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## Behavioral issues in retirement savings

Muhammad Waqar Akhtar

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# UNIVERSITÉ CLERMONT AUVERGNE

École Universitaire de Management  
École Doctorale des Sciences Économiques, Juridiques, Politiques et de Gestion  
Clermont Recherche Management (CleRMa)

Sujet de la thèse :

## **Behavioral Issues in Retirement Savings**

Thèse présentée et soutenue publiquement le 02 juin 2023,  
Pour l'obtention du titre de

DOCTEUR EN SCIENCES DE GESTION

Par

**Muhammad Waqar AKHTAR**

**devant le jury composé de:**

Directeur de thèse	<b>Benjamin WILLIAMS</b> Professeur, Université Clermont Auvergne
Directeur de thèse	<b>Kateřina STRÁŽNICKÁ</b> Maître de Conférences, Université Clermont Auvergne
Rapporteur	<b>Yamina TADJEDDINE</b> Professeur, Université de Lorraine
Rapporteur	<b>Fabrice HERVE</b> Professeur, Université de Bourgogne
Suffragant	<b>François AUBERT</b> Professeur, Université Clermont Auvergne



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*L'université n'entend donner aucune approbation ni improbation aux opinions émises dans les thèses ; ces opinions doivent être considérées comme propres à leurs auteurs.*

## DEDICATION

*I would like to dedicate this thesis to my late father, whose love and support inspired me to pursue my academic dreams. His guidance and encouragement helped me overcome many obstacles and achieve this significant milestone. Although he is no longer with me, his memory will continue to inspire and motivate me in all aspects of my life. This thesis is a tribute to his legacy and the profound impact he had on my journey.*

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## **ABSTRACT**

This PhD thesis investigates the behavioral aspects of retirement savings, with a focus on three empirical chapters. The research extends the existing literature by examining the impact of financial literacy on retirement savings, comparing countries with different levels of financial development. Additionally, the study explores the role of personality traits in shaping savings behavior, using large-scale data analysis. A unique contribution of this research is the combination of micro and macro data to investigate the relationship between these factors and retirement savings. The study examines how investor protection and an individual's risk attitude influence their savings behavior. The primary objective of this thesis is to investigate thoroughly individuals' behavior towards their savings goals for post-retirement life, highlighting the important role played by financial literacy and personality traits in this process.

The first chapter of our thesis examines the relationship between financial literacy and retirement savings, using data from the Household Finance and Consumption Survey (HFCS). To analyze the impact of financial literacy on savings behavior, the study focuses on Luxembourg and Slovakia, which have different levels of financial development. The findings of our research reveal that the level of financial literacy among the population of Luxembourg is higher as compared to that of Slovakia. The empirical analysis indicates that financial literacy is positively associated with retirement savings in Luxembourg, while no significant relationship is found between financial literacy and savings in Slovakia. These findings contribute to a better understanding of the role of financial literacy in retirement savings behavior and have important implications for policymakers.

The second chapter of our thesis investigates the impact of the big five personality traits on individuals' savings behavior. The big five personality traits, including Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, are widely recognized by psychologists as fundamental dimensions that shape human behavior. The study utilizes data from the SHARE database and covers a sample of 27 European countries. The results suggest that personality traits significantly influence savings behavior, and in particular, the traits of Openness and Agreeableness have a positive impact on savings behavior. The findings of this chapter provide important insights into the role of personality traits in retirement savings and have practical implications for financial planners and advisors.

The third and final chapter of the thesis examines the relationship between Investor Protection, Investment Attitude, and Savings Behavior. The study investigates whether investor protection can play an important role in retirement savings behavior among households and whether it can help individuals adopt a more favorable risk attitude towards retirement savings. The analysis focuses on the impact of investor protection and risk attitude on savings behavior and the interaction between the two factors. The study utilizes data from the World Bank for investor protection and from the SHARE database for household data. The results indicate a significant relationship between the strength of investor protection, an individual's risk attitude, and retirement savings behavior. These findings have important implications for policymakers and financial advisors in designing retirement savings schemes that consider the role of investor protection and risk attitude.

Our thesis focuses on retirement savings, a critical area of research due to its impact on financial security. We examine the impact of financial literacy, personality traits, and investor protection on savings behavior. Our findings provide valuable insights for policymakers and financial practitioners. These factors are essential considerations in understanding retirement savings behavior. Policymakers can use our findings to design effective retirement savings policies and programs. The research also helps evaluate the effectiveness of existing policies. By comparing results, policymakers can determine which programs work best and this can lead to expanding effective policies and programs.

**Keywords:** Retirement Savings, Financial Literacy, Personality Traits, Investor Protection, Investment Attitude

## RÉSUMÉ

Cette thèse de doctorat examine les aspects comportementaux de l'épargne-retraite, en se concentrant sur trois chapitres empiriques. La recherche étend la littérature existante en examinant l'impact de la littératie financière sur l'épargne-retraite, en comparant les pays avec différents niveaux de développement financier. De plus, l'étude explore le rôle des traits de personnalité dans la formation du comportement d'épargne, en utilisant une analyse de données à grande échelle. Une contribution unique de cette recherche est la combinaison de données micro et macro pour étudier la relation entre ces facteurs et l'épargne-retraite. L'étude examine comment la protection des investisseurs et l'attitude face au risque d'un individu influencent leur comportement d'épargne. L'objectif principal de cette thèse est d'étudier en profondeur le comportement des individus envers leurs objectifs d'épargne pour la vie post-retraite, en mettant en évidence le rôle important joué par la littératie financière et les traits de personnalité dans ce processus.

Le premier chapitre de notre thèse examine la relation entre la littératie financière et l'épargne-retraite, en utilisant des données de l'Enquête sur les finances et la consommation des ménages (HFCS). Pour analyser l'impact de la littératie financière sur le comportement d'épargne, l'étude se concentre sur le Luxembourg et la Slovaquie, qui ont différents niveaux de développement financier. Les résultats de notre recherche révèlent que le niveau de littératie financière parmi la population du Luxembourg est plus élevé que celui de la Slovaquie. L'analyse empirique indique que la littératie financière est positivement associée à l'épargne-retraite au Luxembourg, tandis qu'aucune relation significative n'est trouvée entre la littératie financière et l'épargne en Slovaquie. Ces résultats contribuent à une meilleure compréhension du rôle de la littératie financière dans le comportement d'épargne-retraite et ont des implications importantes pour les décideurs politiques.

Le deuxième chapitre de notre thèse examine l'impact des cinq grands traits de personnalité sur le comportement d'épargne des individus. Les cinq grands traits de personnalité, notamment l'Ouverture, la Conscience, l'Extraversion, l'Agréabilité et la Névrose, sont largement reconnus par les psychologues comme des dimensions fondamentales qui façonnent le comportement humain. L'étude utilise des données de la base de données SHARE et couvre un échantillon de 27 pays européens. Les résultats suggèrent que les traits de personnalité influencent significativement le comportement d'épargne, et en particulier, les traits d'Ouverture et d'Agréabilité ont un impact

positif sur le comportement d'épargne. Les résultats de ce chapitre fournissent des informations importantes sur le rôle des traits de personnalité dans l'épargne-retraite et ont des implications pratiques pour les planificateurs financiers et les conseillers.

Le troisième et dernier chapitre de la thèse examine la relation entre la protection des investisseurs, l'attitude d'investissement et le comportement d'épargne. L'étude examine si la protection des investisseurs peut jouer un rôle important dans le comportement d'épargne-retraite des ménages et si elle peut aider les individus à adopter une attitude de risque plus favorable envers l'épargne-retraite. L'analyse se concentre sur l'impact de la protection des investisseurs et de l'attitude face au risque sur le comportement d'épargne et l'interaction entre les deux facteurs. L'étude utilise des données de la Banque mondiale pour la protection des investisseurs et de la base de données SHARE pour les données des ménages. Les résultats indiquent une relation significative entre la force de la protection des investisseurs, l'attitude face au risque d'un individu et le comportement d'épargne-retraite. Ces résultats ont des implications importantes pour les décideurs politiques et les conseillers financiers dans la conception de régimes d'épargne-retraite qui tiennent compte du rôle de la protection des investisseurs et de l'attitude face au risque.

Notre thèse se concentre sur l'épargne-retraite, une zone de recherche critique en raison de son impact sur la sécurité financière. Nous examinons l'impact de la littératie financière, des traits de personnalité et de la protection des investisseurs sur le comportement d'épargne. Nos résultats fournissent des informations précieuses pour les décideurs politiques et les praticiens financiers. Ces facteurs sont des considérations essentielles pour comprendre le comportement d'épargne-retraite. Les décideurs politiques peuvent utiliser nos résultats pour concevoir des politiques et des programmes efficaces d'épargne-retraite. La recherche aide également à évaluer l'efficacité des politiques existantes. En comparant les résultats, les décideurs politiques peuvent déterminer quels programmes fonctionnent le mieux, ce qui peut conduire à l'expansion de politiques et de programmes efficaces.

**Mots-clés :** Épargne-retraite, Littératie financière, Traits de personnalité, Protection des investisseurs, Attitude d'investissement.



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## **GENERAL INTRODUCTION:**

### **1. Introduction:**

The term "retirement planning" refers to the process of preparing for the time when an individual will stop actively participating in the labor force and their income from work will come to an end. It is possible to view it as a strategy for achieving an equilibrium between current expenditures and reserves in order to guarantee a retirement that will be financially secure. Prior studies offer support for the hypothesis that there is a connection between the process of saving for retirement and retirement planning activities (Stawski, Hershey & Jacobs-Lawson, 2007; Chou et al., 2015; Anderson, Baker & Robinson, 2017). The level to which an individual perceives they are saving adequately to have a comfortable and secure retirement is known as savings adequacy. In a study that Lusardi (2000) carried out on American homes, he discovered that planning behavior had a substantial influence on the amount of money saved and the wealth that was held. Families where the family head made the decision to engage in some form of retirement planning ended up amassing much more financial holdings and savings compared to families where the family head made no such decision (Tomar et al., 2021). The rationale behind the focus on retirement savings can be attributed to the underlying significance of social welfare, particularly of the elderly/senior citizens in an economy. These senior citizens contributed their prime years to providing the foundations for the current development and growth. Therefore, it's considered mandatory for each country to protect their rights and to provide appropriate care and support of their elderly. In recent decades, there has been a significant rise in the number of older employees who are grappling with the developmental problem of figuring out how to get ready for retirement and how to transition into retirement, reflecting global demographic developments (Hirschi & Pang, 2020). Retirement can take several different forms, but it is traditionally understood to be the final stretch of the career growth process. This is the moment in most people's lives when they scale back or stop their engagement in a paid job and look for alternate ways to fill their time (Fasbender & Deller, 2015; Super, Savickas & Super, 1996). Volunteering, going on trips, spending more time with loved ones participating in activities related to caregiving, and/or looking for new forms of paid work or continuing previous work, possibly with fewer hours, are all opportunities that become available to many people when they reach retirement age (e.g., bridge employment; Adams & Rau, 2011). When it comes to housing, some individuals prefer to stay in their current residence, while others

plan to relocate for a number of reasons. Concerning the connection aspect, questions include those regarding the people with whom one would interact and, presumably, the means by which one will make up for the loss of work associates (Penn et al., 2021). However, decisions regarding when, how, and where to retire are dependent on a wide range of issues such as one's financial situation, health concerns, the support of family and friends, and one's identity in the workplace. Managing that can be difficult, and the early years of retirement can be an emotionally difficult time for a significant portion of people who have retired (Wang & Wanberg, 2017).

Planning for retirement seems like it might make the transition easier, for example, through assisting with the creation of reasonable expectations, planning methods for time organization, anticipating shifts in identity and status, and taking care of financial needs (Muratore & Earl, 2015). According to meta-analytic results, involvement in retirement planning is linked to positive post-retirement prospects, including less issues with mental and physical health, increased opportunities for retirement, and overall greater life pleasure, and a greater degree of participation in bridge employment, which is a potential measure of involvement in post-retirement activities (Topa, Moriano, Depolo, Alcover & Morales, 2009). It has been discovered that retirement adjustment can be related to preretirement planning through the medium of the transition process (Muratore & Earl, 2015), indicating that better preparation could make the transition into retirement easier, which would ultimately lead to improved long-term functionality. These findings highlighting the advantages of retirement planning inevitably lead to inquiries regarding the specifics of the planning process, i.e., what parts of retirement can people most effectively plan for and foresee, either on their own or with the assistance of guided seminars and services? (Penn et al., 2021). Programs that prepare individuals for retirement often place an emphasis on financial planning, with less focus on issues pertaining to mental health, emotional state, interpersonal relationships, leisure, habitation, or other matters (Sterns & Subich, 2005). It makes sense that financial factors, such as savings, pension plans, and healthcare benefits, are being prioritized, provided that one's economic well-being influences other parts of retirement, such as where they are able to reside and whether or not they are required to continue working when they retire. Yet, preparation for retirement may be seen as having several facets, and financial planning is just one of them (Penn et al., 2021).

In today's economy we must also consider how inflation can have an effect on individual savings behavior. Inflation affects the savings attitude of individuals because it erodes the purchasing power of money over time. This means that the same amount of money will not be able to buy as much in the future as it can today be due to the increase in prices. As a result, individuals may be more motivated to save and invest in order to protect their wealth. Central banks have recently raised interest rates in response to global economic conditions and inflationary pressures. This means that the cost of borrowing money will increase, which may discourage individuals from taking out loans and encourage them to save more. However, the influence of this on savings will depend on the individual's personal financial situation and the potential returns on their investments. When considering inflation, individuals may look for investments that offer higher returns in order to keep pace with the rising cost of living. This could include stocks, real estate, or other assets that have the potential to appreciate in value over time. Inflation can also impact the choices people make about where to invest their money, as some countries or regions may have higher inflation rates than others. Ultimately, how people consider inflation when they invest will depend on their financial goals and risk tolerance.

This thesis, titled 'Behavioral Issues in Retirement Savings,' presents a comprehensive investigation into the domain of retirement savings behavior within the European context. The overarching objective of this research is to unveil the complex relationship between individuals' financial literacy, personality traits, investment attitudes, and regulatory frameworks as they pertain to old-age provision savings.

The first chapter dives into the foundational aspect of financial literacy, focusing on its significance as a essential determinant in shaping individuals' capacity to make informed financial decisions, particularly in the context of retirement savings. It seeks to explain how varying levels of financial literacy can either empower or hinder individuals in adequately preparing for their post-retirement years. Moving forward, the second chapter explores the impact of personality traits on retirement savings behavior among elderly individuals. By investigating personality traits, we aim to interpret how these psychological factors influence the approach of retirement savings. In the third chapter, the focus shifts to the broader socio-economic landscape, encompassing investor protection, investment attitudes, and the regulatory framework governing savings behavior. Here, we

investigate the role of investor protection policies, market conditions, and individuals' attitudes towards investment risk in shaping their retirement savings decisions.

By examining these interconnected chapters, this thesis aspires to construct a complete understanding of the behavioral factors surrounding retirement savings, ultimately contributing to a more informed discourse on the dynamics of financial security in post-retirement life within the European context.

## **2. Importance of Retirement Savings:**

### **2.1. Impact of increase in ageing population**

The significance of studying this aspect is further extended with increased life expectancy in developed countries. According to the United Nations, the increasingly aging population in the developed world is among one of the biggest economic and social challenges (Ares et al., 2015). Better lifestyle and innovation in the health sector doubled the population of elderly above 60 to 20% of the population in developed world. This number is even higher at 30% for European countries. From 1975 to 2015, there has been a significant rise in the dependency ratio on average, and it is anticipated that this trend will quicken over the next few years (OECD, 2019). According to Mink (2008), this phenomenon is not new nor it's unique to European countries only, but it should be recognized that it's not an outbreak but instead, it's a continuation with a long-term trend.

The ageing of populations in affluent countries places a significant financial strain on the budgets of their respective governments, when compared to the proportionate decrease in taxpayers of working age, an increase in spending on public welfare comes at a time when such taxpayers are fewer in number (Ntalianis & Wise, 2011). These potential challenges are made more difficult by the fact that the vast majority of individuals wait an excessive amount of time before beginning a savings plan for themselves, resulting in deprivation not just for the individuals but also for the entire society. Workers and retirees are being urged to take on a previously unheard-of level of responsibility over their retirement. Their participation is enabled and encouraged through the utilization of pension schemes. Moreover, the source of income after retirement is largely reliant on private savings (Hauff et al., 2014). However, despite the fact that citizens are being asked to make challenging decisions, it is unclear as to whether or not they are ready to do so. The

effectiveness of financial decisions made by individuals in any economy determines the quality of life.

Several studies have raised concern on the elevated rate of financial insolvency that people experience throughout their retirement years. Due to financial deficits, the long-term viability of both public and private pension programs is under jeopardy (Farrar, Moizer, Lean, & Hyde, 2019). According to the findings of recent studies, by the year 2050, almost 25% (17%) of the population in OECD countries (world population) will be over the age of 65 (He, Goodkind, & Kowal, 2016; Marchal et al., 2012). However, research also reveals that only 24.8% of people around the world save money for their retirement (Demirgüç-Kunt, Klapper, & Panos, 2016). This confluence of a lack of savings and an increasing average age of the population generates enormous liabilities for pension systems. Consequently, there is a possibility that a large number of retirees will have insufficient financial resources to sustain them throughout retirement (Farrar et al., 2019). However, a topic that has yet to be satisfactorily answered is "why do so few people save for retirement?" The explanation can be found in the psychological mechanism that underlies the behavior of saving money and making plans. There is a correlation between demographic characteristics and retirement planning behavior, but psychological constructs, that exert a direct or proximate impact, operate as a mediator of this correlation (Hershey, 2004). On the other hand, demographic traits only have a marginal impact on the manner in which individuals plan their finances and save money (Tomar et al., 2021).

## **2.2. Determinants of Retirement Savings**

The research on retirement savings has become more extensive over the course of the last two decades, where discussions around retirement savings continue to be important topics of conversation among employees, particularly when those individuals are approaching retirement age. For employers, as it is the social obligation of businesses to guarantee that their employees have adequate funds for retirement, either through government or private pension plans, and for governments to play a role in maintaining economic stability (Jantan, 2020). As discussed earlier, there has been a general upward trend in life expectancy. This shift has increased the amount of pressure that is placed on governments to meet the pension needs of retired individuals. Individuals are being asked to bear an increasing portion of the responsibility for making appropriate preparations for their lives after retirement, and governments are making slow but steady efforts



to accomplish this in the form of private retirement savings. The current research is also of the view that government should focus on increasing private retirement savings and therefore is focused on identifying significant determinants for encouraging people to invest in private retirement savings.

### **2.3. Retirement planning in Europe**

Europe, comprising both Western Europe and the European nations that were formerly part of the Soviet Union, is rather similar in comparison to other regions, which has an impact on the lives of its elderly populations. Differences between the east coast and the west coast, as well as between the north and the south, were much more visible thirty or forty years ago than they are today. But there are still significant variances, and to a European, they will be quite apparent. These distinctions are most noticeable between the European countries that are a part of the European Union from Western Europe and the European nations that were a part of the Soviet Union in the past, namely Belarus, Moldova, Russia, and Ukraine. These countries, along with a limited percentage of others located to the east and south-east of the region, stand apart from the rest of the region in terms of the traits they exhibit such as household income, the generosity of pensions, and the standard of medical treatment that have clear effects on elderly people's well-being. In most ways, older people in Sweden are in a better position than older people in Serbia or Romania, and even better than older people in the European nations that were once part of the Soviet Union. The Swedish people enjoy longer lifespans, greater health, higher earnings, and a developed welfare state with ample resources for social care. Such inter-country disparities and discrepancies continue to be significant for national policymaking, however, if we take into account that the majority of European nations fall under the World Bank's definition of high income, and that the majority of them have pension plans that are efficient in ensuring income security. In most of Europe, over the course of the last four or five decades, the income gap between families headed by individuals of working age and households headed by individuals of retirement age has been gradually narrowing (Howse & Sidorenko, 2022). Europe confronts issues due to its ageing population. While the population of working age is dwindling, the percentage of those 65 and over is rising. The increasing average age of the population places a strain on state finances. In the upcoming decades, the financial burden of pension obligations will dramatically increase in cost in the EU. A number of nations that are members of the EU encourage private retirement savings plans. The magnitude of contribution payments, the duration of time during which savings are

accumulated, and the composition of an investment portfolio all have an effect on the total amount of savings accumulated. Long term performance of risky assets, including stocks and stock funds, is superior to the performance of safe investments. Despite this, the majority of investors prefer investments that do not involve any risk (Balaz, 2020). Therefore, Europe is a territory that has become adapted to conceiving of itself as an ageing region, and this notion applies most strongly to the decision-makers inside the continent. It has been a long time since policy circles started recognizing and discussing the requirement for significant adjustments and alterations to be made across a wide variety of policy domains, and the list of age-related policy demands is increasing longer and more diverse on a day-to-day basis. (Howse & Sidorenko, 2022).

One of the most important categories of expenditures on the national budget, particularly in European countries, is allocated to the various pension and social security services. For example, public spending on pensions accounted for approximately 11% of GDP of the European Union in 2006, but by 2015, that percentage had steadily increased to almost 13% (Eurostat, 2020). Estimates on some of the most important demographic and macroeconomic issues affecting the European Union for the period 2009-2060 are included in the Ageing report that was published by the European Commission in 2018 (Eurostat, 2018). According to the forecasts, there is a sizeable decrease in the proportion of the population that is of working age, and a rise in the number of people who are of retirement age; resulting in the old-age dependence ratio being doubled. To calculate the dependence ratio, divide the total population who are 65 or older by the number of people who are of working age, which is 15-64 years old, throughout the time period that is being evaluated. It is becoming increasingly important for workers in today's world to appropriately plan for their retirement by turning to the investment products and saving options that are made available by the private market. Planning is therefore a crucial action that employees must take in order to optimize the benefits they obtain from the public programs and ultimately synchronize with other optional pension plans. Therefore, the individual's planning for retirement must invariably be based on their anticipations regarding the epoch at which they would begin their retirement as well as the benefit that they believe they receive from the public pension program to which they are entitled. People need a wealth of knowledge in order to prepare appropriately for their retirement income, as they must anticipate their future consumption level during retirement and their likelihood of survival. They are required to be knowledgeable about the regulations that govern both Social Security and private pensions and they might consider both current economic

conditions and individual or family circumstances. In addition, due to the fact that retiring is a one-time event, so it doesn't allow people to learn from their mistakes, and there's no structure to prevent workers from making bad retirement plans. (Zanardo, 2020). The pre-retirement financial savings are low for a number of reasons, including some that are consistent with the normal life-cycle approach: unanticipated circumstances, such as experiencing difficult incidents or a deteriorating of health conditions, can lead to the depletion of savings assets. However, other studies corroborate the idea that a lack of planning activities is mostly to blame for low pre-retirement accumulations. Planning behavior is proven to play an essential role in determining the amount of wealth held before the retirement, provided that it is carried out in the appropriate manner (Lusardi, 2010).

The evolution of technology not only helps to improve the social environment of the country but also serves as the primary force for the expansion of the economy (Domar, 1946; Solow, 1957). Technology boosts human productivity across the board, from the manufacturing sector to the medical field. The contributions made in the field of health sciences have resulted in a rise in the average life expectancy. However, a combination of factors, including rising life expectancy in the older population and falling birth rates, has caused many people to be concerned about the effects of an ageing population. The country's fiscal and macroeconomic stability are both impacted by an ageing population. This is because an ageing population could result in an increase in government expenditure on healthcare, social security, and pensions due to a rise in the dependency ratio. The United Nations (UN) projects that the age-dependency ratio in the EU was 29.2 percent in 2015, making it the second highest in the world after Japan, which has a ratio of 42.7 percent. By the year 2070, the age-dependency ratio in the EU will further reach 54.2 percent, the highest percentage among major countries, having increased by another 25 percentage points (Akdede & Giovanis, 2022). As a result, it has become a motivating force for scholars all across the world to investigate the implications that stem from an increase in life expectancy (Jantan, 2020). To the extent that Europe is concerned, life expectancy has seen significant growth over the course of the past century with major variations among the member states continuing to prevail. The topic of when to retire is one of the domains that is impacted by the rise in life expectancy. The question, "How much money do I need to retire?" is a basic one to consider. In order to provide an appropriate response to this inquiry, a comprehensive strategy for retirement preparation needs to be mapped out. Despite the fact that people put money aside for retirement, the amount of money

they have saved is regrettably not enough to support them throughout their years of retirement. In addition to this, the increasing average age of the population drives up the expense of healthcare. In spite of the fact that a person's state of health has a direct bearing on the costs associated with medical treatment, elderly people use medical services more frequently and extensively than younger people do. The requirement for round-the-clock care is expected to rise as the population ages. In developing countries, the aged and retired population can receive financial assistance from the government to pay for their medical care (Jantan, 2020).

#### **2.4. Private Retirement Savings**

Given the aforesaid state of socio-economic trends and economic downturns, public retirement initiatives are becoming increasingly unsustainable, therefore the current study is primarily focused on exploring antecedents of private retirement savings. The lack of sufficient personal savings can severely impact the solvency of individuals in their retirement. Data indicates that baby boomers are saving at a lower rate in comparison to their elder counterparts, in fact, they are saving one-third of what's needed for their retirement (Jacobs-Lawson & Hershey, 2005) Ironically it is also true for employees' contribution funds where they have the option to contribute more, even then majority prefer to contribute the minimum amount required. This led us to focus on why individuals aren't planning for their future needs, so researchers are focusing on factors that are linked with planning and saving tendencies. The pioneer theory that focused on understanding the mechanism of human behavior is the theory of reasoned actions which posits that behavioral outcomes of an individual depend upon individuals' intentions to perform something, and these intentions are determined by the attitude of an individual towards the said task, a task or behavior can be desirable/undesirable depending upon person's evaluation or emotions. The second factor is the subjective norms associated with the task, which is the social acceptability/unacceptability of the behavior. The liking/disliking of the people around you influenced the behavior (Hale et al., 2002). Initially, the researcher utilized this theory by Ajzen & Fishbein, (1975) to explore and understand human behavior in various fields. Later the theory of planned behavior extended this theory further and added an additional determinant of behavioral intentions which is the perceived behavioral control over that task, which is the conviction that one can successfully/unsuccessfully execute the desired behavior to complete the task (Ajzen, 1991). Since its inception, the theory of planned behavior has been the most commonly utilized theory to study human behavior, particularly in social sciences. For a general understanding, it can

be said that the higher the desire toward a particular behavior is, the greater will be the approval in society and resulting in a perceived easiness of the task. These factors will create a stronger intention to perform the task. In the context of the current study, the study intends to explore various variables that can influence an individual's attitude, perceived control, and social norms towards private retirement savings.

### **3. Research Question:**

The main objective of this thesis is how behavioral aspects, such as financial literacy, personality traits, and risk attitude, affect retirement behavior of households. We believe that it is important to understand how such factors play an important role in shaping the individual's behavior towards their old age savings. For our study, our data includes a variety of behavioral and retirement-related variables and analyzes the relationships between them. Through our results, we hope to find out if there is any relationship that might help us understand more about how people plan and the variables that affect their retirement planning. This will also help the policy makers and reduce the burden on the public pension system.

Our first research question is regarding the relationship between financial literacy and retirement savings. We believe that how people plan for retirement greatly depends on their level of financial literacy. According to our presumptions, those with greater financial literacy ought to be better at saving for retirement. This is due to the fact that we believe that people who are more financially literate are better at making good investment decisions. We want to gain a better understanding of the role financial literacy plays in retirement planning by investigating the relationship between financial literacy and retirement savings.

Our second research project is about the relationship between the big 5 personality traits (openness, conscientiousness, extraversion, agreeableness, and neuroticism) and retirement savings. We want to study how people having different personality traits behave towards their retirement planning. For instance, someone who is more outgoing and willing to try new things (extraversion) might plan for retirement differently than someone who is quiet and cautious (neuroticism). We hope to learn more about how personality traits affect retirement planning by looking at this relationship. Finally, in our third essay, we are finding the relationship between investor protection, risk attitude, and retirement savings. Investor protection refers to the laws and regulations that are in place to protect the interests of investors. Risk attitude refers to an individual's tendency to be more or less

willing to take risks while making financial decisions. With the help of these factors, we hope to understand how they influence individuals' behavior towards retirement. This is a crucial area of research because it may show us how to motivate people to increase their retirement savings.

#### **4. Data Set:**

For our empirical analysis, we have utilized data from the Household Finance and Consumption Survey (HFCS) and the Survey of Health, Ageing and Retirement in Europe (SHARE) databases. The HFCS is a multi-country survey that collects detailed information on the financial and non-financial assets and liabilities of households, as well as their income, consumption, and demographic characteristics. HFCS provides individual household data, which has been collected in a harmonized way in several euro area members for a sample of more than 62,000 households. Although there have been earlier efforts to survey wealth in some euro area countries, the HFCS represents the first attempt to gather detailed wealth data on a consistent basis across the euro area. The SHARE is a large-scale, cross-national, and longitudinal survey that focuses on the health, socio-economic status and social networks of individuals aged 50 or over in Europe. The survey is conducted in over 30 countries across Europe and is coordinated by the Mannheim Research Institute for the Economics of Aging (MEA). Both of these databases provide a wealth of information on households and individuals, and are widely used in research on household finance, consumption, and aging.

In the first chapter of our research, we utilized the Household Finance and Consumption Survey (HFCS) database. Three waves of data have been published for the HFCS, with data from the first, second, and third waves made available to researchers in April 2013, December 2016, and March 2020 respectively. We were interested in finding the relationship between financial literacy and retirement savings, and in wave 2 of the HFCS, we have data from Luxemburg and Slovakia about financial literacy, which allowed us to compare the difference between the countries with different levels of financial development. Therefore, we chose to use wave 2 of the HFCS for our analysis. This second wave of data was collected in 2014 from 20 European countries for more than 84,000 households. To ensure an effective way of data collection with minimal error chances, Computer Assisted Personal Interviewing mode was used to collect the survey data.

For the second and third chapters of our research, we used the Survey of Health, Ageing and Retirement in Europe (SHARE) database. Nine waves of data have been published for the SHARE database, making it a helpful resource for studying the aging population in Europe. Our research focused on finding the relationship between personality traits and retirement savings. In wave 7 of the SHARE, we found data from around 27 European countries about the individuals' personality traits. This wave of data was collected in 2017 and released in April 2019, and the dataset includes more than 76,000 individuals. The data from this wave was particularly useful for our research as it provided a detailed analysis of the personality traits of individuals across different European countries, which allowed us to compare the findings across different regions. Waves 8 and 9 of the SHARE are focused on COVID-related data. Overall, the SHARE database proved to be a great resource for our research and enabled us to conduct a detailed analysis of the relationship between personality traits and retirement savings.

#### **4.1. Control variables and Retirement Savings:**

Various other factors in the existing literature are found to be associated with private retirement saving behavior, which includes age, education, income, job situation, gender, marital status, areas of residence, homeownership, saving habits, health, political orientation, etc. and even use or access of internet services is found to be linked with retirement savings (Ares et al., 2015). According to the life cycle theory of saving the overall savings of an individual will increase with the passage of time in the wake of retirement requirements and hence there exists a direct relationship between these two variables (Modigliani & Brumberg, 1954). As far as the education of an individual is concerned existing literature is of the view that with an increase in education the ease of planning and investing in the financial product increases making it much more likely for an educated person to plan and invest for after retirement benefits but as a less educated person has to strive extra for understanding and availing such opportunities they will be less likely to invest for their retirement beside this education is also directly associated with awareness of the matter (Bernheim & Scholz, 1993; Lusardi, 2003).

Similarly, the level of income and the job status of an individual are also found to be directly and positively associated with retirement savings. Higher income can generate extra income and provide with necessary resources required to invest in retirement savings and higher investment is also related to increased tax benefits, which further extend the benefits of investing in retirement

schemes for high income individuals. On the other hand, low-income individuals rely more on public pension systems and tend to save less privately given their scarce income (Huberman et al., 2007; Lum & Lightfoot, 2003). The impact of job status is also similar to the impact of income given the direct link of income with job status and hence has a direct impact on retirement planning. Higher job status is also typically associated with higher retirement and other allied benefits. Apart from that, higher job status is also associated with higher financial awareness and education making them more likely to prepare for their postretirement life (Fontes, 2011).

Gender is also found to be linked with retirement savings, although the existing literature does not have a consensus on the direction of its impact with mixed results (Ares et al., 2015). Authors like Dohmen et al. (2005) are of the view that due to the pay gap between male and their female counterparts, women are less likely to save for their retirement. On the other hand, it is argued that on average women tend to live longer therefore they tend to save more for their retired life and this awareness that they are making less than their male counterparts also aids to this motivation (Huberman et al., 2007). The role of women in financial and business decisions is growing in significance as their participation in various aspects of economic life increases. In addition, research shows that women are naturally better at saving money than men. Previous studies have demonstrated that the participation rate of females in retirement plans is significantly lower than that of males, as a result, they have a greater chance of spending their retirement years in poverty, due to their dependency on their spouses to save for them, along with their lesser wealth and income levels. Women, especially single women, are now held to a higher standard of accountability for the savings they have for their retirement. Since they have no one else to depend on for monetary support, women who are single have the responsibility of planning in advance for their retirement. As a consequence of this, it is absolutely necessary for single women to acquire appropriate knowledge in financial literacy in order for them to effectively plan for their retirement (Abidin & Zainuddin, 2021). Despite the fact that it gives one cause for optimism to discover that women have finally caught up to men in every field, they are still dependent on the male members of their family for making decisions concerning the financial decisions. For instance, in India, which has significant problems of both poverty and underemployment, Literacy in financial matters among women is essential for the maintenance of the expansion engine because it creates opportunities for women to make contributions to the growth of economy (Arora, A. 2016). Another gender-related factor is the role of marriage in this context, the literature indicates that



married couples are more concerned about their future planning regardless of their gender they are more concerned for financial stability hence they save more for their retirement (Lusardi, 2003).

Fontes, (2011) identified that homeownership is another significant factor that influences retirement savings. Homeowners are more likely to save for their retirement which can be attributed to their better income level. Malroux and Xiao (1995) further pointed out that this inclination towards retirement savings is further increased after the mortgage payments on the house are clear. Similarly, Fontes (2011) that individuals residing in urban areas in the US are more likely to save for their retirement in comparison with individuals living in rural areas. This is also attributed to the difference in their education, awareness, and income levels. The savings habits of an individual also determine their retirement savings. According to their saving preferences, individuals can be identified as short and long-horizon planners. An individual with short-term planning is expected to save less than the person with long-term goals and orientations (Ameriks et al., 2003).

The effect of health, political orientation, and internet usage is also discussed in the existing literature (Ares et al., 2015). The health impact retirement savings of an individual's by impacting his ability to perform a stable job and also by increasing the health costs. This leads to a negative impact on the retirement savings of an individual (Lum & Lightfoot, 2003). Some of the existing literature also points to the impact of political orientation on retirement savings. According to their arguments, voters of right-wing parties are more likely to plan and invest because their values aligned with ideas of self-enhancement (Ares et al., 2015; Korhonen, 2011) Lastly the usage of the internet is also found to be linked with increased financial literacy and hence will lead to better retirement contribution. The higher will be the access to financial tools and information the higher will be the impact (Bogan, 2008). Many other factors influence private savings among individuals. Many unexplored avenues need identification and further exploration, but the current study aims to analyze the most significant factors that can substantially and directly enhance private retirement savings. So, the forthcoming sections will focus on those variables and their significance in the context of the European pension system.

## **5. Chapter 1:**

### **5.1. Importance of Financial Literacy**

The majority of households have significant long-term financial responsibilities associated with saving money for retirement while they are still young and using that wealth when they are older. As a result, figuring out an effective method of saving for retirement is a huge challenge for households, particularly given the prevalence of errors brought on by a lack of financial literacy and the potentially high cost of such errors. Empirical research has shown that consumers are having a harder time making these judgments, and several studies on household finances have shown that better-educated and wealthier households tend to follow normative model suggestions. (Calvet et al., 2009; Campbell et al., 2011; Dahlquist et al., 2018).

Concerns have been raised on a global scale over the fact that individuals do not sufficiently plan for their retirement (Niu, Zhou, and Gan 2020; Reyers, Van Schalkwyk, and Gouws 2015). The academic community has called this a "crisis in retirement savings." (Benartzi and Thaler 2013). Additional damage was done to retirement savings as a result of the global emergence of the Covid-19 pandemic, which was accompanied by lockdowns and economic uncertainty as a direct result of the epidemic (OECD, 2020). It is of significant relevance to those people who have been laid off from their jobs or whose wages have been reduced as a consequent result of the economic predicament of their companies, as a direct consequence, they were left with a reduced capacity to make contributions to their retirement savings programs (Dhlembeu et al., 2022). According to the findings of a number of research studies, financially educated consumers are in a position to make more informed decisions regarding their own finances, such as preparing for their retirement (Boisclair, Lusardi, and Michaud 2017; Shambare and Rugimbana 2012). Therefore, having a solid understanding of financial literacy is now an essential tool for surviving in today's world, as it helps people avoid making decisions with their money that are either unpleasant for them personally or for society as a whole (De Beckker et al. 2019; Klapper and Lusardi 2019; Refera, Dhaliwal, and Kaur 2016 & Wagner 2019). Last but not least, it stands to reason that those who are financially savvy are more inclined to setting money aside for their retirement (Antoni et al. 2020). The term "financial literacy" refers to the degree to which an individual is able to comprehend and effectively apply information pertaining to their own personal finances. It can be an important tool as according to Fox et al. (2005), financial literacy can be an invaluable resource

since it has the potential to mitigate a wide range of social and personal issues, including anxiety, disease, and disagreements over money. An individual needs to have a sufficient level of financial literacy and understanding in order to make sound financial decisions and to plan for the future in today's financially driven environment. Individuals who are financially literate are better able to choose profitable ventures (Goyal, Kumar, 2021; Sachitra & Wijesinghe, 2018). In addition to this, it addresses the problem of limited access to financial resources in the country and helps enhance financial inclusion (Morgan & Long, 2020).

Academics are increasingly interested in financial education and literacy to address low savings rates. This interest is due to the general notion that having a thorough understanding of financial principles is crucial to helping people make sensible choices in this age of abundant information. Numerous empirical studies have connected household financial mismanagement to financial illiteracy. Even in industrialized countries with well-established financial institutions and high educational attainment, bad fiscal management is an issue. Thus, a financially literate person can process a lot of information and make good planning judgments. Financial literacy helps people manage their finances in a way that sustains the economy. Financial literacy boosts retirement savings and asset growth, making it a worldwide subject. Hence, financial literacy is essential for ensuring retirement security across the world (Lusardi & Mitchell, 2011). Financial literacy makes it easier for people to start their own firms and boosts the economy. Furthermore, it assists individuals in controlling their spending and saving money (Perry & Morris, 2005), so that they can prepare for their retirement (Lusardi & Mitchell, 2017), and eventually, magnificently create wealth (Nicolescu, Tudorache, & Androniceanu, 2020).

There are several considerations to make when it comes to retirement planning, including, (1) discipline & attitude, (2) recognition of the significance of financial literacy knowledge, and (3) socio-economic and demographic parameters. To improve retirement planning and maximize retirement years for senior people, financial literacy must be improved. The financial security education is in line with the findings of study conducted by Professor Koh, who discovered that the greater the level of financial literacy in a community, the greater the likelihood that its members will put money away for a pleasant retirement (The Business Times, 2020). Subsequently, low-financial-literacy communities will struggle if their elder residents aren't prepared for retirement. Low financial literacy emphasizes the need for a comprehensive retirement plan to ensure seniors

have enough savings. One must analyze their existing and future finances to plan their finances. Financial planning involves many aspects. It includes factors like managing cash flow, saving money, making investments, filing taxes, managing real estate, preparing for insurance, and saving for retirement (Abidin & Zainuddin, 2021).

Today's individuals must make more financial decisions, such as saving for their own education, their children's education, or their retirement. Lack of financial literacy and misunderstanding of key economic factors can prevent people from reaching their long-term goals, such as managing daily finances, buying a home, enrolling in postsecondary education, securing adequate pension funding, making the best investment decisions, and building wealth. (Ergün, 2018; Fort et al., 2016).

## **5.2. Financial Literacy and Retirement Savings**

The first determinant of the theory of planned behavior is the attitude of an individual towards retirement savings. This is the way of thinking towards the task and one of the most significant factors hypothesized to make savings behavior desirable is the knowledge of finance. Research indicated that financial knowledge is significantly associated with retirement planning and savings (Jacobs-Lawson & Hershey, 2005). It is expected that the lack of adequate awareness is the prime reason for retirement anxiety. This lack of financial literacy is not an issue that is limited to the developing world only but it's also significantly affecting developed economies. A World Bank study indicated that financial literacy resulted in major improvements in financial awareness and attitudes towards financial decisions and involvement with financial products (Carpena et al., 2011). The studies of Niu et al. (2020) and Tan & Singaravelloo (2020) analyzed the impact of financial literacy on retirement savings and found that there exists a significant impact of financial knowledge in Malaysia and China respectively. Financial literacy is expected to influence retirement savings through two separate channels, firstly it will change the attitude of people towards such saving making it desirable and the increased financial literacy will also result in increased perceived control of individuals. Financial literacy is also found to be associated with better quality financial decisions (Grable & Lytton, 1997). So, the impact of financial literacy is twofold in the context of retirement savings, as it not only encourages more people to do so but also improves the quality of savings for the individual with retirement saving plans.

## **6. Chapter 2:**

### **6.1. Impact of Behavioral factors on retirement planning**

With the advent of behavioral finance, the incorporation of psychological principles into financial planning and saving behavior has become an even more significant component as well as the realization that individuals do not always make logical choices regarding their finances (Asebedo et al., 2019; Brügger et al., 2017). Recent research in the field of finance has acknowledged the significant impact that an individual's emotions, moods, and behavioral features have in diverting their decision-making away from being rational and maximizing their economic gains. In the context of investment decision making, however, researchers have overlooked the impact of social networks, despite the fact that these networks are one of the most significant links that individuals can retain (Ostrovsky-Berman & Litwin, 2019). Hershey, Jacobs-Lawson, and Austin (2013) established a conceptual model with the purpose of studying the factors that determine effective behavior about retirement planning. The authors of this model argue that the effectiveness of retirement planning and savings is determined by three factors: a person's capacity, their motivation to save, and the opportunities that are available to them. The term "capacity" refers to the cognitive traits including aptitude, comprehension, and knowledge, that set two people apart from one another. The second factor, which is referred to as willingness, is defined by the psychological and emotional attributes that serve as the push to begin retirement planning and to continue doing so over the course of one's lifetime. It incorporates elements that define a person's self-image, such as their attitude, the specificity of their financial and retirement goals, the characteristics that make up their personality, as well as their ethics, values, and righteousness. The third dimension, opportunity, takes into account aspects that are not internal to an individual and includes things like the accessibility of employee pension plans, a variety of investment opportunities, long-term economic and financial market patterns, fiscal policies, and tax systems.

### **6.2. Personality Traits and Retirement Savings**

Perceived behavior control is also hypothesized to be associated and impacted by the personality of the individual. Where "Personality is the quality or collection of qualities which makes a person a distinctive individual; the distinctive personal or individual character of a person, especially of a marked or unusual kind". Researchers from the field of trait theories are interested in the dimension of personality that influences the behavior of a person. The focus of trait theories is on the existence

of a difference between individuals based on which they behave differently. These differences or dispositions from the personality of an individual can lead to a better understanding of retirement savings. Depending upon the personality of an individual they can attribute the desired outcome due to his/her abilities, this is called an internal locus of control, in contrast, if a person thinks the positive result is due to external factors like luck, chance, fate, and powerful others, this is called an external locus of control (Selart, 2005). Hence depending upon one's personality traits the perceived behavioral control will differ across individuals, so will be their intention to save for retirement. A study of the sample of US pre-retirees conducted by Asebedo et al. (2019) connected personality traits with the saving behavior of individuals, the results indicated that every personality trait is directly or indirectly associated with individuals saving behavior. It utilized the 3M model of motivation and personality to identify those psychological characteristics. The theory posits that there exists a hierarchy of psychological characters including elemental, compound, situational, and surface traits through which the surface behavior of saving can be understood. This theory states that each personality trait originates from the elemental traits like the big five personality traits where openness, conscientiousness, and extroversion are found to be positively linked with saving behavior and intentions. Whereas agreeableness and neuroticism are found to be negatively associated with saving behavior. This line provides insight into how individuals' behavior is influenced and their inclinations. This awareness is vital for creating awareness and to creating possible intervention strategies and protections for people with negative inclinations towards private retirement savings.

## **7. Chapter 3:**

### **7.1. Investor's protection and Retirement Savings**

As the public-funded retirement schemes around the globe are becoming increasingly unsustainable and the drive toward private retirement is increasing. This also means that the role of the private sector is increasing, linking it with the degree of corporate governance in an economy (Börsch-Supan et al., 2005). The goals of pensioners' wealth maximization may not always be aligned with the corporate governance goals. Apart from that other problems include poor understanding of the options available and a lack of proper advice to the older individuals in an economy. These issues can lead to investors' exploitation and are prone to scams (Moloney, 2010). Therefore, regulators are trying to address these risks associated with private savings attitude. A

stronger investor protection mechanism can lead to a positive attitude towards private retirement savings and vice versa. This makes the quality of investor's protection and the efforts to promote individual awareness pivotal (de Manuel & Lannoo, 2013). Therefore, it is of prime importance to act aggressively to provide secure and better-equipped markets for increased retirement savings.

Apart from these factors, another issue is that traditionally individuals are expected to be purely rational but this isn't the case, as investors are affected by many factors including psychological and behavioral which hinder the process of rational decision making and behavioral finance tries to explore the reasons by linking different aspects of human nature with financial models (Barber & Odean, 1999) apart from that it also believes that sometimes investors don't have the informational efficiency (Ritter, 2003). Due to these factors, investors are not always rational, and their decisions are affected by behavioral preconceptions. Benartzi and Thaler (2007) studied these factors in the context of the retirement saving decisions of the elderly and concluded that heuristics-based shortcuts and biases do influence individual's decisions, making them slow to adopt favorable retirement plans, even after joining they tend to make infrequent adjustments in their portfolio and rely on diversification strategies that aren't suited with their goals.

## **7.2. Investors' risk attitude and Retirement Savings**

The risk attitude of an individual is also a significant determinant of their retirement savings. Risk attitude can be defined as the behavior of individuals when faced with future decisions like retirement savings which involved risk and uncertainty. Initially, risk attitude ranging from risk aversion to risk-seeking is considered to be a personality trait, but later studies indicated that apart from determining from personality traits of an individual, risk attitude is also influenced by other behavioral and situational factors (Tversky & Kahneman, 1974). Researchers nowadays consider risk attitude to be a function of the task, decision frame, and information processing strategies (Jonsson et al., 2017). Risk attitude is expected to significantly link with retirement savings of an individual, as risk-averse individuals are expected to choose low-risk investments and risk-takers are expected to choose risky alternatives and as it's a fact higher risk is associated with higher returns and vice versa. Consequently, this change in preference will lead to a distinguished return on their respective portfolios of savings. Wong et al. (2019) explored the consequential nature of risk attitude in the context of United Kingdom (UK) and Hong Kong (HK) retirement systems and explored the linkage of risk attitude on both mandatory and private retirement savings. They

studied the mandatory provident fund (MPF) of HK and the UK's individual savings account (ISA). The first is a mandatory scheme and the latter is a voluntary scheme. Regardless of their nature, both of these schemes provide individuals with various risk options of investment to choose from, like in MPF conservative funds are less risky in comparison to an equity fund. The results indicate that the retirement investment choices of risk-averse investors vary significantly from the risk seekers. Hence it is of vital significance to assess risk preference and align it with your retirement saving goals, as a mismatch among these two variables can cause significant deviations from the desired results.

The rest of the thesis includes three chapters separately and then the general conclusion. The first chapter is about the relationship between financial literacy and retirement savings. In our second chapter we investigate how big 5 personality traits play an important role in shaping the individual's behavior towards their savings. Our third chapter is about how investor protection and risk attitude play their part in determining retirement savings of households. The concluding section of this thesis presents the research findings, contributions, practical implications, and limitations & future research prospects.





## **CHAPTER 1: FINANCIAL LITERACY & OLD AGE PROVISION**

### **1. Introduction**

Within the realm of financial management, an issue that has never ceased to be of interest is the stress that should be placed on the necessity of having sufficient funds once an individual has retired. The increasing older age population is causing concern for governments as they struggle to ensure a sufficient retirement income for this demographic. Due to this reason, the challenge of providing for this growing population is becoming increasingly pressing. Individuals are likely to save a much smaller percentage of their income, which can influence their ability to be financially independent in the long term (Jacobs-Lawson & Hershey, 2005). Due to increased financial stress, decrease in supply of public health services (Tavares, L. P., & Zantomio, F., 2017), and long-life expectancy, many people in their working years are anxious about how they will support their so-called golden years of post-retirement life (Kadoya, Y., 2016). As a matter of fact, the propensity to set money aside for a rainy day is dwindling among the following generations, and majority of individuals in the age range of 25 to 71 years do not have enough money saved up to support themselves after retirement (Ma et al., 2000; Greenwald, L., Copeland, C., & VanDerhei, J., 2017). From 1975 to 2015, the average dependence ratio climbed considerably, and it is expected to continue to rise in the following years (OECD, 2017). According to the (Nations, 2017), 13 percent of the world's population (nearly 962 million) is over 60 years old in 2017, with that number expected to reach 1.4 billion by 2030 and 2.1 billion by 2050. This demonstrates that the globe is undergoing a phenomenon known as the ageing population where an ageing population refers to number of employees per retiree. The old-age dependence ratio is another indicator of an ageing population which is the proportion of elderly dependents (65 years of age or older) per 100 working-age people (aged between 20-64 years). The proportion of the country's elderly population increases as the old age dependency ratio rises; this reflects an increasing trend in the population's old age. An aging population creates a significant financial strain on governmental budgets. This is because spending on public welfare rises while there is a proportional decrease in the number of taxpayers who are of working age (Ntalianis and Wise, 2011).

Complex financial instruments, more people nearing retirement age, the stress of saving for post-retirement living, and internet and electronic banking have also increased the demand for financial

literacy (Jappelli, 2010). People who are unfamiliar with fundamental financial and economic principles find it challenging to evaluate such complicated financial instruments. (Park & Martin, 2022) analyzed a variety of psychological and economic elements that influence the retirement planning of customers. Particularly, they investigate how consumers' risk aversion, financial literacy, savings, income, and debt levels all interact to influence their behavior about retirement planning. There are shown to be positive associations between risk tolerance, financial literacy, income, and savings, with retirement planning, even though debt does not have any substantial link with retirement planning.

Though in most European countries, the state plays a major role in retirement pension system, due to the growth in the aging population, planning for old age provision savings has been a major concern over the past many years. This drift has put more pressure on governments and policymakers to fulfil the pension requirements of retired people. Gradually, governments are trying to shift some of the burden on individuals to adequately plan for their post-retirement life. An individual must have some knowledge of financial products to cope with the increasing responsibility of retirement planning. Individuals with financial literacy are better equipped to make prudent investment choices (Sachitra & Wijesinghe, 2018). Better financial literacy, together with more positive behaviors, normative attitudes, and regulated beliefs, increase a person's propensity to make wise financial decisions, especially when it comes to retirement savings (Salleh et al., 2022). A person who possesses appropriate financial literacy can manage a large quantity of information while making sound financial planning judgments. A higher level of financial literacy enables people to manage their finances more successfully and efficiently, which supports the viability of the national economy.

Our research makes significant contributions to the body of previously published work in several different areas. In this research, we investigate if financial literacy helps people to save more for their retirement. It has been demonstrated that having financial literacy has a positive effect on retirement savings. Higher financial literacy tends to help individuals in managing financial decisions which are directly related to retirement savings (Hilgert, Hogarth, & Beverly, 2003). While most studies are done on United States or other single European countries, our focus is to compare that how it differs between two European countries. We are comparing that how savings behavior of Luxembourg households differs with Slovakian households. Luxembourg and

Slovakia have significantly different pension systems, which can be compared based on several factors, such as retirement age, replacement rates, and social and economic contexts (OECD, 2017). There are several reasons why it makes sense to compare the savings behavior of Luxembourg and Slovakia. For instance, both countries are in Europe and have different pension systems that reflect their economic development paths. By comparing two countries with different levels of economic and financial development, we can gain insights into how financial literacy impacts individual savings behavior. For example, according to The World Bank's 2019 data, Luxembourg has a private credit to GDP ratio of 99%, while Slovakia's is 68%. This difference in private credit to GDP ratio highlights the different levels of financial development between the two countries, with Luxembourg being more financially developed.

Luxembourg and Slovakia also exhibit notable differences according to Hofstede Insights' cultural dimensions. Luxembourg tends to have a culture characterized by lower power distance, emphasizing equality and open communication, while Slovakia often displays a higher power distance with stronger hierarchical structures. Luxembourg leans toward individualism, valuing personal achievement and independence, whereas Slovakia leans more toward collectivism, emphasizing close family and community bonds. Luxembourg tends to have a balanced approach between masculinity and femininity, while Slovakia may lean more toward masculinity, emphasizing competitiveness. Additionally, Luxembourg typically has lower uncertainty avoidance, embracing ambiguity and change, whereas Slovakia often has a higher uncertainty avoidance, preferring stability through rules and traditions. Both countries may share a long-term orientation, valuing perseverance, and thriftiness for future success. Lastly, Luxembourg may lean more toward indulgence, while Slovakia might exhibit higher restraint, affecting lifestyle choices and social behaviors. These differences in cultural dimensions contribute to distinct societal norms and behaviors in each country.

We find that households in Luxembourg are more financially literate than Slovakia. Though people in Slovakia are more concerned towards their old age provision savings. This could be explained by that individuals in Luxembourg have better replacement rates available than Slovakia. The replacement rate is a measure of the percentage of a person's pre-retirement income that is received as pension benefits (Chybalski, F., & Marcinkiewicz, E., 2016). We discover significant positive impact of financial literacy on old age provision savings in Luxembourg. Our study is consistent

with previous studies as it shows that men are more financially literate than women. Our findings add to the growing body of empirical evidence indicating that higher levels of financial literacy are typically related with certain patterns of financial behavior in households that is aligned with the best practices which are suggested for retirement planning, as shown by research that was done in the past. This analysis makes a substantial contribution to our comprehension of the attributes and practices of European households that are equipped to maintain financial stability during retirement.

The rest of the research is divided into five sections. The following section evaluates the most recent and pertinent research on the subject and builds our research hypothesis. In this section, we investigate the research problem and provide background information on the subject. We outline the significance of the study and explain why it is important to study the research problem. In section 3, we cover the sample and the research methodology. In addition to that, it includes a thorough analysis of the variables. Section 4 evaluates the descriptive statistics of the study. Section 5 presents the findings of our empirical investigation and is followed by section 6 which draws a conclusion about our research.

## **2. Literature Review & Hypothesis Development**

### **2.1. Individual's Savings Behavior**

Setting away money from your earnings is a cumbersome process. The pattern of savings and spending that individual in an economy exhibit is a crucial factor that determines the level of economic growth that the economy experiences over the long and short terms. Specifically, the effects of households' propensity to save money have ripples that can be felt much beyond the macro level and into society. The pattern of public perceptions about savings can provide insight on everything from a society's capacity for long-term planning to the prevalence of materialistic ways of living (Lindqvist, 1981). Therefore, it is of particular value to have an awareness of individual's saving preferences, from the point of view of both one's own personal finances and the economy as a whole. The understanding of people's propensity to save money is being done in large part with the goal of fostering more responsible financial practices among members of society which, in particular, covers retirement savings (Davis & Hustvedt, 2012). On the other hand, the process of comprehending personal saving behavior is intricate and multifaceted process

and many other factors have a role in describing the general pattern of saving behavior in an economy. Considering all of this relevance, there has been a significant increase in the number of researchers that have looked into retirement savings over the course of the past decade (Jacobs-Lawson & Hershey, 2005). In addition to this, as the average age of Europe's population is steadily increasing, the responsibility of maintaining public pensions is rising, endangering their sustainability, and placing a growing burden on those who are employed (García-Pereiro, 2018). As a result, governments are moving their attention to expanding the private pension system by pushing people to increase the amount of money they save on their own and by modifying the retirement age so that it considers the average lifespan of the population.

As retirement savings is a matter of concern all over the world and aggressive research is being done on this area to highlight the issues faced by individuals. People are expected to take greater responsibility for their personal financial welfare as they grow old, all over the world. Nevertheless, according to household surveys conducted in various nations, a significant number of people are unable to effectively manage their financial concerns (Agarwal, Driscoll, Gabaix, & Laibson, 2009; Calvet, Campbell, & Sodini, 2007). If we consider the Netherlands, there is a constant discussion over altering the country's present pension system. As per a survey done in 2005 on Dutch individuals, about one third of the households have not thought about their post-retirement life (Lusardi & Mitchell, 2007; Van Rooij, Lusardi, & Alessie, 2011). This is extremely important since it is directly tied to the accumulation of wealth and the savings behavior of individuals. (Van Rooij et al., 2011) found new evidence on savings behavior in comparison with financial literacy. Their research was based on two surveys which were done before and after the financial crisis of 2007-08. Using this data, they discovered that having access to financial information and expertise had a beneficial impact on one's retirement savings habits. Retirement planning is positively and significantly impacted by a population's level of financial literacy, the educational level of their families, and their propensity to save money (Ulupui & Buchdadi, 2022). (Dhlembeu et al., 2022) studied the relationship between financial literacy and retirement planning behavior of South Africans. The author states that the importance of being financially literate cannot be overstated when discussing retirement planning. However, only 24 percent of South Africans make active preparations for their retirement. Additionally, women, individuals with lower levels of education and people of African descent had especially low levels of financial literacy. This low level of financial literacy is due to limited resources and lack of education.

Recent changes in socioeconomic structure and the financial environment have caused difficulties in taking steps to have an adequate level of retirement savings. Considering these changes, retirement savings has become an important topic in Europe. Financial literacy also contributes to greater financial inclusion in the country, which alleviates the concern about limited access to credit (Morgan & Long, 2020). With time, more responsibility has been placed on individuals when making retirement decisions. Furthermore, financial literacy has emerged as a significant tool in recent years, which can assist individuals in reaching this phase of life with appropriate possessions (Rebocho, 2022). Retirement planning is a three-stage process. The first step is preparing for retirement, where the individual works and saves money in anticipation of his or her retirement age. The individual acts towards the complications related to tax implications of withdrawing assistance right prior to retirement in the second stage, which is planning at retirement. The third phase is the process of preparing for life after retirement (post-retirement period), during which the individual must make sure that he or she has sufficient wealth and that it is protected during the retirement time (van Deventer, de Klerk, & Bevan-Dye, 2014). According to the study done by (Soekarno & Andani, 2022) on Indonesia, in comparison to other countries, the degree of financial literacy in Indonesia is rather low. In Jakarta, the capital city of Indonesia, they investigate the levels of financial literacy and saving behavior among those in the productive age bracket to be able to see the impact that both characteristics have on their readiness for retirement. A survey was carried out utilizing a questionnaire in Jakarta, and there were 226 people who participated. The participants in this study were divided into three distinct categories of planners: A Planner that is Simple, Serious, and Dedicated. The results show that an individual's propensity to save money has a substantial impact on their ability to be both simple and serious about their planning whereas individuals with a high level of financial literacy have a higher possibility of being committed planners. To their surprise, they also discovered that education and other indicators of maturity, such as a person's marital status, age, and number of children, play a role in determining how well prepared they are to be a retirement planner. The findings also indicate that women are less prepared than males when it comes to their level of financial literacy and their ability to plan for retirement. Despite the substantial advancements that have been made over the past decades regarding the number of women who are actively participating in the work market, there is still a huge gap between the wages earned by men and women, even after

comparing individuals with equal levels of education and experience from both genders (OECD, 2008).

## **2.2. Financial Literacy and Saving Behavior**

Households usually go through a lot of hassle to be financially well off by managing their incomes and expenditures with limited resources at the end of their working lives. The effective usage of their income and resources throughout their working life has been a challenging task for many. Studies have shown that households do not have an adequate level of financial literacy and this low level directly impacts financial and retirement planning (Lusardi & Mitchell, 2011, 2014). Financial literacy is critical for assisting people in making sound decisions in this technological age and an overload of information. In any economic system, the quality of one's life is determined by the quality of financial decisions made by individual citizens. To be successful in today's financially motivated world, an individual needs to have sufficient financial education and expertise to make informed financial decisions and then plan. Financial literacy is a blend of awareness, financial education, abilities, mindset, and behavior essential to take solid financial decisions to achieve financial targets. It can be defined as the ability to recognize and manage one's financial resources effectively (Atkinson & Messy, 2012).

When it comes to financial literacy, an individual's ability to handle his or her finances to reach his or her financial goals is a significant factor (Buckland, 2010). By increasing a person's level of financial literacy, his knowledge of the financial needs after retirement can be considerably improved, making comparisons between available options when acquiring financial products, exhibiting less bias towards the present and planning for and laying away finances for retirement (Yeh, 2022). In financial literacy, one of the most important components is financial knowledge. It corresponds to the comprehension of financial understandings that enables individuals to make informed financial choices (Wilhelm & Chao, 2005). This implies that a user must be familiar with fundamental economic and financial principles. Investments, savings, time worth of money, managing debt, and insurance are just a few examples (Skagerlund, Lind, Strömbäck, Tinghög, & Västfjäll, 2018; Walstad, Rebeck, & MacDonald, 2010). This may also involve questions pertaining to the risk-return relation, risk diversification, and the operation of the stock market in general (Lusardi & Mitchell, 2011). The provision of individuals with sound financial guidance is one of the factors that favorably influences their decisions to join in a retirement plan, whereas



only increased financial literacy can enhance the allocation of risky assets. Both significant aspects have a role in determining the final balance of the retirement account. When taken as a whole, we suggest that financial literacy and advice influence retirement saving choices in a variety of ways. They are mutually beneficial, and the overall effect of their cooperation is to provide better outcomes (Fang et al., 2022). (Arrondel, Debbich, & Savignac, 2014) studied the link between financial literacy and financial planning in France. The author finds that when compared to others, some population groups have a lower level of financial literacy. In addition, women, young generation, old age people and individuals who possess low level of education have lower financial knowledge. It was discovered that disparities in financial understanding related to variances in retirement planning. Retirement planning is yet another determinant of financial education, and concerns about retirement notions are included in this category (Zeka, 2017).

As previously said, policymakers are becoming increasingly worried about the financial literacy of households. Even though the importance is widely recognized, households still lack financial capability to make investment decisions. Households who have high financial literacy seem to perform better in making financial investment decisions (Lusardi & Mitchell, 2007), even they do better in dealing with credit card usage and its debt (Mottola, 2013). Households who possess low level of financial literacy make suboptimal decisions while making financial decisions like choosing mortgages or loans (Moore, 2003; Utkus & Young, 2011), so poor financial decisions of households can be directly associated with low level of financial literacy. Amongst the primary reasons people do not adequately plan for retirement is a lack of sufficient financial knowledge. As per (Lusardi & Mitchell, 2011) a strong and favorable relationship exists between financial literacy and retirement preparation. Financial knowledge was also discovered to be important for planning, as individuals who just couldn't respond to financial questions were less likely to prepare and thrive in their planning. Survey shows that, even in developed nations, individuals do not make financial decisions efficiently (Atkinson, McKay, Collard, & Kempson, 2007). Not only is it a basic need, but financial literacy is also one of the most important skills for life in the twenty-first century. Any person who is not financially literate can neither take full advantages nor fully participate in this modern economy (Klapper, Lusardi, & Panos, 2013). (Mullock & Turcotte, 2012) conducted research to analyze Canadian's financial literacy level and how it plays a role in making retirement savings plan. According to the findings of their study, Canadians are better at grasping simple financial issues but struggle to comprehend sophisticated financial ideas.

According to the study done by (Brown & Graf, 2013) who examined the case of households in Switzerland and studied the association between financial literacy and retirement planning, they found that retirement planners are more likely to report a greater level of financial literacy than those who do not plan for retirement. (Lusardi & Mitchell, 2017) investigated the effect of financial literacy on retirement planning. The results show that financial knowledge obtained in schools prior to joining the job market has a positive impact on the preparation of one's future retirement planning. As a result, it is critical to develop educational programs for youth to provide them with the essential financial knowledge that will have a beneficial impact on their financial welfare later in life, after retirement. Based on a survey of 120 Indonesian university teachers, (Setyawan Hutabarat & Wijaya, 2020) find the impact of financial literacy on financial planning for retirement. The results suggest that when it comes to making personal retirement strategies, views regarding retirement products are important. Pension financial strategies are more likely to be established by those who have favorable views toward retirement products. The emphasis of this research is on individuals who have a high degree of education and are more likely to be financially savvy.

Financial literacy has a positive impact on the financial decision-making of individuals. Numerous studies have demonstrated that individuals with a higher level of financial literacy are more likely to engage in sound savings behaviors and do better financial management in their daily lives (Lusardi, A., 2008). This evidence emphasizes the importance of financial literacy as a means of enabling individuals to make informed and effective financial decisions. Retirement planning and financial literacy are highly associated. This implies that investing in financial education significantly influences an individual's perspective on retirement and their ability to retire with sufficient resources. In other words, financial literacy plays a crucial role in helping people plan for their retirement and ensuring they have the necessary resources to live comfortably during their golden years (Moure, N. G., 2016). We generate our hypotheses based on this:

***H: Financial literacy has a significant positive impact on long term savings behavior.***

### **3. Data & Methodology**

#### **3.1. Sample**

We investigate the financial literacy level of individuals and old age saving decision of European households using the Household Finance and Consumption Survey (HFCS) data from ECB. Among the survey's primary objectives is to collect in-depth information on households' assets, liabilities, and consumption. It is a detailed micro level data which includes several characteristics households balance sheets and related demographic and economic variables which includes employment, income, pensions, gifts, and various other measures. The harmonized methodology makes sure the cross-country comparison is reliable. Three waves have been released for HFCS data. The data collection work for the first wave was done in 2010, for second wave the fieldwork was done in 2014 whereas the field work for third wave took place in 2017. The data from these three waves were made available to researchers in April 2013, December 2016, and March 2020 respectively. The first wave includes data for around 54,000 households from 15 European countries, while for second it was extended to further five countries and includes more than 84,000 households. For the third wave the data collection has been extended to 91,000 households from 22 European countries. We are interested in finding the relationship between financial literacy and retirement savings, and in wave 2 of the HFCS, we have data from Luxemburg and Slovakia about financial literacy. By comparing data on financial literacy from Luxembourg and Slovakia, we can analyze how savings behavior differs between the two countries, given their different levels of financial development. In wave 3, we have data available for financial literacy only for Slovakia. Therefore, we use the second wave of the HFCS data for our research analysis. Computer Assisted personal Interviewing mode was used to collect the survey data. This ensures an effective way of data collection with minimal error chances. Data collection for wave 4 has been done in 2020. It is expected that the report for the subsequent wave will be made public by the end of the second quarter of 2023.

There are two components of dataset divided as core variables and non-core variables. Non-core portion is usually an extension of some core variable part but in more detail. We have data from all participating countries for core variables as it is compulsory. The decision to collect data for non-core variables is made at national level. If the data is not collected for non-core variables from any country, it is set as missing values for that country. Though HFCS database is one of the most

comprehensive and collected on a large scale, it still has some limitations. On one hand, it allows the policy makers and researchers to compare the economic structure, demographic system, household characteristics among different euro countries. It also leaves some inconveniences due to missing data in non-core variables part. Non-core variable section should be given importance equal to core variable section as the questionnaire in that part gives us the opportunity to more detailed data analysis.

As our study is about old age provision savings and financial literacy, we want to analyze it across all European countries included in HFCS. Even within the euro area, there are differences between financial, social, and economic indicators for these countries. Unfortunately, our main variable of interest, financial literacy, is included in the non-core variables section of HFCS questionnaire, which limits the data availability. The data for financial literacy is only available for Luxembourg and Slovakia, so we have chosen these two countries for our empirical data analysis. In Luxembourg, data was collected from April 2014 to December 2014. For Slovakia, data collection period ranges from February 2014 to April 2014. The response rate was quite different for both countries, 23.4% in Luxembourg and 53.4% in Slovakia. We have 1601 observations from Luxembourg and 2135 observations from Slovakia. The response rate is enough as the net target sample size was set at 1500 for Luxembourg and 2000 for Slovakia by respective institutions.

In our sample, 59% of the respondents are male in Luxembourg and 66% are male from Slovakia. The average age is 50 for Luxembourg and 57 for Slovakia. Though 67% of Luxembourg lies between age 30 and 60 whereas in Slovakia 52% of population is from this age group. If we consider the working group, Luxembourg has some 60% population who are employed and only around 3% people are unemployed in our sample. In Slovakia, situation is quite different as only 40% of population is employed and 7% are employed. Overall Slovakia has more retired population at 38% and in Luxembourg it only lies at 23%.

## **3.2. Methodology**

### **3.2.1. Variable Definitions**

In our study, we measure the impact of financial literacy on individuals' attitude towards old age provision savings while controlling for socio-economic factors. Our core variables are financial literacy level and retirement savings. We use retirement savings as a dependent variable. It is

measured by a question which asks respondents if old age provision is the main purpose of their savings. It is a dummy variable which has a value of 1 if respondent said 'Yes'. Financial literacy level, which has a keen importance in our research is independent variable. Financial literacy level is an important tool in measuring how individuals perform while making their financial decisions. Financial literacy term is defined as "the ability to use knowledge and skills to manage one's financial resources effectively for lifetime financial security". Researchers use different sets of questionnaires to measure the financial literacy level of individuals. Financial literacy has been measured by basic methods like measuring it by numeracy and mathematical skills (Banks, J., & Oldfield, Z., 2007). The better and most commonly used methods include the individual's knowledge about financial concepts and financial products. The most widely used approach is the questionnaire designed by (Lusardi & Mitchell, 2005) and are known as Big Three. Lusardi, Annamaria, and Olivia S. Mitchell. "Financial Literacy and Planning: Implications for Retirement Wellbeing." (2005). This questionnaire was used in the 2004 US Health and Retirement Study. The Big Three includes the financial concepts about interest rates, inflation, and risk diversification. Financial literacy helps people comprehend how inflation and interest rates affect retirement funds over time. If savings aren't yielding at least the rate of inflation, inflation might diminish their purchasing power. The cost of borrowing money, known as the interest rate, affects savings returns. Understanding these principles can help people choose investment vehicles and retirement savings strategies. As per (Lusardi & Mitchell, 2014), only 34% of the households correctly answered all three question. As the Big Three doesn't cover the knowledge of advanced financial concepts, two more questions were added by Lusardi and Mitchell to cover the important missing concepts in the financial literacy measurement questionnaire set. The new questions cover the concepts about mortgages and asset pricing. This new set of questionnaires is known as Big Five questions for financial literacy (FINRA, 2010).

For our study, financial literacy is our main independent variable. The questions are intended to assess the level of financial literacy and comprehension of financial concepts among families. It is measured by a set of four questions which includes the concepts of interest rate, inflation, portfolio diversification and riskiness. The financial literacy level of individuals depends on the number of correct answers. It takes the value from 0 to 4, which means if the respondent gave incorrect responses to all 4 questions, he gets a 0 score whereas in case of all correct responses he gets a score of 4. The measurement method for both these variables is discussed below in detail in the

relevant sections. The Appendix shows the exact questionnaire used to measure the variables. Our results are comparable with other studies as the questionnaire in HFCS dataset are similar to previous investigations. Our dependent variable is about retirement savings which has a value of 0 if respondent said 'No' and 1 if respondent is saving.

We want to analyze if our hypothesis stands true after controlling for various factors which might have an impact on retirement savings attitude. For multi variate analysis the list of variables includes investment attitude, gender, age groups, education, marital status, number of dependent children, income quintiles, labor status, has household main residence (HMR), gift or inheritance received, and gift or inheritance expected. Investment attitude is measured on a scale of 1 to 4 depending on how much financial risk household is willing to take. Here 1 means that household is not willing to take any risk whereas 4 means households is willing to take high risk to earn high returns. Gender is a dummy variable which measures as 1 if respondent is male. Age is divided into six groups, so there are six dummy variables for age. It takes the value of 1 if an individual belongs to a particular age group. Our next variable is education which is divided into four dummy variables. Marital status is a dummy variable which equals to 1 if our respondent is married and 0 otherwise. Dependent children are defined as a person who is aged between 0 and 15 and a person between 16 and 24 who does not work and live with a parent. It is a dummy variable which is equal to 1 if the respondent has at least 1 dependent child. We have also controlled for labor status of the respondents. It is divided into four dummy variables as employed, self-employed, unemployed, and retired. Employed is measured at 1 if a person is employed and 0 if the person belongs to other groups. The same criteria are used for the other three labor statuses. We have also included a dummy variable if the respondents own a household main residence. It is defined as a place where the members of households usually live for most of the year. An individual can have only one HMR at any given time. Finally, we have included two control variables if the household has already received a substantial gift or inheritance or is expecting to receive it in future. This can have a significant impact on retirement savings as the rational approach would be to save less if a person is expecting to receive inheritance in future.

*Table 1.1: Descriptive Stats (Luxembourg)*

	N	Mean	Median	p25	p75	min	max
Old Age Provision	1601	.31	0	0	1	0	1
Financial Literacy	1601	3.1	3	3	4	0	4
Risk Attitude	1601	1.37	1	1	2	1	4
Male	1601	.59	1	0	1	0	1
Age	1601	50.13	49	39	60	17	85
Education	1601	3.4	3	3	5	1	5
Married	1601	.57	1	0	1	0	1
No. of Dependent Children	1601	.82	0	0	2	0	6
Monthly Income (ln)	1601	8.83	8.91	8.35	9.42	.51	12.15
Employed	1601	.61	1	0	1	0	1
Self-Employed	1601	.09	0	0	0	0	1
Unemployed	1601	.03	0	0	0	0	1
Retired	1601	.23	0	0	0	0	1
Has Residence	1601	.73	1	0	1	0	1
Gift or Inheritance Received	1601	.29	0	0	1	0	1
Gift or Inheritance Expected	1601	.25	0	0	1	0	1
Stock Market Participation	1601	.37	0	0	1	0	4
Life Insurance	1601	.32	0	0	1	0	1
Saving for Home	1601	.15	0	0	0	0	1

*Table 1.2: Descriptive Stats (Slovakia)*

	N	Mean	Median	p25	p75	min	max
Old Age Provision	2113	.41	0	0	1	0	1
Financial Literacy	2113	2.63	3	2	3	0	4
Risk Attitude	2113	1.27	1	1	1	1	4
Male	2113	.66	1	0	1	0	1
Age	2113	56.9	57	47	67	21	85
Education	2113	3.24	3	3	3	1	5
Married	2113	.57	1	0	1	0	1
No. of Dependent Children	2113	.59	0	0	1	0	7
Monthly Income (ln)	2113	6.69	6.79	6.17	7.32	1.23	10.27
Employed	2113	.42	0	0	1	0	1
Self-Employed	2113	.11	0	0	0	0	1
Unemployed	2113	.07	0	0	0	0	1
Retired	2113	.38	0	0	1	0	1
Has Residence	2113	.87	1	1	1	0	1
Gift or Inheritance Received	2113	.25	0	0	0	0	1
Gift or Inheritance Expected	2113	.13	0	0	0	0	1
Stock Market Participation	2113	.05	0	0	0	0	2
Life Insurance	2113	.1	0	0	0	0	1
Saving for Home	2113	.05	0	0	0	0	1

The list of control variables includes risk attitude, age, gender, education level, marital status, no of dependent children, and monthly income of households. Risk preference is measured on a scale of 1 to 4, where 1 means that a person is risk averse whereas 4 represents a risk seeker person. Other control variables were employment status, if households hold residence, any substantial inheritance or gift received, expect to receive substantial inheritance or gift in future, stock market participation, life insurance and saving for home.

### 3.2.2. Model Specification

For our research we use a Probit model to demonstrate the impact of financial literacy on old age provisions while controlling for certain socio-economic factors. We cannot use a linear regression for our research due to the nature of our dependent variable. Our dependent variable has only two possible outcomes, yes or no, known as dichotomous variable. In our study, our dependent variable has a value of Yes if an individual is saving for old age provision motive and No if he is not saving for this purpose. For such cases, Probit or Logit models are to be used. Probit has a clear benefit over logit in that it is associated with the normal distribution of data. The research uses data from the second wave of Household Finance and Consumption Survey (HFCS) from ECB. We are observing the impact of financial literacy as well as other socio-economic variables on old age provision savings for Luxembourg and Slovakia. Our control variables include gender, age, education, marital status, dependent children, income level, labor status, investment attitude, has HMR, inheritance received, or inheritance expected. We test our analysis by:

$$OldAgeProvision_i = \beta_0 + \beta_1 FinancialLiteracy + \sum \beta_i ControlVariables_i + \varepsilon_i$$

Where  $OldAgeProvision_i$  acts as a dummy variable. It is observed as 1 if individual i purpose of savings is for old age provision and is equal to 0 otherwise. The Probit model is estimated using maximum likelihood method. The financial literacy variable measures the score of individuals as per the questionnaire. Control Variables include all the socio-economic, demographic, and behavioral variables which impact the savings behavior. We discuss our dependent independent and control variables in detail in our next section.



## 4. Descriptive Statistics

We present the descriptive results of our study in the following section. Figure 1.1 below shows some interesting results and demonstrates the differences between financial literacy level among both countries and how the level differs across different questions. In Luxembourg, we can see how the correct responses varies among questions. About 82% of the population correctly answers the interest rate question, and the correct response rate increases to 93% for the following question, related to inflation. The third question is about portfolio diversification and the correct response rate is lower than the previous two questions as 79% answer it correctly. The last question is about the riskiness level of shares or bonds. Interestingly, people really have a hard time answering this question. Here, only 56% of the Luxembourg population are able to give the right answer to this question. 16% give the incorrect answer, whereas around 28% choose 'Do Not Know' option. Though the financial literacy level in Slovakia is lower than Luxembourg, but the results have a similar trend. The highest correct response rate is for the Inflation question and poorest performance is for Riskiness question. 79% of Slovakian population answers Interest rates question correctly. 89% of the population accurately responds to inflation question and 71% answers the portfolio diversification question correctly. There is a huge fall for the accurate response to Riskiness question. Only 23% of the Slovakian population is able to answer this question correctly. We can observe from the graph that overall financial literacy level is higher for Luxembourg in each question, but the trend is similar across four questions for both countries. We will further investigate in detail the possible explanation of the lower accurate response rate for riskiness questions.

We further analyze our results by looking into the distribution of accurate responses to four questions, displayed in figure 1.2. We can see the visible difference in financial literacy level between the two countries. After compounding for the distribution of correct responses, approximately 76 percent of the Luxembourg population correctly answers at least three out of four questions, according to our findings. In case of Slovakia, this percentage fell to 57%. Results turn exciting after accounting for correct responses for all four questions. In Luxembourg, around 39% of population accurately answers all four questions, whereas this percentage falls to 16% for Slovakia. We may simply presume that the riskiness question is to blame for the vast disparity between the two countries' figures. The results are alarming even for Luxembourg as more than

half of the population is unable to respond correctly to all four questions. The situation is particularly concerning in Slovakia, where fewer than one-fifth of the population is able to provide accurate answers to all of the four questions.

For more investigation, we compare the results of two countries by checking the financial literacy across demographic variables. Figure 1.3 illustrates the average financial literacy score across gender and age. Total possible score is four in case of all correct answers for any variable. Results are consistent with previous findings, as financial literacy score is higher for all variables in Luxembourg. In Luxembourg, the average score for male population is 3.17 whereas for female it stands at 2.99. The difference between financial literacy of men and women is similar and large across countries. United States, Netherlands and Germany all have significant financial literacy gender gap (Bucher-Koenen, Lusardi, Alessie, & Van Rooij, 2017). In Slovakia, the difference is not significant between male and female population. Average score for male and female population is 2.65 and 2.59 respectively. We have found some interesting results for financial literacy for difference in ages. For Luxembourg, results show that middle aged are more financially literate than younger and retired population. Population between 30 and 70 have negligible difference for their average financial literacy score as score is around 3.15. In Slovakia, young people scored higher on their financial literacy test. As per figure 1.3, people younger than 31 scored 2.84 whereas the population between 30 and 70 scored around 2.61. A possible explanation for this could be the recent inclusion of financial education at college or university level. In order to further investigate the relationship of financial literacy level with education and labor, figure 1.4 demonstrates some interesting facts. In terms of education level, there are parallel developments in both nations. Population having tertiary education got higher average scores, 3.35 for Luxembourg and 2.78 for Slovakia. The graph shows an increasing trend with an increase in education level for both countries. (Nicolini et al., 2013) find that individuals having at least high school education are more financially literate than others. For labor status, self-employed respondents show highest average financial score at 3.17 in Luxembourg. A possible explanation could be the difference in pension scheme for employed and self-employed. The unemployed population have the lowest financial literacy score among all groups at 2.98. Similar trend is observed for Slovakia where unemployed people have the lowest of financial literacy score of 2.32 among all groups. Employed population are the most financial literate in Slovakia having score of 2.74.

We have some interesting results about the respondents' purpose of savings. Figure 2.1 below shows the difference between Luxembourg and Slovakia. As seen above Slovaks are far behind Luxembourg in terms of being financial literate, but they are much more concerned about their old age provision savings. 41% of respondents from Slovakia says that the main purpose of their savings is as old age provision whereas only 31% says so from Luxembourg. The reason can be well explained due to the difference of pension systems of two countries. As per OECD Income distribution database, income source of retired people in Luxembourg includes 82.4% from public transfers whereas it is 71.5% for Slovakian population. This explains the difference that why Slovakian people are more concerned about their old age provision savings as they are not well covered by public pension system. Figure 2.2 covers old age provision concern across gender and age. In Luxembourg, males are more concerned about their retirement savings. 34% of male population chose the answer 'yes' for the retirement planning in contrast with female population where 28% chose this. This is consistent with previous studies as (Fisher, 2010) confirmed a lower rate of savings among households whose heads were women. There is a negligible gender gap in case of Slovakia. 41.5% of male population is concerned about their retirement savings and 40.8% of female population have the same concern. This gender gap is directly related with the gender gap in financial literacy level in both countries. In Slovakia there is small negligible difference between male and female financial literacy level, hence the same level difference in their retirement planning. Old age provision concern gradually increases with an increase in age in Luxembourg up to 60 years of age. In a young population less than 31 years old, only 15% of people are worried about their old age provision savings, and it increases to 42% for the population aged between 51 and 60. Our data shows that once the people are approaching retirement age their concern falls for retirement savings in Luxembourg. As per (Ekerdt, Kosloski, & DeViney, 2000) individuals become more worried about their retirement savings between age 51-61 as they see themselves to be retired in around 15 years. Only 30% of people are saving for old age provision once they move in the 61-70 age bracket. The concern again increases a little to 34% once they cross the age of 70. For Slovakia, the purpose of saving for old age provision keep on rising gradually throughout their life. Young population of less than 31 years is very less focused on their retirement savings as only 10% have responded yes for the old age provision savings. This keeps on rising and about 48% of people falling in 51-60 age bracket are concerned about their retirement savings whereas it was 42% for the Luxembourg for same age bracket. It rises to 50% for 61-70

age bracket and to 52% for 70 plus age for Slovakia. This supports our above findings that Slovakian people are more concerned about their old age provision savings.

Further we analyze our data to see how things differ across education and labor status in both countries in figure 2.3. In Luxembourg, people most concerned about their old age provision savings were either belong to primary education group or tertiary education. Both groups showed that 34% of the population saves for old age provision. People having primary education could be more concerned due to financial reasons. People with tertiary level education could be more aware and are more financially literate hence it explains the high concern for retirement savings. In Slovakia, the trend is almost similar. Respondents belonging to primary education group and tertiary education both have the highest percentage for old age provision savings at 46%. It would be interesting to find an explanation for the fall among lower secondary and upper secondary education groups for both countries. For the labor group, 31% of households who are employed are worried about their old age provision savings in Luxembourg. It increases to 37% for self-employed households and stands at 32% for both unemployed and retired households. For Slovakia, retired population is the most concerned for the retirement savings. 49% of households chose 'Yes', if their purpose of saving is for old age provision. There is not much difference between employed and self-employed, as their values are 40% and 41% respectively. Unemployed households have surprisingly too low concern for old age provision savings as only 15% have old age provision as a purpose of savings.

## **5. Results & Discussion**

### **5.1. Regression Results**

As the above results show a great picture that how different variables are related to each other, we want to go one step further. We want to see the relationship of financial literacy with old age provision savings by controlling with socio-demographic variables. This has been an important concern for regulators and individuals as there are numerous researchers done on the relationship of financial literacy and retirement planning, e.g (Boisclair, Lusardi, & Michaud, 2017; Bucher-Koenen et al., 2017; Lusardi & Mitchell, 2011).

Regression results are being presented in table 1.3 below. Our dependent variable takes the value from 0 to 1, 0 in case he does not save for old age provision and 1 if he saves for old age provision.

In first column we have results for Luxembourg. We can see that our results are clearly supporting our hypothesis that higher financial literacy leads to saving for old age provision. Financial literacy has a positive significant relation with provision for old age savings. One unit increase in financial literacy score increases the chance of saving for old age provision by 13.9%. This agrees with past studies which states that financial literacy has positive and significant relationship with retirement savings behavior (Boisclair et al., 2017; Kalmi & Ruuskanen, 2018; Van Rooij et al., 2011).

Our dependent variable also has a positive significant relationship with investment attitude. Investment attitude shows how much risk a person is willing to take while making investments. It is measured on a scale of 0 to 4 where 0 shows that he is not willing to take any risks whereas 4 means that individual is ready to take more risk to earn higher returns. Our results show that if a person is a risk seeker it has more chances of ending up in savings for old age. One unit increase in investment attitude of any individual increases 17.7% chance that he will save for old age provision. This could be explained that a risk taker individual will be ready to take more risks and make more investments as compared with a person who is risk averse, and as a result he might end up with higher wealth. Previous studies suggest that there is a gender gap in retirement savings. Our study complies with previous studies and show a positive relationship between retirement savings and male population. The results are not significant though. In Luxembourg, our data shows that elder people save more. Savings are significantly positive related to age. This is in line with previous studies which shows that elder people are more concerned for their old age provision savings. (Hira, Rock, & Loibl, 2009) found age as an important factor which plays a role in retirement savings. We have a strong negative relation of university education with old age provision saving. As per our regression results, one unit increase in university education brings about 25% decrease in saving motive for old age provision. It is interesting why more educated people are less concerned with their old age provision savings. It could be explained by the element that people with university education might be earning more than people who are less educated, and due to this difference, they have different preferences. They might have more investments for other motives and have less concern for old age provision savings. Married couples are more inclined to save than unmarried and single population. It has a positive significant effect on retirement savings. We have also controlled for dependent children. Our results show that dependent children have a negative relationship with old age provision savings. Dependent children are defined as people who are aged between 0 and 15 and people between 16 and 24 who

do not work and live with a parent. It is a dummy variable which is equal to 1 if the respondent has at least 1 dependent child. Our results are rational as households having dependent children would have to deal with more expenses. This proves that with greater expenses they would have less amount to save and hence less concern for old age provision savings. As a potential effect of income level, we do not find any significant effect of income on old age provision savings. We have divided our observation into 5 equal groups. Except income quintile 3, we have a positive relationship of income quintiles with retirement planning, but results are not significant. Households who are employed have stronger significant relationship with retirement planning than those who are unemployed. If households are expecting a significant gift or inheritance in future, it has shown a negative effect on retirement savings. It seems like in such scenario households are less worried about their future than those who are not expecting any substantial gift or inheritance. Our results show that a single unit increase in expectations about receiving significant gift or inheritance in future brings about a 19% decrease in concern for old age provision savings.

After controlling socioeconomic factors for Slovakian data, we find a different relationship between financial literacy level and old age provision savings. In the table 1.3 below, results for Slovakia are presented in second column. Our independent variable, financial literacy is negatively correlated with savings motive for old age provision. It should be noted, as shown above, that on average the Slovakian population is more worried about old age provision savings. Our sample shows 41% Slovaks are worried about their old age provision savings as compared with 31% of Luxembourg population. This concludes that people are more concerned about their old age provision savings, but this concern is not due to financial literacy. There are other factors which play vital role in shaping this behavior of Slovakian population. The high savings rate could be directly due to precautionary motive. As per OECD, Income Distribution Database, older people in Luxembourg get 82% of their earning from public pension system, 7% from capital pension system and 11% from work. In Slovakia, situation is quite different as only 72% of earning weightage is from public pension system and 28% of earnings are from work after retirement. So, this huge difference pushes people in Slovakia to save more for their post-retirement life, regardless of their financial literacy level. This pressure of saving more in Slovakia could also be due to difference in replacement rates of two countries. Luxembourg has 88% of replacement rate whereas in Slovakia it is 84%. Though the difference seems small, it could be regarded as an important factor in influencing households' behavior.

The study done by (Yeh & Ling, 2022) investigates whether or if an individual's overconfidence with regard to their financial literacy influences their participation in the stock market and their planning for retirement, and if so, how it does so. The empirical findings, which were based on data collected from a representative sample of 12,653 Japanese citizens, indicate that a positive role is played by financial literacy, although confidence in one's own level of financial literacy is also important. Overconfidence can motivate people to make financial decisions if they have a low level of financial literacy, while lack of confidence can prevent action for those with great financial knowledge. In addition to this, it was shown that the benefit of having overconfidence is lower for women than it is for males.

*Table 1.3: Regression Analysis*

	<b>(Luxembourg)</b>	<b>(Slovakia)</b>
VARIABLES	Old Age Provision	Old Age Provision
Financial Literacy	0.139*** (0.042)	-0.024 (0.034)
Risk Attitude	0.116* (0.061)	0.104** (0.050)
Male	0.053 (0.072)	0.017 (0.090)
Age	0.017*** (0.004)	0.029*** (0.003)
Education	-0.061** (0.027)	0.037 (0.033)
Married	0.123* (0.074)	0.134 (0.090)
No. of Dependent Children	-0.056 (0.037)	-0.102*** (0.036)
Monthly Income (ln)	0.074 (0.048)	0.090** (0.040)
Employed	0.259 (0.196)	0.544*** (0.208)
Self-Employed	0.307 (0.222)	0.474** (0.223)
Unemployed	0.456* (0.277)	0.124 (0.241)
Retired	-0.090 (0.198)	0.334 (0.207)
Has Residence	0.111 (0.086)	0.398*** (0.097)
Gift or Inheritance Received	-0.092 (0.079)	0.014 (0.067)
Gift or Inheritance Expected	-0.216*** (0.082)	0.161* (0.093)
Stock Market Participation	0.213*** (0.055)	0.405*** (0.127)
Life Insurance	0.133* (0.078)	0.356*** (0.102)
Saving for Home	0.163 (0.104)	0.154 (0.142)
Constant	-2.796*** (0.438)	-3.557*** (0.382)
Observations	1,601	2,113
Pseudo R2	0.0640	0.0927

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.10



## 5.2. Robustness Analysis:

Our above results for Luxembourg clearly show that financial literacy has a direct impact on old age provision savings. Now we want to extend our analysis to measure our research question by using alternative measures of financial literacy and changing the sample.

Firstly, we measure by alternative approach of financial literacy. For robustness checks we have considered any household financially literate if he is able to give correct answers to all four questions. So, in the case of all correct answers, financial literacy takes the value of 1 and otherwise 0. Column 1 in table 1.4 below shows the results for our analysis. It shows that our results are highly significant and positively related. This supports our initial findings that financial literacy helps individuals in preparing better for their post-retirement life.

Secondly, we changed our sample by selecting only those who are under 65, as 65 is retirement age in Luxembourg. The reason for including only those younger than 65 is that they have yet to reach retirement age and their motives might be different. Column 2 in table 1.4 below shows the results for this analysis. Again, our results are highly significant and positively correlated.

Our robustness results are supporting our main hypotheses that people having high financial literacy are more likely to save for their post-retirement life.

*Table 1.4: Robustness Analysis*

	(Luxembourg)	(Slovakia)
VARIABLES	Old Age Provision	Old Age Provision
Financial Literacy	0.255*** (0.072)	-0.093 (0.082)
Risk Attitude	0.117* (0.061)	0.105** (0.050)
Gender	0.049 (0.072)	0.017 (0.090)
Age	0.017*** (0.004)	0.029*** (0.003)
Education	-0.062** (0.027)	0.038 (0.033)
Married	0.122 (0.075)	0.136 (0.091)
No. of Dependent Children	-0.061* (0.037)	-0.103*** (0.036)

	(Luxembourg)	(Slovakia)
VARIABLES	Old Age Provision	Old Age Provision
Monthly Income (ln)	0.077 (0.048)	0.090** (0.040)
Employed	0.264 (0.196)	0.545*** (0.208)
Self-Employed	0.309 (0.222)	0.470** (0.223)
Unemployed	0.440 (0.276)	0.124 (0.241)
Retired	-0.073 (0.198)	0.330 (0.207)
Has Residence	0.105 (0.086)	0.401*** (0.097)
Gift or Inheritance Received	-0.095 (0.079)	0.015 (0.067)
Gift or Inheritance Expected	-0.212** (0.082)	0.161* (0.093)
Stock Market Participation	0.210*** (0.055)	0.408*** (0.127)
Life Insurance	0.138* (0.078)	0.356*** (0.102)
Saving for Home	0.165 (0.104)	0.161 (0.142)
Constant	-2.475*** (0.434)	-3.618*** (0.379)
Observations	1,601	2,113
Pseudo R2	0.0645	0.0930

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.10

## 6. Conclusion

Several implications may be drawn from our investigation. Our data demonstrate that many European households do not make significant preparations for retirement. While many households may not have clear long-term financial objectives, those with a stronger long-term focus really do have a better overview of their money, as documented by the survey results. Our research contributes to the empirical data showing that high levels of financial literacy are frequently associated with financial household behavior that is congruent with recommended practices for retirement planning, as demonstrated by previous research.

This investigation provides a significant contribution to our understanding of the traits and behavior of European households that are prepared to be financially self-sufficient during retirement. Our study shows that increased financial literacy increases the likelihood of saving for retirement by 15.3 percent for every unit improvement in financial literacy. This is consistent with previous research, which has shown that financial literacy has a positive and statistically significant association with retirement savings behavior. Individuals' investing attitudes were found to be a major predictor of their willingness to make contributions to personal retirement accounts.

The relationship between financial literacy and retirement savings cannot be fully explained without adding some other important variables. Other factors such as the field of education, social support, and access to financial advice may also influence this relationship and must be considered for complete understanding of how financial literacy affects retirement savings. Relevant education may provide households with the knowledge and skills needed to make better financial decisions and to understand the importance of retirement savings. People may be more inclined to engage in retirement savings behavior if they get social support, such as encouragement and guidance from family and friends. Moreover, social support and financial advice can assist people in making complex financial decisions and overcome barriers to retirement savings.

The COVID-19 incident has also raised concerns about who should be in charge of making sure people are prepared for retirement and highlighted the significance of retirement savings. Individuals must take care of their own funds, or they may experience issues in the future. To completely understand the factors that influence people's retirement planning decisions, more research is required. Institutions and policymakers should step in to assist people in preparing for retirement.

## Appendix

*Table 1.5: Variable Description Table*

<b>Variable</b>	<b>Definitions</b>
Old Age Provision	Dummy: 1 if respondent saves for old age savings.
Financial Literacy	Measured on a scale of 0 to 4 where 0 means that respondent gave wrong answers to all 4 questions and 4 means that correct answers to all 4 questions.
Risk Attitude	Measured on a scale of 1 to 4 where 1 state that investor is not willing to take any financial risks and 4 presents investors who take substantial financial risks.
Male	Dummy: 1 if respondent is male.
Age	Age of respondents.
Education	Measured on a scale of 1 to 5.
Married	Dummy: 1 if respondent is married.
No. of Dependent Children	No. of Dependent Children of respondent.
Employed	Dummy: 1 if respondent is employed.
Self-Employed	Dummy: 1 if respondent is self - employed.
Unemployed	Dummy: 1 if respondent is unemployed.
Retired	Dummy: 1 if respondent is retired.
Has Residence	Dummy: 1 if respondent owns residence.
Gift or Inheritance Received	Dummy: 1 if respondent has received gift or inheritance.
Gift or Inheritance Expected	Dummy: 1 if respondent is expecting gift or inheritance.
Stock Market Participation	Measured on a scale of 1 to 4.
Life Insurance	Dummy: 1 if respondent has life insurance.
Saving for Home	Dummy: 1 if respondent is saving for home.

## Financial Literacy Questions

### Variable/fixed interest rates

Of the following types of mortgages which one do you think will allow you from the start to fix both the amount and the number of instalments needed to pay off the loan?

- 1 - Floating-rate mortgage
- 2 - Fixed-rate mortgage

### Inflation

Imagine leaving 1,000 euros in a current account that pays 1% interest and has no charges. Imagine also that prices increase by 2%. Do you think that if you withdraw the money in a year's time you will be able to buy the same amount of goods as if you spent 1,000 euros today?

- 1 - Yes
- 2 - No, I will be able to buy less
- 3 - No, I will be able to buy more

### Portfolio diversification

In your opinion, which of the following investment strategies entails a greater risk of losing money?

- 1 - Invest all savings in the securities issued by a single company
- 2 - Invest all savings in the securities issued by a wide range of unrelated companies

### Riskiness

A company can obtain financing either by issuing shares or bonds. In your opinion, which financial instrument entails a greater risk of losing money?

- 1 - shares
- 2 - bonds
- 3 - equally risky
- 4 - I don't know the difference between bonds and shares

## Retirement Savings Question

### Purpose of Saving

Now I'd like to ask you some questions about your attitudes about savings. People have different reasons for saving, even though they may not be saving all the time. What are your (household's) most important reasons for saving?

- 1 - Yes
- 2 - No

a set of 12 variables for items:

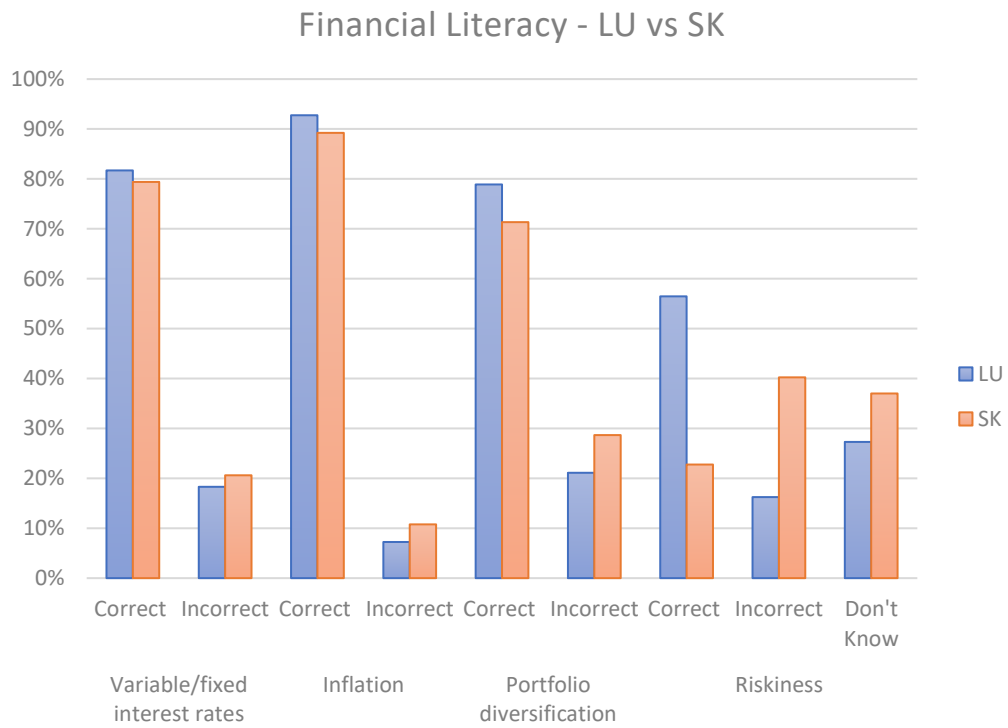
- a - Purchase own home
- b - Other major purchases (other residences, vehicles, furniture, etc.)
- c - Set up a private business or finance investments in an existing business
- d - Invest in financial assets
- e - Provision for unexpected events
- f - Paying off debts
- g - Old-age provision**
- h - Travels/holidays
- i - Education/support of children or grandchildren
- j - Bequests
- k - Taking advantage of state subsidies (for example, a subsidy to building society savings) l
- Other (SPECIFY)

### Investment Attitudes

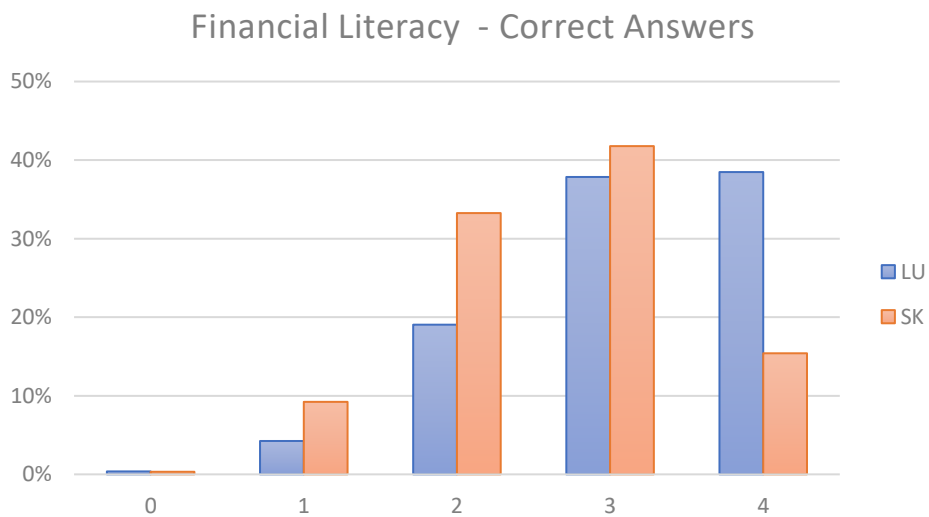
Which of the following statements comes closest to describing the amount of financial risk that you (and your husband/wife/partner) are willing to take when you save or make investments?

- 1- Not willing to take any financial risk.
- 2- Take average financial risks expecting to earn average returns.
- 3- Take above average financial risks expecting to earn above average returns.
- 4- Take substantial financial risks expecting to earn substantial returns.

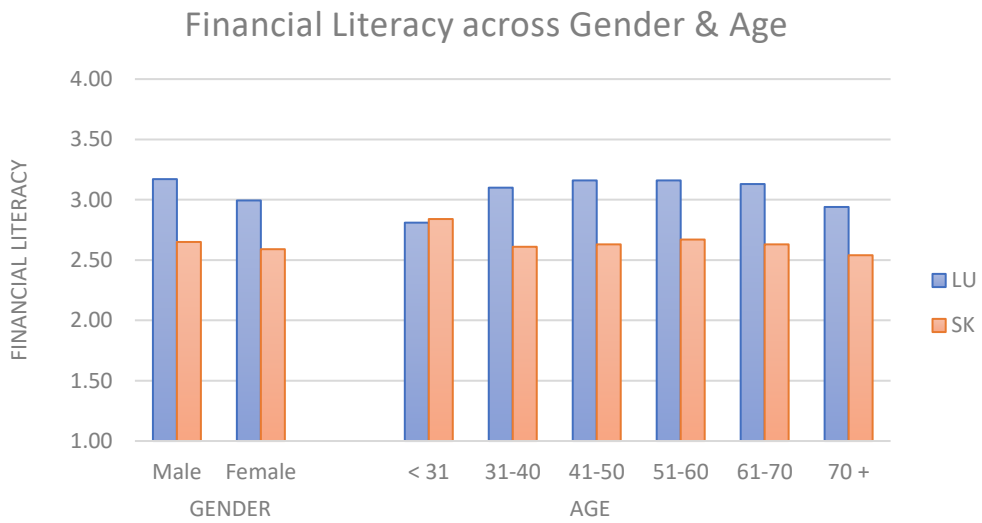
**Figure 1.1 Financial Literacy – LU vs SK**



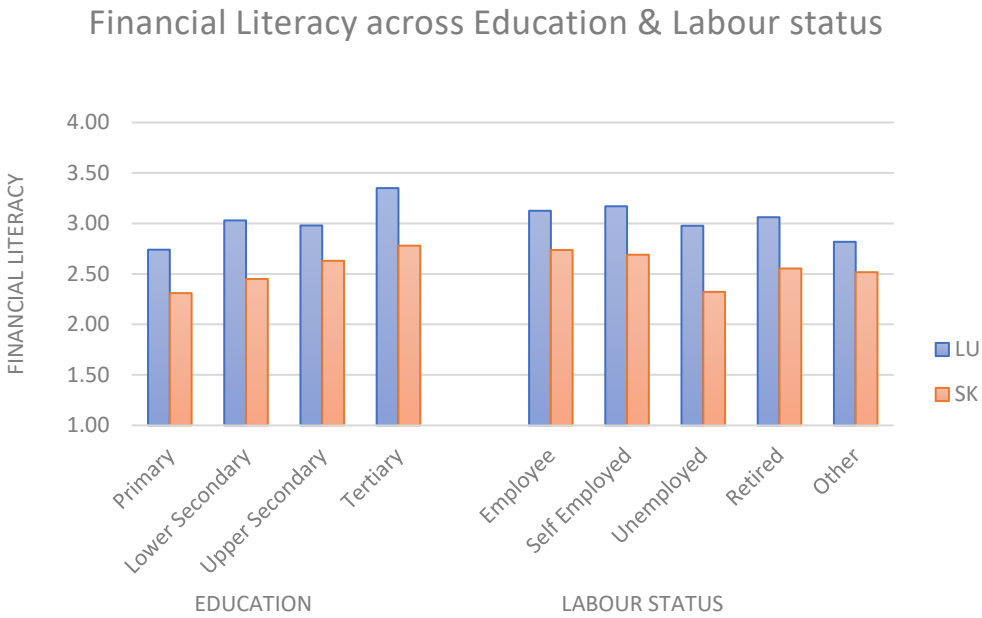
**Figure 1.2 Financial Literacy – Correct Answers**



**Figure 1.3 Financial Literacy across Gender & Age**

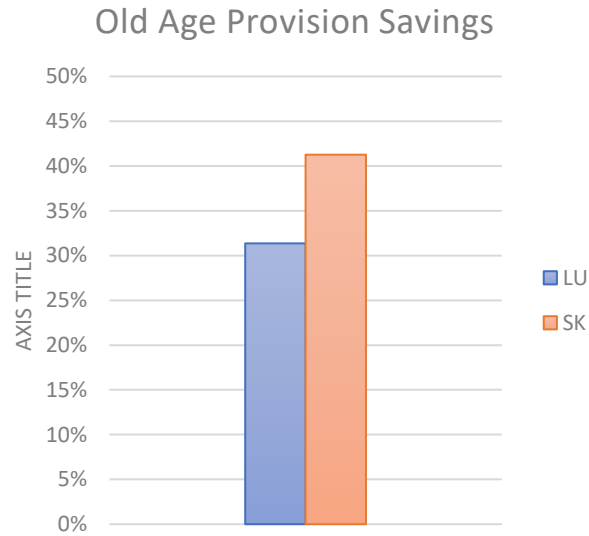


**Figure 1.4 Financial Literacy across Education & Labor Status**





**Figure 2.1 Old Age Provision Savings**



**Figure 2.2 Old Age Provision Savings across Gender & Age**

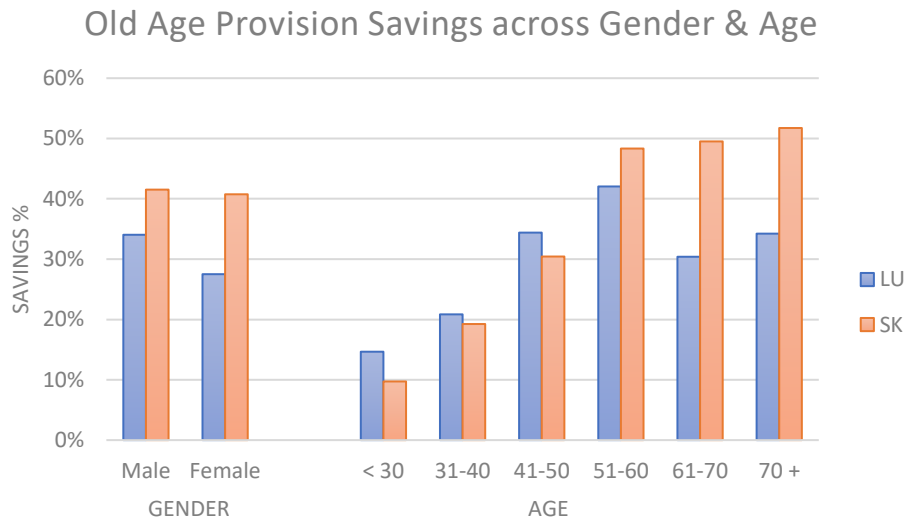
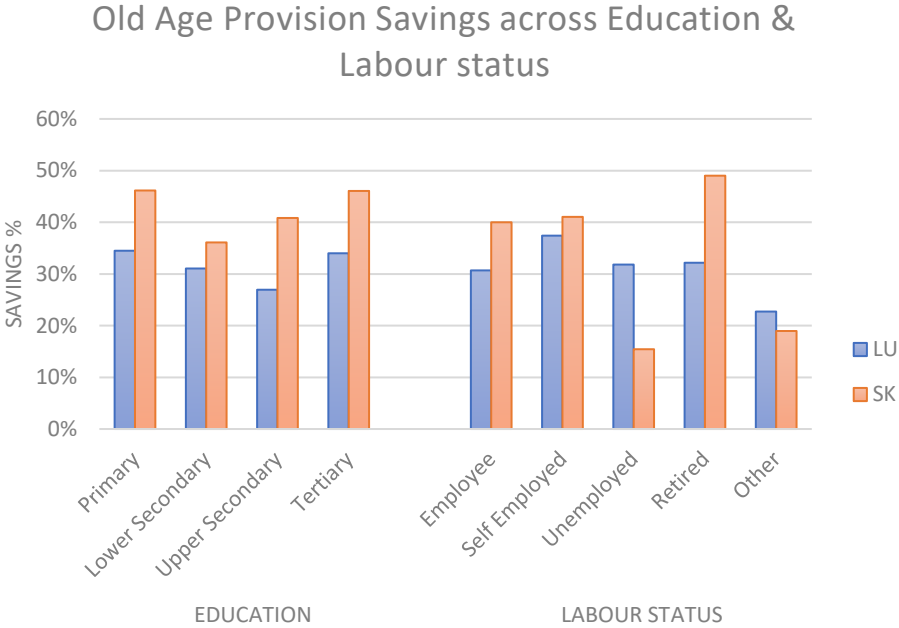


Figure 2.3 Old Age Provision Savings across Education & Labor Status





## **CHAPTER 2: IMPACT OF PERSONALITY TRAITS ON INDIVIDUAL RETIREMENT SAVINGS OF ELDERLY PEOPLE**

### **1. Introduction**

The governments are concerned if households are saving enough for their old age provisions? In almost all the European countries, pension reforms have been in the news for many years. The last financial crisis and ageing population triggered the focus of governments and policy makers on the pension plan reforms (Nerlich & Schroth, 2018). It is the top priority of the governments to create awareness among the population to think more about their retirement savings on their own. Currently, most policy makers are focused on improving the financial literacy of individuals so that overall savings behavior can be improved. We cannot deny the importance of financial literacy in pushing individuals to save more, but policy makers need to understand that it has limited effectiveness. Most European households rely on the public pension system to live their post-retirement life. There are numerous elements which builds the individuals behavior towards savings, and it includes economical, demographic, and behavioral factors (Yusof & Sabri, 2017). Behavioral issues play an important role in the final level of savings for the post-retirement life. There are several factors like time preferences, risk attitudes, financial knowledge, overconfidence bias and other behavioral biases which are responsible for the inefficient savings mindset of individuals (Alessie, Lusardi, & Van Rooij, 2008; Mitchell & Utkus, 2004; Zhang & Hanna, 2011). These above-mentioned aspects only explain the partial effect on savings attitude and cannot be held responsible for the changes in retirement savings level. To overcome this issue, we are interested in knowing about other attributes like personality traits that affect the individuals' approach towards their savings for old age provision. Personality traits have been shown to have a major impact on economic decision making. They have a solid foundation in the psychological literature and are gradually becoming identified as a component in economics, particularly in behavioral economics (Borghans, Duckworth, Heckman, & Ter Weel, 2008). The decisions related to retirement are highly influenced by personality traits encompassing everything from asset allocation to retirement savings, including the timing of retirement itself (Hershey & Mowen, 2000; Robinson, Demetre, & Corney, 2010; Sunden & Surette, 1998). Personality traits clearly have an impact on financial decisions made by individuals and households inclusive of decisions in regard to debt acquisition and the retention of financial assets(Brown & Taylor, 2014).

Among the behavioral factors, big five personality traits are considered as the one of the most influencing factors. The goal is to identify personal attributes as well as behavioral restrictions that could reflect why individuals save for retirement. Psychologists believe that there are five basic dimensions which form human behavior. These big personality traits are listed as Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism. Researchers show that these traits are universal and are found in all the cultures. We will go deeper into the attributes of these personality traits in the later section.

This paper focuses on the relationship between an individual's behavior and their retirement savings. The core purpose of this study is to explore the connection between the big five personality traits and individual retirement savings. We are particularly examining how the five-factor model of personality plays an important role in shaping the behavior of European individuals towards retirement savings. As per previous literature, personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism) have a significant impact on individuals' savings attitude. The link between retirement savings and households' attitudes has gained enough importance recently due to the change in demographic stats over the last many years. Most of the European countries are facing the threat of an ageing population. With the increasing trend, it is becoming difficult for the state to keep running the current pension system with existing policies. The policymakers have continuously amended the current public pension system for a few years, and households are in a tougher position than before. This has led to an increasing trend in private retirement savings, and researchers are also more concerned now in investigating the determinants of savings behavior.

We can observe from the existing studies that these traits have an essential part in an individual's decisions related to their life events. These traits already had a central role in psychological literature, but now are becoming increasingly important in behavioral finance too. For example, (Bouchard, Lussier, & Sabourin, 1999) did a study on 446 couples to investigate the relationship between personality traits and marital life. They concluded that agreeableness and conscientiousness play a significant positive role in marital adjustments, where neuroticism leads to complicated marriages. These personality traits have also shown a significant relationship with career choices. Openness, conscientiousness, and extraversion maintain life satisfaction level during career changes (Page, Bruch, & Haase, 2008). All traits, except neuroticism have a positive impact on job search behavior and individuals having these traits experienced shorter

unemployment periods during job transitions (Kanfer, Wanberg, & Kantrowitz, 2001). Personality traits have previously been established as key determinants of various elements of personal and household finances. Brown and Taylor (2011) in their research found that personality traits like extraversion and openness to experiences have a significant impact on household economics in respect of asset and debt levels. Personality traits like conscientiousness and neuroticism, on the other hand, seem to be irrelevant in affecting degrees of unsecured debt and financial assets. Depending on the types of debt and assets held, the findings of their empirical analysis indicate that the likelihood of having national savings does not tend to be affected by openness to experience. However, it has been discovered to enhance the likelihood of keeping stocks and shares, a quite risky sort of financial instrument.

When we talk about the impact of personality traits on behavioral finance, we emphasize on the fact that studies have found a significant relationship of the five-factor model with the economic decision making of individuals. The big five has an important role in determining labor force participation decision (Wichert & Pohlmeier, 2010). They also found that certain personality traits are helpful to higher wages. (Mueller & Plug, 2006) did a study to find an impact of personality traits on earnings. They found that all the five personality traits have either a positive or negative significant impact on individual earnings. Such kind of results intrigued researchers to find more economic factors where five-factor model could have an important role. Personality traits can predict the reasons and post-retirement satisfaction level of households (Robinson et al., 2010).

In a survey of affluent American investors, the study Jiang et al (2023) explores the connection between personality traits and investment choices. Findings reveal that the Big Five traits significantly influence investors' views on the stock market, risk preferences, and social interactions. Particularly, high Neuroticism and low Openness are associated with lower equity investments.

The purpose of our study is to explore the connection between the big five personality traits and individual retirement savings. Our study focuses on individual retirement savings, so we can find the factors which play an important role in determining this savings behavior. We measure the retirement savings level by the questionnaire which informs us that if the individuals have subscribed to private retirement savings. Personality traits are measured by the 10-item big five

inventory also known as BFI-10 and are used to measure individual's behavior. This short measure of personality traits was first introduced by (Rammstedt & John, 2007).

The research uses the data from the most recent wave of Survey of Health, Ageing, and Retirement in Europe (SHARE) released in 2019. Our study sample includes 34,517 individuals from different European countries and Israel.

Our findings show that openness, conscientiousness, and agreeableness are positively related to private retirement savings when controlled for other socio-economic and demographic variables. These results are consistent with the previous studies and suggest that policy makers and organizations should focus on such results and take measures to manipulate the savings behavior of individuals.

Our research contributes to the existing literature in several ways. First, it enhances the existing literature available on the relationship between personality traits and retirement savings by providing additional evidence on the impact of the big five traits on individuals retirement savings. As per our knowledge, this is the first study to assess the association of private retirement savings with personality traits by taking an account of multiple countries and large sample size. All the existing studies have focused on a single country and with small sizes of 300- 1500 individuals. Our study is the first to include 28 countries and a sample size greater than 34000 individuals. Secondly, our study is the first to account for social models while assessing the link of the big five model with retirement savings. We know that apart from personality traits, social models also play a vital role in shaping the household's behavior towards old age savings.

The rest of the study is organized as follows. The section below reviews the literature. Section 3 develops our research hypothesis. Section 4 includes the sample and research methodology. It also contains detailed variables analysis. Section 5 describes the descriptive statistics and correlation matrix. Section 6 offers the results of our empirical analysis and is followed by section 7 which includes a discussion and conclusion of our study.

## **2. Literature Review & Hypothesis Development**

### **2.1. Individual's savings behavior factors**

It is a complex process to put some money aside from your earnings. In the past few years, people are getting more serious and stressed about their old age savings (Chamon, Liu, & Prasad, 2013).

Several determinants are collectively responsible for this rising stress and are pushing people to save more. The most important is the shift of governments' focus to increase the private pension system by encouraging people to save more on their own. This shift is caused as life expectancy is continuously increasing, and it is disturbing the ratio of givers to takers of pensions. Every year, most of the member states of the European Union increase the retirement age by some margin. Most states spend more than 20% of their total government expenditure on public pensions. Though governments can only enforce measures like changing the retirement age and some other similar actions. They cannot force people to start saving more for their old age provision. This is the reason policy makers are more interested in knowing the determinants of savings behavior so they can manipulate savings attitude to some level.

People have different ways to allocate their earnings for their retirement purpose. An individual's behavior changes over time due to several factors such as changes in financial markets. Financial markets have the potential to play a significant role in the administration of aging-related concerns (Groome, Blancher, & Ramlogan, 2006). Financial changes allow for the efficient flow and distribution of economic resources across space and time, along with a diverse range of investors and financial institutions. These modifications have a favorable impact on household savings who provide finances with the goals of levelling out consumption and providing protection against unanticipated events in the future (Azimova & Mollaahmetoglu, 2017).

As per prior studies it is difficult to understand the true tactics of savings as it relies on various macro and micro economic factors. The most important theory regarding savings behavior is life cycle theory (Modigliani & Brumberg, 1954). It states that savings are made to finance your old age's consumption. This life cycle theory can be further explained as, individuals take the money from others before they start earning, save during the period they earn, and then spends these savings once they retire. (Friedman, 1957) gave another very important theory named as permanent income theory. It adds to the existing life cycle theory, that apart from savings for the motive of old age's consumption, individuals also save for their descendants so that can have a decent lifestyle. Some researchers suggests that it is a bit contrary to life cycle theory which indicates that individuals save resources so that they can consume it all by themselves (Summers & Kotlikoff, 1981). Another motive which extends the basic life cycle theory to some extent is house related savings. Households save by different methods and savings for house is one of them. (Hayashi,



Ito, & Slemrod, 1988) found that Japanese households are tempted to save more in their early stages of life cycle so that they can afford the high down payments required to purchase a house. Apart from the above-mentioned methods and types, purchasing life insurance is also a very important type of retirement savings. This can also be called an extension of permanent income theory. Individuals opt for life insurance contracts so that the benefits can be passed on their descendants (Fischer, 1973).

So far, we have talked about the motives and economic factors which lead to savings. Other than these, demographic and socio-economic factors play an important role too in shaping the individual's behavior. Several studies have focused on these microeconomic factors and how they impact individual behavior towards having retirement savings accounts. These factors include gender, age, income. The determinants of savings behavior affects both genders equally, but there are higher chances that men will end up in higher savings than women (Fernández-López, Vivel-Búa, Otero-González, & Durán-Santomil, 2015). The gender disparity in retirement savings can be seen early in a person's paid professional life and continues to grow over time, demonstrating that women face barriers early in their professions, with minimal signs of improvement. Men, on the other hand, are disproportionately represented in the top quartile of retirement savings growth. Women typically have lower wages across their lifetimes and make less money than males (Deere & Doss, 2006; Dwyer, Gilkeson, & List, 2002). In spite of the significant progress made in recent decades in terms of women's participation in the labor market, the wage disparity between the two genders is still significant, even when considering men and women who have equivalent level of experience and education (OECD, 2008). As a consequence of this, we might anticipate that women have fewer resources available to save for their retirement.

Income is also considered as one of the most important factors in determining the individual's behavior as it shows the saving capability ((Fernández-López et al., 2015; Torricelli, Brancati, & Santantonio, 2016). Households with more income not only have more disposable income but they also have greater opportunity to diversify their income streams by having access to financial markets. Higher income has a positive significant impact on an individual's propensity to save more.

Similarly, several studies indicate the significance of education, marital status and having children on savings level. The contribution of education to retirement savings is vital in many aspects.

Higher education can lead to a higher income level which can increase the savings level of individuals. If the education is somehow related to business, it can drastically improve the financial literacy level which results in raising the tendency to save. Individuals with better education have extra knowledge which puts them in better position to earn more and increase their savings level (Lusardi, 2001; Mosca & McCrory, 2016). There have been some studies which focus on retirement savings with respect to marital status and number of children and suggest that household arrangement has a significant impact on savings behavior. The rational reasoning behind this relationship is that change in this structure has a strong impact on the consumption level which results in a modification of savings behavior. Most of studies hints at positive relationship of marital status and retirement savings, as having shared resources decreases the consumption of two persons and thus, they can save more (Blau, Ferber, & Winkler, 2013).

## **2.2. Big five personality traits:**

Our study is about examining the impact of personality traits on savings behavior. We analyze the different personality traits in households and how this all affects their tendency to save privately. The big five model of personality traits has established its importance by proving that they have a significant impact on economic decision making. The simplest definition of personality traits could be thinking behavior and feelings pattern which remains constant across different situations and time periods. These five traits can be classified as openness, conscientiousness, extraversion, agreeableness, and neuroticism. Several studies have tried linking personality traits with retirement savings behavior, but there is a lack of consensus in their results. These differences can be explained due to differences of data and existence of other factors which controls the savings behavior.

These five factors can be narrowed down into two groups as per (Wichert & Pohlmeier, 2010). They describe that extraversion and agreeableness can be categorized as inter-individual while openness, conscientiousness, and neuroticism can be classified as intra-individual behavior. The first group classifies how individuals behave with others whereas the second group describes how individuals interact with emotional and intellectual responsibilities. Personality traits have an important role in shaping individuals' behavior towards savings. We generate our first hypotheses based on this:

**H1: Personality Traits help to explain individuals' savings behavior.**

Studies indicate that each personality trait contains specific facets, and these facets shape actions and behavior. Openness to experience contains curiosity, imagination, artistic interest and adventurousness (Mosca & McCrory, 2016; Wichert & Pohlmeier, 2010). Openness is the most difficult personality trait when it comes to predict the savings behavior. (Duckworth & Weir, 2010) did a study on 10,000 individuals in United States to explore the relationship of five factor model with economic outcomes. They found that openness has a positive significant relationship with both the total and number assets held. The strength of the relationship though varies with each age group. These ambiguous results could be explained by various factors. Openness has a negative impact on real state holding and value of the vehicles in possession, whereas it has a significant positive impact on savings for old age (Cobb-Clark, Kassenboehmer, & Sinning, 2016). We generate our second hypotheses based on the partial evidence in the prior literature as follows:

**H2: Openness has a positive significant impact on individuals' savings behavior.**

Conscientiousness is considered as the most influencing personality trait among all. Many studies have shown the significant positive impact of conscientiousness on job performance, academic achievements, stability in marriages, and being healthy. (Duckworth & Weir, 2010) found that conscientiousness has the positive significant impact on households' earnings and retirement savings. These results endorse the findings of previous studies too which highlights on the importance of conscientiousness regarding life achievements. (Cobb-Clark et al., 2016) have somewhat similar findings as they suggest that this personality trait has positive impact on household net financial worth in general whereas results show a negative impact on real estate assets. There results do not show any significant impact on the retirement savings. (Brown & Taylor, 2014) also analyzed the impact of big five traits on households' finances but find no outcome of conscientiousness on assets held. This literature leads to our third hypotheses:

**H3: Conscientiousness has a positive significant impact on individuals' savings behavior.**

Extraversion is the simplest of all personality traits as it describes those who are talkative, sociable, friendly, and cheerful individuals. These are the people who are more excited about the external world events and these facets could have an important impact on the economic decisions making of these individuals. Extraversion has a negative significant impact on assets held and a positive impact on unsecured debt (Brown & Taylor, 2014). The negative impact of this trait is rightfully

justified by the fact that they are more anxious about their social status. They maintain their status by spending more on the gatherings. Like openness, extraversion also has some contrary results. (Cobb-Clark et al., 2016) finds a negative impact of extraversion on financial wealth held by households, which is in line with our expectations, and a positive impact of extraversion on real estate assets held. Their results do not show any significant impact of extraversion on retirement savings. These results are in line with results of (Nyhus & Webley, 2001) who finds a negative impact of extraversion with private retirement savings. (Mosca & McCrory, 2016) did a study on 1172 Irish couples and observes that extraversion has a positive significant effect on households' wealth level. We develop our fourth hypotheses based on the above literature:

**H4: Extraversion has a negative significant impact on individuals' savings behavior.**

Agreeableness can be defined as the individuals who possess kindness, sympathy and act pro-friendly towards other members of society. Individuals having agreeableness personality trait earns less than others and even have lower credit scores as compared with the individuals who scores low on agreeableness (Bernerth, Taylor, Walker, & Whitman, 2012; Judge, Livingston, & Hurst, 2012). Agreeableness has a significant negative impact on households' savings level as they act more kind towards others, and this kindness can result in more charity and giving gifts to others (Duckworth & Weir, 2010; Gerhard, Gladstone, & Hoffmann, 2018). (Cobb-Clark et al., 2016) finds an opposite result to studies above and suggests that agreeableness has a significant positive impact on retirement savings of individuals. Though they find that agreeableness affects other wealth types and overall financial wealth negatively. The reason behind these findings is discussed in detail in the later part of our study. the contrast in results about the impact of agreeableness leads to our fifth hypotheses:

**H5: Agreeableness has a positive significant impact on individuals' savings behavior.**

Neuroticism refers to individuals having depressions, anger issues, anxiety and who worries and takes a lot of stress. The rational reasoning would be that if a person is not emotionally stable and takes a lot of stress in general, it could have a negative impact on his earnings and thus he will have less money to save. (Nyhus & Webley, 2001) suggests that neuroticism play a negative role in individuals' ability to save. (Brown & Taylor, 2014; Gerhard et al., 2018) did not find any relationship between neuroticism and retirement savings level. Some researchers reverse the scale of neuroticism to find the values of emotional stability. (Cobb-Clark et al., 2016) inverted the scale

and finds that emotional stability has a significant positive relationship with old age provision savings. We generate our sixth and last hypotheses based on the literature related to neuroticism.

**H6: Neuroticism has a negative significant impact on individuals' savings behavior.**

### **3. Sample & Data**

#### **3.1. Data Sampling**

For our research, we use the data from the Survey of Health, Ageing, and Retirement in Europe (SHARE) released in 2019. SHARE is a multidisciplinary and cross-national panel database of microdata on health, socio-economic status, and social and family networks of about 140,000 individuals. The European Commission always had a deep interest in such a database due to the aging population trend in Europe. So as a response and to meet the needs of policymakers, the SHARE database was created. It covers individuals from 27 European countries and Israel, who are aged 50 or above. Individuals are selected on the criteria that they must speak the official language of the country. Their partners are also interviewed, regardless of their age. The first data wave was released in 2004, and since then, seven waves have been published in total. The first wave of SHARE dataset included 30,242 individuals from 11 European countries and Israel. With each new wave, some new countries were added and finally for the latest wave, wave seven, which was gathered in 2017 & released in April 2019, the dataset includes more than 76,000 individuals. Computer Assisted personal Interviewing mode was used to collect the survey data. This ensures an effective way of data collection with minimal error chances. Share databases is harmonized with other top-rated households' databases like English Longitudinal Study of Ageing and US Health and Retirement Study to facilitate the comparison and interpretation of analysis.

#### **3.2. Methodology**

##### **3.2.1. Model Specification**

Our study uses the Probit model to investigate the impact of personality traits and other socio-economic factors on an individual's propensity to save for their post-retirement life. As our dependent variable is of dichotomous measure, we cannot use a linear regression for our analysis. For our study, we must choose between logit and Probit. Probit and logit differ in the distribution. Probit has the obvious advantage over logit, as it is linked with normal distribution. The possible

outcome either happens or does not happen, but it falls within a certain threshold and the outcomes of our dependent variables are normally distributed. We cannot interpret the coefficients of Probit model, so we use the average marginal effect for the interpretation of our analysis.

The research uses the data from the most recent wave of Survey of Health, Ageing, and Retirement in Europe (SHARE) released in 2019. We run our data on 34,517 individuals who belong to 27 European countries and Israel. We test our analysis by:

$$RetirementSavings_i = \beta_0 + \beta_1 Openness + \beta_2 Conscientiousness + \beta_3 Extraversion + \beta_4 Agreeableness + \beta_5 Neuroticism + \sum \beta_i ControlVariables_i + \varepsilon_i$$

where  $RetirementSavings_i$  acts as a dummy variable. It is observed as 1 if individual  $i$  have a retirement individual account and is equal to 0 otherwise. The Probit model is estimated using maximum likelihood method. The rest of the variables measure each personality trait on the scale of 1 to 5. Control Variables include all the socio-economic, demographic, and behavioral variables which impact the savings behavior. We discuss our dependent independent and control variables in detail in our next section.

### 3.2.2. Variable Definitions

For our study, retirement savings is our dependent variable. The statement of the question asks the respondents if they have ever subscribed to an individual retirement account. An individual retirement account is defined as a retirement plan in which a person puts away some money each year so that he can utilize the money after retirement. The exact question statement is as “Have you ever subscribed to an individual retirement account.” It is a dummy variable, which means that it takes the value of 0 if the respondent answers question as No and 1 if the answer is Yes. As this is our main variable, we have only used the responses from wave 7. Unlike some of the control variables where we have merged the data from the previous waves, we have not merged any data for this variable.

Our independent variables or explanatory variables, the core part of our research, are about personality traits. The questionnaire for personality traits was first introduced in wave 7. For the measurement of personality traits, we have used the Big Five model. The five personality traits in the Big Five model are Openness, Conscientiousness, Extraversion, Agreeableness, and

Neuroticism. Our model is a short model that consists of 10 questions instead of the standard 44 questions used to measure personality traits. The 10 items Big Five Inventory is also known as BFI-10 and is used to analyze the behavior of individuals. Each personality trait is measured by two items or two questions. Each question is measured on a scale of 1 to 5. This short measure of personality traits was first introduced by (Rammstedt & John, 2007). It is suitable for multi-theme surveys where we have limited resources of time and questions. The complete statement of the questionnaire is written in an appendix below, which shows the exact wordings and measurement scale.

Apart from this, we have controlled for a few more variables which include gender, age, education level, marital status, children, income level, employment status, and risk attitude. These variables are included based on previous economic literature. As per research, these variables play an essential role in forcing individuals to make their post-retirement life decisions. We have merged the data for some of these variables with previous waves to solve the problem of missing data.

Our first control variable is about gender named as Male. It is a dummy variable that takes the value of 0 if it is a female and 1 if it is a male. Previous literature shows that gender plays an important and significant role in retirement decision making. Though literature proves the importance of gender in this decision making, different studies show the different impact of gender on savings. Most of the studies demonstrate that men save more than women. The reason behind this could be well explained due to gender gaps. Men are more financially literate than women (Lusardi & Mitchell, 2007, 2011), and they end up in more savings at retirement age. Even though the determinants to take the savings decision are similar for both genders, men are more likely to save more than women (Fernández-López et al., 2015). Women are at a disadvantage at the early stage of their careers and thus end up in lower savings (Feng, Gerrans, Moulang, Whiteside, & Strydom, 2019). On the contrary, some research indicates that women have a better chance of ending up with higher retirement savings as they have longer life expectancy than men (Alessie et al., 2008). The females plan better for their life after retirement as they live longer than men.

Our next variable is about the education of our respondents. The individual's formal education has been measured as per ISCED standards. We have divided the households into three education groups. ISCED (0-2) shows the information about who possesses pre-primary education, primary

education, or lower secondary education. ISCED (3-4) means the individuals who either belong to an upper secondary or post-secondary education group. Finally, ISCED (5-6) related to households who have tertiary education levels. As per previous literature, education has a positive impact on households' savings levels and wealth accumulation (Ares, Lopez, & Bua, 2015; Lusardi, 2001; Mosca & McCrory, 2016; Yang & DeVaney, 2012). This relationship can be justified by the fact that people with higher education have extra knowledge, have potentially more income, and are in a better position to do financial planning for their future. These factors extend their ability to invest in some financial instruments to improve their retirement account returns.

Marital status and having children also play a vital role in savings behavior. Marital status is being measured by a dummy variable which equals 1 if a person is married and 0 otherwise. For our study, we have considered those people as 1 in marital status who are either married or are in a registered partnership. Married people are more concerned about financial stability for their older ages (Johannisson, 2008)), so people who are married or are in formal commitments are more likely to end up in higher retirement savings (Fontes, 2011; Lusardi, 2001). The positive relationship between being married and retirement savings can also be explained by a fact that when two persons share resources, they can have more disposable income to save (Blau et al., 2013). We have also included a dummy variable of having children, which equals to 1 if households have children. An increase in the number of kids would lead to more expenses and thus individuals would be left with less amount to save for their old age.

In our study, the population of income variable is divided into five equal parts or quintiles. This makes it easier for us to compare which group is better than the other in making savings decisions. Income is one of the most vital factors which shape the individual's decision to save for their retirement. Higher income is mostly related to higher education, which means people have more knowledge about how things work. Individuals with higher income might be tempted for savings accounts as there are tax benefits related to opting for retirement accounts (Lum & Lightfoot, 2003). Individuals with higher income have more chances of ending up in greater retirement savings due to availability of greater resources (Fernández-López et al., 2015; Torricelli et al., 2016).

Another variable which is very crucial in deciding the individual's behavior regarding savings is employment status. We have divided the employment status into three dummy variables named as employed, unemployed and homemaker. As per previous literature, employed people have a less



chance of suffering from financial stress as compared with unemployed and homemakers. The main reason for the positive relationship between being employed and savings behavior is that they have more resources available which offers them the chance to save more. Apart from this there is a greater chance that employed individuals can subscribe to their employer's pension plan. On the other hand, due to less resources and fewer opportunities it is difficult for the unemployed and homemakers to think about savings for their old age.

Our last and very important control variable is about the risk attitude of the respondents. Risk attitude is measured as a dummy variable which equals 1 if an individual is a risk taker and 0 if he is risk averse. In previous literature, we obtain contrary results about the impact of risk attitude on savings behavior. The difference in results can be supported by the fact that it depends on the kind of retirement saving accounts. If the retirement accounts are composed of riskier products, individuals will have a different approach. On the other hand, if the savings funds are invested in bonds or other less risky instruments, people with a higher level of risk aversion will save more. Individuals with higher level of risk seeking approach will be inclined to invest in riskier investments for greater returns (Yang & DeVaney, 2012).

## **4. Descriptive Statistics & Correlation**

### **4.1. Descriptive Statistic**

In this section, we present the descriptive results of our study. We produce our descriptive stats in two forms. In the first half, we describe our summary stats considering the eighteen European countries. We further develop a deep analysis by dividing our data according to four social models (Continental, Transitional, Nordic & Mediterranean) of our concerned countries and calculated the mean values of each variable. This shows how things differ among countries having different social groups.

Table 2.1 below shows the summary stats of all the countries in our study. Our final sample consists of 34,517 individuals. Our results show that at the time of data collection, 28.63% individuals answered as yes that they have subscribed to individual retirement accounts. This demonstrates that more than one fourth of our population is concerned about post-retirement life and are taking measures to tackle this issue. We offer some interesting results about the personality traits of our sample. Three personality traits named openness, extraversion and agreeableness have

a mean score around 3.50. There is a sharp increase in conscientiousness personality trait where our sample scored 4.13 as a mean. The mean score of neuroticisms is relatively low at 2.68.

*Table 2.1: Descriptive Stats Country wise*

Variables	N	mean	p25	Median	p75	min	max
Retirement Savings	34517	0.286267	0	0	1	0	1
Openness	34517	3.365925	3	3.5	4	1	5
Conscientiousness	34517	4.137841	3.5	4	5	1	5
Extraversion	34517	3.39459	3	3.5	4	1	5
Agreeableness	34517	3.623146	3	3.5	4	1	5
Neuroticism	34517	2.687983	2	2.5	3.5	1	5
Male	34517	0.480602	0	0	1	0	1
Age	34517	64.6318	57	61	71	51	105
ISCED012	34517	0.345446	0	0	1	0	1
ISCED34	34517	0.421381	0	0	1	0	1
ISCED56	34517	0.233173	0	0	0	0	1
Married	34517	0.664119	0	1	1	0	1
Children Dummy	34517	0.881694	1	1	1	0	1
Employed	34517	0.398154	0	0	1	0	1
Un Employed	34517	0.039783	0	0	0	0	1
Homemaker	34517	0.088113	0	0	0	0	1
Risk Taker Dummy	34517	0.284467	0	0	1	0	1

Our final data shows that out of total sample of 34,517 48% is male and the average age is 64.63. The reason for higher mean age is that SHARE database includes only population over 50. The

education means results are well in line with our expectations. As per table 2.1, 34.5% of our sample declared that they belong to ISCED 0-2 group. This means that they have either pre-primary education, primary education, or lower secondary education. 42% of our sample are qualified for upper secondary or post-secondary education. They belong to ISCED 3-4 group. Our last and most educated group includes 23.3% of our population and has tertiary education.

Regarding marital status and children situation, 66.4% of our sample is either married or are in registered partnership and around 88% reported that they have at least one kid. We have few socio-economic variables too in our study. If we consider employment status, 39.8% of our sample is employed, around 4% is unemployed and 8.8% is homemaker. The reason for the low unemployed percentage can be supported by the fact that around 42% of our sample is retired. Our last and one of the most important variables is risk attitude. The summary stats show that 28.44% of our sample is willing to take substantial financial risk to earn substantial returns.

To go one step further we have also divided our sample as per social models of all the countries. The detailed stats are shown in table 2.2 below. Our data shows that 29.7% of our population is from continental (Austria, Belgium, France, Germany, Luxembourg), 35% is from transitional (Croatia, Czech Republic, Estonia, Poland, Slovenia), 14.5% is from Nordic (Denmark, Sweden, Switzerland) and finally 20.7% is from Mediterranean (Greece, Israel, Italy, Portugal, Spain). If we consider the savings behavior, Nordic people are most concerned about their old age provision savings at 54%, whereas respondents from Mediterranean model are the least concerned at 11%. Our study shows that 35.5% percent of continental individuals have their individual retirement accounts and for transitional this figure stands at 32.2%. There is no significant difference if we look at the mean values of personality traits of the individuals from all four groups. The values of each personality trait of each group are not much different to the mean value of the whole sample. In transitional group, male population is 45.22% which increases to 47.9% in continental, 48.6% in Mediterranean and 50% in Nordic model. There is not much difference of mean age among all social models. The average of whole sample is 64.6 years and in social it varies from 63.9 years to 65 years. We can see the considerable difference between the education level among all groups. It was expected due to diversity of social expenditures in these social model groups. The Nordic model has the lowest percentage of population at 17.05% who have acquired pre-primary, primary or lower secondary education. This shows that they have a highly educated population, and it is proved if we look further into data. 48.1% of Nordic sample falls into those who have upper

secondary and post-secondary education and 34.8% has attained tertiary education. Continental model has somewhat similar results to Nordic model. Here 19.1% falls into ISCED 0-2 category, 51.4% into ISCED 3-4 category and 29.5% in ISCED 5-6 category. In transitional group, 34.3% belongs to ISCED 0-2, 50.11% to ISCED 3-4 and 15.5% to ISCED 5-6 education level. We can notice here that mid-level education holders in transitional group is similar to Nordic and continental, but they have less people who have got tertiary education and more who just attained up to lower secondary education and did not study further. The data for Mediterranean group has a huge disparity if compared to other groups. 65.2% of the population has attained just ISCED 0-2 level of education, 23,6% acquired further of ISCED 3-4 level and 12.3% of the total sample achieved tertiary education level.

*Table 2.2: Descriptive Stats based on Social Model*

Variable	Continental	Transitional	Nordic	Mediterranean
<b>N (Total = 34.517)</b>	10257	12097	5020	7143
	29.7%	35.0%	14.5%	20.7%
Retirement Savings	0.3552701	0.3216979	0.5398882	0.1089874
Openness	3.454908	3.23351	3.325327	3.254482
Conscientiousness	4.189366	4.015587	4.21271	4.062485
Extraversion	3.396028	3.484994	3.722017	3.30285
Agreeableness	3.527666	3.507762	3.975345	3.733965
Neuroticism	2.703966	2.794149	2.263979	2.727715
Male	0.4785035	0.4522562	0.5004133	0.4861595
Age	65.0696	64.48444	64.74168	63.90685
ISCED012	0.1912529	0.3434503	0.1705406	0.641518
ISCED34	0.5141808	0.5011738	0.4810128	0.2355663
ISCED56	0.2945663	0.1553758	0.3484466	0.1229157
Married	0.6372557	0.658466	0.6290757	0.7178374
Children Dummy	0.8768643	0.9230801	0.8810608	0.8808158
Employed	0.400095	0.3444161	0.5208888	0.3807063

Un employed	0.0358516	0.036891	0.0134419	0.0525967
Homemaker	0.0492612	0.0315661	0.0284001	0.178369
Risk Taker Dummy	0.3093795	0.2593784	0.511925	0.1999864

There is not any remarkable difference if we consider the marital status of respondents. The Nordic model has the lowest percentage of married people at 62.9%. It increases to 63.8% for continental group, 65.9% for transitional group and 71.8% for Mediterranean group. Having kids is also similar in all groups. The mean value of having children ranges from minimum of 87.6% in continental to maximum of 92.3% in transitional model.

The difference is heterogenous if we consider the employment status among all four social models. The Nordic region has the highest employment rate at 52.1% whereas transitional model has the lowest employment rate of 34.4%. The employment rate of continental and Mediterranean models stands at 40% and 38% respectively. There is a huge disparity of the mean values of homemaker between Mediterranean and other three social model groups. The Mediterranean model has a very high percentage of respondents who are homemakers 17.8% whereas for others it is 4.9% for continental, 3.2% for transitional and 2.8% for Nordic group.

Our last descriptive stat is about the risk attitude of our respondents. Nordic demonstrated as a most risk taker group at 51.1% willing to take any financial risk for substantial returns. Mediterranean proved to be the most risk averse sample as only 20% of respondents said that they will take some financial risk. 30.9% of individuals from continental model and 25.9% from transitional model were ready to take any financial risk.

## 5. Results & Discussion

### 5.1. Correlation Matrix

In this part of our study, we present the correlation among the variables used for the research. Table 2.3 below shows the pair wise correlation between retirement savings and personality traits, gender, age, education, marital status, children, income employment status, and risk attitude. Our results indicate that there is a statistically significant relationship between retirement savings and all personality traits except extraversion. In line with our hypotheses, we find that Openness, conscientiousness, and agreeableness has a positive significant impact on retirement savings behavior whereas neuroticism shows a negative significant sign with retirement savings. We also observe very interesting outcomes when we consider the correlation among personality traits.

Apart from neuroticism, all the personality traits are positively significantly correlated with each other. We do not discover any significant relationship between openness and agreeableness. Concerning neuroticism, we observe a negative sign of this personality trait with all other four personality traits. Furthermore, being male is positively associated with retirement savings and age has a negative impact on savings variable. For education, we observe a negative influence of primary education and a positive influence of secondary and tertiary education on our dependent variable. We also find that married respondents and having children is positively related to propensity to save. The correlation between retirement savings and income variables is also in line with our expectations. We divide the income variables into quintiles and find that the first three quintiles are negatively correlated with savings behavior and the fifth quintile is positively correlated with retirement savings. Employment status has a statistically significant relationship with retirement savings. Being employed has a positive significant sign and being unemployed and homemaker has a negative significant sign with savings variable. Risk attitude has a positive significant influence on retirement savings which explains that if a person is a risk taker, he will be more inclined towards old age savings.

Table 2.3: Correlation Matrix

Variables	(1)	(2)	(3)	4	(5)	6	(7)	8	(9)	10	(11)	12	(13)	14	(15)	16	(17)	18	(19)	20	(21)	22	
(1) RetirementSavings	1																						
(2) Openness	0.032*	1																					
(3) Conscientiousness	0.014*	0.065*	1																				
(4) Extraversion	0.002	0.134*	0.171*	1																			
(5) Agreeableness	0.029*	0.013	0.165*	0.157*	1																		
(6) Neuroticism	-0.038*	-0.058*	-0.129*	-0.207*	-0.217*	1																	
(7) Male	0.045*	-0.051*	-0.045*	-0.033*	-0.053*	-0.117*	1																
(8) Age	-0.171*	-0.052*	-0.014	-0.033*	0.034*	-0.018*	0.017*	1															
(9) ISCED012	-0.173*	-0.207*	-0.007	-0.049*	0.014*	0.081*	-0.057*	0.192*	1														
(10) ISCED34	0.034*	0.053*	0.008	0.040*	-0.029*	-0.022*	0.024*	-0.110*	-0.610*	1													
(11) ISCED56	0.154*	0.170*	-0.001	0.009	0.018*	-0.065*	0.036*	-0.088*	-0.420*	-0.463*	1												
(12) Married	0.022*	-0.009	0.043*	0.018*	-0.026*	0.006	0.182*	-0.180*	-0.058*	0.019*	0.043*	1											
(13) ChildrenDummy	0.018*	-0.012	0.049*	0.051*	0.027*	-0.008	-0.033*	0.014*	-0.004	0.009	-0.006	0.191*	1										
(14) Income2Q1	-0.116*	-0.035*	-0.037*	0.001	-0.036*	0.048*	-0.100*	0.130*	0.128*	-0.020*	-0.120*	-0.288*	-0.046*	1									
(15) Income2Q2	-0.087*	-0.018*	-0.060*	-0.021*	-0.038*	0.053*	-0.020*	0.102*	0.090*	0.013	-0.116*	-0.013	0.026*	-0.169*	1								
(16) Income2Q3	-0.080*	-0.029*	-0.021*	-0.012	0.003	0.025*	-0.011	0.025*	0.086*	-0.016*	-0.078*	-0.049*	-0.005	-0.189*	-0.250*	1							
(17) Income2Q4	0.014	0.007	0.027*	-0.003	0.009	-0.022*	0.031*	-0.031*	-0.037*	0.012	0.027*	0.092*	0.005	-0.208*	-0.274*	-0.306*	1						
(18) Income2Q5	0.231*	0.063*	0.075*	0.034*	0.049*	-0.085*	0.072*	-0.183*	-0.224*	0.006	0.244*	0.181*	0.011	-0.198*	-0.261*	-0.292*	-0.320*	1					
(19) Employed	0.184*	0.078*	0.040*	0.037*	0.008	-0.068*	0.039*	-0.560*	-0.205*	0.059*	0.162*	0.073*	-0.016*	-0.141*	-0.110*	-0.055*	0.028*	0.232*	1				
(20) UnEmployed	-0.021*	-0.009	-0.01	-0.009	-0.015*	0.031*	0.020*	-0.142*	0.024*	0.003	-0.031*	-0.004	-0.027*	0.054*	0.019*	0.009	-0.026*	-0.040*	-0.087*	1			
(21) Homemaker	-0.115*	-0.032*	0.004	-0.028*	0.004	0.067*	-0.229*	-0.015*	0.166*	-0.070*	-0.105*	0.057*	0.024*	0.003	0.015*	0.036*	-0.014	-0.037*	-0.162*	-0.041*	1		
(22) RiskTakerDummy	0.237*	0.046*	0.0004	0.025*	0.030*	-0.090*	0.131*	-0.140*	-0.199*	0.008	0.214*	0.071*	0.001	-0.120*	-0.111*	-0.067*	0.023*	0.233*	0.162*	-0.018*	-0.075*	1	

Additionally, we analyze the correlation results further by adding some cross variables. We create the cross variables of personality traits and education level to observe how it changes the impact on retirement savings. The detailed results are presented in table 2.4. We find that education has a stronger impact in deciding the savings behavior. For any personality trait, when the individual only has primary education, the impact on retirement savings is negative. We go deep into this analysis by creating more cross variables. The question of the impact of income on retirement savings has been treated several times in literature and we know that higher income leads to higher chances of old age savings. Nevertheless, one may wonder how savings are affected when we combine income and education level of an individual. Table 2.4 below shows some interesting conclusions for this. We can see from the findings that education plays a far more important role in shaping individuals' behavior rather than their income level. If we consider the first group, we can observe that the impact of individuals having primary education is significantly negative on retirement savings, irrespective of their income status. Even if the respondent belongs to the fourth quintile of income group, but has primary education, the impact on savings is significantly negative. The behavior towards savings gets better as the education level of individuals improves.

**Table 2.4: Correlation Matrix**

Variables	Retirement Savings	Variables	Retirement Savings
Retirement Savings	1.000	Retirement Savings	1.000
Openness	0.032*	Openness	0.032*
Conscientiousness	0.014*	Conscientiousness	0.014*
Extraversion	0.002	Extraversion	0.002
Agreeableness	0.029*	Agreeableness	0.029*
Neuroticism	-0.038*	Neuroticism	-0.038*
Primary Education	-0.173*	Income2Q1	-0.116*
Secondary Education	0.034*	Income2Q2	-0.087*
Tertiary Education	0.154*	Income2Q3	-0.080*
Openness n Primary	-0.158*	Income2Q4	0.014
Openness n Secondary	0.026*	Income2Q5	0.231*
Openness n Tertiary	0.144*	Primary Edu n Income2Q1	-0.102*
Conscientiousness n Primary	-0.166*	Primary Edu Income2Q2	-0.088*
Conscientiousness n Secondary	0.034*	Primary Edu n Income2Q3	-0.094*
Conscientiousness n Tertiary	0.153*	Primary Edu n Income2Q4	-0.032*



Variables	Retirement Savings
Extraversion n Primary	-0.161*
Extraversion n Secondary	0.028*
Extraversion n Tertiary	0.145*
Agreeableness n Primary	-0.166*
Agreeableness n Secondary	0.038*
Agreeableness n Tertiary	0.157*
Neuroticism n Primary	-0.160*
Neuroticism n Secondary	0.022*
Neuroticism n Tertiary	0.136*
<b>* Shows significance at the .01 level</b>	

Variables	Retirement Savings
Primary Edu n Income2Q5	0.010
Secondary Edu n Income2Q1	-0.046*
Secondary Edu n Income2Q2	-0.030*
Secondary Edu n Income2Q3	-0.026*
Secondary Edu n Income2Q4	0.011
Secondary Edu n Income2Q5	0.129*
Tertiary Edu n Income2Q1	-0.031*
Tertiary Edu n Income2Q2	-0.010
Tertiary Edu n Income2Q3	0.009
Tertiary Edu n Income2Q4	0.045*
Tertiary Edu n Income2Q5	0.192*
<b>* Shows significance at the .01 level</b>	

Variables	Retirement Savings
Retirement Savings	1.000
Openness	0.032*
Conscientiousness	0.014*
Extraversion	0.002
Agreeableness	0.029*
Neuroticism	-0.038*
Primary Education	-0.173*
Secondary Education	0.034*
Tertiary Education	0.154*
Openness n Primary	-0.158*
Openness n Secondary	0.026*
Openness n Tertiary	0.144*
Conscientiousness n Primary	-0.166*
Conscientiousness n Secondary	0.034*
Conscientiousness n Tertiary	0.153*
Extraversion n Primary	-0.161*
Extraversion n Secondary	0.028*
Extraversion n Tertiary	0.145*
Agreeableness n Primary	-0.166*
Agreeableness n Secondary	0.038*
Agreeableness n Tertiary	0.157*

Variables	Retirement Savings
Retirement Savings	1.000
Openness	0.032*
Conscientiousness	0.014*
Extraversion	0.002
Agreeableness	0.029*
Neuroticism	-0.038*
Income2Q1	-0.116*
Income2Q2	-0.087*
Income2Q3	-0.080*
Income2Q4	0.014
Income2Q5	0.231*
Primary Edu n Income2Q1	-0.102*
Primary Edu Income2Q2	-0.088*
Primary Edu n Income2Q3	-0.094*
Primary Edu n Income2Q4	-0.032*
Primary Edu n Income2Q5	0.010
Secondary Edu n Income2Q1	-0.046*
Secondary Edu n Income2Q2	-0.030*
Secondary Edu n Income2Q3	-0.026*
Secondary Edu n Income2Q4	0.011
Secondary Edu n Income2Q5	0.129*

Variables	Retirement Savings	Variables	Retirement Savings
Neuroticism n Primary	-0.160*	Tertiary Edu n Income2Q1	-0.031*
Neuroticism n Secondary	0.022*	Tertiary Edu n Income2Q2	-0.010
Neuroticism n Tertiary	0.136*	Tertiary Edu n Income2Q3	0.009
<b>* Shows significance at the .01 level</b>		Tertiary Edu n Income2Q4	0.045*
		Tertiary Edu n Income2Q5	0.192*
		<b>* Shows significance at the .01 level</b>	

Table 2.3 and 2.4 present some detailed analysis of correlations among different variables and how retirement savings are affected in different scenarios. The only limitation of correlation is that it does not control other factors, so the results may be biased. To overcome this issue, we run Probit model controlling for all the maximum possible variables which can impact on savings behavior.

## 5.2. Results

Table 2.5 below shows the multivariate analysis of our study. It demonstrates how personality traits and socio-economic variables play their part in predicting the individual's savings behavior. We employ the Probit model for our analysis. Our dependent variable is retirement savings against the independent or explanatory variable of five personality traits named as openness, conscientiousness, extraversion, agreeableness, and neuroticism. As per our hypotheses, we expect the significant positive relationship of openness, conscientiousness, and agreeableness on our dependent variable whereas we expect that extraversion and neuroticism has a negative significant impact on individual's retirement savings. Our control variables include gender, age, education, marital status, kids, income, employment status and risk attitude. As per previous economic literature available we expect positive impact of openness and conscientiousness on individual's saving behavior and negative impact of extraversion, agreeableness, and neuroticism on individuals' attitude towards old age provision savings. For our control variables, we expect a positive relationship of male, education, married, income level and being employed with retirement savings and negative relationship of having kids, unemployment, and homemaker. We also expect that higher the risk-taking behavior of any individual, higher will be the chances of ending up in more savings.

**Table 2.5: Regression Analysis Baseline Model**

VARIABLES	Retirement Savings
Openness	<b>0.056**</b>
	(0.022)
Conscientiousness	<b>0.009</b>
	(0.025)
Extraversion	<b>0.007</b>
	(0.022)
Agreeableness	<b>0.041*</b>
	(0.023)
Neuroticism	<b>-0.002</b>
	(0.020)
Male	<b>0.061</b>
	(0.039)
Age	<b>-0.014***</b>
	(0.002)
ISCED012	<b>-0.222***</b>
	(0.051)
ISCED56	<b>0.083*</b>
	(0.050)
Married	<b>0.004</b>
	(0.047)
Children Dummy	<b>-0.076</b>
	(0.062)
Income2Q1	<b>-0.139</b>
	(0.165)
Income2Q2	<b>-0.097</b>
	(0.085)
Income2Q3	<b>-0.100*</b>
	(0.055)
Income2Q5	<b>0.244***</b>
	(0.047)
Employed	<b>0.215***</b>
	(0.052)
Unemployed	<b>-0.003</b>
	(0.128)
Homemaker	<b>-0.285***</b>
	(0.101)
Risk Taker Dummy	<b>0.219***</b>
	(0.042)
Countries	<b>Yes</b>
Constant	<b>-0.725***</b>
	(0.253)
Observations	34,517
R-Squared	<b>0.214</b>
Wald chi2(p-value)	<b>0.0000</b>

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.10

For our research we employ both coefficients and average marginal effects. The purpose of coefficients is to realize that how personality traits bring change in retirement savings while controlling for certain factors whereas average marginal effects tell us about the change each unit of personality traits and control variables bring in individuals' tendency to save. We display the results of average marginal effects in table 2.6 in appendix. We run two separate regressions to get the empirical evidence of our study. In the first regression we use countries as dummies to control the country effect, which is also our baseline model. In our second regression we divide our sample into four social models based on criteria used in (Rey-Ares, Fernández-López, & Vivel-Búa, 2018). Table 2.6 below shows the details of our empirical results. We find significant results for openness and agreeableness with our dependent variable in our baseline model while for the second model, openness, conscientiousness, and agreeableness indicates a significant relationship with individuals retirement savings.

*Table 2.6: Average Marginal Effects for the Probit Regression*

VARIABLES	Retirement Savings (Countries)	Retirement Savings (Social Models)
Openness	0.0148** (0.00585)	0.0144** (0.00604)
Conscientiousness	0.00248 (0.00671)	0.0125* (0.00715)
Extraversion	0.00196 (0.00576)	-0.00290 (0.00598)
Agreeableness	0.0109* (0.00610)	0.0258*** (0.00636)
Neuroticism	-0.000410 (0.00524)	0.00873 (0.00548)
Male	0.0162 (0.0102)	0.0186* (0.0106)
Age	-0.00382*** (0.000668)	-0.00475*** (0.000681)
ISCED012	-0.0587*** (0.0135)	-0.0220 (0.0136)
ISCED56	0.0218* (0.0131)	0.0349*** (0.0133)
Married	0.00101 (0.0123)	-0.00477 (0.0125)
Children Dummy	-0.0201 (0.0164)	0.000484 (0.0180)
Income2Q1	-0.0366 (0.0434)	-0.0739 (0.0465)
Income2Q2	-0.0257 (0.0225)	-0.0189 (0.0221)
Income2Q3	-0.0263* (0.0145)	-0.0278* (0.0151)
Income2Q5	0.0645*** (0.0122)	0.0628*** (0.0126)

VARIABLES	Retirement Savings (Countries)	Retirement Savings (Social Models)
Employed	0.0567*** (0.0136)	0.0494*** (0.0141)
Unemployed	-0.000869 (0.0336)	-0.00553 (0.0359)
Homemaker	-0.0751*** (0.0266)	-0.101*** (0.0279)
RiskTakerDummy	0.0577*** (0.0109)	0.0736*** (0.0111)
Countries	Yes	
Mediterranean		-0.218*** (0.0150)
Nordic		0.0895*** (0.0111)
Transitional		0.0389* (0.0206)
Observations	34,517	34,517
F-test (p-value)	0.0001	
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

We find the following results while controlling for countries, which is also our baseline model. Our paper demonstrates that openness to experience is more likely to bring a positive change in individuals' behavior regarding retirement savings. The average marginal effect of openness explains that this personality trait is more likely to increase retirement savings by 1.5%. This finding is consistent with the (Brown & Taylor, 2014; Cobb-Clark et al., 2016), who also found that openness brings a significant positive change in individuals' savings. One mechanism which helps us to explain the positive relation of openness and savings could be that this trait is mostly correlated with intelligence (Ackerman). Openness to experience induces risk taking behavior of individuals (McCrae & Costa Jr, 1997) and this risk-taking attitude can be the reason for the positive relationship between openness trait and retirement savings. Risk takers tend to invest more in stocks and understand financial matters better than others.

Our second hypothesis states that conscientiousness brings a significant positive impact on individuals' savings behavior. We do not find any relationship between these two variables in our baseline model but find a significant positive impact in our second model. Extraversion and neuroticism, both are often associated as less likely to bring any positive change in individuals' savings. Our results reject these two hypotheses which state the positive impact of extraversion and neuroticism on propensity to save. In our study, we do not find any significant relationship of these two personality traits with our dependent variable.

Individuals who score high at agreeableness are more likely to have more pension savings than their peers. The average marginal effect explains that agreeableness is more likely to increase the probability of retirement savings at 1.1%. This finding might appear surprising at first, since agreeableness is related to being kind and individuals who act pro friendly towards others. More agreeable individuals tend to donate more to charity and gift items, and this is the reason most quoted for their lower savings. Though most of the studies find that agreeableness is likely to increase the chances of having more savings, (Cobb-Clark et al., 2016) presents that agreeableness is more likely to bring significant positive changes in pension savings. However, our study has a different demographic structure from most of the previous studies. As we only include individuals who are above 50, this may be the single most important factor for opposite results. People tend to behave differently at different ages. Individuals who score higher on this personality trait are considered better at marital adjustment. In our data, 66% of the respondents are married, so we may conclude these individuals care more for their partners and thus this care plays an important role in building the savings reserves. We can also assume that most of the individuals with this personality traits are saving for bequest motive; thus, they want their kids to have a better and secure life after their death.

We then investigate the relationship of our dependent variable with control variables. We find significant and expected results for most of these variables. Even though most have significant relationships, some may have a bigger influence on retirement savings than others. We do not find any significant impact of gender on retirement savings, in our first model. We find that gender plays an important role and being male is significantly positively related to savings behavior when we control for social models. We will discuss these results in the later part of our study.

Our next variable is education. We find that higher education is more likely to bring significant positive change in propensity to save in both our models. Our reference variable is ISCED 3-4 in the education group. The results suggest that ISCED 1-2 education level is less likely to bring any positive change in savings behavior. Our findings state that this level of education decreases the likelihood of any positive change in retirement savings by 5.9%. If we consider the variable ISCED 5-6, which relates to if a person has tertiary education, we can see that a single unit increase in tertiary education is more likely to increase the savings level at 2.2% in our first model and 3.5% in our second model. This is consistent with the previous literature which shows that by increasing the education level of individuals can bring a positive change in savings behavior(Fernández-López et al., 2015; Mosca & McCrory, 2016). We do not find

any effect of marital status and having children on our dependent variables. Education not in social 1-2, but have in 5-6

Our research suggests that higher income is more likely to increase the probability of retirement savings of individuals. We split our data into quintiles and keep a fourth income quintile as a reference. The average marginal effect of income explains the third quintile of income is less likely to increase the pension savings at 2.7% point. The individuals who fall in fifth quintile are more likely to save for their retirements at 6.5% point. Individuals with higher income have more resources and this can lead to an increase in pension savings (Huberman, Iyengar, & Jiang, 2007; Torricelli et al., 2016). Employment situation is also a very important factor which decides individual's behavior in achieving their retirement savings goals. The findings of this paper suggest that being employed increases the likelihood of causing a significant positive change in retirement savings at 5.7% in our first model. We further find that if an individual is a homemaker, it is less likely to increase the probability of pension savings. The average marginal effect shows that being a homemaker decreases the likelihood of savings at 7.5% when we control for countries. The employed individuals have more earnings and the opportunity to subscribe to an employer's pension scheme. On the other hand, unemployed and homemakers have less resources and it is almost impossible for them to keep the money aside for old age provisions (Fontes, 2011; Rey-Ares et al., 2018).

Our last and very important variable is about the relationship of risk taker attitude with savings behavior. The results conclude that risk taking behavior increases the likelihood of individuals savings. The average marginal effects state that risk taker attitude is more likely increase the probability of pension savings at 5.8% in our first model. Our results hint that the retirement savings account might be of a riskier nature, so the risk seeker respondents are investing more in these accounts to obtain higher returns. The outcomes of our research are in line with previous researches (Ares et al., 2015; Yang & DeVaney, 2012).

In our second model, we control the countries as per their social models. We divided our sample into four social models based on criteria used in (Rey-Ares et al., 2018). The social models are classified based on different sets of variables like GDP per capita, retirement income provision, social expenditure on old age, pension funds' assets value and gross replacement rates. We keep continental as a reference variable and find that Nordic and transitional models bring a positive impact of retirement savings behavior whereas Mediterranean brings a negative impact of individuals behavior towards their old age savings.

For most of the variables we find similar results as in our baseline model. Our findings accept our second hypothesis which states that openness brings a significant positive change in retirement savings. In our second model, the average marginal effect states that retirement savings are increased when an individual scores high on openness trait. It is more likely to increase the probability of retirement savings to 1.44% point. Extraversion and neuroticism, both are often associated as less likely to bring any positive change in individuals' savings. In our study, we do not find any significant relationship of these two personality traits with our dependent variable.

Conscientiousness is more likely to increase the savings attitude of individuals when controlling for social models. We expect that a one-unit change in conscientiousness brings a 1.3% positive change in pension savings. We do not find any effect of conscientiousness on propensity to save in our first model. The positive significant impact of conscientiousness on retirement savings is very rational and according to expectations. Individuals having this trait are considered responsible and organized. Conscientiousness is positively related to intelligence and higher IQ, and it increases the likelihood of having more savings (Duckworth & Weir, 2010).

We find a positive significant impact of agreeableness on savings behavior. This relationship between agreeableness and retirement savings becomes stronger when we control social models. The average marginal effect in our second model shows that agreeableness trait is more likely to increase the chances of having pension savings by 2.6%.

We then investigate the relationship of control variables with retirement savings and how control variables affect the savings behavior of individuals. We find similar findings for most of the variables, but the strength of variables changes in each model. Gender plays an important role in shaping the individual's behavior towards pension savings. We find that being male increases the likelihood of concern towards retirement savings in our second model but do not find any effect in our baseline model. The average marginal effect of gender describes that it increases the likelihood of savings by 1.9%. Women are at disadvantage as they earn less than men and have less money to save for their post-retirement life. Men are more financially literate and are more likely to save more for their retirement (Fernández-López et al., 2015; Lusardi & Mitchell, 2011).

Our next variable is regarding the impact of education on our dependent variable. Our reference variable is ISCED 3-4 in the education group. In our second model we do not find any



relationship between ISCED 1-2 group and old age savings, but we find that higher education is more likely to increase the retirement savings of households. We find that ISCED 5-6 group is likely to increase in savings by 3.5%. The relationship is stronger in this model if we compare it with our baseline model.

We find that households belonging to higher income groups are more likely to have more retirement savings. Our results are in line with our expectations. Our reference group is income quintile 4 and we find that households who belong to income quintile 3 are less likely to save for savings. The average marginal effect explains that third quintile is less likely to increase the old age savings at 2.8% whereas the fifth quintile is more likely to increase the savings at 6.3%.

### **5.3. Robustness Tests**

Our study analyses how different personality traits can change the likelihood of retirement savings of households. We have used the 10-item big five inventory to measure the personality traits of individuals and explore how each personality trait shapes the behavior of individuals and how it affects their propensity to save. In addition to the main regression model, we analyze the robustness of our results with two additional dimensions. We apply robustness tests to evaluate how coefficients of our core baseline model perform when we make some changes in our independent variables or use different model. First, we deepen our analysis by dividing the baseline model into five different categories. In the second robustness test, we divide our sample as per social models of all the countries involved. The detailed results are presented in table 2.7 and table 2.8 below.

Our first robustness model is different from the baseline model in a way that we have divided our baseline model into five further categories by changing the control variables at different levels. We expect that our hypothesis will stand true when we apply robustness tests on our sample. We anticipate that openness, conscientiousness, and agreeableness are more likely to bring positive changes in retirement savings of individuals while extraversion and neuroticism are less likely to bring any positive change in old age savings behavior.

*Table 2.7: Robustness Tests*

VARIABLES	Retirement Savings	Retirement Savings	Retirement Savings	Retirement Savings	Retirement Savings
	M1	M2	M3	M4	M5
Openness	0.113*** (0.021)	0.065*** (0.022)	0.058*** (0.022)	0.056** (0.022)	
Conscientiousness	0.008 (0.025)	0.013 (0.025)	0.007 (0.025)	0.009 (0.025)	
Extraversion	0.007 (0.021)	0.008 (0.021)	0.009 (0.022)	0.007 (0.022)	
Agreeableness	0.010 (0.022)	0.044* (0.023)	0.043* (0.023)	0.041* (0.023)	
Neuroticism	-0.030 (0.019)	-0.013 (0.020)	-0.005 (0.020)	-0.002 (0.020)	
Male		0.135*** (0.038)	0.085** (0.038)	0.061 (0.039)	0.045 (0.038)
Age		-0.024*** (0.002)	-0.015*** (0.002)	-0.014*** (0.002)	-0.014*** (0.002)
ISCED012		-0.304*** (0.049)	-0.236*** (0.051)	-0.222*** (0.051)	-0.235*** (0.051)
ISCED56		0.182*** (0.046)	0.106** (0.049)	0.083* (0.050)	0.098** (0.049)
Married		0.089** (0.042)	0.006 (0.047)	0.004 (0.047)	-0.003 (0.046)
Children Dummy		-0.072 (0.061)	-0.086 (0.063)	-0.076 (0.062)	-0.076 (0.062)
Income2Q1			-0.164 (0.163)	-0.139 (0.165)	-0.148 (0.167)
Income2Q2			-0.116 (0.085)	-0.097 (0.085)	-0.103 (0.085)
Income2Q3			-0.112** (0.055)	-0.100* (0.055)	-0.100* (0.055)
Income2Q5			0.263*** (0.046)	0.244*** (0.047)	0.246*** (0.047)
Employed			0.222*** (0.052)	0.215*** (0.052)	0.222*** (0.052)
Unemployed			0.003 (0.128)	-0.003 (0.128)	0.005 (0.129)
Homemaker			-0.268*** (0.102)	-0.285*** (0.101)	-0.286*** (0.101)
Risk Taker Dummy				0.219*** (0.042)	0.223*** (0.042)
Countries	Yes	Yes	Yes	Yes	Yes
Constant	-1.512*** (0.170)	-0.070 (0.222)	-0.641** (0.252)	-0.725*** (0.253)	-0.315 (0.193)
Observations	34,517	34,517	34,517	34,517	34,517
R-Squared	0.157	0.197	0.211	0.214	0.212
AIC	37421.16	35643.16	35068.38	34913.57	34977.87

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.10

We can observe that openness to experience is significant in all our conditions at 1% level. It reduces in size though when we add more control variables. This is in line with our original results calculated through average marginal effects. We do not find any significant results for neuroticism and extraversion, which are similar to our initial results. We discover that agreeableness has a positive significant relationship in all our specifications except the first one where we do not have any control variables. There is a slight change in the size of the coefficient when we add more independent variables in our model. We do not obtain any significant relationship for the neuroticism trait in our robustness check too. Our results are highly robust when we consider the relationship between our dependent variable and independent variable.

The control variables also demonstrate the same results as described by our main model. We find the significant results for male variable when we control for general and labor factors, but do not observe any effect in M4 where we control for all variables. The results for education are also in line with our previous results. Our results indicate that lower education is less likely to increase the savings level whereas higher education increases the likelihood of individuals having more savings at retirement age. The findings are significant in all specifications and the size of coefficient is lowest when we control for all the possible variables. Marital status and having children have no effect on our dependent variable. Marital status is only significant in the absence of most of the control variables. Income findings endorse the results of our baseline model. Individuals who fall in third income quintile are less likely to increase their savings for old age whereas fifth income quintile is more likely to bring positive changes in savings level. The results in table 2.7 about employment level also prove that our findings are robust. If an individual is employed, it is more likely that he possesses a retirement savings account. The results are significant in all specifications. If any respondent is not employed and is a homemaker, our findings in table 2.7 suggest that it is less likely for him to increase his retirement savings level. The chances of having a positive attitude towards retirement savings increase if the respondent has a risk seeker attitude. The results are consistent in both estimations where this variable has been used.

We use five different specifications to test the robustness of our results. From M1 to M4, we have gradually increased the control variables to assess the relationship of independent variables with our dependent variable. In the last specification, we omit the personality traits to observe how it affects the relationship with our dependent variable. The aic score in table 2.7 shows that M4 has the lowest score which proves that it is the better model in comparison with other specifications.

In our second model, we divide our sample as per social models of the countries. This helps us to examine how things differ in different social models. There might be a chance that social models have an impact that how individuals of different personality groups behave towards the old age savings. The detailed results of our robustness check are presented in table 6.2.

*Table 2.8: Robustness Tests for Social Models*

	<b>Continental</b>	<b>Transitional</b>	<b>Nordic</b>	<b>Mediterranean</b>
<b>VARIABLES</b>	<b>Retirement Savings</b>	<b>Retirement Savings</b>	<b>Retirement Savings</b>	<b>Retirement Savings</b>
Openness	<b>0.021</b> (0.025)	<b>0.113*</b> (0.060)	<b>-0.023</b> (0.025)	<b>0.197***</b> (0.069)
Conscientiousness	<b>0.007</b> (0.033)	<b>-0.156***</b> (0.057)	<b>0.013</b> (0.033)	<b>0.080</b> (0.063)
Extraversion	<b>0.003</b> (0.026)	<b>0.062</b> (0.048)	<b>-0.058**</b> (0.027)	<b>0.039</b> (0.059)
Agreeableness	<b>0.026</b> (0.029)	<b>0.058</b> (0.073)	<b>0.023</b> (0.037)	<b>0.048</b> (0.062)
Neuroticism	<b>0.002</b> (0.024)	<b>0.038</b> (0.052)	<b>-0.052*</b> (0.028)	<b>-0.005</b> (0.052)
Male	<b>0.048</b> (0.050)	<b>-0.038</b> (0.102)	<b>-0.012</b> (0.055)	<b>0.163*</b> (0.097)
Age	<b>-0.013***</b> (0.003)	<b>-0.017**</b> (0.007)	<b>-0.012***</b> (0.004)	<b>-0.023***</b> (0.007)
ISCED012	<b>-0.147**</b> (0.061)	<b>0.108</b> (0.094)	<b>-0.329***</b> (0.071)	<b>-0.449***</b> (0.115)
ISCED56	<b>0.067</b> (0.057)	<b>0.503***</b> (0.101)	<b>0.026</b> (0.064)	<b>0.069</b> (0.155)
Married	<b>-0.077</b> (0.060)	<b>0.164</b> (0.124)	<b>0.007</b> (0.064)	<b>0.245*</b> (0.126)
Children Dummy	<b>-0.116</b> (0.077)	<b>-0.040</b> (0.164)	<b>0.033</b> (0.088)	<b>-0.014</b> (0.148)
Income2Q1	<b>-1.198**</b> (0.524)	<b>-0.229</b> (0.236)		<b>0.235</b> (0.265)
Income2Q2	<b>-0.187*</b> (0.112)	<b>-0.240</b> (0.233)	<b>-0.139</b> (0.221)	<b>0.152</b> (0.165)
Income2Q3	<b>-0.106</b> (0.067)	<b>0.050</b> (0.230)	<b>-0.172*</b> (0.100)	<b>-0.134</b> (0.126)
Income2Q5	<b>0.272***</b> (0.056)	<b>0.277</b> (0.356)	<b>0.245***</b> (0.068)	<b>0.134</b> (0.126)
Employed	<b>0.307***</b> (0.065)	<b>-0.068</b> (0.149)	<b>0.189***</b> (0.071)	<b>-0.021</b> (0.125)

	<b>Continental</b>	<b>Transitional</b>	<b>Nordic</b>	<b>Mediterranean</b>
<b>VARIABLES</b>	<b>Retirement Savings</b>	<b>Retirement Savings</b>	<b>Retirement Savings</b>	<b>Retirement Savings</b>
Un-Employed	<b>0.023</b>	<b>-0.657*</b>	<b>-0.449**</b>	<b>-0.037</b>
	(0.157)	(0.338)	(0.220)	(0.225)
Homemaker	<b>-0.185*</b>	<b>-0.455*</b>	<b>-0.462***</b>	<b>-0.437**</b>
	(0.107)	(0.256)	(0.143)	(0.211)
RiskTakerDummy	<b>0.214***</b>	<b>0.198*</b>	<b>0.328***</b>	<b>0.150</b>
	(0.052)	(0.105)	(0.056)	(0.116)
Countries	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
Constant	<b>-0.597*</b>	<b>1.267**</b>	<b>0.877**</b>	<b>-0.738</b>
	(0.323)	(0.621)	(0.382)	(0.619)
Observations	10,257	12,097	5,020	7,143
R-Squared	0.133	0.438	0.0872	0.163

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10

This division does change our results and adds an interesting perspective to our study. From table 2.8 we can see that we do not find any significant results for any of the personality traits in continental countries. In transitional model, we find that openness is more likely to bring a positive significant impact on retirement savings. This is in line with our hypothesis H2 and supports our existing results. We also find that conscientiousness has a significant negative impact on retirement savings which is contrary to our hypothesis. We do not find any results for other personality traits in this group. Furthermore, in the Nordic we do not find any impact of openness, conscientiousness, or agreeableness. We find that extraversion and neuroticism are less likely to bring any increase in retirement savings and the impact is statistically significant. Though these results are in line with our original hypothesis, these two hypotheses are not validated in any of the previous results. When the results of the Mediterranean region are considered, we observe a positive significant impact of openness on savings behavior. We do not find any results for other personality traits. We can conclude from these results that personality traits matter but social models also play an important role in deciding about savings behavior. Further research is necessary to find out how social models have a role in shaping individuals' personalities and how do they play any role in savings behavior.

## 6. Conclusion

This study emphasizes the ageing issue which holds a great importance in current scenarios. It is inevitable that the increase in the ageing population is going to bring changes in public pension policies in the European countries. The European governments have been in difficulty since the last financial crisis and are proposing measures which can lessen the burden on government expenditure. The current pandemic is going to increase the pressure on governments, and they will become more concerned than ever to spread awareness related to household savings.

Our study focuses on the factors that play a vital role in influencing individuals' behavior towards private retirement savings. We study how different personality traits play their role in shaping households' attitude and how it impacts their decisions to go for individual retirement accounts. A personality trait which proves to have a positive impact on retirement savings can be focused and structured. We also observe how social models have an impact on the private retirement savings of individuals. The purpose of analyzing from this point of view is that all countries cannot follow the same policies as same policies cannot be successful in different circumstances.

Currently, most policy makers are focused on improving the financial literacy of individuals so that overall savings behavior can be improved. We cannot deny the importance of financial literacy in pushing individuals to save more, but policy makers need to understand that it has limited effectiveness. There are other psychological measures too which need our attention and application in society to develop the current situation. We find the positive impact of openness and agreeableness on individuals' propensity to save. This shows that people who are imaginative, possess creative skills and act friendly towards others will be the ones who are more responsible and will take measures to live a better post-retirement life. We can also focus on making the combination of traits which proves positive towards savings behavior. Government, policy makers and organizations can run an awareness campaign to measure the personality traits of population and then act accordingly. If it is done at a younger age, it would be easier to train individuals, provide them with detailed feedback and prepare them for their old age private savings. Our results about the impact of social models are very comprehensive and carry significant importance. We should not focus only on the coefficients, but also the characteristics these social models are composed of. Our findings show that Mediterranean countries have a negative impact on private retirement savings. They need to focus on the

characteristics by which they can improve the overall situation and drive individuals towards private retirement savings.

There are several limitations which need to be taken care of in future research. We have limited our analysis of savings to possession of individual retirement account. People tend to save differently for their old age savings. Individuals invest in assets, purchase houses, buy life insurance policies to prepare for their future life.

## Appendix

*Table 2.9: Variable Description Table*

<b>Variable</b>	<b>Definitions</b>
Retirement Savings	Dummy: 1 if respondent saves for retirement.
Openness	Each personality trait is measured by two questions and measured on a scale of 1 to 5.
Conscientiousness	Each personality trait is measured by two questions and measured on a scale of 1 to 5.
Extraversion	Each personality trait is measured by two questions and measured on a scale of 1 to 5.
Agreeableness	Each personality trait is measured by two questions and measured on a scale of 1 to 5.
Neuroticism	Each personality trait is measured by two questions and measured on a scale of 1 to 5.
Male	Dummy: 1 if respondent is male.
Age	Age of respondents.
Education	Dummy variable set for three education groups (ISCED012, ISCED34, ISCED56)
Married	Dummy: 1 if respondent is married.
Children Dummy	Dummy: 1 if respondent has children.
Income	Dummy variable set for 5 income groups.
Employed	Dummy: 1 if respondent is employed.
Un Employed	Dummy: 1 if respondent is unemployed.
Homemaker	Dummy: 1 if respondent is stay at home person.
Risk Taker Dummy	Dummy: 1 if respondent is risk taker.



*Table 2.9A: Personality Traits Questions*

Openness

- I see myself as someone who has few artistic interests.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly
  
- I see myself as someone who has an active imagination.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly

Conscientiousness

- I see myself as someone who tends to be lazy.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly
  
- I see myself as someone who does a thorough job.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly

Extraversion

- I see myself as someone who is reserved.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly

- I see myself as someone who is outgoing and sociable.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly

#### Agreeableness

- I see myself as someone who is generally trusting.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly
- I see myself as someone who tends to find fault with others.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly

#### Neuroticism

- I see myself as someone who is relaxed, handles stress well.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly
- I see myself as someone who gets nervous easily.
  1. Disagree strongly
  2. Disagree a little
  3. Neither agree nor disagree
  4. Agree a little
  5. Agree strongly



## **CHAPTER 3: INVESTOR PROTECTION, INVESTMENT ATTITUDE, AND SAVINGS BEHAVIOR**

### **1. Introduction**

The emphasis on the need for adequate savings after an individual's retirement always remained a topic of interest in the field of financial management. According to Jacobs-Lawson and Hershey (2005), individuals tend to save significantly less which can impact their long-term solvency. In fact, the tendency to save is decreasing in the upcoming generations, and almost half of all the individuals between 25 to 71 years don't have sufficient resources to support their retirement (Ma et al., 2000). According to Hayes and Parker (1993) experts suggests that given the complexity and extensiveness of retirement saving decision, the people who need these savings most are least interested in savings and when this tendency adds with the fact population aging is one of the biggest challenges that developed countries will face. Substantial improvement in the health facilities like access to advanced medical technologies and treatments, highly trained healthcare professionals, and well-funded public health programs lead to an increased life expectancy. This then reflects as an additional burden on public pension systems (Rey-Ares et al., 2015). Taken together, this further extends the significance of studying factors that influence the tendency to save on their own.

Almost all across Europe, the governments are concerned about households saving enough for their old age provisions. The recent economic downturn faced by the European countries leads to uncertainty in the government's ability to provide sufficient retirement support in some countries (Rey-Ares et al., 2015). Which further worsens for older population in face of the recent pandemic (Li, Y., & Mutchler, J. E., 2020). This economic downturn coupled with the increasing aged population and constantly decreasing young population to support the public pension systems are forcing European governments to shift toward private savings to supplement the public pension systems to provide necessary retirement support. This approach places a shared responsibility among government and individuals for their retirement planning. The pension reforms have been in the news for many years. It is the top priority of the governments to create awareness among the population to think more about their retirement savings on their own. This self-saving behavior is particularly significant because the majority of retirees are going to rely on these savings as a

source of additional income in their coming future. Literature indicates that there are several factors like time preferences, risk attitudes, financial knowledge, behavioral biases, and degree of trust/protection which are responsible for the inefficient savings mindset of individuals (Alessie et al., 2008; Castro et al., 2004; Deetlefs et al., 2019; Lee & Hanna, 2015; Rappaport et al., 2000). This particular study will focus on the impact of investor protection and individual risk attitude on their private retirement savings. The term "investor protection" refers to the extent to which laws are in place to safeguard investors' interests and the robustness of the legal structures that make it possible to uphold such laws (Defond, M. L., & Hung, M., 2004). Investor protection is important for retirement savings because it helps in the safety and security of retirement funds and decreases the risk of financial loss. An individual's risk tolerance is essential for savings behavior, as it influences investing decisions and, ultimately, retirement savings. In a study (Giannetti and Koskinen, 2010) on investor protection's impact, weak protection prompts wealthy investors to seek control, leading to higher stock prices due to demand from controlling shareholders. Consequently, stocks with weak governance show lower expected returns. The research also highlights that domestic and foreign investors' stock preferences align with the strength of investor protection, particularly in the case of portfolio investors favoring domestic markets and home equity, providing novel evidence for these relationships.

Conclusively, our study aims to explore the connection between investor protection and risk attitude and individual retirement savings. Our study focuses on individual retirement savings, so we can find the factors which play an important role in determining this savings behavior. We measure the retirement savings level by the questionnaire which informs us that if the individuals have subscribed to private retirement savings. Our study sample includes 34,517 individuals from different European countries and Israel. Our findings indicate that investors protection play a positive role in determining the private saving attitude of an individual and individuals with risk-taking attitude are positively linked to private retirement savings and lastly, we established that in presence of sound investor protection, risk-averse investors gain more in term of private retirement savings as compared to risk-takers, when controlled for other socioeconomic and demographic variables. These results are consistent with the previous studies and suggest that policymakers and organizations should focus on such results and take measures to manipulate the savings behavior of individuals.

Our research contributes to the existing literature on multiple avenues. Firstly, it enhances the existing literature available on the relationship between investor's protection and risk attitude with retirement savings by providing additional evidence of interaction term of risk attitude on an individual's retirement savings. The objective of the interaction term shows whether or not the combined effect of the variables is substantial and different from the effects of the variables taken individually. As per our knowledge, this is the first study to assess the association of private retirement savings with risk attitude by taking an account of multiple countries and a large sample size. All the existing studies have focused on a single country and with small sizes of 300- 1500 individuals. Our study is the first to include 28 countries and a sample size greater than 34000 individuals. By analyzing data from multiple countries, this study offers a complete understanding of the relationship between these variables and how it may vary across different economic contexts. Furthermore, the use of a large sample size ensures that the results of the study are representative to a larger population. This increases the reliability of the findings and makes it more likely that the results are accurate and meaningful. So, the model of the study can play a vital role in shaping the household's behavior towards old age savings.

The rest of the study is organized into five sections. The section below reviews the current and relevant literature on the topic and develops our research hypothesis. Section 3 includes the sample and research methodology. It also comprises the detailed variables overview. Section 4 describes the descriptive statistics of the study. Section 5 offers the results of our empirical analysis and is followed by section 6 which includes a discussion and conclusion of our study.

## **2. Literature Review & Hypothesis Development**

### **2.1. Individual's savings behavior**

The pattern of savings and consumption among individuals in an economy is a significant determinant of economic development both in the short and in the long run. Particularly the consequences of the saving behavior among households extend beyond the macro-level into society. The trend of savings behavior can indicate the ability of the society varying from its future planning ability to a materialistic way of life (Lindqvist, 1981). Therefore, understanding individuals saving behavior is of particular significance from the perspective of both personal finance and the overall economy. The understanding of individuals saving behavior is primarily focused to encourage positive financial behaviors in the society which particularly includes saving

for retirement (Davis & Hustvedt, 2012). However, understanding individual saving behavior is a complex and multidimensional process and various factors contribute to explaining the overall trend of saving behavior in an economy. Given all this significance and complexity the last decade witnessed a substantial rise in the number of studies that explored retirement savings (Jacobs-Lawson & Hershey, 2005; Boisclair, D., Lusardi, A., & Michaud, P. C., 2017). Also with an increasingly aging population across Europe, the burden of pension is increasing with each passing day threatening its viability and increasing burden on the employed individuals to sustain public pensions (García-Pereiro, 2018). Therefore, the governments are shifting their focus to increasing the private pension system by encouraging people to save more on their own and by adjusting the retirement age in accordance with the life expectancy. Although the government can devise policies and take steps to control for pension expense but can't enforce individuals to save and the existing data and literature indicates that people are not saving enough. According to Glass and Kilpatrick (1998) the younger boomers are saving less in comparison with the old boomers. Baby Boomers or Boomers are people who were born between 1946 and 1964. They are often termed as the "baby boom" because of the large increase in birth rates following World War II. Rappaport et al. (2000) concluded that almost half the individuals between ages of 25 to 71 don't have sufficient saving to support themselves in their retirement. Therefore, it's of vital interest for policy makers to explore and understand the underlying factors that incline an individual towards increased savings.

At the individual level, various factors influence individuals' tendency towards saving behavior. These factors ranged from macro factors like overall market condition, business cycle, and sentiments of the markets, etc., and micro factors like demographic, cognitive, and psychological factors. The most important theory regarding savings behavior is the life cycle theory (Modigliani & Miller, 1958). It states that savings are made to finance your old age's consumption. This life cycle theory can be further explained as, individuals take the money from others before they start earning, save during the period they earn, and then spends these savings once they retire. Friedman (1957) gave another very important theory named permanent income theory. It adds to the existing life cycle theory, apart from savings for the motive of old age's consumption, individuals also save for their descendants so that can have a decent lifestyle. This behavior is contrary to the traditional life cycle theory which emphasis saving for own utilization only. Another such example of future saving is the purchase of life insurance by individuals, which is primarily intended to pass the

benefits to their dependents (Fischer, 1973). Such behavior is more aligned with the theory of permanent income theory which states that individual consumption pattern is aimed with smooth future consumption smoothing. Another concept that can be provided with a model to explain human behavior is the theory of planned behavior which is applied extensively in the field of personal finance (Davis & Hustvedt, 2012). According to this theory, individual intentions depend on three factors including the attitude of the individual toward that behavior, social norms that indicate the influence of society regarding that behavior, and lastly, the perceived behavioral control refers to the difficulty affiliated with that activity. Apart from that, various other dimensions are identified in the prior literature including impact of contextualized variables. Like in Japan households are inclined to save more in their early stages of employment so that they can afford the high down payments required to purchase a house (Hayashi et al., 1988).

Now in prior literature studies have explored various macro and microeconomic variables leading to impacting retirement savings. Studies like Davis and Hustvedt (2012), Fernández-López et al. (2015), and Jacobs-Lawson and Hershey (2005) focused on microeconomic factors including demography, perceptions, and knowledge. Income is also considered as one of the most important factors in determining the individual's behavior as it shows the saving capability. Households with more income not only have more disposable income but also have a greater opportunity to diversify their income streams by having access to financial markets. Higher income has a positive significant impact on an individual's propensity to save more (Fernández-López et al., 2015; Torricelli et al., 2016). Similarly, education also contributes significantly in increasing the tendency of saving especially when the education is related to business, which is also attributed to increased financial literacy (Mosca & McCrory, 2016). Davis and Hustvedt (2012) concluded that perceived behavioral control of the individual plays a vital role in determining and saving behavior.

The current study will focus on the direction and will incorporate the degree of investor's protection and investor's risk attitude in determining the saving behavior among individuals. The rationale behind the link is that an increased level of investor protection will lead to an increased sense of reliability among. The theory is that if investors feel their investments are safeguarded by robust rules and protections, they will be more confident in investing their money. As more people feel secure investing their money in the market, this improved sense of confidence may contribute to a favorable trend in investments. Similarly, investors' risk attitudes will also influence investors'



investment in private saving schemes. The higher will be the investor's inclination towards risk-taking the higher will be the investment in such saving schemes.

## **2.2. Investor Protection and Saving Behavior**

Investor protection is important because large shareholders and creditors often take advantage of smaller shareholders and creditors in many nations. They face the continuous risk that their investments won't provide profits because of the authority to control shareholders or managers. This can happen in several ways like the controlling shareholders simply take the profits or sell the assets, or the additional securities in the firm they control to another firm they own at below-market prices. It may be legal in certain cases, but it still puts small shareholders at risk. Another way to put it is that the large shareholders gain from the company's profits rather than giving the money back to the outside investors. The answer to this problem is known as investor protection. When people invest in businesses, they typically receive certain benefits that are protected by the implementation of rules and regulations. Hence investor protection can be simply defined as the degree of protection the laws provide through its implementation against exploitation against company insiders (Castro et al., 2004). The measurement of investors' protection is multifaceted and incorporates laws in an economy-related to corporations, bankruptcy, and reorganization alongside the degree of their enforcement (Mehta, 2014). La Porta et al. (2000) in their study explored the origin of investor protection and found that there exists a significant difference regarding investor protection across economies and also the strength of their implementation varies in accordance with the efficiency of the judiciary. The data indicated that the quality of investors' protection is significantly higher for developed countries. The prior literature including studies of Gorton and Schmid (2000) and La Porta et al. (2000) also indicates that a weaker investors protection leads towards a more concentrated ownership structure in comparison to the stronger investors protection.

The significance of investors' protection is not only linked to the protection of minority investors but extends way beyond that. The existing literature explored the impact and role of investors' protection in corporate governance, financial market performance, investment efficiency, and economic growth (Castro et al., 2004; La Porta et al., 2000; Tran, 2020) and the current study is intended to extend it further by focusing on exploring the role of investors' protection as a determinant of individual retirement savings. The study is of the view that increased investors

protection will lead individuals towards other direct investment options instead of traditional retirement plans. González (2020) in their study analyzed the impact of investor protection on investment efficiency of the firms across 34 developed and developing countries. The study concluded that investors' protection is significantly associated with increased investment efficiency which can lead to better firm performance. This better performance is then translated into a better supply of credit/capital (Claessens et al., 2002; Haselmann et al., 2010). These results are indicative of increased inflow for firms in economies with better investors' protection. According to Castro et al., (2004) it is a widely accepted view that better investment protection leads to better external financing. The generalizability of this link is evident from the recommendations of the International Monetary Fund (IMF), the World Bank, and the European Bank for Reconstruction and Development to the economies they assist inspired from the OECD corporate governance standards (Castro et al., 2004; Samanta & Johnston, 2019). This better financing can be attributed to increased trust of minority individual investors on firms in a well legislated economy regarding investors protection. Deetlefs et al. (2019) analyzed the impact of trust in context of retirement savings and concluded that trust play a complex and significant role in retirement savings and successfully predict engagement in active pension plans. Based on this paradigm of increased investment in stock markets with better investors' protection. We posit that this increased investment is also indicative of decreased involvement of retirement savings due to increased trust in direct investment such as financial markets and firms. The households direct their saving towards financial markets instead of participating in a private pension plan and hence it is proposed that,

**H1: The strength of investor protection has a negative significant impact on individuals' savings behavior.**

### **2.3. Investor Risk Attitude and Saving Behavior**

According to Xiao et al., (2010) individual behavior is multifaceted and complex, which includes the financial aspect of behavior also. The factors that influence an individual include environmental or external factors and behavioral factors including biases, personality, and cognitive factors. The current literature of finance is particularly focusing on these behavioral dimensions and among these behavioral factors is an individual attitude towards risk (Nandan & Saurabh, 2016). The current is focusing on investor's risk attitude and its impact on retirement

saving behavior. Davies & Brooks (2014) defined risk attitude as the willingness to take additional risks in pursuance of their financial goals and people differentiate in decisions that involve risk and uncertainty. These differences are referred to as differences in risk attitude (Sivaramakrishnan et al., 2017).

The theory of finance segregates individuals based on investor's attitudes into two types i.e., risk-taking, and risk-averse individuals (Markowitz, H., 1952). Risk-averse individuals can be explained as individuals that prefer to avoid risk and choose outcomes with minimum risk involved. In contrast, risk-taking individuals use opportunities with high risk and high returns and try to get benefit from the market volatility. The traditional view of finance following the directions of Markowitz (1952) and other traditional financial models considers the investors risk attitude to be rational hence expects to select an alternative that provides the highest return at the given level of risk and lowest risk for a given level of return but this isn't the case in real life. So the behavioral approach, contrary to traditional finance considers investors to be influenced by behavioral factors and doesn't always follow assumptions of rational decision making (Kahneman & Tversky, 1979). According to Blais and Weber (2006), risk attitude is the shape of the utility function for individual choices, and risk-averse individuals tend to avoid investment in risky assets even if the return against it is justified (Mahdzan et al., 2017). Existing literature indicates a significant linkage between financial risk attitude and investment intentions (Akhtar & Das, 2018; Nandan & Saurabh, 2016; Sivaramakrishnan et al., 2017).

In the context of individual retirement savings, Mahdzan et al. (2017) concluded that individual's risk-taking behavior is crucial to understand their financial behavior including retirement savings. Grable and Carr (2014) added to this link that although individual financial plans are the main determinant of their financial activities including retirement savings but the formulation and implementation of these relied on an individual's financial risk attitude. Rey-Ares et al. (2015) explored the existing literature regarding antecedents of private retirement savings and found a significant impact of risk attitude on private retirement savings. Risk-taker investors are more likely to save higher, as they tend to take higher risks and higher risks are expected to yield higher returns and as the risk-averse investors are expected to allocate their resources among less risky investments regarding retirement portfolio, their cumulative wealth will be significantly less than the risk-taking individuals. Similarly, Yang and DeVaney (2012) concluded the same that the

individuals with higher risk-taking behavior are more likely to save higher for their retirement and based on this discussion the following relationship is proposed to be tested,

**H2: The risk-taking attitude has a positive significant impact on individuals' savings behavior.**

#### **2.4. Risk Behavior and Investor Protection**

Lastly, the study focused on the impact on investors saving behavior in presence of strong investors protection for risk-averse and risk-taking investors and as discussed earlier, investors are divided into two categories based on investor's risk attitudes i.e., risk-taking, and risk-averse investors. Where risk-averse investors can be explained as investors that prefer to avoid risk and invest in options with the lowest risk involved, hence prefer to invest in non-risky retirement saving plans with minimum risk involved but as increased investors protection leads to a reduction in the risk associated with a direct investment as minority shareholders in stocks. Investor protection has the potential to act as a facilitator for risk-averse investors to enter into direct investing with higher returns. The objective of the interaction term shows whether or not the combined effect of the variables is substantial and different from the effects of the variables taken individually. Empirical evidence indicates that increased investor protection leads to decreased ownership concentration (increased minority investments), an increase in mean stock return, and decreased volatilities (risk) (Basak et al., 2019). Similarly, increased investor protection also decreases a firm's overall risk through risk-averse behavior for firm investment and financing decisions. Which is empirically established and reported in the studies of Castro et al. (2004) and Tamayo (2015). This decrease in the overall firm and return risk can lead to increased investment from risk-averse investors. As Bonfiglioli (2012) in his study concluded that investors tend to take more risks in presence of strong investors protection and lend/invest more in firms. On this premise, we infer that stronger investor protection risk will lead towards significantly higher returns for risk-averse investors.

On other hand, risk-taking investors are those who avail themselves of opportunities with high risk and high returns and try to benefit from the market volatility. Such investors are already investing in risky investments. As concluded by Castro et al. (2004) and Tamayo (2015), the presence of stronger investors protection will also impact them by reducing the risk associated with their risky portfolio but as far as the overall return of their portfolio is concerned it will not be impacted substantially. Hence the impact of benefit derived from stronger investors protection will be

significantly less for risk-taking investors in comparison with risk-averse investors and based on this discussion the following is proposed to be tested,

**H3: The higher the risk averse attitude, the higher the benefit of investor protection is.**

### **3. Data & Methodology**

#### **3.1. Sample**

We use the data from Survey of Health, Ageing and Retirement in Europe (SHARE) for household data. It is a huge database which covers 27 European countries and Israel. SHARE is a multidisciplinary cross-national database of micro data on health, socio-economic variables and it includes around 140,000 individuals aged 50 or older. The first wave of SHARE database was collected in 2004. After that second wave was collected in 2007 and then after every two years data was collected for new wave. We use data from wave 7 which was gathered in 2017 & released in April 2019. Respondents are asked if they have ever subscribed to an individual retirement account. Using the data from World Bank, we get the data related to strength of investor protection of our target countries and lastly risk attitude is measured on a scale of 1 to 4 where 1 state that investor is not willing to take any financial risks and 4 presents investors who take substantial financial risks.

#### **3.2. Methodology**

##### **3.2.1. Variable Definitions**

The significance of our study is to find the impact of investor protection and individual risk attitude on their private retirement savings. In the realm of financial management, the emphasis on the importance of having appropriate savings after one's retirement has always been a matter of discussion.

In our study, retirement savings/ individual's saving behavior is our dependent variable. The question asks the respondents if they have ever contributed to an individual retirement account, according to the question's statement. An individual retirement account (IRA) is defined as a retirement plan in which a person puts aside a set amount of money each year with the hopes of being able to use the money after retirement. The precise question phrase is "Have you ever subscribed to an individual retirement account." It is a dummy variable, this means that if the respondent answers the question with a No, the value of the variable is 0 and if the participant

replies to the question with Yes then it takes the value of 1. Due to the fact that this is our primary variable, we have only used responses from wave 7 of SHARE database. For this variable, unlike some of the other control variables for which we have integrated the data from earlier waves, we have not combined any data from any previous waves.

Our variables of interest, also known as explanatory variables, are the key components of our analysis are investor protection and risk attitude. We obtain the data about the strength of investor protection in our target countries from the World Bank, Doing Business database. This index has a value between 0 and 10, with higher values indicating more investor protection. Investor protection is critical because in many countries small shareholders and creditors are being taken advantage of by the predominant shareholders who control the company. Their investments are constantly exposed to the risk that the profits from their investments will never materialize because of the authority of controlling shareholders or managers. Therefore, investor protection can be defined as the degree of protection provided by the laws through their application against exploitation by corporate insiders (Castro et al., 2004). La Porta et al., (2000) in their research investigates the origin of investor protection and establish that there is a considerable difference in investor protection between different economies, and the strength of their application varies in accordance with the effectiveness of the judiciary in each country. According to the data, the quality of investor protection in developed countries is substantially higher than in developing countries. Furthermore, the other independent variable is risk attitude, which is measured through a dummy variable. It takes the value of 0 if the respondent is risk averse and is equal to 4 if the individual is risk taker. According to (Davies & Brooks, 2014) risk is defined as people differ in their willingness to accept more risks in pursuit of their financial goals, and they also differ in their ability to differentiate themselves while making decisions that involve risk and uncertainty. These distinctions are considered as differences in risk attitude, with risk takers and risk averse people being the two types of individuals (Sivaramakrishnan et al., 2017). In the light of the current study risk-takers are more likely to save more money because they prefer to take more risks, and bigger risks are projected to bring larger returns. Given that risk-averse investors are likely to divide their resources among lower-risk investments in their retirement portfolio, their total worth will be much lesser than that of risk-taking investors. Despite the fact that individual financial plans are the primary predictor of their financial actions, including retirement savings, the design and

implementation of these plans are dependent on an individual's financial risk tolerance (Grable & Carr, 2014).

There is also a cross term in the current study (investors protection x risk attitude). Investor protection has the ability to encourage risk-averse investors to participate in direct investment, which has the potential for better returns. Increased investor protection results in lower ownership concentration (more minority investments), higher average stock returns, and lower volatility (risk) (Basak et al., 2019). Increased investor protection also has the additional benefit of lowering a company's total risk by encouraging risk-averse behavior in the firm's investment and financing decisions (Castro et al., 2004; Tamayo 2015). This reduction in the overall company and return risk will result in an increase in investment from risk-averse investors. In the existence of robust investor protection, investors are more likely to take risks and lend/invest more money in enterprises (Bonfiglioli, 2012). On the other hand, stronger investor protection will also have an influence on risk takers by lowering the risk related to their risky portfolio but in terms of total return on their portfolio, it will not be affected significantly.

Aside from that, we have considered a few additional control variables which include age, gender, education level, marital status, children, employment status and income level. These variables are included because they have been previously discussed in economic research. The research has found that the factors listed above have an important influence in motivating people to make decisions about their post-retirement lives. To alleviate the problem of missing data, we consolidated the data for some of these variables with data from prior waves.

The first control variable is gender referred to as Male. It is a dummy variable that's equal to 0 if the participant is a female and it takes the value of 1 if it is a male. Prior research suggests that gender has a considerable and important influence on retirement decision-making in both men and women (Garcia Mata, O., 2021). Despite the fact that literature supports the relevance of gender in decision-making, different research reveals that gender has a distinct impact on savings. Males save more money than females, according to the majority of studies. The rationale for this could be traced back to the disparity in treatment between men and women. According to (Lusardi & Mitchell, 2007, 2011) men have a higher level of financial literacy than women and they have higher savings when it comes time to retire. As per (Fernández-López et al., 2015) despite the fact that the factors that influence saving decisions are comparable for both men and women, males are

more inclined to save than women. Early in their professions, women are at a disadvantage, and as a result, they have lower savings (Feng, Gerrans, Moulang, Whiteside, & Strydom, 2019). On the other hand, according to some research, since the women have a longer life expectancy than men, they stand a better chance of retiring with more money (Alessie et al., 2008).

The next variable we'll look at is the level of education of our participants. The formal education of the participants has been evaluated in accordance with ISCED criteria. We have classified the households into three different groups based on their educational level. ISCED (0-2) displays the information about those who have completed pre-primary school, elementary education, or lower secondary education. Individuals who are either in upper secondary or post-secondary education are members of ISCED (3-4) educational group. Lastly, ISCED (5-6) is associated with households that have completed tertiary education. According to numerous prior research, education has a favorable impact on the amount of money saved by households and the amount of wealth they accumulate (Ares, Lopez, & Bua, 2015; Lusardi, 2001; Mosca & McCrory, 2016; Yang & DeVaney, 2012). This association is due to the fact that individuals with higher education possess additional knowledge and they may have higher income potential and are in a better position to make financial plans for the future. These characteristics increase their ability to invest in certain financial products in order to increase the returns on their retirement accounts.

The presence of children, as well as one's marital status, are important factors in an individual's savings behavior. A dummy variable is being used to assess people's marital status, which takes the value of 1 if the individual is married and 0 otherwise. For the purposes of this study, we have classified respondents as 1 in their marital status if they are either married or in a registered relationship. As per (Johannisson, 2008) people who are married are more anxious about their financial security in their later years. As a result, individuals who are married or have other formal obligations are more prone to having retirement funds (Fontes, 2011; Lusardi, 2001). One possible explanation for the favorable association between being married and retirement savings is that when two people share resources, they have more disposable money with which to invest for their golden years (Blau et al., 2013). For having children, we included a dummy variable which is equal to 1 if the household has children and 0 if they don't have any. An increased number of children would result in added expenses, leaving the individuals with less amount of money to put down for their retirement years.



In our analysis, the population of the income variable is divided into five equal sections or quintiles. As a result of this the comparison of which group performs better in terms of saving decisions becomes easier. One of the most important things that influences a person's decision to save for retirement is their income. More income is primarily associated with higher education, which implies that people have a better understanding of how things work. Individuals with greater incomes may be enticed to open savings accounts since there are tax incentives associated with opening retirement accounts rather than savings accounts (Lum & Lightfoot, 2003).

Finally, another factor that plays a significant role in determining an individual's savings behavior is his or her employment situation. We have classified the employment status into three dummy variables, which are labeled as employed, unemployed, and homemaker. Where employed individual takes the value of 1 and 0 otherwise. For unemployed participants, dummy variable equal to 1 and 0 otherwise. Finally for homemaker, respondent takes the value of 1 and 0 otherwise. In light of prior literature, when compared to the unemployed and homemakers, employed people are less likely to experience financial hardship. The primary reason for the favorable association between being employed and saving behavior is that people who are employed have more available resources to them, which allows them to put more money aside for retirement. Aside from that, there is a larger likelihood that employed individuals will be eligible to participate in their employer's pension plan. Unemployed people and homemakers, on the other hand, find it difficult to plan for their retirement due to a lack of resources and possibilities.

### **3.2.2. Model Specification**

Our study investigates the impact of individual protection, risk attitude of individuals and other socioeconomic and demographic variables on their private retirement savings, using the Probit model. Due to the dichotomous nature of our dependent variable, we are unable to do our analysis using a linear regression. For the purpose of our research, we have to decide between logit and Probit. Probit and logit differ when it comes to their probability distributions. Probit has a clear edge over logit, as a result of its association with normal distribution. Either the probable outcome occurs or does not occur, however, it is within a particular range, and it can be said that the results of our dependent variables follow a normal distribution. We are unable to comprehend the Probit model coefficients, so in order to interpret our analysis, we make use of the average marginal effect.

We analyzed the data of 34,517 individuals from 17 European nations and Israel. We test our findings by:

$$\mathbf{RetirementSavings}_i = \beta_0 + \beta_1 \mathbf{InvestorProtection} + \beta_2 \mathbf{RiskAttitude}_i + \beta_3 \mathbf{InvestorProtection} * \mathbf{RiskAttitude}_i + \Sigma \beta_i \mathbf{ControlVariables}_i + \varepsilon_i$$

Where  $\mathbf{RetirementSavings}_i$  is a dummy variable. If an individual  $i$  has a retirement individual account, it is considered as 1; otherwise, it is set to 0. Estimation of the Probit model is done using the method of maximum likelihood. For our explanatory variable, strength of investor protection, we acquire the data from the World Bank in our target nations, employing their statistics as a base. Moreover, risk attitude is measured on a scale of 1 to 4 which takes the value of 4 if the individual takes substantial financial risks and is equal to 1 if not willing to take any financial risks. Control Variables consist of all socioeconomic, demographic, and behavioral variables.

#### **4. Descriptive Statistics**

We present the descriptive results of our study in the following section. Our study sample comprises of 34,860 individuals from seventeen European countries and Israel, and we describe our summary stats considering these eighteen countries. We develop our analysis by calculating the mean values of all the variables. Table 3.1 summarizes the stats of all the countries included in our research. We determine the retirement savings level by administering a questionnaire that tells if the respondents have enrolled in private retirement savings plans. According to our findings, at the time of data collection 28.43 percent of those who replied yes indicated that they have enrolled in individual retirement accounts. This indicates that more than one-fourth of our population is concerned about their post-retirement lives and is taking steps to address the problem. The focus of our study is the impact of investor protection and the risk attitude on their private retirement savings. We have some interesting findings about these variables and also for a cross term (investor protection x risk attitude) in our sample. Investor protection has a mean value of 6.26. On the other hand, one of the most important variable risk attitude has a mean score of 1.33. According to the summary statistics, a significant percentage of our sample is willing to accept considerable financial risks in order to gain substantial returns on their investments. As shown in the table below, 1 represents the individual who doesn't take the risk and is risk averse while 4 indicates the individuals who like to take risk. While the mean score of our interaction term (investor protection x risk attitude) lies at 8.41.

*Table 3.1: Descriptive Stats*

<b>Variables</b>	<b>N</b>	<b>mean</b>	<b>p25</b>	<b>Median</b>	<b>p75</b>	<b>min</b>	<b>max</b>
Retirement Savings	34860	0.284278	0	0	1	0	1
Risk Attitude	34860	1.338841	1	1	2	1	4
Investor Protection	34860	6.261359	6	6.3	6.5	4.5	7.5
RiskAttitudexInv~o	34860	8.401785	6	6.5	12	4.5	30
Male	34860	0.479089	0	0	1	0	1
<b>Variables</b>	<b>N</b>	<b>mean</b>	<b>p25</b>	<b>Median</b>	<b>p75</b>	<b>min</b>	<b>max</b>
Age	34860	64.78829	57	61	71	51	105
ISCED012	34860	0.346964	0	0	1	0	1
ISCED34	34860	0.420753	0	0	1	0	1
ISCED56	34860	0.232283	0	0	0	0	1
Married	34860	0.659142	0	1	1	0	1
Children Dummy	34860	0.880842	1	1	1	0	1
Income2Q1	34860	0.049516	0	0	0	0	1
Income2Q2	34860	0.128998	0	0	0	0	1
Income2Q3	34860	0.237234	0	0	0	0	1
Income2Q4	34860	0.32668	0	0	1	0	1
Income2Q5	34860	0.257573	0	0	1	0	1
Employed	34860	0.394531	0	0	1	0	1
Unemployed	34860	0.03942	0	0	0	0	1
Homemaker	34860	0.087462	0	0	0	0	1

In addition, we also have a few socio-economic variables in our research. Our final data indicates that 48 percent of the 34,860 participants are male, with an average age of 64.79. The reason for the higher mean age is that the SHARE database only contains people over the age of 50. The educational outcomes are consistent with our expectations. According to table 3.1, 34.7 percent of our sample stated that they are part of ISCED 0-2 classification. In other words, they have received either pre-primary education, primary schooling, or lower secondary education. For upper secondary or post-secondary education, 42 percent of our sample meets the eligibility requirements. They fit into ISCED 3-4 group. Our final and most educated group ISCED 5-6 consists of 23.2 percent of our people who have tertiary education.

In terms of marital status, nearly 66 percent of the people in our sample are married or in a registered partnership. Regarding children's situation, around 88 percent stated that they at least have one child. Furthermore, income is one of the most crucial determinants in influencing an individual's behavior because it indicates the individual's saving capacity. In our study we divide the income variable into five equal income groups. This allows us to compare which group is better than the other when it comes to saving decisions. The ability to earn a living is one of the most important elements that influence an individual's decision to save for retirement. As per Table 3.1, 4.9 percent of our respondents fall into the Income2Q1 category. This means they belong to a lower income group. 12.9 percent of the population in our sample are part of Income2Q2 group. The percentage of the participants belong to Income2Q3 classification is 23.7. For Income2Q4, 32.7 percent of the total sample in our study are part of this group. Lastly, our final group Income2Q5 consists of 25.7 percent of the total respondents in our study. Next, we take into consideration the employment situation, 39.5 percent of our sample is employed, around 4 percent is unemployed, and 8.7 percent are classified as homemakers. This low unemployment rate can be attributed to the fact that approximately 42 percent of our sample is retired, which supports the low unemployment rate.

## **5. Results**

### **5.1. Correlation Matrix**

The correlation between the variables employed in the research is presented in this section of our study. The pairwise correlation is depicted in table 3.2 below between retirement savings and investor protection, risk attitude, gender, age, education, marital status, children, income, and

employment status. Our findings show that there is a statistically negative association between retirement savings and investor protection. Generally, investors fund firms acquire specific rights or abilities, which are often safeguarded by execution of laws and regulations. According to our study, higher investor protection will drive people away from traditional retirement plans and into other direct investment options. Based on this model, which calls for more investment in stock markets along with improved protection for investors, we believe that this increasing investment reflects a drop in retirement savings participation because of increased confidence in direct investments which include financial markets and firms. So instead of contributing to a private pension plan, households divert their savings to financial markets. Moreover, risk attitude has a significant positive impact on retirement savings. This explains that if an individual is a risk taker, he is more likely to save for retirement. Additionally, being a male is positively linked with retirement savings. The retirement savings variable is negatively impacted by advancing age. For education, we see a negative impact of primary education and positive effect of secondary and tertiary education on retirement savings. Additionally, we discover that respondents who are married and who have children have a greater predisposition to save money. The correlation between retirement savings and income variables is also consistent with our expectations. The income variables are divided into quintiles. The first three quintiles are found to have a negative relationship with saving behavior and there is a significant positive correlation between the fifth quintile and retirement savings. There is a statistically significant association between retirement savings and employment status of an individual. Being employed has a positive significant relationship while being unemployed and housemaker has a negative significant association with retirement savings.

Table 3.2 provides a comprehensive analysis of the correlations that exist between the various variables and how retirement savings are impacted. The sole drawback of using correlation is it doesn't account for other factors, which means the findings could be biased. To address this issue, we run a Probit model while controlling for the greatest number of variables that could possibly influence savings behavior.

*Table 3.2: Correlation Matrix*

	Retirement Sav	Risk Att	Male	Age	ISCED012	ISCED56	Married	Childr~y	Incom~Q1	Incom~Q2	Income~3	Income~5	Employed	UnEmpl~d	Homema~r
Retirement Sav	1														
RiskAttitude	0.2356* 0	1													
Male	0.0449* 0	0.1362* 0	1												
Age	-0.1707* 0	-0.1413* 0	0.0211* 0.0001	1											
ISCED012	-0.1731* 0	-0.1974* 0	-0.0579* 0	0.1859* 0	1										
ISCED56	0.1536* 0	0.2125* 0	0.0365* 0	-0.0864* 0	-0.4203* 0	1									
Married	0.0262* 0	0.0725* 0	0.1817* 0	-0.1723* 0	-0.0609* 0	0.0458* 0	1								
ChildrenDu~y	0.0201* 0.0002	0.0021 0.6971	-0.0324* 0	0.0183* 0.0006	-0.006 0.2652	-0.005 0.346	0.1929* 0	1							
Income2Q1	-0.1207* 0	-0.1235* 0	-0.1003* 0	0.1505* 0	0.1312* 0	-0.1209* 0	-0.3021* 0	-0.0522* 0	1						
Income2Q2	-0.0854* 0	-0.1092* 0	-0.0186* 0.0005	0.0962* 0	0.0884* 0	-0.1143* 0	-0.0084 0.115	0.0274* 0	-0.1752* 0	1					
Income2Q3	-0.0781* 0	-0.0640* 0	-0.01 0.062	0.0183* 0.0006	0.0839* 0	-0.0766* 0	-0.0428* 0	-0.0034 0.5257	-0.1956* 0	-0.2466* 0	1				
Income2Q5	0.2317* 0	0.2333* 0	0.0719* 0	-0.1889* 0	-0.2252* 0	0.2441* 0	0.1846* 0	0.0122 0.023	-0.2049* 0	-0.2583* 0	-0.2884* 0	1			
Employed	0.1857* 0	0.1659* 0	0.0378* 0	-0.5965* 0	-0.2061* 0	0.1622* 0	0.0793* 0	-0.0139* 0.0093	-0.1516* 0	-0.1071* 0	-0.0523* 0	0.2353* 0	1		
UnEmployed	-0.0209* 0.0001	-0.0156* 0.0036	0.0199* 0.0002	-0.1513* 0	0.0235* 0	-0.0300* 0	-0.0026 0.621	-0.0268* 0	0.0484* 0	0.0194* 0.0003	0.0098 0.0662	-0.0389* 0	-0.0869* 0	1	
Homemaker	-0.1138* 0	-0.0732* 0	-0.2273* 0	-0.0224* 0	0.1645* 0	-0.1041* 0	0.0591* 0	0.0247* 0	-0.0043 0.4198	0.0166* 0.0019	0.0385* 0	-0.0363* 0	-0.1615* 0	-0.0411* 0	1

## 5.2. Regression Results

The multivariate analysis of our research is presented below in Table 3.3. It indicates how strength of investor protection; individual's risk attitude and socio-economic factors play a role in determining an individual's behavior regarding their savings. For our analysis, we use a Probit model. Our dependent variable is retirement savings against the variables of interest of strength of investor protection and risk attitude. According to our hypotheses, we expect a significant positive impact of individual's risk attitude on our dependent variable, as the higher an individual's risk-taking attitude, the higher the likelihood of ending up with more savings. Whereas we expect that the strength of investor protection has a negative significant effect on individual's retirement savings. About the interaction term (investors protection x risk attitude) of our study, we expect a significant impact on retirement savings as the effect of increased investor protection will be much lower for risk-taking investors than for risk-averse investors.

Our control variables comprise of gender, age, education, marital status, children, income, and employment status. According to prior economic literature, we expect the positive impact of individual's risk attitude towards old age provision savings and the strength of investor protection has negative impact on individual's saving behavior. In terms of our control variables, we expect a positive relationship of being male, education, income level and being employed with retirement savings and negative association of age, being married and homemaker.

*Table 3.3: Regression Analysis Baseline Model*

VARIABLES	Retirement Savings
Risk Attitude	<b>0.269**</b>
	(0.126)
Inv Protection	<b>-1.043*</b>
	(0.597)
RiskAttitudexInv~o	<b>-0.013</b>
	(0.020)
Male	<b>0.054***</b>
	(0.018)
Age	<b>-0.023***</b>
	(0.001)
ISCED012	<b>-0.213***</b>
	(0.023)
ISCED56	<b>0.121***</b>
	(0.021)

VARIABLES	Retirement Savings
Married	<b>-0.064***</b> (0.022)
Children Dummy	<b>0.046</b> (0.030)
Income2Q1	<b>-0.550***</b> (0.047)
Income2Q2	<b>-0.344***</b> (0.035)
Income2Q3	<b>-0.169***</b> (0.027)
Income2Q5	<b>0.223***</b> (0.025)
Employed	<b>0.150***</b> (0.025)
Unemployed	<b>-0.072</b> (0.064)
Homemaker	<b>-0.391***</b> (0.046)
Countries	<b>Yes</b>
Constant	<b>5.404</b> (3.675)
Observations	34,860
R-Squared	<b>0.306</b>

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.10

For our study we attempt to quantify the relationship between the variables of interest (such as investor protection and risk attitude) and the dependent variable (retirement savings) while controlling for other variables. The details of our empirical findings are shown in Table 3.3 above. Our first two hypotheses, H1 and H2, are accepted. We find significant results of the strength of investors protection and individual's risk attitude on our dependent variable while our third hypothesis H3 is rejected as the interaction term (investors protection x risk attitude) has no significant impact on individuals' retirement savings as per our results.

The following findings emerge when we control variables in our analysis, which serves as the basis for our baseline model. Our research shows that the strength of investor protection is less likely to bring any positive change in individuals' behavior regarding retirement savings. Our findings state that this level of investors protection decreases the likelihood of any positive change in retirement savings by 1.043. Our results suggest that with improved investor protection measures in place, individuals are more likely to trust the financial markets and invest their funds in the stock market.



This confidence in the financial markets can be attributed to the increased level of security and assurance provided by the investor protection measures. As a result, individuals may feel less need to invest in traditional retirement savings investments, such as pension plans or individual retirement accounts. The logic behind this is that when individuals feel confident in the security of their investments, they are more likely to prioritize investment in the financial markets over saving for their retirement. It is crucial to consider the balance between investment in the financial markets and traditional retirement savings investments to ensure financial stability and security in retirement.

Our second hypothesis states that individuals' risk attitude is more likely to bring a positive change in individuals' retirement savings behavior. Our result explains that risk attitude is more likely to increase retirement savings by 0.269. This finding is consistent with Rey-Ares et al. (2015) who explored the available literature on the determinants of private retirement savings and revealed that risk attitude has a considerable impact on private retirement savings. Investors who are willing to take on increased levels of risk are more likely to have higher levels of savings because higher levels of risk are projected to result in higher levels of return. Whereas risk-averse investors are predicted to place their resources in the less risky investments in their retirement portfolio, resulting in a much lower cumulative wealth than risk-takers. This relationship between risk tolerance and retirement savings highlights the importance of considering an individual's personal risk tolerance when making investment decisions and constructing a retirement savings portfolio.

With respect to the third hypothesis our interaction term (investors protection x risk attitude), results show that both are often associated as less likely to bring any change in individuals' savings behavior. The rejection of H3 means that the study does not find evidence to support the relationship between the interaction term of risk attitude & investor protection and retirement savings.

Next, we look at the relationship between our dependent variable and the various control variables. The majority of these variables yield results that are significant and in line with expectations. Despite the fact that most of these variables are connected in some substantial way, certain variables may have a greater impact on retirement savings than others. Gender plays a significant impact in determining how people save for their retirement. According to our findings, being male is associated with an increased chance of concern regarding retirement savings. The result shows

that gender is more likely to increase the individual's retirement savings by 5.4 percent. Women are at a financial disadvantage since they earn less than males on average and so have less money available to save for their lives after they retire. Men have a higher average level of financial knowledge and are therefore more likely to put away more money for their retirement. (Fernández-López et al., 2015; Lusardi & Mitchell, 2011).

The next variable that we will look at is education. According to our findings, having a higher level of education is associated with a greater likelihood of bringing about a significant positive shift in the tendency to save. Within the education group, our reference variable is an ISCED 3-4. According to the findings, having an education level of ISCED 1-2 is less likely to bring about any kind of positive change in saving behavior. According to our results, having this degree of education makes it 21.3 percent less likely that there will be any positive change in the amount of money saved for retirement. If we take into account the ISCED 5-6 variable, which indicates that if a person has completed tertiary education, we can see that an increase of just one unit in tertiary education is more likely to result in an increase of savings of 12.1 percent. This is consistent with the research that has been done in the past, which demonstrates that elevating a person's level of education can bring about a favorable change in their propensity to save money (Fernández-López et al., 2015; Mosca & McCrory, 2016). We also find that the marital status of an individual is less likely to bring any positive change in retirement savings behavior. The results state that the marital status of an individual decreases the likelihood of any positive change in retirement savings by 6.4 percent. We do not find any effect of having children on our dependent variable.

According to the findings of our study, having a higher income is associated with an increased likelihood of an individual having saved for retirement. Our data was divided into quintiles, with the fourth income quintile serving as a baseline. The result explains that the individuals in the third quintile of income are less likely to increase the amount of money they save for their pension by 16.9 percentage points. Individuals who are in the fifth quintile of the income distribution have a 22.3 percentage point higher likelihood of putting money away for their retirement. Individuals who make more money have access to more resources, and this can lead to an increase in the amount of pension savings they have (Huberman, Iyengar, & Jiang, 2007; Torricelli et al., 2016). The individual's employment status is another extremely important aspect that plays a role in determining their behavior with regard to accomplishing their retirement savings objectives.

According to the findings of this study, being employed improves the probability that there would be a significant positive change in one's retirement savings by 15 percent. In addition, we find that if an individual is a homemaker, it decreases the likelihood that they will save money for their retirement. When we control for countries, the data suggests that being a homemaker reduces the likelihood of saving by 39.1 percent. Individuals who are employed typically have higher wages and the chance to subscribe to an employer's pension scheme. Unemployed and homemakers, on the other hand, have fewer resources and it is nearly difficult for them to save money for old age requirements (Fontes, 2011; Rey-Ares et al., 2018).

### **5.3. Robustness Tests**

The aim of our study is to investigate the relationship between investor protection, investment attitude, and savings behavior. We use the data from the World bank and SHARE database to examine how investor protection and investment attitude play their role in shaping individual behavior towards savings. Given the complex nature of these variables, it is crucial to ensure that our results are robust and reliable. We run different robustness tests to evaluate our findings. We examine how our results change when we use different models. For our first robustness test, we apply a logarithmic transformation to the variable of interest, investor protection, to examine how this modification affects the relationship between investor protection and savings behavior. In our second robustness test, we converted the investor protection variable into dummy variables at the 25th, 50th, and 75th percentiles to explore whether the relationship between investor protection and savings behavior varies across different levels of investor protection.

Our first robustness model is different from the baseline model in a way that we apply a logarithmic transformation to investor protection to examine whether our results remain robust. We expect that our hypothesis will stand true when we apply robustness tests on our sample. We can see that risk attitude has a positive significant impact on savings behavior and is significant at 10% level. This is in line with our baseline regression model. We discover that investor protection, after taken log of this variable, is less likely to bring a positive significant impact on savings behavior. Our results are highly robust when we consider the relationship between our dependent variable and independent variable.

In our second model, we divide investor protection variables into dummy variables at the 25th, 50th, and 75th percentiles. There might be a chance that it impacts our results differently when we

consider investor protection in this manner. Our results for risk attitude remain robust in all three regressions of our second robustness model and we observe that risk attitude is more likely to bring positive significant impact on savings behavior of individuals. For investor protection, we do not find any significant relationship between investor protection and retirement savings at 25th and 50th percentile. When we create a dummy variable at 75th percentile, we observe that investors protection decreases the likelihood of any positive change in retirement savings. Similar to the first robustness model, our second model is also robust when we compare the results with our baseline regression model.

Lastly, we explore the relationship of control variables with retirement savings and how control variables affect the individual savings behavior. For all the control variables we find similar results as in our baseline model. Gender significantly influences how people behave about pension savings. We find that being male is more likely to increase the retirement savings both in baseline and robustness tests. The next variable is about education level, and we find that our results in robustness tests are aligned with baseline model results and higher education is more likely to bring positive significant impact on retirement savings. Marital status and income findings endorse the results of our baseline model. The chances of having a positive attitude towards retirement savings increase if the respondent is employed and the results are consistent in both estimations where this variable has been used.

**Table 3.4: Robustness Tests**

	<b>Investor Protection Log</b>	<b>Investor Protection P25</b>	<b>Investor Protection P50</b>	<b>Investor Protection P75</b>
<b>VARIABLES</b>	Retirement Savings	Retirement Savings	Retirement Savings	Retirement Savings
RiskAttitude	0.381*	0.185***	0.178***	0.178***
	(0.223)	(0.020)	(0.019)	(0.017)
InvPro_log	-6.854*			
	(3.938)			
RiskAttitudexInvPro_log	-0.106			
	(0.121)			

	Investor Protection Log	Investor Protection P25	Investor Protection P50	Investor Protection P75
VARIABLES	Retirement Savings	Retirement Savings	Retirement Savings	Retirement Savings
InvPro_P25		-0.056		
		(0.237)		
RiskAttitudexInvPro_P25		0.001		
		(0.028)		
InvPro_P50			-0.075	
			(0.237)	
RiskAttitudexInvPro_P50			0.017	
			(0.028)	
InvPro_P75				-0.247*
				(0.127)
RiskAttitudexInvPro_P75				0.025
				(0.031)
Male	0.054***	0.054***	0.054***	0.054***
	(0.018)	(0.018)	(0.018)	(0.018)
Age	-0.023***	-0.023***	-0.023***	-0.023***
	(0.001)	(0.001)	(0.001)	(0.001)
ISCED012	-0.213***	-0.213***	-0.213***	-0.214***
	(0.023)	(0.023)	(0.023)	(0.023)
ISCED56	0.120***	0.121***	0.122***	0.122***
	(0.021)	(0.021)	(0.021)	(0.021)
Married	-0.064***	-0.064***	-0.064***	-0.064***
	(0.022)	(0.022)	(0.022)	(0.022)
Children Dummy	0.046	0.046	0.047	0.046
	(0.030)	(0.030)	(0.030)	(0.030)
Income2Q1	-0.550***	-0.551***	-0.551***	-0.551***
	(0.047)	(0.048)	(0.048)	(0.048)
Income2Q2	-0.344***	-0.344***	-0.345***	-0.345***
	(0.035)	(0.035)	(0.035)	(0.035)
Income2Q3	-0.170***	-0.169***	-0.169***	-0.169***
	(0.027)	(0.027)	(0.027)	(0.027)
Income2Q5	0.223***	0.223***	0.222***	0.222***
	(0.025)	(0.025)	(0.025)	(0.025)
Employed	0.150***	0.150***	0.150***	0.150***
	(0.025)	(0.025)	(0.025)	(0.025)
Unemployed	-0.072	-0.072	-0.072	-0.072
	(0.064)	(0.064)	(0.064)	(0.064)
Homemaker	-0.391***	-0.392***	-0.392***	-0.392***
	(0.046)	(0.046)	(0.046)	(0.046)
Countries	Yes	Yes	Yes	Yes

	Investor Protection Log	Investor Protection P25	Investor Protection P50	Investor Protection P75
VARIABLES	Retirement Savings	Retirement Savings	Retirement Savings	Retirement Savings
Constant	11.425	-1.353***	-1.346***	-0.843***
	(7.149)	(0.244)	(0.244)	(0.176)
Observations	34860	34860	34860	34860
r2_p	0.306	0.306	0.306	0.306

## 6. Conclusion

This study places a strong emphasis on ageing, which is of critical significance in the contemporary context. It is inescapable that the increase in the proportion of the population that is reaching retirement age will result in modifications to public pension systems in the European nations. Since the recent financial crisis, the European government has been in a tough position, and as a result, they are proposing steps that can reduce the strain that is placed on government expenditures. The current pandemic is likely to put even more strain on governments, and as a result, policymakers will be more worried than they have ever been about raising people's knowledge of their own finances. The topic of the importance of having sufficient funds by the time one reaches retirement age has always been one that has generated a lot of attention in the study of financial management. This economic crisis, along with an ageing population and a steadily declining youthful population to sustain public pension systems, is prompting European governments to investigate private resources to boost public pensions and offer needed retirement support.

In conclusion, this research paper explores the complex relationship between investor protection, investment attitude, and savings behavior, offering valuable insights into the factors that shape individual financial decision-making. Our findings highlight the importance of the strength of investor protection, an individual's risk-taking propensity, and their socio-economic background in influencing savings behavior. Understanding these connections has critical implications for policymakers, financial institutions, and other stakeholders involved in shaping the financial landscape. By taking these factors into account, it becomes possible to develop better strategies that encourage financial inclusion, promote sensible savings behavior, and create an environment in which individuals feel secure in their investments.

Moreover, this research emphasizes the significance of adapting investment policies and regulations to the diverse needs and risk appetites of individual investors. By focusing on creating a supportive and transparent investment environment, we can help individuals make informed decisions that can optimize their financial outcomes, mitigate risks, and ultimately contribute to their overall financial well-being. In summary, this study sheds light on the complex dynamics of investor protection, investment attitude, and savings behavior. It serves as a valuable resource for future research and practical applications aimed at promoting financial stability, inclusion, and economic growth for individuals and the broader global economy.

## Appendix

*Table 3.5: Variable Description Table*

<b>Variable</b>	<b>Definitions</b>
Retirement Savings	Dummy: 1 if respondent saves for retirement.
Risk Attitude	Measured on a scale of 1 to 4 where 1 state that investor is not willing to take any financial risks and 4 presents investors who take substantial financial risks.
Investor Protection	This index has a value between 0 and 10, with higher values indicating more investor protection.
Male	Dummy: 1 if respondent is male.
Age	Age of respondents.
Education	Dummy variable set for three education groups (ISCED012, ISCED34, ISCED56)
Married	Dummy: 1 if respondent is married.
Children Dummy	Dummy: 1 if respondent has children.
Income	Dummy variable set for 5 income groups.
Employed	Dummy: 1 if respondent is employed.
Unemployed	Dummy: 1 if respondent is unemployed.
Homemaker	Dummy: 1 if respondent is stay at home person.





## GENERAL CONCLUSION

This study places a strong emphasis on the subject of aging, which is of critical significance in the contemporary context. The research presents an overview as it pertains to the topic of behavioral issues of retirement planning patterns of European countries with a focus on individual's financial literacy, personality traits and investor protection. Concerns have been raised on a global scale over the lack of appropriate retirement planning being done by individuals (Niu, Zhou, and Gan, 2020; Reyers, Van Schalkwyk, and Gouws, 2015). This global trend has been given the moniker of a "retirement savings crisis" by the academic community (Benartzi and Thaler, 2013). Anxiety over getting older is on the rise among many older populations, particularly in relation to how they will pay for their retirement (Park & Martin, 2022). Putting together a strategy for retirement is a very significant challenge that individuals are facing nowadays. The extent to which one is prepared for retirement has an impact on a variety of aspects of life, including the degree to which one will be satisfied psychologically and emotionally in their post-retirement lives (Wang et al., 2011). Understanding the financial behavior of consumers in relation to retirement planning is a significant area of research that needs to be done due to the aforementioned concerns.

Retirement planning has gotten more complicated in developed countries. The sustainability of retirement systems has been called into question as a result of the rise in the average life expectancy. Individuals are now expected to shoulder a significant portion of the financial burden that had previously been shouldered by institutions like corporations and governments. There are repercussions, both positive and negative, that can be attributed to this transformation. However, the responsibility that an individual bears in preparing for retirement and in making the appropriate decisions has substantially expanded (Lusardi & Mitchell, 2011). The majority of countries in Europe are grappling with the challenge that comes with having an increasingly elderly population. Households are in a more precarious position than they were in the past as a result of the persistently ongoing revisions that politicians have been making to the existing public pension system over the past few years. Because of this, there has been a recent upward trend in private retirement savings, and as a result, researchers are becoming increasingly interested in examining the factors that determine saving behavior.

It is vital to note that the increase in the proportion of elderly people in Europe's population will result in modifications to the existing public pension plans. Since the last global financial crisis, the governments of Europe have found themselves in a tough position, and as a result, they are putting forward proposals for reforms that will reduce the strain that is placed on government spendings. Despite the fact that in the majority of European countries, the government plays a significant part in the pension system for retirees, however, as a result of the continued rise in the proportion of elderly people in the population, retirement provision savings planning has emerged as a primary area of concern over the course of the past several years. To be able to handle the growing burden of retirement planning, an individual has to have at least a basic understanding of different types of financial products. Those who possess a higher level of financial literacy, combined with more constructive behavior patterns, normative beliefs, and controlled beliefs are more likely to make wise decisions concerning their economic conditions, in particular with reference to financial preparation for retirement (Salleh et al., 2022).

The individual's propensity to save money can be influenced by a wide variety of factors, some of which are economic, demographic, and behavioral in nature (Yusof & Sabri, 2017). The amount of savings needed to support one's post-retirement lifestyle depends in large part on behavioral factors. There are aspects of an individual's make-up, such as their personality traits, which influence how they think about and go about their retirement planning and financial provisioning. Personality traits have a substantial impact on all aspects of retirement planning, including asset allocation, retirement savings, and even the decision about when to actually retire (Hershey & Mowen, 2000; Robinson, Demetre, & Corney, 2010; Sunden & Surette, 1998). According to previous research, Personality traits have been shown to have a considerable impact on an individual's propensity to save money.

On an individual level, the propensity of individuals to engage in saving behavior is influenced by a variety of circumstances. In this study, investor protection has been identified as a key macro factor that influences the saving behavior of individuals. Investor protection is of utmost importance because the controlling shareholders exploit small shareholders and creditors in many nations. The investors' finance firms normally have specific rights or privileges, which are mainly protected through the implementation of laws and regulations. Due to an increased level of trust in direct investments, such as those offered by financial markets and firms that provide improved

protection for investors, there is a trend toward a reduced participation in retirement savings. Therefore, instead of contributing to a private pension plan, the households invest their savings in the financial markets. Hence, the more robust an investor protection system is, the less attractive savings become. An individual's risk attitude is also one of the main components of the research as investments made by investors in private savings plans will also be influenced by their attitudes toward risk.

## **1. Research Findings**

In our first study we analyze whether having a higher level of financial literacy is associated with an increase in the amount of money saved for retirement. Data for this research was collected from the European Bank, which provided information on the financial literacy levels and retirement savings of individuals in Luxembourg and Slovakia. We looked into the differences between people in these two countries with regard to the ways in which they put money away for the future. The findings of this study make a substantial contribution to our comprehension of the characteristics and activities of European households that are capable of maintaining their own financial well-being during their retirement years. Our research demonstrates that an increase in financial literacy is associated with an increased likelihood of people's propensity to save for retirement in both Luxembourg and Slovakia. Though, the strength of this relationship differed between the two countries. In Luxembourg, individuals with greater levels of financial literacy were more likely to have higher retirement savings, while in Slovakia, the relationship was less strong. In terms of specific factors that influenced retirement savings in each country, we found that in Luxembourg, access to financial education and the availability of retirement planning tools played a substantial role. In Slovakia, cultural attitudes towards saving for retirement and the availability of retirement savings options were more impactful.

In the second empirical research analysis, we investigate the role that personality traits and socio-economic factors play in determining an individual's propensity toward saving money in 27 European countries. In order to obtain the empirical data for our research, we conduct two independent regressions. In the first regression, we employ countries themselves as dummies in order to control the effect of countries. It is also the model that serves as our baseline. Our sample is split into four social models for our second regression to examine the ways in which different societal models influence the private retirement savings of individuals. The idea behind

approaching the problem from this vantage point is that no two nations can have the same set of policies since the exact same set of policies cannot be successful in any two separate sets of conditions. In our baseline model, we discover statistically significant findings for openness and agreeableness with the dependent variable. Whereas, both neuroticism and extraversion are frequently regarded as having lower propensities to influence people's savings in a positive way. In our second model, we control for the countries in accordance with the social models. We segmented our sample into four different social models, on the basis of varied set of factors, including GDP per capita, provision of retirement income, social spending on old age, Asset value of pension funds and gross replacement rates. We use the continental model as a point of reference and discover that the Nordic and transitional models have a positive effect on individuals' tendencies to save for retirement. Conversely the Mediterranean model has been shown to have a negative impact on the conduct of individuals with regard to their retirement savings. In our second model, openness, conscientiousness, and agreeableness suggest a strong association with an individual's retirement savings. Specifically, individuals who are more conscientious and agreeable incline to have higher levels of retirement savings, which may be due to the fact that they have a responsible and cooperative nature. On the other hand, extraversion, and neuroticism, both are typically identified as being less likely to bring about any positive change in an individual's savings, same as baseline model.

Our third empirical study evaluates how strength of investor protection, the risk attitude of individuals, and other socioeconomic and demographic factors influence private retirement savings. In our analysis, we find that individuals' risk attitudes have a significant positive effect on retirement savings, as the likelihood that an individual will accumulate more savings increases with their level of risk-taking attitude. In contrast, the strength of investor protection has a negative and significant impact on an individual's ability to save for retirement. This finding is consistent with the perspective that increased investment in stock markets, accompanied by improved protection for investors, results in a lower level of participation in retirement savings because there is an increased level of confidence in direct investments, such as those made in companies and financial markets. According to our second hypothesis, an individual's risk attitude is the factor that is most likely to bring about a positive change in an individual's behavior regarding retirement savings. As higher levels of risk are expected to produce higher levels of return, investors who are willing to take more risk are more likely to have higher levels of savings. While risk-averse

investors are more likely to put their money into investments with a lower potential for loss, which will likely leave them with a cumulative wealth that is significantly lower than that of risk-takers. Regarding our study's interaction term (investor protection x risk attitude), the impact of increased investor protection on risk-taking investors will be much lower than on risk-averse investors, so there will be no significant impact on retirement savings.

## **2. Contributions**

Retirement savings is a crucial issue because people need to make sure they have enough money to support themselves in their later years. It is one of those research areas that academics follow and study in great detail. However, the major contribution of our thesis rests with the number of variables that impact retirement savings including financial literacy, personality traits and investor protection. Financial literacy has long been recognized as an important factor in individuals' ability to save for retirement. However, research on the topic has largely focused on North American and Asian countries, with very little attention given to European countries. In this study, we set out to fill this gap in the literature by investigating the relationship between financial literacy and retirement savings in two European countries: Luxembourg and Slovakia, with different level of financial development, through the analysis of data from the Household Finance and Consumption Survey (HFCS) carried out by the European Central Bank. Also, it adds to the understanding of the different ways in which financial literacy can impact retirement savings and can guide efforts to improve financial literacy and retirement readiness through policy and education.

This thesis provides secondary contributions by analyzing the relationship between personality traits and retirement savings among individuals living in 27 European countries. This is the first time that such a study has been conducted on such a large scale, covering a broad range of countries in the European context, using data from the SHARE database, which is widely recognized as a reliable and extensive source of information on retirement savings in Europe. Previous studies on this topic have typically focused on a single personality trait (such as risk-taking or conscientiousness) and a limited number of countries, making it challenging to draw broad conclusions about the generalizability of their findings. By exhibiting the importance of traits such as conscientiousness, agreeableness, and openness in predicting retirement savings behavior, our research provides useful insights for policymakers and financial advisors seeking to encourage individuals to save more for their retirement.

Finally, our research significantly contributes to the literature by examining the impact of investor protection and risk attitude on retirement savings while using both micro and macro data to provide a more comprehensive analysis of the relationship between the two variables. One of the major contributions is the use of micro data from the SHARE database and data on investor protection from the World Bank for 27 EU countries. This provided us with the opportunity to conduct previously unreported individual-level research on the impact of investor protection on retirement savings. Another important aspect of our research is the focus on small shareholders and creditors, who are often exploited by controlling shareholders in many countries. By investigating the impact of investor protection on these groups, this study is able to shed light on the importance of protecting the rights of these investors in order to encourage retirement savings.

### **3. Practical Implications**

Having a better understanding of finances has practical impacts on one's ability to save for retirement. Firstly, individuals with higher financial literacy are more likely to have a retirement plan in place. They understand the importance of saving for the future and are capable of making informed decisions about the best investment options for their retirement funds. They therefore have a higher likelihood of a secure financial future and are less likely to rely on government support in the form of public pensions or face financial hardship in retirement. This can also lessen the burden on the government, as it will not have to allot as many resources towards providing for the retirement needs of its citizens.

The research on personality traits and retirement savings has practical implications for governments and policymakers. By understanding which group of personality traits lacks in savings behavior, governments can more effectively target their policies and initiatives to address this problem. For instance, according to the research the individuals with high levels of neuroticism tend to have lower levels of retirement savings, governments may carry out financial education initiatives that focus on helping these individuals manage their emotions and stress when it comes to saving for retirement. This could entail supplying resources on budgeting, goal setting, and stress management, as well as collaborating with financial institutions to provide services for financial planning. The findings from this study may help inform the design of financial products and services. For example, the study shows that individuals with high levels of openness are more likely to engage in long-term planning and saving, financial institutions could develop products

and services that are tailored to these people, such as providing investment choices that are geared toward long-term growth or giving financial planning services that help individuals create a long-term financial plan. There are numerous practical implications of research on personality traits and retirement savings that can be used to inform policy, program design, and financial product development.

Numerous practical implications for retirement savings can be drawn from the research on investor protection and risk attitude. Governments and policymakers can apply the research's findings to design policies and programs that cater to the needs and preferences of different groups of individuals. The current research can help policymakers evaluate the effectiveness of existing retirement savings policies and programs. By contrasting the results of various policies and programs, policymakers can determine which ones are most effective in increasing retirement savings and can replicate or expand those policies and programs.

#### **4. Limitations and Future Research Prospects**

This study has several limitations that should be considered when analyzing its results. One of these shortcomings is that the study solely used data gathered from EU households. This means that we cannot be certain if the findings from this study will be the same for consumers in other parts of the world. In order to better understand the financial behavior of individuals in a wider range of cultural contexts, it would be helpful to conduct a cross-cultural study in the future. Such a study could examine how cultural factors influence the way that people handle their money in different parts of the world, such as the East and the West. By comparing the financial behavior of consumers in different cultures, we can get a complete understanding of how cultural influences shape financial decision-making.

Secondly in this study, the effects of psychological variables and financial literacy on saving behavior were examined, but it is important to consider other factors in future studies. Some examples of these might include emergency funds and financial stress. These variables may also play a role in determining how much people save and it would be valuable to study them deeper to get a better understanding of their impact on individual savings behavior.

In addition, with regard to any cross-sectional study, caution should be taken when inferring a causal relationship between psychological traits and household saving behavior. Total household



savings can be influenced by both long-term behaviors like regularly setting money aside and one-time events like inheritances. Some of the household savings reported in this study may have been the result of decisions made before the time of the study or may not have been influenced by any particular decision at all.

Finally, the recent pandemic and crises, such as COVID-19, have had a significant impact on the economy and retirement savings behaviors. These events can cause widespread economic disruption, leading to job loss, reduced income, and increased financial stress for many individuals and households. As a result, people may be less able to save for retirement or may be forced to withdraw savings to meet basic needs. This research could examine how these events affect retirement savings. Studies could analyze how income and employment shifts throughout the epidemic have affected people's retirement savings and whether specific groups have been disproportionately affected. Studies could also examine if financial stress has pushed people to withdraw retirement savings or delay contributions.



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