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INDIVIDUALS' BEHAVIOURAL CHARACTERISTICS AND DECISION TO SAVE FOR RETIREMENT

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ABSTRACT

World's aging population is putting pressure on government sponsored pension plans. Shift from defined-benefit plans to defined-contribution saving plans has increased individuals' responsibility to participate in collecting funds for retirement. In this thesis, it is found which behavioural characteristics influence individuals' decision to save for retirement. The paper contributes to the previous literature by giving an insight into how multiple behavioural characteristics together influence a person's decision to save for retirement with representative data. Based on the previous literature, four hypotheses are proposed expecting that individuals who are financially literate, demonstrate future-oriented time preferences, have stronger financial socialization and ask advice about financial matters from partners, co-workers or friends are more likely to save for retirement. Six logit binary models are created with data from the National Financial Well-Being Survey collected in 2017 in the United States.

The results show that discussing family financial matters with children increases the likelihood of children deciding to save for retirement. Also, high financial knowledge, demonstration of self-control, longer than 2-year financial planning horizon, tendency to wait and asking advice about financial matters from co-workers or friends increases the likelihood for an individual to save for retirement. According to the results, exponential-growth bias and asking advice about financial matters from partner do not affect the decision to save for retirement. Other significant variables in the model are age, gender, ethnicity, income, relationship status, education, family size, employment status, financial well-being and defined benefit pension plan.

Keywords: behavioural finance, household finance, retirement savings

INTRODUCTION

A lot of countries in the world, but in particular developed countries, are facing the problem that there are more elderly people in the population than younger. The demographic shift has increased the uncertainty over government-sponsored pension schemes. Furthermore, not all countries offer good government-sponsored pensions, but rather expect people to invest themselves for retirement. Over the past decades, there has been a substantial shift from defined-benefit plans to defined-contribution plans. In other words, the responsibility to accumulate funds for retirement has shifted from employer or government to the employee with increased independence to decide whether to participate, how much to contribute and how to invest. (Benartzi, Thaler 2007) Also, it is known that government-sponsored pensions are usually lower than income earned during the working period in individuals' life. Therefore, when people do not want to lose their standard of living, they need to act and save before retirement.

In general, politicians and economists agree that households do not save enough for retirement and adverse life circumstances. One of the largest global surveys about households' financial management, which includes savings, borrowings, payments and risk management, has found that only 48% of adults worldwide have reported having saved or set money aside during the last year (Saving … 2017). The global percentage of people reported having saved in the past year has decreased compared to the previous Global Findex Survey taken in 2014, which reported that 56% of adults around the world saved money (Demirgüç-Kunt *et al*. 2016). More specifically, in 2014 close to 25% (Demirgüç-Kunt *et al.* 2016) of adults and 2017 21% of adults worldwide reported having saved for old age in the past 12 months. The latter rate being respectively 44% in high-income countries and 15% in developing countries. (The World Bank 2017) The trend shows a decrease in saving in general, as well as saving for retirement across the world.

Furthermore, Rhee and Boivie have found in their research that around 45% of the United States households do not own any retirement savings and the median retirement account balance is $2,500 (Rhee, Boivie 2015). The research shows that people do not save enough, although, the shift between defined-benefit plans to contribution-based plans has changed individuals' passive

participant position in retirement savings to active, with decisions whether and how much to save. Therefore, the author believes it is important to understand how retirement decisions are made and to find out which individuals' characteristics influence the decision to save for retirement.

The aim of the thesis is to find out which behavioural characteristics influence individuals' decision to save for retirement.

The following hypotheses are tested in the thesis:
1. individuals who are more financially literate are more likely to save for retirement;
2. individuals who demonstrate future-oriented time preferences are more likely to save for retirement;
3. individuals who have a stronger financial socialization effect are more likely to save for retirement;
4. individuals who ask advice about financial matters from partners, co-workers or friends are more likely to save for retirement.

There has been some research about the relationship between retirement savings, financial literacy, future-oriented time preferences, financial socialization and asking advice about financial matters from partners, co-workers or friends separately. Although according to the author's knowledge, there has not been any research that investigates all the characteristics together with such a representative data set. The aim of the thesis is to give further insight into what characteristics influence individuals' decision to save for retirement.

In the empirical part of the thesis, a regression analysis is carried out. The data from the National Financial Well-Being Survey with a representative sample size of 3,244 is used. The total amount of the survey sample is 6,394 with 217 questions. The data was collected by the Consumer Financial Protection Bureau in 2017 in the United States. The dependent variable used in the model is whether the individual has a retirement savings account (such as a 401k or IRA). As the response to the question is binary, the logit binary model will be created to test the aim of the thesis.

The first chapter of the thesis presents a literature overview of retirement savings. Moreover, as the dependent variable of the model is whether people own a retirement savings account or not, it is related to the participation of financial markets. Therefore, a theory about financial inclusion is presented, along with the relationship between owning a retirement savings account and financial

inclusion. Also, a literature overview of socio-economic characteristics is described as well as an overview of behavioural characteristics based on proposed hypotheses.

In the second chapter, a review of the data used to construct the regression model is presented. Independent variables selected for the models are described along with the descriptive statistics. Also, the methodology and description of the model is carried out. The third chapter examines the results from the base model, models created to test hypotheses and from the final model. In the end, important findings from the empirical work are analysed and further suggestions about future research will be discussed.

1. LITERATURE OVERVIEW

1.1. Overview of retirement savings

The United Nations has reported that in the year 2018 for the first time on our planet, there are more old people alive (over 65 years) than children (under 5 years) (United Nations 2019a, 1). The total population of all the countries and the proportion of older people are growing in all regions of the world. In 2019, the world population was around 7.7 billion, where people aged 65 and over accounted for 9% of the total population, with a 3% increase over the last 20 years. The number of elderly people is projected to double by 2050 to 16% of the total population. The largest proportion, approximately 37% of the world's elderly live in Eastern and South-Eastern Asia, followed by Europe and Northern America with 29%. Furthermore, longevity is rising globally. Between the years 2015 and 2020, people over 65 years old are expected to live on average around 17 years more than previously. By 2045–2050 the same age group is expected to live two extra years compared to the 2015–2020 range. Moreover, both women and men are expected to live longer and the gap of women outliving men is predicted to decrease over the next thirty years. (United Nations 2019b)

The consumerism of the elderly is financed with government-sponsored pension schemes mostly in Europe and Latin America. On the other hand, in areas such as Southern Asia, South-Eastern Asia, the United States, the United Kingdom and Australia, assets are one of the most common instruments to finance the spending of the elderly. Governments all over the world are facing increasing pressure to support the old people with their ageing populations. (United Nations 2019b For decades, there has been a trend to switch from traditional defined-benefit pension schemes to defined contribution plans, especially in the United States. Defined-benefit plans which were compulsory for employees have largely been replaced in private-sector with tax-deferred savings accounts, such as 401(k)s and individual retirement accounts (IRAs). Those accounts are voluntary and give employees a choice, whether to participate and how much to contribute towards saving for retirement. (Poterba *et al.* 1996) As people are becoming more responsible for their funds for

retirement, it is important to understand, how the decision to save for retirement is made (Duflo, Saez 2003).

One of the first to suggest retirement as a motive to save were Ando and Modigliani (1963) with the life-cycle model. The theory implies that individuals tend to smooth consumption of wealth during the expected lifetime, which consists of three periods: pre-work time, working time and retirement. Respectively, individuals are expected to consume borrowed money during the young adulthood years before starting a career. During that period, individuals are either going to university, thus needing to take student loans to support themselves or have a low-income job due to the lack of experience and specialized knowledge. The second stage refers to the period, when individuals that have a job, through the years of studying and gaining experiences, are climbing up the career ladder towards higher income. During the second stage, individuals are expected to earn more than one could spend and save for the future low-income period. The final stage in the individual's life-cycle model is retirement, where working is harder due to health reasons, thus individuals are expected to dissave funds collected in the previous life-cycle stage.

In reality, people have different motivations to save. For example, according to the 2007 Survey of Consumer Finances Fisher and Montalto (2010) found that amongst the households the most popular reason for saving is retirement. The second most popular reason is saving for emergencies, following saving for children's education and down payment for a car or a morgage. Also, the same research found that individuals' motivation to save for retirement, as proposed in the life-cycle model, significantly increased the probability to save regularly. Furthermore, Soman and Zhao (2011) have found that having a single saving goal leads to a greater probability of having real savings. On the contrary, having multiple goals, which demand a certain amount of compromises, increases the probability of individuals staying deliberative and holding up to the decision to save.

Saving for old age, as well as saving in general, differs across the world. One of the largest global surveys about households' financial management, which includes savings, borrowings, payments and risk management, has found that 48% of adults worldwide have reported having saved or set money aside during the last year, specifically 71% in developed countries and 43% in developing countries. (The World Bank 2017) The global percentage of people reported having saved in the past year has decreased compared to the previous Global Findex Survey taken in 2014, which reported that 56% of adults around the world saved money (Demirgüç-Kunt *et al*. 2016). In 2014,

close to 25% (Demirgüç-Kunt *et al*. 2016) of adults and in 2017 21% of adults worldwide reported having saved for old age in the past 12 months. The latter rate being respectively 44% in high-income countries and 15% in developing countries. (The World Bank 2017) The trend shows a decrease in savings in general, as well as saving for the old age across the world.

Saving for retirement varies notably across all regions. For instance, the highest percentage of adults saving for old age are living in high-income countries, East Asia and the Pacific area with 40% and 37% respectively. The contrast is remarkable with the other economies with a result of more than 20% lower: 12% in Eastern Europe and Central Asia, 11% in Latin America and the Caribbean, 10% in Sub–Saharan Africa, 9% in South Asia, 7% in the Middle East and North Africa. (Demirgüç-Kunt *et al*. 2016) In respect to the data, high-income countries seem to perform well in saving for retirement, compared to the developing regions, although one might ask whether it is still enough.

To illustrate, research based on the United States data, indicates that people do not save enough for retirement. More than half of the respondents from the 2015 National Financial Capability Study have not thought about how much should be saved for retirement (Scott *et al*. 2018). Also, Pew Charitable Trust has found in the large survey of American Family Finances that 6 in 10 households are capable to cover unexpected expenditures of $2,000. It refers that almost 41% of households in America do not save for retirement (Pew Charitable Trusts 2015). Data is in line with Munnell *et al*. (2009), whose research indicates that half of the households in the United States will not have enough income to keep the pre-retirement standard of living.

According to the annual Planning and Progress Study, conducted to examine attitudes and behaviours towards money and financial decision-making, shows that more than half of the respondents do not know how much they should save for their retirement period and are worried about not covering their expenses during retirement. 22% of adults living in the United States have less than $5,000 saved for retirement. Furthermore, 15% of the survey respondents answered they have no savings for retirement. Additionally, a closer look at the US Baby Boomer generation, who is retiring in current years, shows that almost one in five have less than $5,000 saved for retirement. (Northwestern Mutual 2019) To sum up, there is enough evidence to support the notion that people do not save for retirement, however, in order to be able to save, one needs a retirement savings account. Therefore, financial inclusion theory plays an important role, where to start saving for retirement, one would need access to financial services in order to do it efficiently.

"Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way" (The World Bank 2018a). The World Bank has stated that everybody should have access to a bank account by the year 2020 to reduce poverty and facilitate economic growth (The World Bank 2018b). Research supports the goal as more developed banking services together with stock market liquidity helps to increase economic growth (Levine, Zervos 1998).

Whilst bank accounts are an essential part of everyday life for people in developed countries, only 63% of adults have a bank account in developing countries, as opposed to 94% in higher-income regions (Demirgüç-Kunt *et al.* 2017). In developing countries, in addition to saving in the bank, people often use other informal ways to save. Some of the most common informal ways are to keep cash at home, to buy assets that are not easily sold or converted to cash without a loss in value, savings groups (like ROSCA) and to keep the savings with friends or family. (Dupas *et al.* 2018) For instance, when saving boxes were given to the households in Kenya, people were more likely to keep their money in a box at home than in the bank (Dupas *et al.* 2017). Evidence from research indicates that people in developing countries prefer to use more informal ways of saving over saving formally in the bank.

Access to financial institutions is not only a problem in developing countries, although evidence shows a significant positive correlation between developed countries and households having a bank account (Sarma, Pais 2011). According to the Federal Deposit Insurance Corporation in the United States, there were almost 7% of households without checking or savings account in 2017. The most common reasons to not own a savings account are low income, low level of education, living on the countryside, incapacity to work and Hispanic ethnicity. (Apaam *et al.* 2018) Evidence from research shows that having a bank account is linked to having a savings account. Therefore, the reasons for not having a bank account might explain why individuals do not have a retirement savings account.

Demirgüç-Kunt *et al.* (2016) looked into the data from different profiles all over the world and investigated the relationships between peoples' financial inclusion status and whether they were saving for the old age or not. Adults with accounts at a financial institution are around 53% to 64% more likely to save for old age, than people who do not have a formal account in any financial institution. Also, a field study done in Somalia Garowe City supports the significant positive

correlation between savings and financial inclusion. Although only 19% of the participants of the research were saving for the future consumption, more than half of them saved in financial institutions. (Mohamed *et al.* 2017, 329)

Furthermore, Lyons *et al.* (2018) have found a significant positive relationship between financial inclusion and saving for old age. Individuals with a bank account are 18 percentage points more likely to be saving for retirement and 22 percentage points more likely to save in general. As evidence from multiple studies have demonstrated, financial inclusion rises the probability of saving for retirement and therefore, it is an important part of the theory to determine socio-economic and behavioural characteristics which influence individuals' decision to save for retirement.

1.2. Socio-economic characteristics

Age, gender, employment status, income, ethnicity and education are all factors that many research papers have found to increase participation in voluntary individual savings accounts, such as defined-contribution retirement plans (401(k)s) and individual retirement accounts (IRAs) (Bassett *et al.* 1998; Springstead, Wilson 2000; Honig and Dushi 2010).

Gender and age are variables usually consider to be in the model by default, as every individual has those socio-economic characteristics. Financial inclusion literacy indicates that gender is only a lightly significant variable to predict having a bank account in developed countries and more significant in developing countries. Furthermore, research shows existing evidence of gender gap in bank account ownership (Demirgüç-Kunt, Klapper 2013; Demirgüç-Kunt *et al.* 2014; Lyons *et al.* 2018). More precisely, women are 4.9 percentage points less likely to have a financial account than men (Lyons *et al.* 2018, 18). Also, evidence implies that gender gap in saving for retirement is bigger in developing countries than in developed economies (Demirgüç-Kunt *et al.* 2016). On the other hand, evidence suggests that in developing countries women are more likely to use their bank account for saving money, in contrast to developing countries, where men are more likely to save formally (Demirgüç-Kunt *et al.* 2014, 33).

In general, individuals older than 25 years are between 18 to 36 percentage points more likely to save for retirement than comparable younger age group between 18- and 24-year olds. Older age

groups are more likely to save for retirement, particularly in countries where the proportion of senior citizens is greater. (Lyons *et al*. 2018, 19) From the study which examines data from all over the world, solid increase in saving for retirement appears in the 36-45 age group in all regions, except in South-Asia, Latin America, Caribbean, Middle East, North Africa, Sub-Saharan Africa, where the occurrence of saving for old age is delayed (Demirgüç-Kunt *et al*. 2016). Age effect in retirement savings could intuitively be explained by lack of skills, experience and education, which will be gained during adulthood, resulting in higher income, and a chance to set money aside.

The research shows that in the United States ethnic minorities are more likely to be unbanked and neighbourhood effect plays an important role in these findings. People living in neighbourhoods with a smaller proportion of ethnic minorities were more likely to have a bank account. Minority groups in the United States are usually more likely to be unemployed, uneducated, have a low income and a low level of wealth, and therefore, according to the findings less likely to have a bank account. Although, if they had a bank account, they would more likely own a savings account than a checking account. (Vermilyea, Wilcox 2002) Interestingly, non-Hispanic white individuals are less likely to automate their savings in the United States than Hispanic individuals (Middlewood *et al*. 2018). Overall, research shows that there are behavioural differences amongst different ethnicities how individuals decide to save.

The global education cap regards to saving for retirement is about 11% between tertiary and secondary education. The effect is even higher in Latin America and Caribbean regions where around 12% of individuals with secondary education are saving for old age compared to 25% having tertiary education. Furthermore, individuals who have higher education are 19% more likely to save for retirement than individuals with primary education. (Demirgüç-Kunt *et al*. 2016) A survey comparing data from the United States and 14 countries in the European Union have found that in both areas education is a significant factor to predict bank account ownership, although the effect in the United States was stronger (Ampudia, Ehrmann 2017). Overall, studies have found that individuals with a lower level of education are less prepared for retirement and less likely to participate in defined-contribution plans than individuals with higher levels of education (Hurd, Rohwedder 2012; Bassett *et al*. 1998).

Worldwide, individuals who are in the bottom percentages of earnings distribution are less likely to save for retirement than the rich in the top (Demirgüç-Kunt *et al*. 2016). In developed countries the gap between rich and poor is smaller regards to the retirement savings than in developing

regions. For instance, in high-economy countries the top 20% of the country's income distribution is around 15 percentage points more likely to save for old age than the bottom 20%, respectively for developing countries the likelihood is 20 percentage points (Lyons *et al*. 2018, 19). Furthermore, individuals with higher income are also more likely to participate in defined-contribution retirement savings plans and interestingly, more willing to automate their savings than workers with lower income (Dushi *et al* 2011; Middlewood *et al*. 2018). Moreover, according to Demirgüç-Kunt *et al*. (2016) research, almost in every country, except for countries in South-Asia, adults who are working for employer are more likely to save for the old age than unemployed, self-employed and others.

A study using data from the U.S. Federal Reserve Board's Survey of Consumer Finances has found that young adults who are married are more likely to put retirement as a saving goal and participate in a defined contribution pension plan than singles with the same age range of 22-35 years (Knoll et al. 2012). Honig and Dushi (2010) have also found that married white male respondents are more likely to participate in the defined contribution pension plan than single people. Not only the relationship status is found to affect retirement savings but also family size matters. A study using data from 15 Euro Area countries shows that household size impacts positively the probability to have higher expenses than income. On the other hand, household size is found to negatively influence saving for old age. It is understandable that bigger families with many children have higher expenses and therefore less money to set aside to save for retirement. However, financial support from family members upon retirement is suggested to interchange a formal way of saving via pension plans. (Blanc et al. 2015, 10-14)

1.3. Behavioural characteristics

Thaler and Shefrin (1981) introduced a rational behaviour theory framework of two selves in an economic man example. The theory indicates that a man has two personalities, Doer and Planner, which differ from each other based on time horizon and self-control. For instance, Doer is more selfish and sees only one period at a time, whilst Planner has a long lifetime perspective to make present value of Doer's utility as great as possible. In order for Planner to alter Doer's will, its preferences or incentives must be transformed, or rules must be enforced to restricts Doer's taste. In other words, for the ones whose choices are dominated by planner-self excel in self-control better than doer-self. (Thaler and Shefrin, 1981) In addition, Thaler and Shefrin involved Doer-

Planner theory into the life cycle of the saving theory, developing it even further to be more behaviourally realistic and naming it Behavioural Life Cycle hypothesis. The theory emphasizes that foresight, self-control and good habits are necessary for saving for retirement. To illustrate, retirement savings need a long-term planning, thus the skill to predict the aspects of influencing the future is fundamental. Moreover, self-control is needed to delay present consumption and good habits are necessary to act according to the purpose of saving for the retirement. (Shefrin, Thaler 1988)

Individuals tend to choose instant gratification instead of realistic and more patient option in the future. Person's short-term preferences are with higher discount rate than long-term decisions; the described phenomenon is called a quasi-hyperbolic discounting. For instance, if one must decide whether to take an hour break from work in hundred and one days or half an hour break in hundred days, the longer option is chosen. However, when the decision is brought closer in time, the preferences might change, and half an hour break today, is much more appealing than an hour break tomorrow. (Laibson *et al*. 1998) If you think you do not save enough for retirement, and do not take any action to change the behaviour, one has most probably self-control problems. Individuals with tendency to hyperbolic discounting are likely to undersave because they would be thinking during working that when it is time to retire, they would like to work for a few more years instead and, therefore, there is no need to save as much for retirement currently. (Diamond, Köszegi 2003)

In general, self-control means resisting temptation, the ability to change and overcome one's behaviour. Weak self-control may be caused by one's conflicted standards, inability to monitor one's behaviour and lack of self-regulatory strengths to alter one's behaviour. (Baumeister 2002) Insufficient self-control opens individuals to many different financial risks. Consumers with self-control problems tend to use short-term credit, which is an easy access product, however, is relatively expensive. As a result, these individuals have more likely extreme amount of debt and are more exposed to financial shocks. (Gathergood 2012)

On the other hand, significant evidence of strong self-control as psychological force is related to high levels of wealth and consumption of less than the average individual (Ameriks *et al*. 2007). Moreover, individuals are expected to over-spend during some periods in life. For individuals with high propensity to plan, it is easier to acknowledge the pattern and correct it as part of a natural

self-control, which in result leads to accumulation of wealth and more savings than individuals with short-term planning tendency. (Ameriks *et al*. 2003)

Every individual has different time horizon in mind when thinking about saving for retirement. Fisher and Montalto (2010) found that long time horizon, which is more than ten years, correlates to higher probability to save. Another study supporting positive relationship between saving intentions and time horizon is based on surveys carried out in Belarus and the Netherlands. Respondents were divided into two groups: those who had a plan to save and implemented it successfully, and the others who had a plan to save but failed to follow the plan. Interestingly, the results were constant in both economies and showed linear positive correlation. Individuals with longer saving plans are more likely to realize the plan and those with shorter time horizon are more likely to fail the savings plan. (Rabinovich, Webley 2007)

In the context of behavioural finance, time horizon means an estimated length of time when one is planning for savings or expenses (Rabinovich, Webley 2007, 448). Munnell *et al* (2001) proved that employee's planning horizon has a great importance in determining the participation and contribution in 401(k) plan. Workers with shorter planning horizon, which is less than five years, are less likely to participate in 401(k) plan compared to the ones whose planning horizon is over five years. (Munnell *et al*. 2001)

Higher financial knowledge, risk tolerance and future orientation are found to be important factors when investigating individuals' different manners to save for retirement. Individuals with future perspective thinking and a good financial knowledge are not affected by risk tolerance when practicing retirement saving. On the other hand, risk tolerance matters a lot for those with low level of financial knowledge and high level of future orientation regarding retirement savings. (Jacobs-Lawson, Hershey 2005) In addition, financially literate individuals are less affected by the effect of hyperbolic discounting of retirement savings. This means that when individuals are procrastinators and would normally delay the decision to save for future, they still save when they have high level of financial knowledge. (Anantanasuwong 2019)

The United States President's Advisory Council defines financial literacy as "the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being" (PACFL 2009). Hung *et al*. 2009 have expanded the definition by adding the fundamental economic and financial concept as a core knowledge. In detail, the term financial literacy consists

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of four components; these are financial knowledge, financial skill, perceived knowledge and financial behaviour. First three of the mentioned components impact the actual financial behaviour, which in turn influence financial knowledge and perceived knowledge. (Hung *et al*. 2009)

Financial literacy is one of the most examined variables impacting retirement savings. Lusardi and Mitchell, who have thoroughly been examining the relationship between financial literacy and retirement savings in their papers from 2007 to 2011, show that financially literate people have a tendency to successfully plan for their retirement (Lusardi *et al* 2007a, 2007b, 2011a, 2011b). More explicitly, financial literacy is referred to as the key factor in individual's retirement planning (Lusardi, Mitchell 2007c). Similar to Lusardi and Mitchell's work, there have also been multiple studies conducted with European data. For example, financially knowledgeable individuals are more likely to prepare for retirement in the Netherlands. (Alessie *et al*. 2011) This is also true for Italy, as according to the study based on SHIW data collected by the Bank of Italy, households with a higher financial knowledge are more likely to participate in private pension plans to save for retirement (Fornero and Monticone, 2011). Financial literacy is not about the knowledge, rather than the capability to use the financial wisdom into making efficient and educated financial decisions, such as saving for retirement.

One of the variables impacting the decision to start saving for the retirement depends on the trade-off between evaluation of money now and in the future (McGowan *et al*. 2019). Exponential growth bias is a human phenomenon first studied by Wagneaar and Sagaria (1975). It means that when solving problems, individuals tend to intuitively use simple interest rate when in truth the problem follows the nature of compounding interest (Eisenstein, Hoch 2007). Exponential growth bias and financial decision making is examined by Stango and Zinman (2009) who argue that individuals who cannot calculate interest rates accurately, are more likely to underestimate the compound interest rates, tend to borrow more and save less.

Furthermore, experimental study in Dublin found persistent evidence that individuals underestimate the growth of money from both savings instalments and lump sums, although exponential-growth bias effect was higher for regular savings instalments. The results imply that individuals estimate money collected over thirty years to be less than 50 percent of the correct accumulated amount. Underestimation of compound interest in the end lessens the probability to save. Moreover, the study also supports with the evidence that individuals fail to value small regular contributions that accumulate over long periods of time. (McGowan *et al*. 2019)

Similar findings come out from the McKenzie and Liersch 2011 multi-experiment study. Undergraduate students were asked to calculate accumulative amount of 400 dollars of monthly deposits over 40-year period with 10% and 5% interest rate. Most participants in the study believed that retirement savings increase linearly, thus underestimating the amount which could be collected in the case of 400$ monthly instalments over 40 years with 5% of interest rate by two-thirds or approximately 400 thousand dollars less than the correct answer. Furthermore, graphical tables of the exponential growth of retirement savings over time were showed to students and 401(k) participants, which increased the interest in saving more and raised the awareness of the cost of postponing the start of saving. According to the literature, the importance of understanding the exponential growth impact over a long period of time is much greater than simply knowing what compound interest is and how to calculate it. When individuals do consider exponential growth in their retirement savings, they are more motivated to start the process of saving. (McKenzie, Liersch 2011)

Moore (2003) stresses the relationship between the financial knowledge and practical application of that knowledge in making financial decisions, such as managing assets, using credit cards, paying back debt and planning for the retirement. Therefore, proxies as indirect variables are needed to measure financial literacy. Evidence based on the American Life Panel survey imply that financial literacy has a strong positive relationship with retirement savings, which is similar to the relationship between exponential growth bias and retirement savings. Moreover, studies show that financial literacy reduces the perception of exponential growth bias on retirement savings. (Anantanasuwong 2019, Goda *et al*. 2015) In conclusion, as exponential growth bias is in essence about the financial knowledge of compound interest rate, the latter variable could be used as a proxy for measuring the relationship between financial literacy and retirement savings.

Danes 1994 defines financial socialization as individual's process of gaining and developing behaviours, knowledge, attitudes, values, norms and standards about financial well-being (Danes 1994, 128). Financial socialization may be expressed explicitly or implicitly, by open communication between a parent and a child or by being a role model and demonstrating with actions (Bucciol, Veronesi 2014, 8). Parents are considered to be the first financial socialization agents for their children, even though it might not be purposeful action by the parents (Danes 1994). Bucciol and Veronesi (2014) have found that households who have received education

about savings from parents in childhood are 16% more likely to save during adulthood than those who have not been taught about saving in general.

Furthermore, the education about savings received in childhood is quite significant considering the result that unemployed households, which received parental teaching, have the same propensity to save as employed households without that knowledge. Also, a household with parental teaching and without high school degree is as likely to save as one that has graduated college and has not received parental financial socialization when being young. In addition, households without parental teaching during childhood are more likely to postpone the start of saving. (Bucciol, Veronesi 2014) Thus, parental financial socialization received in young age could be as important variable in the decision to save as having a job, an income or a higher degree.

The one who saves during adolescence is more likely to save in the adulthood, meaning that parental guidance about saving during young ages could shape the habit of saving in adulthood. (Ashby *et al*. 2011) Study by Shim *et al*. (2010) stresses that the parents' role in childhood is more influential in predicting an adult's financial education, attitude and behaviour, than one's experience from high school financial education and work together. (Shim *et al*. 2010) Interestingly, conversations about finances whilst growing up are also linked to automated savings. (Middlewood *et al*. 2018). Study of Dutch and Norwegian young adults between 18-32 years demonstrated that individuals who were encouraged to save in young age, were more likely to choose saving overspending and had a stronger future orientation (Webley, Nyhus 2013). As most of the research is based on the relationship between savings in general and financial socialization, the author also believes there could be a strong positive correlation between financial socialisation and saving for retirement.

Family financial socialization model is introduced by Gudmunson and Danes (2011), where family interactions, relationships and deliberate financial socialization plays an important role in building and changing healthy financial behaviour. There has not been enough attention in the research on the aspects of financial socialisation process where new family roles and identities (spouse, grandparent, etc.), as well as financial attitudes are created. Therefore, more research can be done on how financial socialisation affects one's entire lifecycle. (Gudmunson, Danes 2011) Payne *et al*. (2014) have found that couples' family financial socialization is linked to preparing for retirement. Moreover, individuals who are supporting their spouses and partners with savings advice influence planning for retirement indirectly via time perspective (Hershley *et al*. 2010).

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Another Australian based study indicates that spouses or partners have a direct social influence over one's retirement savings decision (Croy *et al*. 2012). Although, in depth research on the relationship between having retirement savings and discussing financial matters with a spouse or a partner is missing, one might believe that couples have a significant influence on each other and share life values and thoughts, therefore, the influence could be significant also on the financial matters, such as saving for retirement.

A field experiment in a large university detected a strong network effect that influences positively enrolment in a Tax Deferred Account (TDA) retirement plan, such as 403(b). A letter of invitation with a promise of a monetary reward for attending an information fair about retirement plans at a university was sent to a random number of employees in selected departments. The results showed that the participation in the fair and enrolment to TDA was significantly higher within the departments where invitation letters were sent, compared to the control group departments. Furthermore, those who did not receive the letter were as likely to enrol as those who did receive invitation; therefore, the social effect has a strong influence on deciding whether to participate in TDA or not. (Duflo, Saez 2003)

In another study with librarians at a university suggests strong evidence that an individual's peer group affects the decision to participate in employer offered Tax Deferred Account of retirement plan, such as 401(k). Thus, every individual's environment performs an important role in economic decision making. It is important to recognize that decisions about retirement savings or savings in general are influenced by peer's decisions about savings or financial actions. (Duflo, Saez 2002) The evidence from the work demonstrates that discussing common matters, such as 401(k) plan, amongst co-workers may be one determinant to help people make important financial decisions.

In conclusion, according to the research socio-economic characteristics which influence the decision to save for retirement are age, gender, ethnicity, employment status, income, education, relationship status and family size. Moreover, every person has a certain set of behavioural characteristics which influence processes during life. According to the research, behavioural characteristics which influence the decision to save for retirement are financial knowledge, exponential-growth bias, self-control, tendency to wait, financial planning horizon, financial socialization, family financial socialization and peer effect.

2. DATA AND METHODOLOGY

2.1. Data

The data used in the regression model is taken from the financial well-being survey. The survey is carried out by the Consumer Financial Protection Bureau (CFPB) to contribute to the financial well-being of households by collecting data and serving the policymakers and practitioners by providing them with a vital picture of the present state of United States households' financial well-being. The survey consists of 217 questions about a wide range of individual situational and household characteristics, such as financial behaviour, financial skills, attitude about personal finances, past financial experiences, savings, assets, financial securities, employment and income. (CFPB 2017)

A total of 6,394 respondents completed the national financial well-being survey. The design of the survey is to represent the population of adults who are 18 or older from all fifty states in the United States of America. The survey was operated by one of the largest panels named GfK Knowledge Panel. Respondents accessed surveys via a link sent through email and on average, it took 26 minutes to finish the questionnaire. The pre-test and main study were carried out during the period from October 27 to December 5 in 2016. Eventually, weighting was applied to all collected answers to ensure the sample matches characteristics of the United States population by gender, age, race, region, education and poverty levels. (*Ibid.*)

The final sample consists of almost 70% white, 15% Hispanic, 12% black and 5% other ethnic origins. Most of the respondents were from the 35-54 age group (30%), an additional sample was made to target elderly in the age groups of 62-74 and 75 and over with 24% and 12% respectively. Adults between the age of 18 and 34 were represented by 24%. Moreover, one-fourth of the respondents live below 200 percent of the federal poverty level. As the sample is diverse and the questions are about an individual's financial behaviours, skills and socio-economic factors, the survey fits well with the goal of this thesis. (*Ibid.*)

The thesis aims to find out which behavioural characteristics influence individuals' decision to save for retirement. Thus, the cross-sectional study like financial well-being survey could be used, as the focus of the thesis is on understanding associations between behavioural characteristics and retirement savings and less concentrated on temporal effects.

Although, it is also essential to expose the limitations of that cross-sectional study design to make appropriate conclusions. Cross-sectional studies are performed at one point in time or sometimes the study could be conducted over a short period. The purpose of a cross-sectional study is to describe a population with respect to an outcome of a specific event and its set of risk factors in a snapshot. Nevertheless, it is impossible to make causal inferences as the essence of the design is limited to a specific time point, and there is no evidence whether the exposure of the event occurred before, after or during the outcome. Likewise, the same specific event may provide different results in a new timeframe. Regardless of the flaws, the cross-sectional study pinpoints associations that may exist in the specific event and create the hypotheses for future research. (Levin 2006)

On that account, it is important to choose appropriate variables to describe the main event of the thesis which is retirement savings. Variables have been chosen after thorough research on previous literature about retirement savings, the participation of financial services, financial inclusion and individual behavioural aspects, considering the topics and questions in the financial well-being survey. Socio-economic variables used in the model are *age*, *gender*, *ethnicity*, *relationship status*, *education*, *income* and *employment status*. In addition, variables presenting the hypothesis of individuals' behavioural characteristics in the model are *financial literacy*, *exponential-growth bias*, *tendency to wait*, *time horizon*, *self-control*, *partner's advice, peer advice* and *parental influence*.

Smith *et al*. (2010) found that in households where financial matters are handled by financial respondents whose cognitive numeracy skills are better than partners, the outcome or accumulated wealth of those households is significantly greater than for households with the non-financial respondents in charge. Considering the latter research and example of Van Rooij *et al*. (2012, 456) where only the heads of the households' responses were chosen into the model, a restriction will be made to the data. In the questionnaire, it was asked: "who in household makes financial decisions". There were three options: 1) "someone else takes care of all or most money matters in my household", 2) "someone else and I take care of money matters in my household about the same", 3) "I take care of all or most money matters in my household". In reflection, those who are

responsible for financial matters in a household also have the most relevant answers about financial decisions in a household, and therefore, the sample is restricted to the third option. Consequently, from the initial sample of 6,394 respondents, a representative and sufficient final sample size of 3,244 answers will be included in the regression model on this thesis.

2.2. Variables used in estimations

This thesis concentrates on characteristics that have an impact on retirement savings. The dependent variable in the model is binary, respondents with a retirement account (such as a 401k or IRA) and ones without. The question "which of the following financial products and services do you have?" was asked. Value 1 is assigned to the variable where the response is "yes" and 0 for "no". All variables used in the model with explanations are to be found in table 1 and descriptive statistics data from table 2 in the end of the chapter.

Socio-economic factors like age, gender, ethnicity, education, employment status, income, family size and relationship status are used in the model as control variables to avoid omitted-variable bias. Gender is coded as a binary variable where 1 refers to females and 0 to male. Descriptive statistics table 2 shows that there are 4% less women in the sample than man. Age is a factor variable were a higher level refers to a higher age group. The average respondents age is between 45 to 54 years. Education is also a factor variable with selection as "Less than high school", "High school degree/GED", "College/Associate", "Bachelor's degree", "Graduate/professional degree".

Moreover, ethnicity is also a factor level variable with the selection of "White, Non-Hispanic", "Black, Non-Hispanic", "Other, Non-Hispanic", "Hispanic". The average respondent in the sample belongs to White ethnic group. Employment status is another factor level variable which has 8 levels (see table 1). Most of the respondents in the sample work full-time for employer. Household income is a factor level variable where a higher level refers to a higher income group. Family size is a continuous variable from 1 to 5, where 5 is equal to 5 or more people in a family. Relationship status is a factor variable with options "married", "widowed", "divorced/separated", "never married", "living with partner".

Furthermore, other variables such as financial well-being and defined-benefit pension are added into the model as controls to improve the model's predictability. The financial well-being scale

index is considered as a proxy for income. It is a continuous variable from 0 to 100, which shows a financial well-being score for answering questions about having control over everyday finances, having extra resources for financial shocks, being on track to meet financial goals, having the financial freedom to enjoy life. (CFPB 2017b). Defined-benefit pension is a binary variable, where value 1 is having a defined-benefit pension and 0 not having a defined-benefit pension. When a person already has a guaranteed pension, there might not be any motivation to save extra with contribution-based retirement savings accounts. Thus, it is interesting to find out how is defined-benefit pension influencing the probability to save for retirement with 401(k) or IRA accounts.

Two proxies as independent variables are selected to test hypothesis one, which states that individuals' who are more financial literacy savvy are more likely to save for retirement. A Block of questions about financial knowledge, which is based on the Knoll and Houts (2012) research is used. Nine questions focusing on financial knowledge are asked from the respondents about the understanding of long-term returns on investments, stocks vs bonds vs savings volatility, benefits of diversification, the possibility of stock market losses, life insurance, possibility of housing market losses, credit card minimum payments, the relationship of bonds and interest rates, mortgage term length on total interest paid. Data from the response of each question is provided in a separate variable named KH1correct, KH2correct and so on until KH9correct. If the respondent answered correctly, value is 1 for "Yes" and 0 for "No". The author constructed a financial knowledge index by calculating the average value over the latter discussed binary variables and multiplying it by 100. The index is a continuous variable representing financial knowledge proxy for testing the financial literacy hypothesis.

Exponential growth bias as the other proxy for testing the relationship between financial literacy and retirement savings comes from the literature. Although not a lot of research has been conducted about retirement savings and exponential growth bias, the evidence (McKenzie, Liersch 2011; McGowan *et al*. 2019) indicates a negative relationship. In the survey, under variable FINKNOWL1 is asked: "Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money grow?". The answers are 1) "More than $102", 2) "Exactly $102", 3) "Less than $102". The question tests an individual's understanding of compound interest. The data about the answer is reported in variable FK1correct where value 1 is "Yes", indicating the respondent's correct answer and 0 is "No" which is the opposite. The correct answer is "Exactly $102", which implies that it is more probable that an individual does not have a tendency to exponential growth bias.

The second hypothesis about future-oriented time preference is tested with three proxies: the tendency to wait, self-control and time horizon. Those independent variables have a positive correlation with retirement savings, meaning that individuals who demonstrate a stronger tendency to wait, better self-control and longer planning horizon are more likely to save for retirement (Diamond, Köszegi 2003; Ameriks *et al*. 2003; Munnell *et al*. 2001). Variable "Discount" with the question "If you had a choice, would you rather receive …?" and options 1) "$816 now", 2) "$860 in three months" is used to test individual's tendency to wait. Variable is converted to binary values, 1 refers to the second option, which demonstrates the tendency to wait and 0 refers to the preference receiving money immediately.

Proxy for self-control is an index of three questions. In the survey, three statements about self-control are asked: "I often act without thinking through all the alternatives", "I am good at resisting temptation", "I am able to work diligently towards long-term goals". Respondent is expected to select the response that best describes them for each statement. Options are 1) "Not at all", 2) "Not very well", 3) "Very well", 4) "Completely well". Responses are organized in a sense that higher value indicates higher self-control. In the end, index as a continuous variable is created by calculating the average over three questions and rescaling the index to be in a range from 0 to 100, to be comparable with other independent variables.

In the survey, variable SCFHorizon "In planning you and/or your family's savings and spending, which of the time periods is most important?" has five options 1) "The next few months", 2) "The next year", 3) "The next few years", 4) The next 5 to 10 years", 5) "Longer than 10 years". The answer is coded to time horizon binary variable, where value 1 is referring to a plan for the next few years or more, and 0 for the next few months or years.

An index is constructed to measure the third hypothesis about stronger financial socialisation increasing the likelihood of saving for retirement. In the financial well-being survey, there is a block of questions about financial socialization, where is asked: "While growing up at home, did your family do any of the following?". Out of the seven statements, four that connect more with the topic of retirement savings are selected. For each of the following statements: FINSOC2_1 "Discussed family financial matters with me", FINSOC2_2 "Spoke to me about the importance of saving", FINSOC2_3 "Discussed how to establish a good credit rating", FINSOC2_7 "Provided me with a savings account", 1 is "Yes" and 0 is "No". The author has constructed an index by

calculating the total sum of four statements. Created continuous independent variable has a scale from 0 to 4, where value 0 means that respondent has not spoken about any of the topics with parents, 1, 2 or 3 refer to the number of topics discussed with parents and 4 means that all the topics were discussed with parents at home while growing up. The higher the number, the stronger is the financial socialization effect on the individual.

Two proxies are found to test the fourth hypothesis, which is about individuals who ask advice about financial matters from spouse/partner, co-workers or friends are more likely to save for retirement. Seeking financial advice from co-workers or friends has been linked to greater participation in Tax-Deferred Account retirement plans offered from work (Duflo, Saez 2002, 2003). Also, some evidence has been found about the link between retirement savings and discussing financial matters with one's spouse or partner (Croy *et al*. 2012; Payne *et al*. 2014; Hershley *et al*. 2010). In the survey under interconnections section is asked "Do you seek advice on matters involving money from any of the following types of people or organizations?". Variables INTERCONNECTIONS_2 and INTERCONNECTIONS_5 with options "Spouse/Partner" and "Friends/Co-workers" respectively are used in the model. They are binary variables with values 1 - "Yes" reflecting asking advice about financial matters and 0 - "No" meaning otherwise.

Table 1. Variables and explanations

Variable	FWBS code	Variable type	Explanation
Retirement account	PRODHAVE_4	Binary	1 - have retirement account (401k/IRA), 0 - do not have
Gender	PPGENDER	Binary	1 - female, 0 - male
Age	agecat	Factor	1 - (18–24), 2 - (25–34), 3 - (35–44), 4 - (45–54), 5 - (55–61), 6 - (62–69), 7 - (70–74), 8 - (75+)
Education	PPEDUC	Factor	1 - less than high school, 2 - high school degree /GED, 3 - some college/Associate, 4 - bachelor's degree, 5 - Graduate/professional degree
Ethnicity	PPETHM	Factor	1 - White, non-Hispanic, 2 - Black, non-Hispanic, 3 - other, non-Hispanic, 4 - Hispanic
Income	PPINCIMP	Factor	1 - less than $20,000, 2 - $20,000–29,999, 3 -$30,000–$39,999, 4 - $40,000–$49,999, 5 - $50,000–$59,999, 6 - $60,000–$74,999, 7 - $75,000–$99,999, 8 - $100,000–$149,000, 9 - $150,000 or more
Family size	PPHHSIZE	Continuous	1 to 5; 5 means 5 or more members

Variable	FWBS code	Variable type	Explanation
Relationship status	PPMARIT	Factor	1 - married, 2 - widowed, 3 - divorced/separated, 4 - never married, 5 - living with partner
Employment status	EMPLOY	Factor	1 - self-employed, 2 - work full-time for an employer or the military, 3 - work part-time for an employer or the military, 4 - homemaker, 5 - full-time student, 6 - permanently sick, disabled or unable to work, 7 - unemployed or temporarily laid off, 8 - retired
Financial well-being	FWBscore	Continuous	0 to 100; higher value means higher financial well-being
Defined-benefit pension	BENEFITS_3	Binary	1 - have defined-benefit pension, 0 - do not have defined-benefit pension
Financial knowledge	KHKNOWL1 to KHKNOWL9	Continuous	0 to 100; higher value means higher financial knowledge
Exponential-growth bias	FK1correct	Binary	1 - exponential-growth bias, 0 - no exponential-growth bias
Self-control	SELFCONTROL_1 to SELFCONTROL_3	Continuous	0 to 100; higher value means higher self-control
Tendency to wait	DISCOUNT	Binary	1 - tendency to wait, 0 - tendency not to wait
Time horizon	SCFHORIZON	Binary	1 - plan for the next few years or more, 0 - plan for next few months/year
Parental influence	FINSOC2_1 FINSOC2_2 FINSOC2_3 FINSOC2_7	Continuous	0 - speak about nothing to 4 - speak about all topics
Partner advice	INTER-CONNECTIONS_2	Binary	1 - ask advice, 0 - do not ask advice
Peer advice	INTER-CONNECTIONS_5	Binary	1 - ask advice, 0 - do not ask advice

Source: composed by the author based on data from financial well-being survey

Table 2. Descriptive statistics

Variable	Mean	Median	S.D.	Min	Max	N
Retirement account	0.61	1	0.49	0	1	3244
Gender	0.46	0	0.50	0	1	3244
Age	4.69	5	2.04	1	8	3244
Education	3.25	3	1.19	1	5	3244
Ethnicity	1.58	1	1.03	1	4	3244

Variable	Mean	Median	S.D.	Min	Max	N
Income	5.32	6	2.73	1	9	3244
Employment status	4.32	2	2.80	1	8	3244
Family size	2.27	2	1.22	1	5	3244
Relationship status	2.20	2	1.35	1	5	3244
Financial well-being	59.20	59	15.1	15	100	3241
Defined-benefit pension	0.35	0	0.48	0	1	3235
Financial knowledge	71.70	78	20.60	0	1	3244
Exponential-growth bias	0.13	1	0.33	0	1	3244
Self-control	75.60	75	13.00	25	100	3233
Tendency to wait	0.62	1	0.49	0	1	3220
Time horizon	0.69	1	0.47	0	1	3221
Parental influence	1.75	2	1.37	0	4	3240
Partner advice	0.32	0	0.46	0	1	3244
Peer advice	0.25	0	0.43	0	1	3244

Source: composed by author based on data from financial well-being survey

2.3. Model and regression analysis

The aim of the thesis is to find out which behavioural characteristics influence individuals' decision to save for retirement. The dependent variable of the thesis is whether individuals' have a retirement account (such as a 401k or IRA) or not. As the dependent variable is binary, two models could be used, logit or probit. Literature states that logit and probit models are giving similar results because of similar densities. The occasion when the results might differ between logit and probit models is when the dependent variable is very unbalanced, for example when 10% of the answers are 0 and 90% are 1. (Brooks 2008) In the thesis, the split between 0 and 1 for the dependent variable is 39% and 61% respectively. The dependent variable does not seem extremely unbalanced, therefore, both logit and probit models should give similar results. The author has chosen to use logit binary model to test the aim of the thesis.

The logistic model estimated is:

$$P_i = \frac{1}{1 + e^{-(\beta_1 + \beta_2 X_2 + \cdots + \beta_k X_{ki} + u_i)}} \tag{1}$$

where P_i is the probability that $y_{i=1}$ (Brooks 2008).

For the purpose to test the aim of the thesis, six logit models will be created. In the base model, all socio-economic and other independent variables will be tested. All significant variables from the base model are added as controls in the following models. Next five models are created to test the hypothesis proposed in the thesis. In the final model, all significant independent variables from previous models will be tested. For each model, multi-collinearity will be tested with the variance

inflation factor (VIF) to check, whether independent variables are correlated. In order to get conservative results robust standard errors are used.

Finally, robustness check will be performed to check the stability of the results. For the robustness test, logit models with fewer restrictions to sample size and with the full sample are created. For fewer restriction model the sample is restricted to responses, where someone else and the respondent is taking care of money matters in addition to responses where respondent takes care of all or most money matters in the household. For full sample, there will be no restrictions.

3. EMPIRICAL RESULTS

3.1. Results from the models 1–5

In the empirical work, the regression model with the data from the financial well-being survey gathered by the Consumer Financial Protection Bureau in the United States is used. The dependent variable chosen for the model is whether the individual has a retirement savings account, such as a 401(k) or IRA. As the dependent variable is limited, a binary logit regression model is used in the empirical work. To receive more clear results, the model is restricted to a condition, where only responses from a person who takes care of the household's financial matters forms the sample. According to the authors' professional judgement, all variables are evaluated in each model at a 5% significance level. Moreover, no multi-collinearity occurs in the models according to the VIF test, which shows that all variables are independent. The results of the models 1 to 5 could be seen from the table 3 in the end of the chapter.

In the beginning, the base model is constructed with socio-economic and other factors to find which ones influence owning a retirement savings account. Considering theoretical framework and previous literature, demographic characteristics such as *age*, *gender*, *ethnicity, education*, *income*, *family size*, *relationship status*, *employment status*, and other characteristics like *financial well-being* and *defined-benefit pension* are added into the base model. Base model results show that *age*, *education*, *income*, *financial well-being* and *defined-benefit pension* were statistically significant at 0.01 significance level. Although not all dummy variables in factor variable groups like *ethnicity*, *relationship status* and *employment status* were statistically significant, they are still considered important variables as a group to be included as control variables in other models. Family size appeared to be statistically significant at 0.05 level and is considered to act as a control variable in other models. Whilst *gender* is not significant in the base model, it is still included in the other models as it is one of the fundamental variables and no individual is without gender.

The variables of interest which characterise behavioural factors in retirement savings are included gradually to test four hypotheses proposed to explain the phenomenon of the thesis – decision to

save for retirement. Behavioural independent variables used to describe the model are *financial knowledge, exponential-growth bias, self-control, tendency to wait, time horizon, parental influence, partner's advice, peer advice*.

In order to test the first hypothesis, the second model is constructed with independent variables *financial knowledge* and *exponential-growth bias*. The results from the second model show that *financial knowledge* is statistically significant at a 0.01 significance level. The outcome is in line with previous literature, suggesting that *financial knowledge* is one of the most important factors predicting retirement savings (Lusardi, Mitchell 2007c). However, *exponential-growth bias* appears to not influence the probability to have a retirement savings account. The p-value of *exponential-growth bias* is 0.5316. As it is bigger than the significance level 0.1, the null hypothesis failed to be rejected, thus the variable is insignificant in this model. Interestingly, *gender* in this model is statistically significant at the 0.01 level, compared to the base model. Furthermore, all other variables, except for *other ethnicities, Hispanic ethnicity* and *with student employment status*, stay at the same significance level as in the base model. *Other ethnicities* and *employment status (student)* are statistically significant at the 0.1 level and *Hispanic ethnicity* is significant at the 0.05 level in the second model.

In the third model, time preference characteristics, such as *self-control*, *tendency to wait* and *time horizon* are included to test the second hypothesis. All results of the control variables are similar to the base model, except for *employment status (student)* which is significant at a 0.1 significance level and *other ethnicities*, which is statistically insignificant. Time preference independent variables are all statistically significant at the 0.01 significance level. Coefficients of *self-control, tendency to wait* and *time horizon* are positive, indicating when one has high levels of self-control, future-oriented thinking and is willing to wait for the prize, one is also more likely to have a retirement savings account. The result is in line with the theory and evidence from the existing literature.

The independent variable of *parental influence* is included in the fourth model to test the third hypothesis. All control variables are at the same significance level as in the base model, except for *employment status (student)* which is significant at a 0.1 significance level. Independent variable *parental influence* is statistically significant at significance level 0.01. Moreover, a positive coefficient supports the previous evidence from the literature, which implies that talking about financial matters with parents during childhood raises the probability to save for retirement.

The fifth model is constructed to test the fourth hypothesis. Independent variables *partner's advice* and *peer advice* are included. Control variables remain still in consideration of significant levels compared to the base model. *Peer advice* coefficient presents to be statistically significant at 0.01 significance level and positive, meaning that discussing financial matters with peer groups like friends or co-workers increases the likelihood to save for retirement. On the other hand, asking financial advice from a partner/spouse has failed to reject the null hypothesis and therefore, the coefficient is not considered statistically significant in this model.

Table 3. Retirement savings account logit models 1−5 coefficients

	Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	Constant	−4.366***	−5.467***	−5.168***	−4.560***	−4.523***
	Gender	0.129	0.299***	0.162	0.144	0.132
	Age (Reference category = (18−24))					
	Age_2 (25−34)	1.230***	1.149***	1.228***	1.315***	1.234***
	Age_3 (35−44)	1.356***	1.234***	1.332***	1.478***	1.361***
	Age_4 (45−54)	1.838***	1.672***	1.789***	1.973***	1.872***
	Age_5 (55−61)	1.859***	1.682***	1.800***	2.007***	1.904***
	Age_6 (62−69)	1.870***	1.659***	1.869***	2.051***	1.923***
	Age_7 (70−74)	1.738***	1.521***	1.732***	1.900***	1.797***
	Age_8 (75+)	1.364***	1.158***	1.370***	1.558***	1.442***
	Ethnicity (Reference category = White)					
	Eth_2 (Black)	−0.774***	−0.510***	−0.671***	−0.754***	−0.762***
	Eth_3 (other)	−0.477**	−0.411*	−0.367	−0.465**	−0.472**
Base	Eth_4 (Hispanic)	−0.549***	−0.314**	−0.435***	−0.537***	−0.523***
	Education (Reference category = less than high school)					
	Ed_2 (secondary)	0.812***	0.789***	0.830***	0.763***	0.804***
	Ed_3 (college)	0.935***	0.817***	0.906***	0.862***	0.917***
	Ed_4 (bachelor)	1.633***	1.377***	1.580***	1.539***	1.609***
	Ed_5 (graduate)	1.539***	1.230***	1.410***	1.428***	1.517***
	Income (Reference category = less than $20,000)					
	Inc_2 ($20,000 to $29,999)	0.777***	0.666***	0.774***	0.768***	0.772***
	Inc_3 ($30,000 to $39,999)	0.872***	0.735***	0.840***	0.836***	0.870***
	Inc_4 ($40,000 to $49,999)	0.996***	0.863***	0.974***	0.977***	0.993***
	Inc_5 ($50,000 to $59,999)	1.070***	0.870***	1.008***	1.030***	1.073***
	Inc_6 ($60,000 to $74,999)	1.754***	1.567***	1.764***	1.729***	1.753***
	Inc_7 ($75,000 to $99,999)	1.623***	1.420***	1.581***	1.611***	1.630***
	Inc_8 ($100,000 to $149,999)	1.830***	1.634***	1.773***	1.795***	1.835***
	Inc_9 ($150,000 or more)	2.162***	1.895***	2.147***	2.123***	2.152***

	Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	Family size	−0.115**	−0.124**	−0.111**	−0.113**	−0.112**
	Relationship status (Reference category = married)					
	Relp_2 (widowed)	0.147	0.152	0.203	0.122	0.139
	Relp_3 (separated)	−0.321**	−0.345**	−0.311**	−0.322**	−0.323**
	Relp_4 (never married)	−0.096	−0.098	−0.112	−0.093	−0.112
	Relp_5 (partner)	0.064	0.099	0.103	0.045	0.076
	Employment status (Reference category = full-time)					
	Empl_1 (self-employed)	−1.423***	−1.527***	−1.508***	−1.457***	−1.404***
	Empl_3 (part-time)	−0.470**	−0.512**	−0.521**	−0.482**	−0.451**
	Empl_4 (homemaker)	−1.084***	−1.186***	−1.131***	−1.096***	−1.051***
	Empl_5 (student)	−0.629	−0.706*	−0.724*	−0.678*	−0.624
	Empl_6 (disabled/sick)	−1.793***	−1.784***	−1.748***	−1.801***	−1.766***
	Empl_7 (unemployed)	−1.232***	−1.236***	−1.198***	−1.251***	−1.173***
	Empl_8 (retired)	−1.262***	−1.332***	−1.297***	−1.279***	−1.243***
	Financial well-being	0.034***	0.030***	0.024***	0.033***	0.034***
	Defined-benefit pension	0.374***	0.350***	0.345***	0.373***	0.367***
H1	Financial knowledge		0.024***			
H1	Exponential-growth bias		−0.087			
H2	Self-control			0.011***		
H2	Tendency to wait			0.494***		
H2	Time horizon			0.470***		
H3	Parental influence				0.134***	
H4	Partner advice					0.027
H4	Peer advice					0.320***
	N	3184	3184	3147	3182	3184
	Adjusted R^2	0.277	0.294	0.290	0.281	0.278

Source: composed by the author based on data from financial well-being survey; odds-ratios denoted by ***, **, and * are significant at 0.01, 0.05, and 0.1 significance level respectively; description of the variable is included in the parentheses.

3.2. Results from the final model

The final model is compiled with all the important control variables from the base model and independent variables, illustrating behavioural aspects in the model with a 0.05 significance level. Specified socio-economic variables in the last model are *gender*, *age*, *ethnicity, education, income, family size, relationship status, employment status*, as well as other factors, such as *financial well-being* and *defined-benefit pension*. Behavioural characteristics are represented by variables *financial knowledge, self-control, tendency to wait, time horizon, parental influence* and *peer*

advice. The dependent variable in the final model is a retirement savings account. The results of the final model could be seen at the end of the chapter from table 5 together with the results of the robustness checks.

The total number of observations in the final model is 3,146. 98 missing or incomplete values are excluded from the sample. The likelihood ratio test shows p-value=0.000, therefore, the null hypothesis is rejected, indicating that the final model itself is significant. The number of cases correctly predicted by the model is 79,7% (appendix 1). Specifically, correctly predicted cases, where an individual has a retirement account, is around 87,7% and correctly predicted cases where an individual does not have a retirement account is about 66,8%, therefore the model is inclined to predict cases with retirement account more accurately. Adjusted R-squared suggests that the final model (0.3047) has improved compared to the base model (0.2767). Besides, McFadden R-squared value is 0.3257, which indicates a decent model fit. The odds-ratios of the final model are presented in table 4.

Table 4. Final model's odds-ratios for retirement savings

Variable	Odds-ratio	95.0% confidence interval
Gender	1.3677***	[1.112, 1.683]
Age (Reference category = (18−24))		
Age_2 (25−34)	3.3591***	[1.743, 6.475]
Age_3 (35−44)	3.6839***	[1.866, 7.275]
Age_4 (45−54)	5.7785***	[2.939, 11.361]
Age_5 (55−61)	5.8312***	[2.851, 11.926]
Age_6 (62−69)	6.1817***	[2.984, 12.808]
Age_7 (70−74)	5.3956***	[2.437, 11.946]
Age_8 (75+)	3.9022***	[1.768, 8.610]
Ethnicity (Reference category = White)		
Ethnicity_2 (Black)	0.6510***	[0.488, 0.869]
Ethnicity_3 (other)	0.7479	[0.474, 1.180]
Ethnicity_4 (Hispanic)	0.7994	[0.585, 1.092]
Education (Reference category = less than high school)		
Education_2 (secondary)	2.1361***	[1.314, 3.472]
Education_3 (college)	2.0840***	[1.285, 3.381]
Education_4 (bachelor)	3.5670***	[2.121, 5.999]
Education_5 (graduate)	2.8814***	[1.689, 4.915]
Income (Reference category = less than $20,000)		
Income_2 ($20,000 to $29,999)	1.9428***	[1.291, 2.924]
Income_3 ($30,000 to $39,999)	2.0256***	[1.353, 3.033]
Income_4 ($40,000 to $49,999)	2.3504***	[1.532, 3.605]
Income_5 ($50,000 to $59,999)	2.2635***	[1.469, 3.488]
Income_6 ($60,000 to $74,999)	4.8713***	[3.156, 7.518]
Income_7 ($75,000 to $99,999)	4.0644***	[2.656, 6.219]

Variable	Odds-ratio	95.0% confidence interval
Income_8 ($100,000 to $149,999)	4.9016***	[3.155, 7.616]
Income_9 ($150,000 or more)	6.5395***	[3.895, 10.981]
Family size	0.8913**	[0.807, 0.985]
Relationship status (Reference category = married)		
Relationship_2 (widowed)	1.1879	[0.817, 1.727]
Relationship_3 (separated)	0.7077**	[0.530, 0.944]
Relationship_4 (never married)	0.8634	[0.636, 1.172]
Relationship_5 (partner)	1.1138	[0.693, 1.789]
Employment status (Reference category = full-time)		
Employment_1 (self-employed)	0.2029***	[0.138, 0.298]
Employment_3 (part-time)	0.5830**	[0.375, 0.905]
Employment_4 (homemaker)	0.3024***	[0.186, 0.493]
Employment_5 (student)	0.4448*	[0.186, 1.062]
Employment_6 (disabled/sick)	0.1749***	[0.108, 0.282]
Employment_7 (unemployed)	0.3068***	[0.170, 0.552]
Employment_8 (retired)	0.2593***	[0.179, 0.376]
Financial well-being	1.0221***	[1.014, 1.031]
Defined-benefit pension	1.3691***	[1.105, 1.696]
Financial knowledge	1.0214***	[1.015, 1.027]
Self-control	1.0078*	[1.000, 1.016]
Tendency to wait	1.5280***	[1.260, 1.852]
Time horizon	1.5006***	[1.225, 1.838]
Parental influence	1.1141***	[1.036, 1.197]
Peer advice	1.2297*	[0.983, 1.539]

Source: composed by the author based on data from financial well–being survey; odds-ratios denoted by ***, **, and * are significant at 0.01, 0.05, and 0.1 significance level respectively; description of the variable is included in the parentheses.

Age is tested as a factor variable and all age dummy variables are significant at a 0.01 significance level with positive coefficients values, which indicate that individuals older than 24 years are more likely to own a retirement savings account than individuals in age group 18−24. For individuals between years 45−74 the odds to have a retirement account are about 200% higher than between years 25−44 and highest between years 62−69 compared to the reference category. *Ceteris paribus*, the odds for individuals just before the retirement age or some years after retirement (years between 62 to 69) are 518% higher than the odds for individuals with age between 18 to 24 to have a retirement savings account. The finding is similar to the literature overview which states that adults between 36 and 45 years old are more likely to save for retirement than adults under the age of 25 (Demirgüç–Kunt *et al.* 2016).

Education is another factor variable where all dummy variables are statistically significant at the 0.01 significance level. Positive coefficients and odds-ratios show that individuals who have secondary or tertiary level education have higher odds to own a retirement savings account than

individuals with primary education level. Bachelor education level influences most significantly the likelihood to have a retirement savings account compared to other education levels. The odds for individuals who have a bachelor's degree are 257% higher than the odds for individuals with education less than high school to have a retirement savings account. The finding is in line with existing literature, which stresses that individuals with higher levels of education are more likely to be prepared for retirement and are more likely to have a defined-contribution pension plan (Hurd, Rohwedder 2012; Bassett *et al*. 1998).

From *ethnicity* variable group only, black ethnic coefficient is significant. Positive coefficient and odds ratio (table 4) implies that *ceteris paribus* individuals with black skin colour have a 34% lower probability to have a retirement account than White ethnic group. The result is related to evidence from the literature, where the most probable candidate to have a retirement savings account is a white married man (Honig and Dushi 2010).

The *household income* variables with positive coefficients have all been significant at the 0.01 level in every generated model. Results show a sudden increase in probability to own a retirement account compared to the reference group between the fifth and sixth group. The average household income in the United States is $63,179 (Federal… 2019), therefore, there is about 250% increase in probability between average household and households below average compared to the poorest income group. Results show a trend, the higher is income, the higher is the probability to own a retirement account. Likewise, the evidence from the previous research indicates that an increase in income also rises the probability to own a retirement savings account (Dushi *et al* 2011; Demirgüç-Kunt *et al*. 2016; Lyons *et al*. 2018).

In the *employment status* group, almost all variables are significant at the 0.01 level. The part-time variable is significant at the 0.05 significance level and the student is significant at the 0.01 significance level. All variables have a negative coefficient which indicates that all employment status variables have a lower probability to have a retirement account than full-time employed. As the 401(k) account is only offered by the employers and different variations of IRA-s could be provided by employers or investment banks, it is reasonable to believe that individuals who are working full-time for an employer are more likely to own 401(k) or IRA account. Also, the result relates to previous literature implying that employed adults are more likely to save for retirement (Demirgüç-Kunt et al. 2016).

The descriptive statistics table 1 shows that the average household has two individuals. According to the negative coefficient value, every extra person in the family reduces the probability to save for retirement. The probability to have retirement savings account decreases by 11% when the household has one more family member *ceteris paribus*. Also, holding all other variables at a fixed value, individuals who are separated or divorced are 29% less likely to have a retirement savings account than married people. Other relationship status variables are insignificant. The result is in line with the evidence from the literature suggesting that married individuals are more likely to own the defined contribution pension plan and put retirement as a saving goal (Honig and Dushi 2010; Knoll *et al*. 2012).

The *financial well-being* variable has been significant at the 0.01 level in every model. Independent variable coefficient and odds-ratio imply that holding all other variables at a fixed value, there is a 2% increase in the odds of having retirement savings account for a one-unit increase in financial well-being score. The essence of this variable is to validate how well one can control everyday finances, meet financial obligations and feel secure about future financial resources (CFPB 2017b). Therefore, the relationship where higher financial well-being score rises the probability to have a retirement account is reasonable, as one of the needs for individuals is to feel safe about future financial resources.

Independent variable *defined-benefit pension* is significant at a 0.01 significance level and has a positive coefficient which means that having a defined-benefit pension increases the likelihood of also having a retirement savings account. Results from table 4 show that *ceteris paribus* the odds of having retirement savings account for defined-benefit pension holders are 37% higher than for individuals who do not have a defined-benefit pension plan. One might expect when already having a defined-benefit pension plan, it is unlikely to have another one. Despite the argument, there is little evidence to support the finding, contributions to the 401(k) account barely replace other types of personal savings accounts (Poterba *et al*. 1995). Furthermore, in the public sector in the United States, defined-contribution plans are offered as an additional option to the defined-benefit pension schemes, the latter is still mainly offered by the public sector employers compared to the private sector. (Munnell *et al*. 2007) Therefore, the result indicates that around 35% of the sample is working in the public sector.

The *financial knowledge* variable is significant at the 0.01 significance level; thus, it is an important characteristic in the model. *Ceteris paribus*, positive coefficient and odds-ratio show a

2% increase in the odds of having retirement savings account for a one-unit rise of one's financial knowledge score. A positive correlation between financial knowledge and retirement savings account is in line with evidence from previous research, referring to those individuals who are more financially literate are more likely to successfully plan for their retirement (Alessie *et al*. 2011; Lusardi *et al* 2007a; 2007b; 2011a; 2011b).

Self-control with a p-value of 0.0566 has a weak statistical significance (<0.05), but as the model is run with robust standard errors, the variable is assessed as significant in this thesis. Positive coefficient and odds ratio show that ceteris paribus, there is a 0.8% increase in the odds of having retirement savings account for a one-unit increase in demonstrating self-control. The finding is in line with the literature which suggests that self-control is related to the accumulation of wealth and savings (Ameriks et al. 2003, 2007).

On the other hand, the *tendency to wait* and *time horizon* are significant at the 0.01 significance level. Both independent variables have a positive coefficient value, meaning that when an individual is willing to wait for a better outcome and has a long planning perspective, he or she is also more likely to have a retirement savings account. According to the odds-ratio, the probability to own retirement savings account for individuals who tend to wait is 53% higher than the probability for impatient individuals. Similarly, the odds to own a retirement account for individuals with a long-time horizon is 50% higher than for individuals with a short time horizon. Although in this model a short time horizon refers to the next few months or up to the next year, the result is still in line with the literature (Munnell *et al*. 2001), where workers with planning horizon for less than five years are less likely to participate in 401(k) plan.

Independent variable *parental influence* is significant at a 0.01 significance level. Positive coefficient value, which refers to an increased likelihood of having a retirement account when one has discussed family financial matters with parents when growing up, such as the importance of saving and having a good credit rating and using savings account in childhood. Results from table 4 show that *ceteris paribus*, there is a 11% increase in the odds of having retirement savings account for a one-unit increase in parents' influence during childhood. The result is in line with the literature which implies that parental guidance about savings during childhood increases the likelihood of saving in adulthood (Bucciol, Veronesi 2014).

Peer advice with a p-value of 0.0706 has a weak statistical significance (<0.05), but like with *self-control*, the variable is assessed as significant in this thesis. Variable's positive coefficient and odds-ratio indicate that *ceteris paribus* the likelihood of having retirement savings account for individuals who seek money advice from friends or co-workers is 23% higher than the likelihood of those who do not ask financial advice from friends or co-workers. The result matches with peer effect literature (Duflo, Saez 2002), which suggests that talking with one's peer group about financial matters affects one's decision to participate in a tax-deferred retirement savings plan.

For the robustness test, logit models with fewer restrictions to sample size and with the full sample are created with the same dependent and independent variables as in the final model. Models created in the empirical work were all restricted to a condition, where only responses from a person who takes care of all or most money matters in the household form the sample. With fewer restriction model the sample is restricted to responses, where someone else and the respondent is taking care of money matters in addition to responses where respondent takes care of all or most money matters in the household. The total sample size for the fewer restriction model is 5,340 and for full sample model 6,149. The results of the robustness test could be seen in table 5.

Independent variables *age*, *education*, *income*, *financial well-being*, *defined-benefit pension*, *financial knowledge*, *tendency to wait*, *time horizon* and *parental influence* coefficients' significance levels and direction of the relationship with dependent variable remain consistent in the final model as well as in fewer and full sample models. Overall, the direction of the relationship between independent and dependent variable remains unchanged with significant variables in all three models.

On the other hand, the robustness test has found some changes in significant levels of the independent variables' coefficients. Variables like other ethnicities, Hispanic ethnicity, self-employed and permanently sick have become statistically significant at least a 0.05 significance level in fewer restrictions and full sample models. Moreover, never married relationship variable has become significant at a 0.01 level with full sample model. The change to become a significant variable in the robustness test indicates that in fewer restriction model and full sample model stronger evidence were provided to reject the null hypothesis. Coefficient of variables family size, separated relationship status and peer advice have lowered the significance levels in the robustness test confirming the importance of the variables in the final model. On the contrary, self-control is statistically insignificant in fewer restrictions and full sample models. In conclusion, there were

no significant changes in the robustness test indicating that the results from the final model could be trusted.

Table 5. Final model's, robustness models' coefficient and standard errors for retirement savings

	Variables	Final model		Robustness fewer		Robustness full	
		Coef.	Std.	Coef.	Std.	Coef.	Std.
	Constant	−6.144***	0.610	−5.801***	0.448	−5.519***	0.403
	Gender	0.313***	0.106	0.225***	0.078	0.217***	0.072
	Age (Reference category = (18−24))						
	Age_2 (25−34)	1.212***	0.335	1.302***	0.234	1.177***	0.193
	Age_3 (35−44)	1.304***	0.347	1.551***	0.248	1.448***	0.210
	Age_4 (45−54)	1.754***	0.345	1.864***	0.247	1.798***	0.209
	Age_5 (55−61)	1.763***	0.365	1.929***	0.261	1.815***	0.223
	Age_6 (62−69)	1.822***	0.372	1.932***	0.269	1.827***	0.231
	Age_7 (70−74)	1.686***	0.406	1.746***	0.297	1.606***	0.258
	Age_8 (75+)	1.362***	0.404	1.589***	0.292	1.495***	0.255
	Ethnicity (Reference category = White)						
	Eth_2 (Black)	−0.429***	0.148	−0.562***	0.119	−0.523***	0.113
	Eth_3 (other)	−0.291	0.233	−0.365**	0.164	−0.303**	0.146
	Eth_4 (Hispanic)	−0.224	0.159	−0.419***	0.117	−0.502***	0.109
	Education (Reference category = less than high school)						
Base model	Ed_2 (secondary)	0.759***	0.248	0.692***	0.188	0.609***	0.168
	Ed_3 (college)	0.734***	0.247	0.554***	0.189	0.565***	0.169
	Ed_4 (bachelor)	1.272***	0.265	1.056***	0.203	1.049***	0.182
	Ed_5 (graduate)	1.058***	0.272	0.954***	0.210	0.929***	0.189
	Income (Reference category = less than $20,000)						
	Inc_2 ($20,000 to $29,999)	0.664***	0.209	0.563***	0.175	0.500***	0.167
	Inc_3 ($30,000 to $39,999)	0.706***	0.206	0.719***	0.168	0.743***	0.159
	Inc_4 ($40,000 to $49,999)	0.855***	0.218	0.824***	0.178	0.793***	0.169
	Inc_5 ($50,000 to $59,999)	0.817***	0.221	0.919***	0.177	0.943***	0.167
	Inc_6 ($60,000 to $74,999)	1.583***	0.221	1.489***	0.174	1.445***	0.164
	Inc_7 ($75,000 to $99,999)	1.402***	0.217	1.294***	0.170	1.200***	0.159
	Inc_8 ($100,000 to $149,999)	1.590***	0.225	1.611***	0.177	1.490***	0.163
	Inc_9 ($150,000 or more)	1.878***	0.264	1.936***	0.206	1.797***	0.187
	Family size	−0.115**	0.051	−0.086**	0.038	−0.094***	0.034
	Relationship status (Reference category = married)						
	Relp_2 (widowed)	0.172	0.191	0.075	0.165	0.063	0.156
	Relp_3 (separated)	−0.346**	0.147	−0.368***	0.120	−0.453***	0.113
	Relp_4 (never married)	−0.147	0.156	−0.160	0.124	−0.295***	0.113
	Relp_5 (partner)	0.108	0.242	0.085	0.169	0.066	0.159

	Variables	Final Coef.	Robus Std.	Robustnes Coef.	Variabl	Final Coef.	Robus Std.
	Employment status (Reference category = full-time)						
	Empl_1 (self-employed)	−1.595***	0.196	−1.635***	0.148	−1.577***	0.139
	Empl_3 (part-time)	−0.540**	0.225	−0.591***	0.157	−0.640***	0.141
	Empl_4 (homemaker)	−1.196***	0.249	−1.225***	0.173	−1.307***	0.156
	Empl_5 (student)	−0.810*	0.444	−0.924***	0.278	−1.121***	0.215
	Empl_6 (disabled/sick)	−1.743***	0.268	−1.839***	0.202	−1.815***	0.193
	Empl_7 (unemployed)	−1.181***	0.300	−1.068***	0.223	−1.349***	0.191
	Empl_8 (retired)	−1.349***	0.189	−1.194***	0.144	−1.219***	0.134
	Financial well-being	0.022***	0.004	0.024***	0.003	0.024***	0.003
	Defined-benefit pension	0.314***	0.109	0.226***	0.082	0.245***	0.077
H1	Financial knowledge	0.021***	0.003	0.019***	0.002	0.020***	0.002
H2	Self-control	0.008*	0.004	0.004	0.003	0.003	0.003
	Tendency to wait	0.424***	0.098	0.333***	0.075	0.287***	0.070
	Time horizon	0.406***	0.103	0.388***	0.079	0.358***	0.074
H3	Parental influence	0.108***	0.037	0.101***	0.028	0.094***	0.026
H4	Peer advice	0.207*	0.114	0.237***	0.089	0.191**	0.083
	N	3146		5340		6149	
	Adjusted R^2	0.305		0.301		0.313	
	McFadden R^2	0.326		0.314		0.323	

Source: composed by the author based on data from financial well-being survey; Coef. means coefficients and std. means standard errors; coefficients denoted by ***, **, and * are significant at 0.01, 0.05, and 0.1 significance level respectively; description of the variable is included in the parentheses.

3.3. Important findings and discussion

Important findings from the empirical research conducted part of this thesis will be discussed in this chapter. To find an answer to the question of which behavioural characteristics influence individuals' decision to save for retirement, six logit regression models were created. The idea of the first model is to test socio-economic and other variables of interest. The purpose of the second until the fifth model is to test each hypothesis separately with significant control variables from the base model. The motive of the final model is to analyse the relationships of the hypothesis joined in one model by testing significant independent variables from previous models all together. The dependent variable of all the models is whether an individual has a retirement savings account,

such as 401(k) or IRA, which concerning the aim of the thesis indicates whether people decide to save for retirement or not.

All models are controlled with socio-economic variables. The control variables, which are significant and influence retirement savings according to the regression model are gender, age, ethnicity, education, income, employment status, family size and relationship status. Moreover, other factors, such as financial well-being score and owning a defined-benefit pension, are also significant and increase the likelihood of saving for retirement. Interestingly, one could conclude from the results that, when people already have some kind of security in a form of defined-benefit pension scheme provided by the workplace, they do not settle with that and are likely to find further security for the future, by also having a contribution-based retirement plans, like 401(k) or IRA. On the other hand, in the United States, it is common in the public sector for employers to offer both options, defined-benefit and contribution-based pension plans. Thus, the results suggest that people working in the public sector are more likely to have both defined-benefit pension and contribution-based retirement plans than people working in the private sector. This is also in line with the existing literature.

The first hypothesis suggests that individuals who are more financially literate are also more likely to save for retirement. It is a logical expectation that when one has a strong financial knowledge, they decide to save for retirement in consonance with the theory of the life cycle model. Two proxies, financial knowledge and exponential-growth bias were selected to test the hypothesis. The results suggest that exponential-growth bias is insignificant in the model. This may indicate that the selected variable for measuring exponential-growth bias was not accurate enough, in contrast to previous studies (Anantanasuwong 2019, Goda *et al*. 2015), where instead of a single question, multiple questions to test the knowledge about exponential-growth bias were asked. All in all, for the first hypothesis, the null hypothesis is rejected, suggesting that financial knowledge about long-term returns, volatility, benefits of diversification, life insurance, stock and housing market losses, bonds' interest rates, mortgage length and total interest paid influences decision to save for retirement.

The second hypothesis states that individuals who demonstrate future-oriented time preferences are more likely to save for retirement. It is reasonable to believe that a person who saves for retirement, also thinks about the future, is willing to wait in the hope to receive a better outcome in the future and is ready to delay consumption today in exchange of keeping the same living

standard as today in the future. Thus, self-control, tendency to wait and time horizon are chosen to test the hypothesis. Empirical work conducted in this thesis reveals that self-control has weak statistical significance in the implemented model. On the other hand, the tendency to wait and time horizon both are significant variables, which strongly influence retirement savings. As a result, the null hypothesis is rejected for the second hypothesis. The tendency to wait and self-control demonstrate a person's willpower to resist the temptation of receiving instant pleasure in favour of gaining it in the future. As people usually retire in the final quarter of their expected lifetime, the person inevitably needs to think about how to manage a retirement period without work income. Empirical results in this thesis show, that a person whose financial planning period is at least two years, is increasing the likelihood of saving for retirement.

The third hypothesis expresses that individuals who have a stronger financial socialization effect, are more likely to save for retirement. In other words, when an individual has received parental guidance during childhood about financial decisions in life, one is more likely to demonstrate a tendency to save for retirement, as saving for old age is part of the important healthy financial behaviour during one's lifetime. The results from the empirical work in this thesis suggest that parental influence or when parents speak with their children about family financial matters, the importance of saving, how to establish a good credit rating and provide children with a savings account, the likelihood of saving for retirement for children increases. There is little literature describing the relationship between retirement savings and financial socialization compared to savings in general and financial socialization. Therefore, by rejecting the null hypothesis for the third hypothesis in this paper, the result supports the literature by demonstrating evidence on a positive relationship between financial socialization and saving for retirement.

The fourth hypothesis states that individuals who ask advice about financial matters from partners, co-workers or friends are more likely to save for retirement. In contrast to the family financial socialization literature, which suggests that spouses or partners influence one's decision to save for retirement, the results from the empirical work performed in this thesis indicates that asking financial advice from a spouse or partner does not influence the decision to save for retirement. On the other hand, the result of the final model suggests that asking advice about financial matters from co-workers or friends, significantly influences the likelihood of saving for retirement and, therefore, the null hypothesis is rejected for the proposed fourth hypothesis. The result indicates that people decide based on financial advice received, whether to participate in 401(k) or IRA. People usually share advice with their best intentions and knowledge; therefore, one might also

conclude that to participate in contribution-based pension plan is a reasonable shared advice. Alternatively, as contribution-based plans, like 401(k) and IRA, are widely offered by the employers in the United States, the schemes are a common interest between co-workers, therefore, the result seems reasonable according to the peer effect literature, that one's peer group opinion matters when deciding whether to save for retirement through 401(k) and IRA or not.

CONCLUSION

The population of the world is ageing, which means more retirees are living on earth than children who are under 5 years old. The occurrence of this demographic shift has put governments under fiscal pressure. Therefore, during recent decades, defined-contribution pension plans have emerged and become more common than defined-benefit pension plans. This has raised the individuals' responsibility to choose whether and how to participate in retirement savings schemes. For this reason, the thesis aims to find out which behavioural characteristics influence individuals' decision to save for retirement.

To meet the aim of the thesis, six binary logit regression models were created. The empirical results showed that all four hypotheses proposed in the thesis were significant. Therefore, this thesis supports with evidence, that financial literacy, self-control, time horizon, tendency to wait, financial socialization and peer group advice all influence the decision to save for retirement. On the other hand, results show that exponential-growth bias does not influence decision to save for the old age.

Socio-economic factors show that compared to young adults the highest probability to own a retirement savings account is for individuals in their 60s. Also, black ethnic group is less likely to own a retirement savings account than the white ethnic group. Bachelor level education increases the probability of owning a retirement savings account more than graduate level education. Moreover, women are more likely to own a retirement savings account than men. The higher the income, the higher is the probability to own a retirement savings account. There is a substantial drop in probability of owning a retirement savings account between average income households and below-average compared to the poorest households. Individuals with a full-time job are more likely to own a retirement savings account than any other employment status group. Every extra person in household decreases the probability of having a retirement savings account and separated or divorced are also less likely to own a retirement savings account than married people. Higher financial well-being state raises the likelihood of having a retirement savings account. Interestingly, individuals who have a defined-benefit pension plan are more likely to also have a

contribution-based retirement plan, such as 401(k) or IRA, in contrast to individuals without defined-benefit pension.

In conclusion, the author has lined out assessments and proposals derived from the results:

- Raising parents' awareness about the importance of discussing family financial matters with children is increasing the likelihood of children deciding to save for retirement. Small steps, like willingness to openly share financial knowledge, discuss family financial matters, the importance of saving, how to establish a good credit rating and provide children with a savings account will increase the probability of children saving for retirement.

- Providing people with wider financial knowledge increases the probability of deciding to save for retirement.

- Encouraging people to talk about financial matters with co-workers and friends increases the likelihood of saving for retirement.

- Teaching people about long-term financial planning, with longer than 2-year goals, increases the likelihood of saving for retirement.

- Educating people on being more patient increases the likelihood of saving for retirement.

- Teaching people how to practice and build the mindset of self-control increases the likelihood of saving for retirement.

Cross-sectional data is used in this thesis, which sets limitations on interpreting the causal inferences, considering that exposure and outcome of the event occur at the same point in time. The relationship between owning a retirement savings account and independent variables tested in this thesis might provide different results in a new timeframe. Therefore, a suggestion for future studies that investigate retirement savings, would be to use panel data to test variables of interest. Moreover, as some of the questions were self-evaluations, the results might have a personal bias. For future research on retirement savings, it is suggested to use independent variables, which are constructed to minimize personal bias. Furthermore, the dependent variable in this thesis refers to the ownership of the account, but the validation whether contributions are actually made to the account is missing. The suggestion for further research is to investigate both, participation and contributions of the retirement savings account.

KOKKUVÕTE

INIMESTE KÄITUMISOMADUSED JA OTSUS SÄÄSTA PENSIONIPÕLVEKS

Nele Tüvi

Paljud riigid maailmas, eriti arenenud riigid, seisavad silmitsi probleemiga, kus rahvastikus on rohkem eakaid kui noori. Demograafiline muutus on suurendanud ebakindlust riikide pensionisüsteemides. Viimastel aastakümnetel on toimunud oluline liikumine kindlaks määratud hüvitistega pensioniplaanidelt sissemaksetega pensioniplaanidele. Vastutus pensionipõlveks kogumise ees on tööandjalt või valitsuselt nihkunud töötajale, millega on kaasa tulnud suurenenud iseseisvus otsustada, kas osaleda säästmisplaanides ning kui palju panustada. (Benartzi, Thaler 2007) Kui inimesed ei soovi kaotada pensionile jäädes elatustasemes, tuleb juba varakult tegutseda ning alustada säästmisega.

Magistritöö eesmärk on välja selgitada, millised käitumisomadused mõjutavad inimeste otsust pensionipõlveks säästa. Lõputöös testitakse järgnevaid hüpoteese:

1. inimesed, kellel on kõrgem finantskirja-oskus, säästavad tõenäolisemalt pensionipõlveks;
2. inimesed, kellel on tulevikku suunatud ajalised eelistused, säästavad tõenäolisemalt pensionipõlveks;
3. inimesed, kellel on tugevam finants sotsialiseerumise efekt, säästavad tõenäolisemalt pensionipõlveks;
4. inimesed, kes küsivad rahaasjades nõu partneritelt, töökaaslastelt või sõpradelt, säästavad tõenäolisemalt pensionipõlveks.

Töö empiirilises osas teostatakse regressioonanalüüs, kus kasutatakse andmeid *National Financial Well-Being Survey*-st. Uuringus on küsitud vastajatelt 217 küsimust ning valimi kogusuurus on 6394. Andmeid kogus Ameerika Ühendriikides tarbijate finantskaitsebüroo 2017. aastal. Mudelis kasutatav sõltuv muutuja on, kas inimesel on pensioni kogumiskonto (näiteks *401k* või *IRA*). Tegemist on binaarse muutujaga, seetõttu kasutatakse empiirilise analüüsi läbi viimisel logit mudelit.

Empiirilise analüüsi tulemustest selgub, et võrreldes noortega on suurim tõenäosus omada pensioni kogumiskontot inimestel 60-ndates eluaastates. Tulemustest selgus, et naised omavad

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tõenäolisemalt pensioni kogumiskontot kui mehed. Seevastu tumedanahalised omavad väiksema tõenäosusega pensioni kogumiskontot kui heledanahalised. Inimestel, kel on bakalaureuse haridus on suurem tõenäosus omada pensioni kogumiskontot võrreldes inimestega kel on magistri haridustase. Mida suurem on sissetulek, seda suurem on tõenäosus omada pensioni kogumiskontot. Samuti täistööajaga töötavatel inimestel on suurem tõenäosus omada pensioni kogumiskonto kui teistel tööhõive rühmadel. Iga lisanduv pereliige vähendab pensioni kogumiskonto olemasolu tõenäosust ning vallalistel või lahutatutel on pensioni kogumiskonto omamise tõenäosus väiksem kui abielus inimestel. Lisaks suurendab kõrgem majanduslik heaolu tõenäosust, säästa pensioniks. Huvitav on tulemus, et kindla pensionihüvitisega inimestel on tõenäolisemalt sissemaksetega pensioniplaan, näiteks *401 (k)* või *IRA*, erinevalt inimestest, kellel pole kindlaksmääratud hüvitisega pensioni.

Järgnevad on autori hinnangud analüüsi tulemustele:
- Lapsevanemate teadlikkuse tõstmine, kui tähtsat rolli omab lastega pere raha-asjade arutamine, suurendab tõenäosust, et lapsed otsustavad pensionipõlveks säästa. Väikesed sammud, näiteks valmisolek jagada teadmisi finantsteemadel, arutada nii perekonna rahaasju kui ka säästmise olulisust, õpetada lastele, kuidas saada hea krediidireiting ja teha lastele pangas hoiukonto, suurendavad tõenäosust, et lapsed säästavad vanaduspõlveks.
- Inimestele laialdasemalt finantsteadmiste andmine, suurendab tõenäosust otsustada säästa pensionipõlveks.
- Inimeste julgustamine arutada töökaaslaste ja sõpradega raha-asju, suurendab pensioniks säästmise tõenäosust.
- Inimeste õpetamine, kuidas teha pikemaid finantsplaane (vähemalt 2 aastat), suurendab tõenäosust säästa pensionipõlveks.
- Inimestele kannatlikkuse õpetamine, suurendab tõenäosust säästa pensionipõlveks.
- Inimeste koolitamine enesekontrolli kohta, suurendab tõenäosust säästa pensionipõlveks.

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APPENDICES

Appendix 1. Logit final model

Model 24: Logit, using observations 1-3244 (n = 3146)
Missing or incomplete observations dropped: 98
Dependent variable: Account
QML standard errors

	Coefficient	Std. Error	z	p-value	
const	−6.14405	0.609558	−10.08	<0.0001	***
Gender	0.313157	0.105826	2.959	0.0031	***
Age_2	1.21168	0.334875	3.618	0.0003	***
Age_3	1.30397	0.347162	3.756	0.0002	***
Age_4	1.75414	0.344934	5.085	<0.0001	***
Age_5	1.76323	0.365055	4.830	<0.0001	***
Age_6	1.82160	0.371665	4.901	<0.0001	***
Age_7	1.68559	0.405537	4.156	<0.0001	***
Age_8	1.36155	0.403796	3.372	0.0007	***
Ethnicity_black	−0.429225	0.147573	−2.909	0.0036	***
Ethnicity_other	−0.290549	0.232886	−1.248	0.2122	
Ethnicity_hispanic	−0.223860	0.159059	−1.407	0.1593	
Education_secondary	0.758978	0.247842	3.062	0.0022	***
Education_college	0.734299	0.246847	2.975	0.0029	***
Education_bachelor	1.27173	0.265242	4.795	<0.0001	***
Education_graduate	1.05828	0.272425	3.885	0.0001	***
Income_2	0.664114	0.208555	3.184	0.0015	***
Income_3	0.705890	0.205900	3.428	0.0006	***
Income_4	0.854571	0.218295	3.915	<0.0001	***
Income_5	0.816892	0.220699	3.701	0.0002	***
Income_6	1.58335	0.221392	7.152	<0.0001	***
Income_7	1.40227	0.217052	6.461	<0.0001	***
Income_8	1.58956	0.224811	7.071	<0.0001	***
Income_9	1.87786	0.264424	7.102	<0.0001	***
Family_size	−0.115093	0.0509207	−2.260	0.0238	**
Relationship_widowed	0.172199	0.190781	0.9026	0.3667	
Relationship_separated	−0.345715	0.147186	−2.349	0.0188	**
Relationship_not_married	−0.146873	0.155857	−0.9424	0.3460	
Relationship_partner	0.107772	0.241846	0.4456	0.6559	

Appendix 1 Continued

	Coefficient	Std. Error	z	p-value	
Employment_status_1	−1.59484	0.195823	−8.144	<0.0001	***
Employment_status_3	−0.539591	0.224499	−2.404	0.0162	**
Employment_status_4	−1.19608	0.249260	−4.799	<0.0001	***
Employment_status_5	−0.810175	0.444078	−1.824	0.0681	*
Employment_status_6	−1.74363	0.244366	−7.135	<0.0001	***
Employment_status_7	−1.18151	0.299871	−3.940	<0.0001	***
Employment_status_8	−1.34964	0.189146	−7.135	<0.0001	***
Financial_well_being	0.0218676	0.00417454	5.238	<0.0001	***
DB_pension	0.314137	0.109268	2.875	0.0040	***
Financial_knowledge	0.0211906	0.00300938	7.041	<0.0001	***
Self_control	0.00773256	0.00405594	1.906	0.0566	*
Tendency_to_wait	0.423949	0.0982222	4.316	<0.0001	***
Time_horizon	0.405866	0.103392	3.926	<0.0001	***
Parental_influence	0.108028	0.0368275	2.933	0.0034	***
Peer_advice	0.206797	0.114365	1.808	0.0706	*

Mean dependent var	0.618881	S.D. dependent var	0.485739
McFadden R-squared	0.325732	Adjusted R-squared	0.304688
Log-likelihood	−1409.800	Akaike criterion	2907.599
Schwarz criterion	3173.970	Hannan-Quinn	3003.181

Number of cases 'correctly predicted' = 2508 (79.7%)
f(beta'x) at mean of independent vars = 0.486
Likelihood ratio test: Chi-square(43) = 1362.12 [0.0000]

		Predicted	
		0	1
Actual	0	801	398
	1	240	1707

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