mainly because it comes from the aggregation of ordinal qualitative answers to questions included in the ECF2016. Consequently, least squares estimation, and especially the statistical significance of the regressor slope parameters, may be affected by the lack of quantitativeness in the dependent variable required in this framework. To avoid this, we also perform an ordered probit regression model with the same structure.

On the other hand, as Lusardi and Mitchell (2014) point out, it is also arguable that individual financial knowledge may be endogenous. *Financial knowledge* and *financial behavior* may be correlated to omitted variables. For example, we can expect that greater involvement in financial matters will lead to greater financial knowledge but also better financial behavior. Moreover, we might also expect that individuals with better financial behavior would be more motivated to increase their level of financial knowledge.

Accordingly, to overcome the endogeneity problem, we use an extended ordered probit model where financial knowledge is considered as an endogenous covariate in the model for financial behavior. The extended ordered probit is an Extended Regression Model (StataCorp, 2021) that accounts for ordinal endogenous covariates and ordinal outcomes. The extended ordered probit uses instrumental variables to model the ordered endogenous covariate, i.e., *financial knowledge*. From the predictions of this auxiliary model, the extended ordered probit builds an indicator dummy variable which is incorporated into the model of the response variable, financial behavior. Both, the auxiliary model for *financial knowledge* and the main model for *financial behavior* are

estimated jointly by maximum likelihood.

We use two instruments simultaneously in the extended ordered probit model: The average financial knowledge of individuals for each of the six income levels shown by the *Income* variable, and average financial knowledge of individuals for each of the nine educational levels shown by the *Education* variable. Van Rooij *et al*. (2011) and Peng *et al*. (2018) suggest that individual financial knowledge can be influenced by interacting with others, which obviously occurs in their socioeconomic environment. In that case, Xu *et al*. (2020) argue that these variables can be qualified to act as valid instruments to the extent that the financial knowledge of the other individuals in the same socioeconomic level can be regarded as exogenous to individual financial behavior.

The ECF2016 sample design does not consist of a simple random sampling of the population. In this case, we would need to consider sample design features, such as stratification and clustering, to calculate the standard errors of the estimated coefficients. As the stratum and cluster indicators are not available for confidentiality reasons, we calculate these standard errors by using the 1,000-replicate weights provided by ECF2016. This is an alternative to the 1,000 bootstrap resampling estimates using sample design features (Banco de España, 2021).

5. Results

Table 2.3 shows the results of the regression of *Financial Behavior*. The first column of results shows the slope coefficients estimated by weighted least squares. These show evidence supported by previous literature: the slope coefficient of *Financial Knowledge* is positive and significant, confirming that individual financial knowledge has a clearly positive influence on individual financial behavior. As expected, all the control variables except *gender* have a significant slope coefficient, keeping the sign of its correlation with individual financial behavior.

Table 2.3. Financial Behavior regressions.

This table shows the slope coefficients of estimated models. We include the inverse of the probability that an individual is in the sample as weights in the estimation processes. Below the coefficients, in parenthesis, we report p-values computed from standard errors bootstrapped by using replicate weights that consider sampling design features. In the extended ordered probit models, observed Financial Knowledge, the endogenous ordinal variable, is replaced by an indicator dummy variable computed from the Financial Knowledge ordered probit model. This table also shows the slope coefficients of the instruments used in the Financial Knowledge model, and the correlation between the errors from the Financial Behavior and the Financial Knowledge models estimated jointly in the extended ordered probit models. The estimates of the cut points in both ordered probit models and the slope coefficients for control variables in the one for Financial Knowledge have been omitted.

	Weighted last squares	Ordered probit	Extended ordered probit		
			Whole sample	Homeowners	Tenants
Financial Knowledge	0.058***	0.040***	0.150***	0.152***	0.203*
	(0.000)	(0.000)	(0.002)	(0.006)	(0.063)
Age	-0.013***	-0.010***	-0.011***	-0.010***	-0.017***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	0.037	0.036	-0.043	-0.026	-0.134
	(0.373)	(0.255)	(0.341)	(0.615)	(0.139)
Income	0.178***	0.130***	0.095***	0.086***	0.120**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.018)
Education level	0.079***	0.060***	0.036***	0.034**	0.029
	(0.000)	(0.000)	(0.005)	(0.020)	(0.339)
Unemployed	-0.190***	-0.133***	-0.132***	-0.125**	-0.118
	(0.003)	(0.005)	(0.005)	(0.023)	(0.184)
Alone	-0.241***	-0.185***	-0.186***	-0.184***	-0.162**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.031)
Financial Attitude	0.405***	0.298***	0.285***	0.281***	0.290***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Intercept	3.578***				
	(0.000)				
FK avg. by income class			0.457***	0.434***	0.499***
			(0.000)	(0.000)	(0.000)
FK avg. by education class			0.581***	0.575***	0.621***
			(0.000)	(0.000)	(0.000)
Correlation between errors			-0.159**	-0.148*	-0.282*
			(0.022)	(0.053)	(0.066)
Wald c2	1,177.30***	1,002.27***	1,031.146***	766.592***	309.338***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
A-R2 // P-R2 // Log P-Like	0.180	0.0536	-92,069,066	-71,605,004	-20,256,573
# Observations	6,584	6,584	6,584	5,294	1,290

* Significant at 10% level, ** Significant at 5% level, *** Significant at 1% level.

Table 2.3 also shows the estimated slope coefficients of the ordered probit model. The coefficient associated to our variable of interest, *financial knowledge*, remains positive

and significant. The likelihood of individuals attaining better financial behavior increases significantly as their financial knowledge level increases. Similarly, all the estimated coefficients related to controls maintain their sign and significance. These results reinforce the evidence found by the weighted least squares regression.

When we move to the results of the extended ordered probit model for the whole sample all the estimated coefficients maintain their significance, and the significant slope coefficients maintain their sign. Now, the slope coefficient of financial knowledge has a different order of magnitude as extended ordered probit replaces the observed variable with an instrumentalized variable in order to avoid endogeneity. Accordingly, the slope coefficients of the two instrumental variables used in the auxiliary model for *financial knowledge*, also shown in Table 2.3, are both highly significant. This fact, together with the Wald chi-square test for identifying weak instruments that shows significant critical values at the 1% level, indicates the suitability of the instruments proposed and the effectiveness of their joint use. The correlation between the error terms of the two models included in the extended ordered probit, which measures the endogeneity between *financial behavior* and *financial knowledge* that has been avoided, is also shown in Table 2.3. It is significant at the 5% level and corroborates both the presence of such endogeneity and the effectiveness of the extended ordered probit model in mitigating it.

Overall, there are no qualitative differences between the results from using different econometric regression models to analyses the empirical relation between *financial behavior* and *financial knowledge*. A positive and significant relation between them is found using three alternative econometric models. These findings are in line with those obtained for Razen *et al*. (2021) for Austrian adolescents that supports that *financial knowledge* positively impacts on *financial behavior*; and with Behrman *et al*. (2012), who conclude that financial knowledge is positively and significantly related with wealth, pension contributions, and the retirement planning of Chilean adults.

However, ensuring that the lack of quantitativeness, not only in the response variable but also in the variable of interest, and the endogenous determination of *financial behavior* and *financial knowledge* are not influencing results may require the use of the extended ordered probit model in a furthermore thorough analysis. Thus, we run extended ordered probit regressions for the homeowners- and tenants-subsample to test whether their *financial behavior* is associated with their *financial knowledge* in the same way that it is for the whole sample.

Results in Table 2.3 shows a *financial knowledge* slope coefficient for homeowners positive, indicating a greater probability of reaching higher levels of *financial behavior* by increasing financial knowledge. However, the financial knowledge slope coefficient for tenants, equally positive but significant only at 10% level, is higher, showing a larger impact of their *financial knowledge* on their *financial behavior*. These results suggest, as expected, that since homeowners have better *financial behavior* for the same level of *financial knowledge* than tenants, the explanatory capacity of *financial behavior* that *financial knowledge* has is smaller.

Interestingly, when we analyze the estimated slope coefficients of controls, we observe that while their signs and significance in the case of homeowners are, in general, in line with those for the whole sample; this is not so in the case of tenants. The slope coefficients for *education level* and *unemployed* variables are no longer significant for tenants, and the significance levels of those for the *income* and *alone* variables are slightly reduced with respect to the homeowner variables.

6. Conclusions

Our study provides, to the best of our knowledge, the first empirical evidence supporting the role of home ownership as a moderating factor in the relationship between financial knowledge and financial behavior of adult citizens. This finding has significant implications for both academic research and public policy formulation.

The relationship between financial knowledge and financial behavior has been the subject of numerous studies in recent decades. However, until now, the potential role of home ownership in this relationship had been largely ignored. Our results suggest that this omission may have led to an incomplete understanding of the factors influencing individuals' financial behavior.

Specifically, our findings indicate that, to the extent that home ownership explains the financial behavior of homeowners, financial knowledge has greater potential to improve the financial behavior of renters. This observation is crucial for several reasons. Firstly, it suggests that homeowners may have certain "built-in" financial behaviors due to their ownership status, such as the financial discipline necessary to maintain mortgage payments. On the other hand, renters, not having these externally imposed financial structures, could benefit more from an increase in their financial knowledge.

This difference in the potential impact of financial knowledge between homeowners and renters has important implications for the design of financial education programs. It suggests that these programs could be more effective if tailored to the home ownership status of the participants. For example, programs aimed at renters could focus more on developing skills and knowledge that help them manage their finances more effectively in the absence of the financial structures associated with home ownership.

Furthermore, our findings have implications for housing policies. If home ownership truly acts as a moderating factor in the relationship between financial knowledge and financial behavior, this could provide an additional argument in favor of policies that promote home ownership. However, it is important to note that our study does not directly address the relative costs and benefits of home ownership versus renting, and more research would be needed to make definitive policy recommendations in this area.

It is important to emphasize that our results do not imply that financial knowledge is irrelevant for homeowners. On the contrary, they suggest that financial knowledge remains an important factor in the financial behavior of both homeowners and renters, but that its relative impact may be greater among renters.

This evidence can be particularly valuable for policymakers in designing both housing and financial education strategies and programs, two relevant areas of action in their current agenda. On one hand, it could inform the design of more effective and personalized financial education programs. On the other hand, it could provide additional information for the ongoing debate on housing policies and their broader implications for citizens' financial well-being.

Chapter 3. Early retirement and financial asset preferences in the private-public pension system

1. Introduction

As the population continues to age, the issue of retirement has become increasingly important. As the famous economist and Nobel laureate, Paul Samuelson, once said, "Retirement at sixty-five is ridiculous. When I was sixty-five, I still had pimples". The question of when to retire and how to plan for it is not only a personal decision, but also a public economic one. As governments around the world grapple with the financial implications of an aging population, researchers have explored the factors that can affect retirement decisions (Fisch & Seligman, 2022).

Factors influencing retirement timing are multifaceted and encompass various dimensions. Studies by Radl (2013) and Fischer & Sousa-Poza (2006) emphasize the role of social class, the institutional factors (such as mandatory retirement age and pension policies), gender, and macro effects, along with health and family considerations, which all play crucial roles in retirement decisions. Fisher *et al.* (2016) provided a detailed review of the existing literature on a variety of these factors related to retirement timing, including physical factors, demographic factors, psychological factors subjective life expectancy, family factors, work factors and macroeconomic factors.

Among these factors, an extensive literature has focused on the relationship between retirement decisions, more specifically, retirement age, and wealth accumulation (Foster, 2018). To this respect, financial considerations play a pivotal role in retirement age decisions. Wang *et al.* (2011) and Qian *et. al* (2024) highlight the importance of expected retirement income and financial assets in influencing retirement intentions. The level of financial and non-financial assets has been found to influence planned retirement age, with higher asset levels potentially leading to earlier retirement (Jedynak, 2022). Researchers have shown that those who start saving earlier tend to

have higher retirement savings and are more likely to retire earlier (Fichtner & Seligman, 2018).

Blažienė (2022) underscores the versatility of both non-financial and financial assets as tools for saving or shaping saving behavior. This suggests that individuals have the flexibility to select a mix of financial assets, including stocks, bonds, or retirement accounts, in alignment with their saving objectives and personal preferences. By considering a combination of these assets, individuals can tailor their saving strategies to suit their financial goals and risk tolerance levels, thereby optimizing their retirement savings portfolio. This approach allows for a diversified and customized approach to saving, catering to individual needs and aspirations for financial security in retirement.

Related to the above, there are some examples in the literature that analyze more specifically how financial market participation can be related to economic well-being, more concretely, total savings outcomes. Following Brown *et al.* (2004), individuals who participate in the stock market accumulate significantly more wealth - relative to a given level of savings - than individuals who do not. In this sense, as Fichtner & Seligman (2018) state, active participation in the stock market could be an important predictor of wealth preservation for retired households. Going deeper in this relationship, Brown *et al.* (2004) suggest that stock market participation can lead to earlier retirement through increased wealth accumulation, but research has shown that the impact may vary based on individual factors and financial behaviors. For instance, Gustman *et al.* (2010) found that low-income individuals may delay retirement when participating in financial markets as it provides them with greater financial security and confidence. On the other hand, those with high income and education levels, who often have complex financial portfolios, may choose to retire early regardless of financial market participation. In this line, Fagereng *et al.* (2017) document a double adjustment as households ages: a rebalancing of the portfolio composition away from stocks as they approach retirement and stock market exit after retirement. More specifically, these authors find that households should begin to reduce risk exposure (shares in the market) before retirement to diversify a possible decline in financial markets. However, when trying to look for clear empirical evidence, these authors do not find any that supports the outcome of the model.

Very close to this argument, we find in the UK context the work of Boado et al. (2023). It should be noted that the UK context, compared to other countries, presents some

important differences that require further analysis. The UK pension system, characterized by a unique combination of public and private pension provisions, features a well-established private-funded pension system alongside a relatively modest state pension system compared to other European countries (Rossi, 2009). This blend offers a rare diversity of pension incentives for retirement (Blundell et al., 2002) where the public-private can influence the preferences of pension policy stakeholders, resulting in compromises between business and unions (Bridgen & Meyer, 2018). In contrast to systems like Italy's, Spain's, Portugal's or France's which are more reliant on state pensions, the UK places a greater emphasis on private savings and raising the retirement age (Adami & Gough, 2008). Furthermore, the UK's pension landscape has undergone significant policy transformations with transition from defined-benefit to defined-contribution pensions, mirroring shifts in occupational pension provision (Bridgen & Meyer, 2005). Research has highlighted the necessity for improved provisions to combat pensioner poverty and income discrepancies in later life (Ginn & MacIntyre, 2013) and it is crucial to ensure that accumulated pension entitlements are independent for the future efficacy of the pension system (Sefton *et al.*, 2011).

With this issue as an objective, Boado et al. (2023) find that individuals with higher levels of financial market participation – and a greater tendency to plan for retirement– are more likely to delay their retirement compared to those with lower levels of financial participation. These results seem to be contrary to the previous literature which finds a positive significant relationship between retirement age and the financial assets portfolios. With regards to the above, the spurious results may be because of the proxy used for market participation in Boado *et al.* (2023). These authors use a dichotomous variable for financial market participation, which is equal to 1 if individuals have financial assets other than current and savings accounts, and 0 if they only have current and/or savings accounts. However, the positive relationship between advancing retirement and holding financial assets focuses mainly on holding shares, as shown Bütler *et al.* (2017) or Fagereng et al. (2017), where the findings are that individuals with more sophisticated financial assets tend to retire earlier than those with more basic assets.

Considering the above, this chapter aims to analyze the crucial role financial assets hold in retirement-age decisions for a pension system characterized by a unique combination of public and private pension provisions. Our research question regarding

whether people with more sophisticated (riskier) financial portfolios retire earlier than those individuals with more basic financial assets can address the literature gap. This research question constitutes the main research gap in this context, since, to the best of our knowledge, it has not been addressed before.

2. Materials and methods

2.1. ELSA dataset

To carry out our research, we collect data provided by ELSA (English Longitudinal Study of Ageing). Its implementation is the result of a collaboration between the Institute for Fiscal Studies (IFS), University College London (UCL), the National Centre for Social Research (NatCen), and the University of Manchester, establishing itself as a key resource to comprehend the dynamics of aging in British society. ELSA has followed a cohort of approximately 10,000 individuals by wave, spanning from Wave 1 (2002-2003) to Wave 9 (2018-2019) with biennial study intervals. In Table 3.1 the total number of individuals by wave appears and it can be observed that an individual can participate in different waves.

Within the framework of ELSA, an extensive array of variables is available, capturing a broad spectrum of characteristics. These encompass household and individual demographics (including gender, age, educational level), aspects of physical and psychosocial health, social care information (commencing from Wave 6 onwards), details on work and pensions, income and assets (such as bonds, stocks, options), housing specifics, cognitive function metrics, insights into social participation, data on effort and reward (in terms of voluntary work and caregiving), considerations regarding expectations, as well as measurements related to walking speed and weight, among other relevant factors.

Table 3.1. Observations by wave of control variables

Control variables	**Category**	**wave**									**Total** (9,782 obs.)
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
Gender	*0: Males*	3,628	19	122	692	37	54	23	8	27	4,610
	1: Females	4,278	10	73	715	18	35	13	9	21	5,172
Education	*0: Low Education*	6,128	18	105	971	43	89	35	16	46	7,451
	1: High Education	1,778	11	90	436	12	0	1	1	2	2,331
Households	*0: Non-Own a House*	1,798	5	18	222	3	13	5	5	11	2,080
	1: Owns a House	6,108	24	177	1,185	52	76	31	12	37	7,702
Marital status	*0: Single or similar*	3,430	5	85	609	19	42	19	11	20	4,240
	1: Married or similar	4,476	24	110	798	36	47	17	6	28	5,542
Work over SPA	*0: Non-working over state pension age*	7,457	28	188	1,244	49	88	36	17	47	9,154
	1: working over state pension age	449	1	7	163	6	1	0	0	1	628
Salary income	*0: £0- £10,000*	1,742	4	31	227	7	21	3	1	6	2,042
	1: £10,001- £25,000	830	0	45	129	6	6	2	1	1	1,020
	2: over £25,000	5,334	25	119	1,051	42	62	31	15	41	6,720
Previous personal pension	*0: Non-Received income from personal or employer pensions before taxes and other deductions*	5,977	29	173	1,363	53	73	32	16	45	7,761
	1: Received income from personal or employer pensions before taxes and other deductions	1,929	0	22	44	2	16	4	1	3	2,021

Note: Starting from wave 2, additional observations (i.e., new individuals) have been added to the sample for each variable in each wave. Therefore, the number of observations reported for each variable in each wave represents the number of individuals who provided valid data for that variable in that particular wave.

In the context of our study, which focuses on retirement age and wealth, we found three groups of research within ELSA. The first group is dedicated to the type of pension system and retirement preferences, and notable works include those by Arkani & Gough (2007), Banks *et al.* (2015), and Disney *et al.* (2009). The second group explores the

social repercussions related to retirement, including psychological characteristics. Relevant examples are the works of Banks & Oldfield (2007) and Banks *et al.* (2010), and Kung *et al.* (2023). Lastly, we find a group of studies that examine the relationship between retirement and wealth in general terms, i.e., the possession of financial and non-financial assets at the household level. Among these works are those by Banks & Crawford (2022), Crawford & O'Dea (2020), Thomas & Spataro (2016) and Boado *et al.* (2023).

2.2. Variables

2.2.1. Sample dataset

From the ELSA dataset the initial sample comprises over 90,000 observations and we selected 26 primary variables. We focus only on individuals who provided complete answers to all the selected variables and only used date from the first time in which any individual appears. This means that, for example, if an individual was present in Waves 1, 2, and 3, only their appearance in Wave 1 was considered. This avoids multiplicity problems in our analysis. After preparing data, identifying and removing outliers, and transforming variables the final sample covered 9,782 individuals.

2.2.2. Dependent variable

The dependent variable in this study is Retirement age, which represents the retirement age of individuals in the sample. Since the ELSA database does not specifically list retirement age, but rather indicates whether individuals are active (working) or retired, we utilize the variable “age” (indager tag), contingent upon the “wpdes” tag, which answers the question “Which one of these would you say best describes your current situation?” being equal to "retired". This variable is presented in all available waves. Closely linked to this variable is the “work over SPA” variable, which indicates if individuals are working beyond the state pension age. This enables us to understand the specific retirement age for everyone in the sample. Additionally, the database furnishes information on the current retirement status of everyone in the sample, as well as whether they have opted for early retirement and if they have reached the state pension age.

2.2.3. Control variables

We select a set of socio-demographic variable as used in previous literature. Specifically, we add gender, education level, house owner, marital status, work over SPA, salary income, and previous personal pension. All these variables are dichotomous, taking a value of 1 if the conditions are met and 0 otherwise, except for education level and salary income, which are categorical. Specifically, Gender is equal to 1 for females and 0 for males; education level is a dichotomous variable equal to 1 if the education is high (in the UK code system categories NVQ4/NVQ5/degree and equivalent or higher education below degree), and 0 if it is low education (UK code system NVQ3/GCE A Level equivalent, NVQ2/GCE O Level equivalent, NVQ1/CSE other grade equivalent, Foreign/other, or No qualification).

House owner is a dichotomous variable equal to 1 if the individual owns a house and 0 if otherwise; marital status is a dichotomous variable equal to 1 if married or similar and 0 if single or similar; salary income is a numerical variable equal to total wage and salary income received by the individual including their partner in the last year before taxes and other deductions; previous personal pension is a dichotomous variable equal to 1 if the individual receives any income from personal or employer pensions before taxes and other deductions, 0 otherwise; work over SPA is a dichotomous variable equal to 1 if the individuals working over state pension age and 0 if otherwise.

Table 3.2 shows the main descriptive statistics for descriptive statistics of the Socio-demographic variable used in our analysis. The average retirement age of individuals in the sample is 67.32 years. Most individuals in the sample are female (53%), while 47% are male. In terms of education, only 24% of individuals have completed higher education, while 76% have low education. A significant majority of individuals in the sample (79%) are homeowners, while 21% do not own a house. In terms of marital status, 57% of individuals in the sample are married or in a similar relationship, while 43% are single or in a similar relationship. Most individuals in the sample (94%) are not working past the state pension age, while only 4% are. Most individuals in the sample (82%) do not receive any income from personal or employer pensions, while 18% do. Finally, in terms of salary income received by individuals in the last year before taxes and other deductions, 48% of the sample have a salaried income between £0-10,000, 35% have a salary income between £10,001-£25,000, and 17% have a salaried income over £25,000.

Table 3.2. Descriptive statistics of the Socio-demographic variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Retirement age	9,782	67.32	9.548	40	99
Gender		0.529	0.499	0	1
0: Males	4,610				
1: Females	5,172				
Education level		0.238	0.426	0	1
0: Low Education	7,451				
1: High Education	2,331				
Households		0.787	0.409	0	1
0: Non-Own a House	2,080				
1: Owns a House	7,702				
Marital status		0.567	0.496	0	1
0: Single or similar	4,240				
1: Married or similar	5,542				
Salary income		1.478	0.817	0	2
0: 0-10000 libras	2,042				
1: 10001-25000 libras	1,020				
2: over 25000 libras	6,720				
Previous personal pension		0.207	0.405	0	1
0: Non- Receive income from p.p.	7,761				
1: Receive income from p.p.	2,021				
Work over SPA		0.064	0.245	0	1
0: Non-working over SPA	9,154				
1: working over SPA	628				

2.2.4. Interest variables

Our variable of interest is directly related to the individual's portfolio of financial assets and how it influences the decision to retire. To explore this, we leverage the information on financial asset ownership from the ELSA database. These assets serve as a proxy for risk preferences (profiles) as well as their involvement in financial markets. Building on the work of Martynov & Schepker (2015), individuals with diverse asset portfolios, such as stocks, bonds, investment plans, or simple savings accounts, may exhibit different risk profiles that impact their retirement timing. Similarly, García & Marques (2017) found that factors such as age, education, income, and homeownership positively influence household savings, while risk aversion has a negative impact. In this manner, individuals' risk preferences, influenced by asset ownership choices such as shares or savings accounts, play a critical role in shaping retirement decisions.

To measure *Financial Risk Preferences,* we follow Balloch *et al.* (2015), Yeh & Ling (2022), and Fisch & Seligman (2022). These studies use financial asset holdings as a proxy for financial risk preferences. Specifically, they consider the trade-off return-risk according to which riskier financial assets have a greater return with respect to plain financial instruments. In this way, individuals who have more basic assets, for example savings accounts and fixed income plans, would have a low risk profile. By contrast, individuals with variable income assets, such as stocks and options, would have a riskier profile in their preferences. Still further in this line, Christelis *et al.* (2020), using life-history survey data from 11 European countries, find that risk preference influences portfolio choice based on the expected return.

For financial risk preference we use the ELSA dataset in which we identify several categories related to the item *financial assets holding.* These categories include basic financial assets, i.e. saving accounts, to more sophisticated financial assets such as stock options. In Appendix Chapter 4. B.1., the description for each one is presented. These descriptions determine whether the individual or their partner owns any of these savings and investments and it allows the selection of more than one item. Based on this response we group the savings and investments in five categories with different risk preference profiles, starting from the most liquid and increasing in risk complexity. These final categories *are Savings and/or Current Account, Bond, PEP, Stocks* and *Share Options*, and all of these are dichotomous variables equal to one if the individual owns the financial assets class, 0 otherwise which can be seen in Figure 3.1.

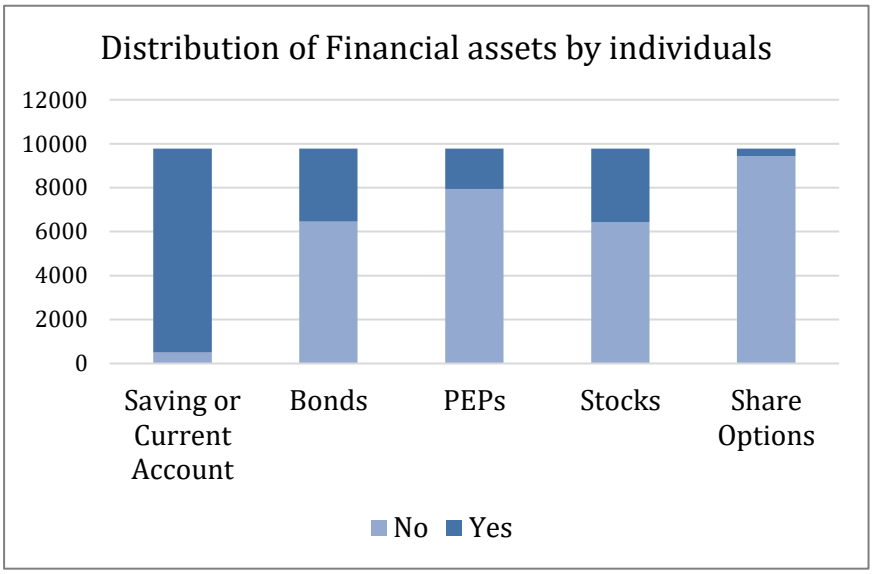

Figure 3.1. Total Individual's financial holdings wave 1-9

In Appendix Chapter 4 details the financial assets included in each category. We note that it has not been possible for us to add the items 03-TESSA, 04- ISA, 06- National certificate, 10- Share clubs, 11- Unit Trust and 13- Other investments, given their mixed nature as a savings product, and may include fixed income and variable income assets.

In addition to these basic categories, we have also constructed combinations between these categories to control for combination tenancy through dichotomous variables, equal to one if true, zero otherwise. The first would be those people who own both *Stocks and Bonds*, the second *Stocks and PEPs* and the third those who own *PEPs, Stocks and Bonds*. Furthermore, to analyze the marginal effect of specific portfolios on *Advanced financial assets* composed of *Bonds, PEPs, Stocks and Options*, we use the product the *Advanced financial assets * stocks*, *Advanced financial assets * Share Options* and *Advanced financial assets * Stocks & Share Options*.

In Table 3.3 we show the main descriptive statistics for the financial assets holding and the combinations. It can be observed that most individuals have a savings or current account (94.9%), while a smaller proportion have bonds (34.0%) or stocks (34.3%). Even fewer individuals have a Personal Equity Plan (PEP) (18.8%) or stock options (3.6%). Concerning the combination of financial assets, a smaller proportion of individuals have a combination of stocks and bonds (21.6%), stocks and PEPs (13.2%), or all three (9.9%). Regarding combinations, we observe that 55.9% of individuals have more advanced assets (*Advanced financial assets)*.

Table 3.3. Descriptive statistics of the financial asset's variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Retirement age	9,782	67.319	9.548	40	99
Saving or Current Account		0.949	0.221	0	1
0: No	502				
1: Yes	9,280				
Bond		0.34	0.474	0	1
0: No	6,457				
1: Yes	3,325				
PEP		0.188	0.391	0	1
0: No	7,939				
1: Yes	1,843				
Stock		0.343	0.475	0	1
0: No	6,423				
1: Yes	3,359				
Share Options		0.036	0.187	0	1
0: No	9,429				
1: Yes	353				
Stock and Bond		0.216	0.412	0	1
0: No	7,660				
1: Yes	2,122				
Stock and PEP		0.132	0.338	0	1
0: No	8,491				
1: Yes	1,291				
Stock, PEP and Bond		0.099	0.299	0	1
0: No	8,806				
1: Yes	976				
Advanced financial assets (A1)		0.559	0.496	0	1
0: Current or Saving Account	4,311				
1: Bond, PEP, Stock and Options	5,471				
Advanced financial assets * stock		0.343	0.474	0	1
0: Advanced financial assets	5,471				
1: Stock on Advanced financial assets	3,359				
Advanced financial assets * Share Options		0.036	0.186	0	1
0: Advanced financial assets	5,471				
1: Share options on Advanced financial assets	353				
Advanced financial assets * Stock and Share Options		0.027	0.164	0	1
0: Advanced financial assets	5,471				
1: Stocks and Share options on Advanced financial assets	271				

2.3. Models

Regarding statistical models, we use linear regression models to analyze the relationship between retirement age and financial assets, and we control for socioeconomic variables and the business cycle in our models. To test our main hypothesis, we use the following model, in which we include the control variables:

$$Retirement\_age_{i,t} = \beta_0 + \beta_1 \cdot gender_{i,t} + \beta_2 \cdot education_{i,t} + \beta_3 \cdot house\_owner_{i,t} + \beta_4 \cdot marital\_status_{i,t} + \beta_5 \cdot salary\_income_{i,t} + \beta_6 \cdot work\_over\_spa_{i,t} + \beta_7 \cdot previous\_personal\_pension_{i,t} + \beta_8 \cdot financial\_assets_{i,t} + \varepsilon_{i,t}$$

In addition to the control variables, for each of the models we have used a different financial asset as a variable of interest (β_8). Respectively, model 1 includes *Savings or current account*, model 2 *Bonds* holding, model 3 *PEP*, model 4 *Stocks*, and model 5 indicates whether they have *Share Options*. For models 6 to 8, we have made three combinations of these financial assets. In model 6, we have used whether the individual has *Stocks and Bonds*, in model 7, whether they have *Stocks and a PEP*, and in model 8, whether they have *Stocks, PEPs and Bonds*. Finally, we perform a marginal effects analysis in which we try to control how including a new asset in the portfolio modifies the relationship with the retirement age. Concerning this, we label *Advanced Financial Assets*, *Advanced Financial Assets*Stocks, Advanced Financial Assets*Share Options*, and *Advanced Financial Assets*Stocks and Share Options* in Models 9 to 12, respectively.

To address potential issues of inconsistency arising from intra-group correlation, we employed robust standard errors estimated using the *vce (cluster)* command in Stata. This approach enhances the robustness of our models by relaxing the assumption of strict independence between observations.

3. Empirical results and discussion

Table 3.4 presents the correlations between variables. The dependent variable, retirement age, exhibits negative and significant correlations with all control variables except for *previous personal pension*, with which it shows a positive correlation. Analyzing the relationship between retirement age and different financial assets reveals negative and significant correlations at the 10% level for all assets. Furthermore, the data indicates a positive correlation between holding a current account and owning bonds,

stocks, pension plans, and stock options. Table 3.4 also reveals consistent positive correlations among various financial instruments. For instance, savings or having a current account positively correlates with bonds, stocks, pension plans, and stock options. Similarly, stocks exhibit positive correlations with pension plans, bonds, and combinations of stocks, pension plans, and bonds. Finally, pension plans show positive correlations with bonds, stocks, and combinations of stocks, pension plans, and bonds. Importantly, the absence of high correlations between control variables suggests that multicollinearity is not a concern in this analysis.

Table 3.4. Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Retirement age												
(2) Gender	-0.034*	1										
	(0.001)											
(3) Education	-0.195*	-0.100*	1									
	(0.000)	(0.000)										
(4) House Owner	-0.186*	-0.024*	0.155*	1								
	(0.000)	(0.001)	(0.000)									
(5) Marital Status	-0.202*	-0.121*	0.070*	0.222*	1							
	(0.000)	(0.000)	(0.000)	(0.000)								
(6) Salary	-0.139*	-0.042*	0.046*	0.062*	0.006	1						
	(0.000)	(0.000)	(0.000)	(0.000)	(0.363)							
(7) Work Over Spa	-0.176*	0.057*	0.073*	0.047*	0.006	-0.018*	1					
	(0.000)	(0.000)	(0.000)	(0.000)	(0.423)	(0.012)						
(8) Prev. Personal Person	0.234*	-0.058*	-0.023*	0.028*	0.063*	-0.202*	-0.059*	1				
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)					
(9) Saving Or Current Acc.	-0.085*	0.001	0.062*	0.151*	0.055*	-0.035*	0.040*	0.043*	1			
	(0.000)	(0.836)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
(10) Bond	-0.072*	-0.005	0.139*	0.170*	0.094*	-0.296*	0.064*	0.110*	0.140*	1		
	(0.000)	(0.504)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
(11) Stock	-0.191*	-0.040*	0.192*	0.245*	0.134*	-0.052*	0.069*	0.018*	0.160*	0.312*	1	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.013)	(0.000)	(0.000)		
(12) Pep	-0.143*	-0.021*	0.212*	0.166*	0.098*	-0.129*	0.056*	0.052*	0.097*	0.301*	0.329*	1
	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
(13) Share Options	-0.167*	-0.020*	0.059*	0.090*	0.083*	0.071*	0.017*	-0.034*	0.054*	0.050*	0.183*	0.056*
	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.014)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Table 3.5 presents the results of regression analyses focusing on individual financial asset holdings (savings/current account, bonds, PEPs, stocks, and share options), excluding interactions.

Table 3.5. Models for retirement age

	(1)	(2)	(3)	(4)	(5)
	Saving or Current Account	**Bond**	**PEP**	**Stock**	**Share Options**
Gender	-1.274***	-1.272***	-1.277***	-1.306***	-1.296***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	-3.056***	-3.042***	-2.767***	-2.721***	-3.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House Owner	-2.395***	-2.452***	-2.318***	-2.042***	-2.456***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Marital Status	-3.596***	-3.564***	-3.488***	-3.427***	-3.422***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Salary	-0.030*	-0.031*	-0.031*	-0.031*	-0.029*
	(0.087)	(0.070)	(0.073)	(0.075)	(0.080)
Work Over Spa	-4.727**	-4.805**	-4.806**	-4.686**	-4.710**
	(0.044)	(0.042)	(0.043)	(0.043)	(0.040)
Previous Personal Pension	5.215***	5.147***	5.124***	5.053***	5.029***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Financial Assets	-2.812***	-0.597***	-1.883***	-2.191***	-6.298***
	(0.001)	(0.010)	(0.000)	(0.000)	(0.000)
Constant	75.185***	72.818***	72.734***	72.885***	72.702***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	9,782	9,782	9,782	9,782	9,782

* p<0.10, ** p<0.05, *** p<0.01.

The findings reveal a significant negative relationship between *gender* and *retirement age*, indicating that women tend to retire earlier, aligning with existing research on gender disparities in retirement patterns (Radl, 2013). Furthermore, all variables, except for *previous personal pension*, demonstrate a positive and significant influence on early retirement age, highlighting the influence of individual characteristics on retirement decisions. Individuals with a pension plan, for instance, tend to delay retirement to maximize their retirement benefits. This initial analysis reveals a consistent positive and significant association between holding financial assets and earlier retirement age across various asset categories. Importantly, this effect intensifies with the ownership of more sophisticated financial assets, corroborating the findings of Fichtner & Seligman (2018).

This aligns with previous research by Lusardi *et al.* (2014), who demonstrated that individuals with higher financial sophistication, often reflected in their ownership of more complex financial assets, tend to be better prepared for retirement. Similarly, Korankye *et al.* (2022) found a strong correlation between financial sophistication and improved retirement planning decisions, suggesting a potential influence on retirement age.

In Table 3.6 we delve into combinations of more sophisticated financial assets building upon Asher *et al*. (2017). This allows us to examine the impact of different risk profiles, including investments in bonds, PEPs, stocks, and options, on retirement planning. Recognizing the inherent trade-off between risk and return, we acknowledge that stocks, due to their higher volatility, are considered riskier than bonds, although they can offer greater potential returns (Spicer et al., 2016).

Table 3.6. Models for retirement age with financial assets combinations

	(6)	**(7)**	**(8)**
	Stock & Bond	**Stock & PEP**	**Stock, PEP & Bond**
Gender	-1.283***	-1.295***	-1.288***
	(0.000)	(0.000)	(0.000)
Education	-2.841***	-2.798***	-2.890***
	(0.000)	(0.000)	(0.000)
House Owner	-2.271***	-2.367***	-2.432***
	(0.000)	(0.000)	(0.000)
Marital Status	-3.479***	-3.485***	-3.517***
	(0.003)	(0.003)	(0.003)
Salary	-0.033*	-0.031*	-0.031*
	(0.056)	(0.075)	(0.069)
Work Over Spa	-4.747**	-4.801**	-4.788**
	(0.042)	(0.044)	(0.043)
Previous Personal Pension	5.104***	5.085***	5.097***
	(0.000)	(0.000)	(0.000)
Combinations of financial assets	-1.944***	-2.191***	-2.027***
	(0.000)	(0.000)	(0.000)
Constant	72.816***	72.725***	72.731***
	(0.000)	(0.000)	(0.000)
N	9,782	9,782	9,782

* p<0.10, ** p<0.05, *** p<0.01.

This necessitates a careful balancing act for retirement planning. Combinations involving PEPs, which offer diversification benefits, and options, as financial derivatives, can introduce complex risks into an investment portfolio. Our analysis investigates the influence of these combined investment options on earlier retirement planning, revealing a positive impact of diversification. This strategy allows individuals to anticipate their retirement age. Notably, the combination with the highest risk profile – stocks and PEPs – exhibits the most significant influence on retirement age. Consistent with previous analyses, the relationship with control variables remains similar.

This final analysis (Table 3.7) investigates the marginal effect of introducing higher-risk financial assets into individual portfolios. We specifically examine the impact of holding shares, options, and both jointly, aiming to understand how including riskier assets in retirement planning influences portfolio allocation decisions. Previous research highlights the crucial role of wealth accumulation through investment planning and retirement goal clarity in successful retirement preparation (Ketkaew *et al.*, 2019). The strong correlation between riskier financial assets and retirement planning emphasizes the need for informed decision-making in portfolio construction (Brown & Graf, 2013). Further, the positive relationship between riskier financial assets and retirement planning suggests these investments can significantly impact individuals' ability to plan for retirement effectively (Moure, 2015).

Our findings reveal that introducing shares produces a significant and positive marginal effect, exceeding the average impact of holding the entire portfolio. This indicates that stock ownership has a leveraged effect on retirement age. This effect intensifies when individuals introduce share options into their portfolios, with the impact being almost three times greater. Although the intensity is maintained when both shares and options are included (Table 3.7, last column), the marginal effect is slightly softened, aligning with expectations.

Table 3.7. Models for marginal effect on advanced financial assets

	(9)	**(10)**	**(11)**	**(12)**
	Advanced Financial Assets	**Advanced Financial Assets*Stocks**	**Advanced Financial Assets*Share Options**	**Advanced Financial Assets*Stock and Share Options**
Gender	-1.273***	-1.302***	-1.291***	-1.307***
	(0.000)	(0.000)	(0.000)	(0.000)
Education	-2.824***	-2.686***	-2.785***	-2.752***
	(0.000)	(0.000)	(0.000)	(0.000)
House Owner	-2.076***	-1.970***	-2.070***	-2.065***
	(0.000)	(0.000)	(0.000)	(0.000)
Marital Status	-3.476***	-3.414***	-3.338***	-3.332***
	(0.003)	(0.003)	(0.003)	(0.003)
Salary	-0.032*	-0.032*	-0.031*	-0.032*
	(0.063)	(0.067)	(0.056)	(0.053)
Work Over Spa	-4.707**	-4.669**	-4.621**	-4.649**
	(0.044)	(0.043)	(0.042)	(0.041)
Previous Personal Pension	5.146***	5.065***	5.049***	5.039***
	(0.000)	(0.000)	(0.000)	(0.000)
Advanced Financial Assets	-1.531***	-0.394***	-1.180***	-1.249***
	(0.000)	(0.006)	(0.000)	(0.000)
Advanced Financial Assets * Stocks		-1.953***		
		(0.000)		
Advanced Financial Assets * Share Options			-5.867***	
			(0.000)	
Advanced Financial Assets * Stock and Share Options				-6.470***
				(0.000)
Constant	73.060***	72.958***	72.983***	72.997***
	(0.000)	(0.000)	(0.000)	(0.000)
N	9,782	9,782	9,782	9,782

* p<0.10, ** p<0.05, *** p<0.01.

4. Conclusions

This chapter investigates the relationship between individuals' risk preferences, as reflected in their financial asset portfolios, and retirement age within a hybrid public-private pension system, exemplified by the English system. Utilizing the ELSA dataset, we constructed various financial asset portfolios and analyzed their impact on retirement age, controlling for relevant socio-demographic characteristics and other factors identified in the literature.

Our findings demonstrate a clear positive influence of financial asset holdings on retirement age, indicating an earlier retirement in such systems. Notably, significant differences emerge based on the risk profile of the assets, ranging from basic savings accounts to sophisticated share options. While the initial analysis of asset types, excluding diversification, did not reveal significant differences between assets with distinct risk profiles (e.g., bonds and stocks), the introduction of diversification analysis unveiled more nuanced results. Portfolios with riskier diversification strategies exhibited a more pronounced impact on retirement age, leading to earlier retirement.

Perhaps the most compelling finding relates to the marginal effect of introducing riskier assets. We observed a significant increase in the effect on retirement age when shares are included in the base portfolio, approximately 30% greater than the average effect. This impact triples when highly sophisticated assets, such as share options, are introduced. Our research confirms the positive impact of holding financial asset portfolios as a complementary factor to retirement planning and as a key driver for advancing retirement age within a public-private pension system like the English model.

Conclusions, Limitations, and Future Research Directions

Conclusions

This thesis has explored various aspects of financial behavior and retirement planning, with a particular focus on the role of homeownership and financial assets. Throughout our study, we have addressed several crucial issues that shed light on the complex interaction between financial knowledge, financial behavior, and retirement decisions.

Firstly, our bibliometric analysis of the field of financial behavior has revealed exponential growth in research on this topic over the past two decades. We have identified emerging trends, such as an increased focus on financial education and financial technology, which are shaping the research landscape. This analysis not only provides an overview of the current state of the field but also highlights potential areas for future research.

Regarding the relationship between financial knowledge and financial behavior, our findings suggest that homeownership acts as a significant moderating factor. We have discovered that while financial knowledge generally leads to better financial behavior, this effect is less pronounced among homeowners compared to renters. This implies that homeownership may provide a form of financial discipline that complements formal financial knowledge.

Our study on financial asset preferences and retirement age in the context of the UK's public-private pension system has yielded intriguing results. We have found a clear positive influence of financial asset holdings on retirement age, indicating earlier retirement in such systems. Notably, portfolios with riskier diversification strategies exhibited a more pronounced impact on retirement age, leading to earlier retirement. This finding underscores the importance of considering individuals' risk profiles when designing pension policies and financial education programs.

These results have significant implications for both policymakers and individuals. For policymakers, our findings underscore the need for policies that foster financial literacy but also recognize the role that asset ownership, especially housing, can play in financial

behavior. For individuals, our results highlight the importance of financial education and retirement planning, while also indicating how different investment strategies can influence retirement decisions.

Limitations

Despite our efforts to conduct a comprehensive analysis, we acknowledge several limitations in our study that should be taken into account when interpreting the results.

Firstly, our bibliometric analysis, while extensive, relied primarily on the Web of Science database. Although this is a respected source, it may not capture all relevant literature, especially works in languages other than English or non-indexed publications. This could have led to an incomplete representation of the field.

Regarding our study on financial knowledge and financial behavior, the cross-sectional nature of the data limits our ability to establish definitive causal relationships. Furthermore, while we focused on Spain, regional differences within the country might not be fully captured in our analysis.

Our study on financial asset preferences and retirement age was based on UK data, which may limit the generalizability of our findings to other contexts. The UK's unique pension system, with its mix of public and private provisions, may not be directly comparable to systems in other countries.

Moreover, while we used a variety of financial assets as a proxy for risk preferences, we acknowledge that this approach may not fully capture the complexity of individual risk attitudes. Investment decisions may be influenced by factors we were unable to measure directly, such as financial advice received or specific life events.

Finally, although our study spans a significant time period, rapid changes in the financial landscape, including the emergence of new financial technologies and the effects of global events such as the COVID-19 pandemic, may have introduced factors that our analysis could not fully capture.

Future Research Directions

These limitations, however, open up several promising avenues for future research. Firstly, it would be valuable to extend our analysis to other countries to examine how different pension systems and cultural contexts affect the relationship between financial knowledge, financial behavior, and retirement decisions.

A longitudinal study could provide a deeper understanding of how financial behavior and retirement decisions evolve over time in response to changes in financial knowledge and asset accumulation. This would also allow for a more robust analysis of causal relationships.

Future research could also benefit from a more detailed examination of how new financial technologies are influencing financial behavior and retirement decisions. This could include an analysis of how online investment platforms, budgeting apps, and cryptocurrencies are changing the way people interact with their finances.

Finally, given the growing importance of sustainability and ethical investing, it would be interesting to explore how these considerations are influencing individuals' financial and retirement decisions, especially among younger generations.

Conclusiones, Limitaciones y Futuras Líneas de Investigación

Conclusiones

Esta tesis explora varios aspectos del comportamiento financiero y la planificación de la jubilación, con un enfoque particular en el papel de la propiedad de vivienda y los activos financieros. A lo largo de nuestro estudio, hemos abordado varios temas cruciales que arrojan luz sobre la compleja interacción entre el conocimiento financiero, el comportamiento financiero y las decisiones de jubilación.

En primer lugar, nuestro análisis bibliométrico del campo del comportamiento financiero ha revelado un crecimiento exponencial en la investigación sobre este tema durante las últimas dos décadas. Hemos identificado tendencias emergentes, como un mayor enfoque en la educación y la tecnología financiera, que están moldeando el panorama de la investigación. Este análisis no solo proporciona una visión general del estado actual del campo, sino que también destaca áreas potenciales para futuras investigaciones.

En cuanto a la relación entre el conocimiento y el comportamiento financiero, nuestros hallazgos sugieren que la propiedad de vivienda actúa como un factor moderador significativo. Hemos descubierto que, si bien el conocimiento financiero generalmente conduce a un mejor comportamiento financiero, este efecto es menos pronunciado entre los propietarios de viviendas en comparación con los inquilinos. Esto implica que la propiedad de vivienda puede proporcionar una forma de disciplina financiera que complementa el conocimiento financiero formal.

Nuestro estudio sobre las preferencias de activos financieros y la edad de jubilación en el contexto del sistema de pensiones público-privado del Reino Unido ha arrojado resultados intrigantes. Hemos encontrado una clara influencia positiva de las tenencias de activos financieros en la edad de jubilación, indicando una jubilación más temprana en tales sistemas. Notablemente, las carteras con estrategias de diversificación más arriesgadas mostraron un impacto más pronunciado en la edad de jubilación, llevando a una jubilación más temprana. Este hallazgo subraya la importancia de considerar los

perfiles de riesgo de los individuos al diseñar políticas de pensiones y programas de educación financiera.

Estos resultados tienen implicaciones significativas tanto para los legisladores como para los individuos. Para los legisladores, nuestros hallazgos subrayan la necesidad de políticas que fomenten la alfabetización financiera pero también reconozcan el papel que la propiedad de activos, especialmente la vivienda, puede jugar en el comportamiento financiero. Para los individuos, nuestros resultados destacan la importancia de la educación financiera y la planificación de la jubilación, al tiempo que indican cómo diferentes estrategias de inversión pueden influir en las decisiones de jubilación.

Limitaciones

A pesar de nuestros esfuerzos por realizar un análisis exhaustivo, reconocemos varias limitaciones en nuestro estudio que deben considerarse al interpretar los resultados.

En primer lugar, nuestro análisis bibliométrico, aunque extenso, se basó principalmente en la base de datos Web of Science. Aunque esta es una fuente respetada, puede no capturar toda la literatura relevante, especialmente trabajos en idiomas diferentes al inglés o publicaciones no indexadas. Esto podría haber llevado a una representación incompleta del campo.

En cuanto a nuestro estudio sobre conocimiento y comportamiento financiero, la naturaleza transversal de los datos limita nuestra capacidad para establecer relaciones causales definitivas. Además, si bien nos centramos en España, las diferencias regionales dentro del país podrían no estar completamente capturadas en nuestro análisis.

Nuestro estudio sobre preferencias de activos financieros y edad de jubilación se basó en datos del Reino Unido, lo que puede limitar la generalización de nuestros hallazgos a otros contextos. El sistema de pensiones único del Reino Unido, con su mezcla de provisiones públicas y privadas, puede no ser directamente comparable a sistemas en otros países.

Además, si bien utilizamos una variedad de activos financieros como proxy para las preferencias de riesgo, reconocemos que este enfoque puede no capturar completamente la complejidad de las actitudes individuales hacia el riesgo. Las decisiones de inversión pueden estar influenciadas por factores que no pudimos medir directamente, como el

asesoramiento financiero recibido o eventos específicos de la vida.

Finalmente, aunque nuestro estudio abarca un período de tiempo significativo, los rápidos cambios en el panorama financiero, incluida la aparición de nuevas tecnologías financieras y los efectos de eventos globales como la pandemia de COVID-19, pueden haber introducido factores que nuestro análisis no pudo capturar completamente.

Futuras Líneas de Investigación

Sin embargo, estas limitaciones abren varias vías prometedoras para futuras investigaciones. En primer lugar, sería valioso extender nuestro análisis a otros países para examinar cómo diferentes sistemas de pensiones y contextos culturales afectan la relación entre el conocimiento financiero, el comportamiento financiero y las decisiones de jubilación.

Un estudio longitudinal podría proporcionar una comprensión más profunda de cómo el comportamiento financiero y las decisiones de jubilación evolucionan con el tiempo en respuesta a cambios en el conocimiento financiero y la acumulación de activos. Esto también permitiría un análisis más robusto de las relaciones causales.

La investigación futura también podría beneficiarse de un examen más detallado de cómo las nuevas tecnologías financieras están influyendo en el comportamiento financiero y las decisiones de jubilación. Esto podría incluir un análisis de cómo las plataformas de inversión en línea, las aplicaciones de presupuesto y las criptomonedas están cambiando la forma en que las personas interactúan con sus finanzas.

Finalmente, dada la creciente importancia de la sostenibilidad y la inversión ética, sería interesante explorar cómo estas consideraciones están influyendo en las decisiones financieras y de jubilación de los individuos, especialmente entre las generaciones más jóvenes.

Appendix A

Appendix Chapter 2

A.1. Financial Literacy Score

Financial behavior, Financial Knowledge and Financial Attitude scores created as in OECD (2018). The second column shows ECF2016 question numbers and below [in brackets] the OECD/INFE toolkit equivalence.

Panel A: Financial Behavior Score [0-9 range]

Information collected	Question #	Score contribution
Day to day financial decisions of the household. Various behaviors that are related to budgeting.	d0200; j0100 [QF1; QF2]	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.
Various forms of active saving.	b1000x [QF3]	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.
Approach taken to making ends meet.	j0200; j0300x [QF11 QF12]	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.
Financial product awareness. Product holding. Product choice. Most recent product. How the most recent product choice was made. Question to explore aspects of the importance of the company.	b0600, b0700x [Qprod1_a; Qprod1_b; Qprod1_c; Qprod1_d; Qprod2; Qprod2_a; Qprod3_INT; Qprod4]	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. Qprod_D1: Tried to compare across providers taking value of: 1 if variable Qprod2 is equal to 1 or 4 (I considered several or I looked around but there were no others); 0 otherwise. Note that 0 includes no recent product choice/not applicable. 2. Qprod_D2: Sought information or advice taking values: 2 if yes at any of Qprod3_1 or Qprod3_2 (Best-buy guidance / Recommendation from independent financial adviser);

Short question about the information that influenced the most recent product choice decision. Information about issues related to financial product use.		1 if yes at any of Qprod3_3, Qprod3_4, Qprod3_5, or Qprod3_6 (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 points if CProd_D2 =2. The value of 2 indicates Used independent info or advice. 1 point if CProd_D1 =1 or CProd_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).
Various statements that are designed to indicate attitudes, behaviors and subjective wellbeing.	d0106; d0107; d0101; d0104 [QS1; QS2]	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. 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.

Panel B: Financial Knowledge Score [0-7 range]

Information collected	Question #	Score contribution
Impact of inflation on spending power.	e0600s [QK3]	1 point for correct responses [c, unless the country indicates otherwise; or d, if mentioned spontaneously]. 0 in all other cases.
Identification of interest.	e0700s [QK4]	1 point for correct response [0]. 0 in all other cases.
Simple interest calculation.	e0800s [QK5]	1 point for correct response [102]. 0 in all other cases.
Understanding the implication of compounding.	e0900s [QK6]	1 point 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.
Relationship between risk and reward.	e1001s [QK7_1]	1 point for a correct response [1/True]. 0 in all other cases.
Definition of inflation.	e1002s [QK7_2]	1 point for a correct response [1/True]. 0 in all other cases.
Risk diversification.	e1003s [QK7_3]	1 point for a correct response [1/True]. 0 in all other cases.

Panel C: Financial Attitude Score [1-5 range]

Information collected	Question #	Score contribution
Various statements that are designed to indicate attitudes, behaviors and subjective wellbeing.	d0102 [QS1; QS3]	1/3 of the answers in the following three questions ranged from 1 to 5: I find it more satisfying to spend money than to save it for the long term. Money is there to be spent. 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).

Appendix B

Appendix Chapter 3

B.1. Financial asset classification ELSA dataset

1. *Current Account at a bank, building society or elsewhere:* It is a bank account that allows for daily transactions such as deposits, withdrawals, payments, and transfers. Generally, they do not earn interest but offer liquidity and accessibility for day-to-day money.
2. *Savings Account at a bank, building society or elsewhere*: It is an account designed for saving money and usually earns interest on the deposited balance. They often have conditions such as a minimum balance or withdrawal limits but offer security and some profitability.
3. *TESSA/TOISA (in 1999 these were converted to cash ISA):* TESSA (Tax-Exempt Special Savings Account) and TOISA (Tax-Exempt Special Savings Account) were special savings accounts in the UK that offered tax benefits. In 1999, these accounts were converted into Cash ISA, which are savings accounts where the generated interest is tax-free.
4. *ISA (known as NISA from 2014):* ISA (Individual Savings Account) is a savings or investment account that allows individuals to save or invest money tax-free up to certain annual limits. Starting from 2014, it was known as NISA (New Individual Savings Account), which offered higher investment limits and greater flexibility.
5. *Premium Bonds:* These are bonds issued by the UK Government that do not pay interest but offer the chance to win prizes in monthly draws. Bondholders participate in the draws and can win tax-free cash prizes.
6. *National Savings Accounts or Certificates:* These are savings products offered by National Savings and Investments (NSandI), a UK government agency. They may include savings accounts or savings certificates that offer guaranteed returns by the government.
7. *PEP* (in 1999 these were converted to stocks and shares ISA): PEP (Personal Equity Plan) was an investment plan in stocks that allowed UK investors to invest in stocks and other assets with tax benefits. In 1999, these plans were converted into Stocks and Shares ISA, which offered the same tax advantage but with a wider range of investment options.
8. *Stocks and / or Shares:* These represent partial ownership of a company. Investors who own shares of a company own a portion of that company and have the right to participate in its profits and decisions.
9. *Share Options / Employee share ownership:* These are programs that offer employees the opportunity to purchase shares of the company they work for, often at discounted prices or with tax incentives.
10. *Share clubs:* These are groups of individuals who come together to collectively

invest in the stock market. Members contribute funds that are then used to buy and sell shares according to the group's decisions.

11. *Unit or Investment Trusts:* These are collective investment vehicles that pool money from multiple investors to invest in a diversified portfolio of assets, such as stocks, bonds, or other securities. These funds can be actively managed by fund managers or follow passive strategies.
12. *Bonds and Gilts (government or corporate):* These are debt instruments issued by governments or companies. Government bonds (gilts in the UK) are debt issued by the government, while corporate bonds are debt issued by companies. Investors receive periodic interest payments and the return of invested capital upon maturity.
13. *Other Savings or Investments:* This category may include a variety of unspecified financial assets, such as pension funds, real estate, art, precious metals, among others.

B.2. Financial asset categories based on ELSA Dataset

Interest variables	**Code in ELSA Dataset**
Savings and/or Current Account	1. Current Account at a bank, building society or elsewhere. 2. Savings account at a bank, building society or elsewhere.
Bond	5. Premium Bonds. 6. National Savings Accounts or Certificates. 12. Bonds and Gilts (government or corporate).
PEP	7. Personal Equity Plan (PEP).
Stocks	8. Stocks and / or Shares.
Share Options	9. Share Options / Employee share ownership.

References

Acedo, F. J., Barroso, C., & Galan, J. L. (2006). The resource-based theory: dissemination and main trends. *Strategic Management Journal*, *27*(7), 621-636.

Adami, R., & Gough, O. (2008). Pension reforms and saving for retirement: comparing the United Kingdom and Italy. *Policy Studies*, *29*(2), 119-135.

Agustí, M. A., & Orta-Pérez, M. (2023). Big data and artificial intelligence in the fields of accounting and auditing: a bibliometric analysis. *Spanish Journal of Finance and Accounting/Revista Española de Financiación y Contabilidad*, *52*(3), 412-438.

Al-Bahrani, A., Weathers, J., & Patel, D. (2019). Racial differences in the returns to financial literacy education. *Journal of Consumer Affairs*, *53*(2), 572-599.

Allgood, S., & Walstad, W. B. (2016). The effects of perceived and actual financial literacy on financial behaviors. *Economic Inquiry*, *54*(1), 675-697.

Aristei, D., & Gallo, M. (2022). Assessing gender gaps in financial knowledge and self-confidence: Evidence from international data. *Finance Research Letters*, *46*, 102200.

Arkani, S., & Gough, O. (2007). The impact of occupational pensions on retirement age. *Journal of Social Policy*, *36*(2), 297-318.

Asher, A., Meyricke, R., Thorp, S., & Wu, S. (2017). Age pensioner decumulation: Responses to incentives, uncertainty and family need. *Australian Journal of Management*, *42*(4), 583-607.

Baker, H. K., & Ricciardi, V. (2014). *Investor behavior: The psychology of financial planning and investing*. John Wiley & Sons.

Baker, M., & Wurgler, J. (2013). Behavioral corporate finance: An updated survey. In *Handbook of the Economics of Finance* (Vol. 2, pp. 357-424). Elsevier.

Balloch A., Nicolae A. & Philip, D. (2015). Stock market literacy, trust, and participation. *Review of Finance*, 19(5), 1925–1963.

Banco de España (2021). *The Survey of Financial Competences (ECF) 2016. User Guide.* Banco de España, Madrid.

Bangun, B. P. P., & Kurniyati, N. N. (2022). The role of financial behavior in mediation the influence of financial literacy and financial self-efficacy on financial will being. *International Journal of Economics and Management Research*, *1*(3), 166-176.

Banks, J., & Crawford, R. (2022). Managing retirement incomes. *Annual Review of Economics*, *14*, 181-204.

Banks, J., & Oldfield, Z. (2007). Understanding pensions: Cognitive function, numerical ability and retirement saving. *Fiscal studies*, *28*(2), 143-170.

Banks, J., Crawford, R., & Tetlow, G. (2015). Annuity choices and income drawdown: evidence from the decumulation phase of defined contribution pensions in England. *Journal of Pension Economics and Finance*, *14*(4), 412-438.

Banks, J., o'Dea, C., & Oldfield, Z. (2010). Cognitive function, numeracy and retirement saving trajectories. *The Economic Journal*, *120*(548), F381-F410.

Barberis, N. (2018). Psychology-based models of asset prices and trading volume. In *Handbook of behavioral economics: applications and foundations 1* (Vol. 1, pp. 79-175). North-Holland.

Barberis, N., & Thaler, R. (2003). A survey of behavioral finance. *Handbook of the Economics of Finance*, *1*, 1053-1128.

Behrman, J. R., Mitchell, O. S., Soo, C. K., & Bravo, D. (2012). How financial literacy affects household wealth accumulation. *American Economic Review*, *102*(3), 300-304.

Benartzi, S., & Thaler, R. H. (2013). Behavioral economics and the retirement savings crisis. *Science*, *339*(6124), 1152-1153.

Blanchett, D. M. (2018). The impact of retirement age uncertainty on retirement outcomes.

Blažienė, I. (2022). The Impact of Household Wealth and Other Factors on Retirement Saving Behaviour in an Ageing Society: The Case of Lithuania. *Organizacijų vadyba: sisteminiai tyrimai*, (88), 31-53.

Blundell, R., Meghir, C., & Smith, S. (2002). Pension Incentives and the Pattern of Early Retirement. *The Economic Journal*, *112* (478), 798365.

Boado-Penas, M. C., Nave, J. M., & Toscano, D. (2023). Financial Market Participation and Retirement Age of the UK Population. *International Journal of Financial Studies*, 11(1), 37.

Boisclair, D., Lusardi, A., & Michaud, P. C. (2017). Financial literacy and retirement planning in Canada. *Journal of pension economics & finance*, *16*(3), 277-296.

Börner, K., Chen, C., & Boyack, K. W. (2003). Visualizing knowledge domains. *Annual review of information science and technology*, *37*(1), 179-255.

Bover, O., Hospido, L., & Villanueva, E. (2018). *Survey of financial competences 2016: Main results.* Banco de España, Madrid.

Bover, O., Hospido, L., & Villanueva, E. (2019). The Survey of Financial Competences (ECF): Description and methods of the 2016 wave. *Occasional Paper Series | Banco de España,* 1909.

Boyack, K. W., & Klavans, R. (2010). Co-citation analysis, bibliographic coupling, and direct citation: Which citation approach represents the research front most accurately?. *Journal of the American Society for information Science and Technology*, *61*(12), 2389-2404.

Bridgen, P., & Meyer, T. (2005). When do benevolent capitalists change their mind?

Explaining the retrenchment of defined-benefit pensions in Britain. *Social Policy and Administration*, *39*(7), 764-785.

Bridgen, P., & Meyer, T. (2018). Individualisation reversed: the cross-class politics of social regulation in the UK's public/private pension mix. *Transfer: European Review of Labour and Research*, *24*(1), 25-41.

Brown, J. R., Ivkovich, Z., Smith, P. A., & Weisbenner, S. (2004). The geography of stock marketparticipation: The influence of communities and local firms. Nber Working Paper No. 10235. *National Bureau of Economic Research.*

Brown, M., & Graf, R. (2013). Financial literacy and retirement planning in Switzerland. *Numeracy*, *6*(2), 6.

Bütler, M., Peijnenburg, K., & Staubli, S. (2017). How much do means-tested benefits reduce the demand for annuities? *Journal of Pension Economics and Finance*, 16(4), 419-449.

Callon, M., Courtial, J. P., & Laville, F. (1991). Co-word analysis as a tool for describing the network of interactions between basic and technological research: The case of polymer chemsitry. *Scientometrics*, *22*, 155-205.

Campbell, J.Y. (2006). Household finance. *The Journal of Finance*, *61*(4), 1553-1604.

Casillas, J., & Acedo, F. (2007). Evolution of the intellectual structure of family business literature: A bibliometric study of FBR. *Family Business Review*, *20*(2), 141-162.

Choung, Y., Chatterjee, S., & Pak, T. Y. (2023). Digital financial literacy and financial well-being. *Finance Research Letters*, *58*, 104438.

Christelis, D., Dobrescu, L. I., & Motta, A. (2020). Early life conditions and financial risk-taking in older age. *The Journal of the Economics of Ageing*, *17*, 100266.

Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of informetrics*, *5*(1), 146-166.

Costa, D. F., Carvalho, F. D. M., & Moreira, B. C. D. M. (2019). Behavioral economics and behavioral finance: A bibliometric analysis of the scientific fields. *Journal of Economic Surveys*, *33*(1), 3-24.

Crawford, R., & O'Dea, C. (2020). Household portfolios and financial preparedness for retirement. *Quantitative Economics*, 11(2), 637-670.

Cupák, A., Fessler, P., & Schneebaum, A. (2021). Gender differences in risky asset behavior: The importance of self-confidence and financial literacy. *Finance Research Letters*, 42, 101880.

De Bondt, W. F., Muradoglu, Y. G., Shefrin, H., & Staikouras, S. K. (2008). Behavioral finance: Quo vadis?. *Journal of Applied Finance (Formerly Financial Practice and Education)*, *18*(2).

Disney, R., Emmerson, C., & Tetlow, G. (2009). What is a public sector pension

worth?. *The Economic Journal*, *119*(541), F517-F535.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285-296.

Eck, N. J. V., & Waltman, L. (2009). How to normalize cooccurrence data? An analysis of some well-known similarity measures. *Journal of the American society for information science and technology*, *60*(8), 1635-1651.

Ellili, N. O. D. (2022). Bibliometric analysis and systematic review of environmental, social, and governance disclosure papers: Current topics and recommendations for future research. *Environmental Research Communications*, *4*(9), 092001.

Eurostat (2022). *Housing in Europe - 2022 interactive edition.* European Union, Luxembourg.

Fagereng, A., Gottlieb, C., & Guiso, L. (2017). Asset market participation and portfolio choice over the life-cycle. *The Journal of Finance*, *72*(2), 705-750.

Fernandes, D., Lynch Jr, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management Science*, *60*(8), 1861-1883.

Fichtner, J., & Seligman, J. (2018). Household reactions and strategic responses to retirement wealth building and decumulation in a Low interest rate environment. In Mitchell O. (ed.), *Retirement Saving and Decumulation in A Persistent Low-Return Environment.* UK: Oxford University Press, 131–162.

Fisch, J. E., & Seligman, J.S. (2022). Trust, financial literacy, and financial market participation. *Journal of Pension Economics and Finance*, 21(4), 634-664.

Fischer, J. A., & Sousa-Poza, A. (2006). The institutional determinants of early retirement in Europe. *University of St. Gallen Economics Discussion Paper*, (2006-08).

Fisher, G. G., Chaffee, D. S., & Sonnega, A. (2016). Retirement timing: A review and recommendations for future research. *Work, Aging and Retirement*, 2(2), 230-261.

Foster, J. (2018). Active ageing, pensions and retirement in the UK. *Journal of population ageing*, 11(2), 117-132.

Garcia, M. T. M., & Marques, P. D. C. V. (2017). Ownership of individual retirement accounts–an empirical analysis based on SHARE. *International review of applied economics*, *31*(1), 69-82.

Garg, N., & Singh, S. (2018). Financial literacy among youth. *International Journal of Social Economics*, *45*(1), 173-186.

Ginn, J., & MacIntyre, K. (2013). UK pension reforms: is gender still an issue? *Social Policy and Society*, *12*(1), 91-103.

Goodell, J. W. (2020). COVID-19 and finance: Agendas for future research. *Finance research letters*, *35*, 101512.

Goyal, K., & Kumar, S. (2021). Financial literacy: A systematic review and bibliometric analysis. *International Journal of Consumer Studies*, *45*(1), 80-105.

Grohmann, A. (2017). Financial literacy and financial behavior: Evidence from the emerging Asian middle class. *Pacific-Basin Finance Journal*, *48*, 129-143.

Guleria, D., & Kaur, G. (2021). Bibliometric analysis of ecopreneurship using VOSviewer and RStudio Bibliometrix, 1989–2019. *Library Hi Tech*, *39*(4), 1001-1024.

Gustman, A. L., & Steinmeier, T. L. (2005). Retirement, saving, benefit claiming and solvency under a partial system of voluntary personal accounts. *Michigan Retirement Research Center Research* Paper No. WP, 105.

Gustman, Alan L., Thomas L. Steinmeier, & Nahid Tabatabai. (2010). "What the Stock Market Decline Means for the Financial Security and Retirement Choices of the Near-Retirement Population." *Journal of Economic Perspectives*, 24 (1): 161-82.

Hasler, A., & Lusardi, A. (2017). The gender gap in financial literacy: A global perspective. *Global Financial Literacy Excellence Center, The George Washington University School of Business*, 2-16.

Hershey, D. A., Jacobs-Lawson, J. M., & Austin, J. T. (2013). 26 Effective Financial Planning for Retirement. *The Oxford handbook of retirement*, 402.

Hira, T.K. (2012). Promoting sustainable financial behaviour: Implications for education and research. *International Journal of Consumer Studies*, *36*(5), 502-507.

Hirshleifer, D. (2015). Behavioral finance. *Annual Review of Financial Economics*, *7*(1), 133-159.

Huston, S. (2010). Measuring financial literacy. *Journal of Consumer Affairs, 44*(2), 296-316.

Hwang, H., & Park, H. (2022). The relationships of financial literacy with both financial behavior and financial well-being: Meta-analyses based on the selective literature review. *Journal of Consumer Affairs, 57*(1), 222-244.

Ingale, K. K., & Paluri, R. A. (2022). Financial literacy and financial behaviour: A bibliometric analysis. *Review of Behavioral Finance*, *14*(1), 130-154.

Jain, J., Walia, N., Singh, S., & Jain, E. (2021). Mapping the field of behavioural biases: A literature review using bibliometric analysis. *Management Review Quarterly*, 1-33.

Jedynak, T. (2022). Does the Formulation of the Decision Problem Affect Retirement? Framing Effect and Planned Retirement Age. *International Journal of Environmental Research and Public Health*, *19*(4), 1977.

Ketkaew, C., Van Wouwe, M., Vichitthamaros, P., & Teerawanviwat, D. (2019). The effect of expected income on wealth accumulation and retirement contribution of Thai wageworkers. *SAGE Open*, *9*(4), 2158244019898247.

Klapper, L., Lusardi, A., & Panos, G. A. (2013). Financial literacy and its consequences: Evidence from Russia during the financial crisis. *Journal of Banking & Finance*, *37*(10),

3904-3923

Korankye, T., Pearson, B., & Salehi, H. (2023). The nexus between investor sophistication and annuity insurance ownership: evidence from FINRA's National Financial Capability Study. *Managerial Finance*, *49*(2), 398-419.

Kung, C. S., Zhu, J., Zaninotto, P., & Steptoe, A. (2023). Changes in retirement plans in the English older population during the COVID-19 pandemic: The roles of health factors and financial insecurity. *European Journal of Ageing*, *20*(1), 22.

Kuroki, M. (2019). Are American homeowners more satisfied with their lives than renters? *International Journal of Consumer Studies*, *43*(6), 536-548.

Li, Z., & Wang, K. (2020, January). Investigation and Research on the Financial Literacy of Rural Residents in Wuling Mountainous Area Against the Background of Rural Revitalization. In *5th International Conference on Economics, Management, Law and Education (EMLE 2019)* (pp. 122-126). Atlantis Press.

Locke, J., & Perera, H. (2001). The intellectual structure of international accounting in the early 1990s. *The International Journal of Accounting*, *36*(2), 223-249.

Lusardi, A., & Mitchell, O. S. (2011). *Financial literacy and planning: Implications for retirement wellbeing* (No. w17078). National Bureau of Economic Research.

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *American Economic Journal: Journal of Economic Literature*, *52*(1), 5-44.

Lusardi, A., Mitchell, O., & Curto, V. (2014). Financial literacy and financial sophistication in the older population. *Journal of Pension Economics and Finance*, 13(4), 347-366.

Martynov, A., & Schepker, D. J. (2017). Risk preferences and asset ownership: Integrating prospect theory and transaction cost economics. *Managerial and Decision Economics*, *38*(2), 125-143.

Moral-Muñoz, J. A., Herrera-Viedma, E., Santisteban-Espejo, A., & Cobo, M. J. (2020). Software tools for conducting bibliometric analysis in science: An up-to-date review. *Profesional de la Información*, *29*(1).

Morgan, P. J., & Trinh, L. Q. (2019). Determinants and impacts of financial literacy in Cambodia and Viet Nam. *Journal of Risk and Financial Management*, *12*(1), 19.

Moure, N. G. (2016). Financial literacy and retirement planning in Chile. *Journal of Pension Economics & Finance*, *15*(2), 203-223.

Mutlu, Ü., & Özer, G. (2022). The moderator effect of financial literacy on the relationship between locus of control and financial behavior. *Kybernetes*, *51*(3), 1114-1126.

Nave, J. M., Oliva, L., & Toscano, D. (2023). Financial knowledge and financial behaviour: The moderating role of home ownership. *Finance Research Letters, 57*, 104208.

Norris, M., & Oppenheim, C. (2007). Comparing alternatives to the Web of Science for coverage of the social sciences' literature. *Journal of Informetrics*, *1*(2), 161-169.

OECD (2018). *OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion.* OECD, Paris.

Oyewola, D. O., & Dada, E. G. (2022). Exploring machine learning: a scientometrics approach using bibliometrix and VOSviewer. *SN Applied Sciences*, *4*(5), 143.

Panos, G. A., & Wilson, J. O. (2020). Financial literacy and responsible finance in the FinTech era: capabilities and challenges. *The European Journal of Finance*, *26*(4-5), 297-301.

Peng, G., Liu, F., Lu, W., Liao, K., Tang, C., & Zhu, L. (2018). A spatial-temporal analysis of financial literacy in United States of America. *Finance Research Letters*, *26*, 56-62.

Potrich, A., & Vieira, K. (2018). Demystifying financial literacy: A behavioral perspective analysis. *Management Research Review, 41*(9), 1047-1068.

Price, D. J. (1965). Networks of scientific papers. *Science, 149*(3683), 510-515.

Purwidianti, W., Tubastuvi, N., Darmawan, A., & Rahmawati, I. Y. (2022, January). Does Financial Behavior Mediate The Relationship Between Financial Literacy and Financial Experience Towards Financial Performance of Small Businesses?. In *International Conference on Sustainable Innovation Track Accounting and Management Sciences (ICOSIAMS 2021)* (pp. 235-241). Atlantis Press.

Putri, M. D. P. W., Xu, C., & Akwetteh, L. N. (2020). Financial behavior during COVID-19: Cognitive errors that can define financial future. *Open Journal of Social Sciences*, *8*(10), 259.

Qian, Y., Tan, W., & Wu, J. (2024). Household financial literacy and retirement planning in rural China. *International Review of Financial Analysis*, 103130.

Radl, J. (2013). Labour market exit and social stratification in Western Europe: the effects of social class and gender on the timing of retirement. *European Sociological Review*, *29*(3), 654-668.

Ramos-Rodríguez, A. R., & Ruíz-Navarro, J. (2004). Changes in the intellectual structure of strategic management research: A bibliometric study of the Strategic Management Journal, 1980–2000. *Strategic Management Journal*, *25*(10), 981-1004.

Razen, M., Huber, J., Hueber, L., Kirchler, M., & Stefan, M. (2021). Financial literacy, economic preferences, and adolescents' field behavior. *Finance Research Letters*, *40*, 101728.

Robb, C. A., & Woodyard, A. (2011). Financial knowledge and best practice behavior. *Journal of Financial Counseling and Planning*, *22*(1).

Rossi, M. (2009). Examining the interaction between saving and contributions to personal pension plans: evidence from the BHPS. *Oxford Bulletin of Economics and Statistics*, *71*(2), 253-271.

Schmeiser, M. D., & Seligman, J. S. (2013). Using the right yardstick: Assessing financial literacy measures by way of financial well-being. *Journal of Consumer Affairs*, *47*(2), 243-262.

Sefton, T., Evandrou, M., Falkingham, J., & Vlachantoni, A. (2011). The relationship between women's work histories and incomes in later life in the UK, US and West Germany. *Journal of European Social Policy*, *21*(1), 20-36.

Sekita, S., Kakkar, V., & Ogaki, M. (2022). Wealth, Financial Literacy and Behavioral Biases in Japan: the Effects of Various Types of Financial Literacy. *Journal of the Japanese and International Economies*, *64*, 101190.

Setyorini, N., Indiworo, R., & Sutrisno, S. (2021). The role financial literacy and financial planning to increase financial resilience: Household behaviour as mediating variable. *Media Ekonomi Dan Manajemen, 36*(2), 243.

Shefrin, H. (2015). How psychological pitfalls generated the global financial crisis1. In *The Routledge companion to strategic risk management* (pp. 269-295). Routledge.

Shim, S., Xiao, J. J., Barber, B. L., & Lyons, A. C. (2009). Pathways to life success: A conceptual model of financial well-being for young adults. *Journal of Applied Developmental Psychology*, *30*(6), 708-723.

Singh, V. K., Singh, P., Karmakar, M., Leta, J., & Mayr, P. (2021). The journal coverage of Web of Science, Scopus and Dimensions: A comparative analysis. *Scientometrics*, *126*, 5113-5142.

Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for information Science*, *24*(4), 265-269.

Sorgente, A., & Lanz, M. (2019). The multidimensional subjective financial well-being scale for emerging adults: Development and validation studies. *International Journal of Behavioral Development*, *43*(5), 466-478.

Spicer, A., Stavrunova, O., & Thorp, S. (2016). How portfolios evolve after retirement: evidence from australia. *Economic Record*, 92(297), 241-267.

StataCorp L.L.C. (2021). *Stata Extended Regression Models Reference Manual - Release 17.* Stata Press, Texas.

Statman, M. (2019). *Behavioral finance: The second generation*. CFA Institute Research Foundation.

Stolper, O. A., & Walter, A. (2017). Financial literacy, financial advice, and financial behavior. *Journal of Business Economics*, *87*, 581-643.

Thaler, R. H. (2015). *Misbehaving: The making of behavioral economics*. WW Norton & Company.

Thaler, R. H. (2016). Behavioral economics: Past, present, and future. *American Economic Review*, *106*(7), 1577-1600.

Thomas, A., & Spataro, L. (2016). The effects of pension funds on markets performance: A review. *Journal of Economic Surveys*, *30*(1), 1-33.

Van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market

participation. *Journal of Financial Economics*, *101*(2), 449-472.

Vestman, R. (2019). Limited stock market participation among renters and homeowners. *The Review of Financial Studies*, *32*(4), 1494-1535.

Wang, M., Henkens, K., & Van Solinge, H. (2011). Retirement adjustment: A review of theoretical and empirical advancements. *American Psychologist*, *66*(3), 204.

Warmath, D. (2021). Financial literacy and financial well-being. In *The Routledge handbook of financial literacy* (pp. 505-516). Routledge.

White, H. D., & Griffith, B. C. (1981). Author cocitation: A literature measure of intellectual structure. *Journal of the American Society for information Science*, *32*(3), 163-171.

Xiao, J. J., & O'Neill, B. (2016). Consumer financial education and financial capability. *International Journal of Consumer Studies*, *40*(6), 712-721.

Xiao, J. J., Chen, C., & Sun, L. (2015). Age differences in consumer financial capability. *International Journal of Consumer Studies*, *39*(4), 387-395.

Xiao, J., & Porto, N. (2017). Financial education and financial satisfaction. *The International Journal of Bank Marketing, 35*(5), 805-817.

Xiao, J.J., Ahn, S.Y., Serido, J., & Shim, S. (2014). Earlier financial literacy and later financial behaviour of college students. *International Journal of Consumer Studies*, *38*(6), 593-601.

Xu, N., Shi, J., Rong, Z., & Yuan, Y. (2020). Financial literacy and formal credit accessibility: Evidence from informal businesses in China. *Finance Research Letters*, *36*, 101327.

Xu, S., Yang, Z., Ali, S., Li, Y., & Cui, J. (2022). Does financial literacy affect household financial behavior? The role of limited attention. *Frontiers in Psychology, 13*.

Xu, Y., Johnson, C., Bartholomae, S., O'Neill, B., & Gutter, M. S. (2015). Homeownership among millennials: The deferred American dream?. *Family and Consumer Sciences Research Journal*, *44*(2), 201-212.

Xue, R., Gepp, A., O'Neill, T. J., Stern, S., & Vanstone, B. J. (2020). Financial well-being amongst elderly Australians: the role of consumption patterns and financial literacy. *Accounting & Finance*, *60*(4), 4361-4386.

Yamori, N., & Ueyama, H. (2022). Financial Literacy and Low Stock Market Participation of Japanese Households. *Finance Research Letters*, *44*, 102074.

Yeh, T. M., & Ling, Y. (2022). Confidence in Financial Literacy, Stock Market Participation, and Retirement Planning. *Journal of Family and Economic Issues*, 43(1), 169-186.

Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, *18*(3), 429-472.