Universidade do Minho
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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

The impact of financial literacy and personality traits on financial behaviour

Resumo

O objetivo deste estudo é analisar a relação entre literacia financeira, traços de personalidade e comportamento financeiro. Este visa contribuir para a literatura e ajudar, por exemplo, a preencher a lacuna de algumas relações ainda não estudadas, como é o caso de literacia financeira com investimentos socialmente responsáveis. Os dados necessários para o procedimento foram coletados através de um questionário online partilhado entre pessoas que falam o português e maiores de 18 anos. A analise econométrica passa pelo uso de regressões OLS, Probit e Ordered Probit aplicadas a variáveis dependentes que respeitam o horizonte temporal, a frequência de transação, produtos financeiros que são/foram possuídos, ser atualmente um investidor, investimentos socialmente responsáveis, e diversificação internacional.

As conclusões conseguidas passam por a Extroversão ser um traço voltado para o futuro (provável de ter plano de poupança reforma e fundo de pensões), contrariamente ao traço relacionado com Abertura para experiências, que é mais provável de ter seguros. A Amabilidade e Neuroticismo são dois traços que trazem claramente um impacto negativo para o comportamento financeiro, principalmente na participação no mercado de valores mobiliários. E por fim, Conscienciosidade sendo um traço cuidadoso no que respeita risco financeiro, e preventivo de ambos os tempos, do futuro e do presente (provável de ter títulos do governo, depósitos estruturados e planos de poupança reforma). No que diz respeito à literacia financeira, esta tem um maior impacto e em mais dimensões do comportamento financeiro em estudo que os traços de personalidade. Desta forma, o estudo conclui que deve-se apostar e promover mais formações na área financeira para os indivíduos, e que estas comecem desde tenra idade. Assim, pode-se alcançar um melhor comportamento financeira na população em geral.

Palavras-chave: Comportamento financeiro, literacia financeira, traços de personalidade

The impact of financial literacy and personality traits on financial behaviour

Abstract

The goal of this study is to analyse the relationships between personality traits, financial literacy, and financial behaviour. It aims to contribute to literature and help, for example, to fill the gap arising from some relationships that have not been studied, such as between financial literacy and socially responsible investments. Through an online survey shared between Portuguese speakers aged 18 and older, it was possible to obtain the data needed. The econometric analysis involves the use of OLS, Probit and Ordered Probit regressions applied to the dependent variables that relate to time horizon, trading frequency, financial products hold/held, being a current investor, socially responsible investments, and international diversification.

The conclusions suggest that extraversion is a forward-looking trait (since this had a positive relationship with retirement savings plan and pension funds), contrary to openness, where the likelihood of having insurance is higher. Agreeableness and neuroticism have a negative impact on financial behaviour, namely in terms of securities market participation. And, lastly, conscientiousness is regarded as trait that is cautious of financial risk-taking, and preventive about both the present (more likely to hold government bonds and structured deposits) and the future (having retirement savings plan). Regarding financial literacy, it has higher impact on more dimensions of financial behaviour than the personality traits do. This way, this study concludes that one should invest in and promote more financial training for individuals, and that it must start at a younger age. Better financial behaviour in the general population can thereby be achieved.

Keywords: Financial behaviour, financial literacy, personality traits

Contents

Abbreviations

ALP- American Life Panel

B5 – Big-Five Model

BNT – Berlin Numeracy Test

CMVM – Comissão do Mercado de Valores Mobiliários

DHS - De Nederlandsche Household Survey

ELSA – English Longitudinal Study on Aging

NEO-PI-R – Revised NEO Personality Inventory

NFCS – National Financial Capability Study

PISA – Programme for International Student Assessment

SHARE – Survey of Health, Aging and Retirement

SRI – Socially Responsible Investments

Tables

1. Introduction

Behavioural finance introduces broader factors to justify financial behaviour differently from traditional finance (Muhammad, 2009). Financial literacy appears as a crucial factor to do so. Literature found that higher levels of financial literacy lead to better chances of having a better financial behaviour (Fachrudin & Fachrudin, 2016; Grable, 2000). However, financial literacy is not enough. Authors like Nicholson, Soane, Fenton-O'Creeevy, & Willman (2005), Mayfield, Perdue, & Wooten (2008), Nga & Yien (2013), and Panichk & Mahmood (2015) defend the importance of personality traits in the financial behaviour explanation.

This study has as main goal to analyse the influence that individuals' financial literacy and personality traits have on financial behaviour. But why is this theme so important? The financial world has gone through a big evolution, becoming more and more complex and diversified. A simple example is given by Hogarth & Hilgert (2002) when referring to a financial institution. Erstwhile the act of going to a bank to open an account, and to make a deposit, was easy. Nowadays, when individuals go to a bank with the same intentions of opening an account, they are faced with a wide range of various products, each of them with distinct characteristics, such as different taxes. To preserve their well-being, individuals must raise their level of financial literacy and improve their financial behaviour. Additionally, individuals are required to make financial decisions at an earlier age (Lusardi, Mitchell, & Curto, 2010). So, it is not only asked of them to follow this evolution, it is also required that they do it from a younger age. So, more training is needed at earlier ages. If individuals' level of financial literacy does not keep up with the evolution of financial markets, then it is more likely that individuals will make poorer decisions, which will be reflected in lower wealth (e.g., accepting a higher interest rate when asking for financing, when it is possible to have access to a lower one).

Nevertheless, it was referred previously that individuals act in unique ways, which are the reflection of different preferences and ways of thinking. These varied behaviours are reflected in the financial world, and it is important that people are aware of it. In case of financial advisors, they could advise more effectively and instantly if they

had guidelines indicating easily clients' preferences and choices, considering their personality. The more complete the investor's profile, the better are the investments and strategies proposed by the financial advisor to that specific client.

Despite many studies confirming that financial literacy and personality traits are indeed related with financial behaviour (Grable, 2000; Nicholson, Soane, Fenton-O'Creeevy, & Willman, 2005; Mayfield, Perdue, & Wooten, 2008; Nga & Yien, 2013; Panichk & Mahmood, 2015; Fachrudin & Fachrudin, 2016), not all dimensions of financial behaviour are studied as much (for example the relationship between financial literacy and socially responsible investments (sri), and between conscientiousness and home bias). Some other relationships do not prove consensus in their conclusions, for example Duran, Newby, & Sanghani (2008) affirm that extraversion has a negative relationship with trading frequency, and Tauni, et al. (2017) affirm the opposite. This study appears to help to fill these gaps in literature.

The goal of this study is to analyse the impact that financial literacy and personality traits have on financial behaviour. To achieve it, this work proceeds with data collected from an online survey, addressed to Portuguese-speakers aged eighteen years old and older. OLS, Probit and Ordered Probit regressions are applied to the data to explore the relationships that financial literacy, personality traits and sources of knowledge variables have in markets' participation, in the type of products preferred, in time horizon, trading frequency, sri and in international diversification.

This study concludes that financial literacy has a higher impact on more financial behaviour dimensions, than personality traits do. Specifically, it has a positive impact on the securities market entrance, on sri, on international diversification, and on the holding of house loans, stock, corporate bonds and commercial paper, crowdfunding investments, and digital coins. It also has a negative relationship with trading frequency and time horizon, which reflects a better financial behaviour (Barber & Odean, 2000; 2001). On the other hand, personality traits vary more on the impact that they have with each of the financial behaviour dimensions. Either way, conscientiousness has a positive impact on financial literacy, so it may affect indirectly financial behaviour in the same dimensions as financial literacy.

The current section, section 1, provides a brief introduction to the whole work. It is followed by section 2 dedicated to the existing studies in literature about the theme. Section 3 describes the study's hypothesis, the methods used for data collection and statistical analysis. The data analysis and description are to be found in section 4, which is followed by section 5 presenting the results and discussion. Lastly, section 6 comprises the main conclusions achieved with the study.

2. Literature Review

Financial behaviour has often been the object of analysis. However, its definition is rarely clarified. It becomes hard to do so, since psychologists have not found a consensual concept for behaviour itself. Bergner (2011) defines it as an observable action (Bergner, 2011). From here, financial behaviour can be understood as choices and plans that individuals make in terms of financial management (Titus, Fanslow, & Hira, 1989; Zaimah, et al., 2013). Ozer & Mutlu (2019) break it down as individuals' actions in relation to their expenditures, savings, investments, and financial planning.

The big question surrounding the theme is: how can financial behaviour be explained? Traditional finance produced countless models and theories based on consumers' rationality (Muhammad, 2009). However, these theories have many restrictions, and more importantly, they do not predict individuals' behaviour well enough due to inconsistencies (Zaleskiewicz, 2015). Behavioural finance justifies these flaws by presenting the normal individual (Statman, 2008; Zaleskiewicz, 2015). The main characteristic of these individuals is that they are also influenced by psychological factors, instead of only financial and economic variables such as inflation, exchange rates, expectations (Zaleskiewicz, 2015). Within the psychological factors, empirical studies found a strong link between financial behaviour and financial literacy, individuals' personality, and sociodemographic factors (Titus, Fanslow, & Hira, 1989; Dolan, 2013). Drawing on this, it appears that financial behaviour can be influenced by financial literacy, numeracy and psychological, cultural, socialization, demographic factors, etc.

2.1. Financial Literacy

This section is devoted to financial literacy. Firstly, it presents some concepts, as well as measures used in the literature (sections 2.1.1 and 2.1.2. respectively). Next in this section (section 2.1.3.), the financial literacy predictors are examined, as well as the way that they affect financial behaviour. Lastly, a subsection about numeracy is included (section 2.1.4.).

2.1.1. The concept of financial literacy

The concept of financial literacy varies depending on the author who is using it and its purpose. For example, some authors define financial literacy only by the basic

knowledge needed to make basic choices, such as budget creation, to have savings and to invest (Fernandes, Lynch Jr., & Netemeyer, 2014). However, some other authors add to it the knowledge people have, to see how economic factors affect their choices (Remund, 2010; Lusardi & Mitchell, 2014).

In 1992, financial literacy was defined by the National Foundation for Educational Research, as the ability people have to make informed and productive decisions at financial level (Tippet & Kluvers, 2007). Later in 2003, Moore affirmed that financial literacy has to do with individuals having financial knowledge and knowing how to use it (Fernandes D. T., 2011).

Financial literacy is also distinguished by the ability that people have to understand economic information and use it in their favour. This way, they can make better decisions about financial planning, debt, wealth accumulation and pensions (Lusardi & Mitchell, 2014). It is similarly described as a measure to gauge someone's level of knowledge about central financial concepts, and the ability, and confidence to manage their personal finances (Fernandes, Lynch Jr., & Netemeyer, 2014).

Kadoya & Khan (2020) define it as the knowledge about the money's value and maximisation of the benefits it can bring. Nevertheless, the different definitions of financial literacy have some similarities. So, OECD (2020) created a general concept well-marked as "a combination of awareness, knowledge, skills, attitudes and behaviour necessary to make sound financial decisions and ultimately achieve individual financial well-being".

2.1.2. The measurement of financial literacy

Regarding the way authors evaluate financial literacy, an interesting approach is provided by Rooji, Lusardi, & Alessie (2011). These authors divided financial literacy into two levels: the basic and the advanced levels. The basic level matches a lower level of financial literacy, assessed with simple questions about the financial area (such as questions about interest rates, and inflation). The advanced level corresponds to a higher level of financial literacy, and the questions used to estimate it are more complex (questions which encompass matters like the relation between bond prices and interest rates, and the knowledge about investment and portfolio choices can be perceived). This questionnaire was done with the aim of improving and create an efficient measure of finan-

cial literacy. However, it can be a little tiresome to answer due to its size. Plus, this questionnaire was built over two more questionnaires created by the same author, the Big Three and the Big Five that are equally good and more often used all over the world.

Regarding the Big Three, it was created by Annamaria Lusardi, and Olivia Mitchell and its importance comes with its use in the U.S. Health and Retirement Study (HRS) [1]. It is composed of three questions which evaluate participants' knowledge of interest rates, inflation, and risk diversification (Lusardi & Mitchell, 2011). Nevertheless, there is also the Big Five, which is an extension of Big Three. It was used in two waves (2009 and 2012) of the National Financial Capability Study (NFCS)[2], and it adds two more questions about bond pricing and mortgages. Despite the Big Three being more used, in this study, the base of the financial literacy section is the Big Five by Annamaria Lusardi and Olivia Mitchell. Its description can be seen in Lachance's (2014) work.

2.1.3. The influence of financial literacy on financial behaviour

According to previous studies, financial literacy is dependent on the individual's demographic characteristics (Ansong & Gyensare, 2012). It was found that the level of financial literacy varies according to education and numeracy levels (Lusardi A. , 2012), experience, age, income, and gender (Yoong,2011).

On the other hand, financial literacy is also seen as an influential variable. Some studies concluded that there is a positive relationship between financial literacy and financial behaviour (Fachrudin & Fachrudin, 2016; Grable, 2000).

With a sample of 1,508 individuals belonging to the De Nederlandsche Household Survey (DHS), Rooij, Lusardi, & Alessie (2011) analysed the impact that financial literacy has on financial behaviour, namely on stock market participation They found that besides worsening financial behaviour in general, as would be the case in terms of portfolio diversification (Abreu & Mendes, 2010), lower levels of financial literacy may lead individuals to avoid their involvement in the stock market. Xia, Wang, & Li (2014) confirm these results by concluding that a higher level of financial literacy leads to a

[1] Health and Retirement Study (HRS) is a longitudinal panel study that provides researchers with data from diversified themes within health and economic fields linked to ageing. Its sample is composed of American individuals aged fifty and over. This study is in alignment with ELSA, in England, and with SHARE, in Europe.

[2] A large-scale project that has been developed through the years in America, and which measures the Americans' financial capability.

higher rate of participation in the same market. In a study carried out with the Swedish population, Almenberg & Widmark (2011) achieved the same output and ascertained that those individuals with higher levels of financial literacy were the ones with mortgages, long-term savings, and online banking, regardless of age. Nevertheless, the influence of financial literature is not only seen in the stock market. There is evidence suggesting that higher levels of financial literacy make it easier for individuals to enter the derivatives market. Participation in this market increases about 58% with the unitary increase of financial literacy (Hsiao & Tsai, 2018).

In addition, it is known that people usually invest more in domestic markets than in international ones. French & Poterba (1991) tried to document the reasons why it happens. The two main reasons they found were institutional factors, and the investors' behaviour, namely their perception of risk and expected returns. However, international diversification benefits are known all over the financial world (French & Poterba, 1991). Plus, knowing more about international markets makes individuals more comfortable with them (Graham, Harvey, & Huang, 2009).

Before talking about trading frequency, it is important to refer that firstly Barber and Odean (Barber & Odean, 2000; Barber & Odean, 2001) distinguish between two types of investors, the overconfidence investors, who believe their financial knowledge is higher than it actually is, and the rational investor, who possess superior information. Following these authors, overconfidence individuals trade more often, and have lower expected utility, than rational investors. Indeed, the authors in question affirm that overconfident investors "will trade to their detriment" (Barber & Odean, 2000, p. 774). However, for rational investors the situation is not the same since these "only trade and only purchase information when doing so increases their expected utility" (Barber & Odean, 2001, p. 263). A link between rational individuals and those who have higher levels of financial literacy is thus established.

2.1.4. Numeracy

Just as financial literacy, numeracy is also an important skill, for example to have a bank account, and to make a mobile phone contract. Despite not being the same as financial literacy, it is strongly related with it (Skagerlund, Lind, Strömbäck, Tinghög, & Västfjäll, 2018). The difference between these two terms is that numeracy refers to cog-

nition ability to do simple computations, which do not have to be necessarily in the finance field (Peters, et al., 2006; Skagerlund, Lind, Strömbäck, Tinghög, & Västfjäll, 2018). This way, and considering the purpose of this study, it is also important to mention the existence of studies which correlate numeracy and financial behaviour (Calvet, Campbell, & Sodini, 2007; Almenberg & Widmark, 2011; Lusardi A. , 2012).

Numeracy is defined in Peters, et al., 2006, as "the ability to process basic probability and numerical concepts" (p. 407) and execute simple computations (Almenberg & Widmark, 2011). Peters, et al. (2006) concluded as well that, despite the need to develop techniques of measurement, numeracy has a significant relationship with the process of decision-making. Despite not being the focus of this study, it is important to refer that the differences in numeracy levels, presented in some studies, can be justified by demographic variables, such as gender, age, and ethnicity (Lusardi A. , 2012).

To measure the level of numeracy of a group of people aged fifty and over, the 2004 HRS used a simple inquiry form of three questions. It included a percentage calculation, a simple division in the context of a lottery, and a compound interest. The hit rate only reached 18%, corresponding to the question with less correct answers (Lusardi A. , 2012). The use of this questionnaire spread, and it was used by Lusardi & Mitchell (2007) and by the English Longitudinal Study on Aging (ELSA)[3]. On the ELSA questionnaire there were six questions in the numeracy section, although the participants only answered a maximum of five questions (Banks & Oldfield, 2007). According to Lusardi A. (2012), concerning the levels of numeracy in Europe, the results presented by many studies, which used this questionnaire, are in accordance with the data from OECD'S Programme for International Student Assessment (PISA)[4]. Despite this questionnaire being the one to be used in this study, it is relevant to refer one more questionnaire that can be used to measure numeracy. It was created by Michael Dewey and Martin Prince to measure numeracy, and it can be found in the study of Christelis, Jappelli, & Padula (2010). The questionnaire is composed of four questions which assess participants' numeracy on a

[3] ELSA (English Longitudinal Study of Ageing) is a longitudinal panel study that provides data from diversified themes. Its sample is composed of English participants aged fifty and over. It started in 2002 and nowadays there is an eighth wave being collected. This study is in alignment with the well-known HRS, in America, and SHARE, in Europe.

[4] PISA is a global network that focus on students' performance evaluation. It was first applied in 2000 and is repeated every two years. It intends to improve educational policies and results.

scale from 1 to 5 points (more details in Christelis, Jappelli, & Padula (2010)). Its relevance comes from its application to SHARE[5] respondents.

Redirecting this topic to the impact of numeracy on financial behaviour, it was found that people with a higher level of numeracy are more financially active and show a better financial behaviour than those who have a lower level (Lusardi A. , 2012). In fact, Sweden studies from Almenberg & Widmark (2011) and Calvet, Campbell, & Sodini (2007) agreed that, just like in financial literature, people with a lower level of numeracy are less likely to participate in asset markets, to have long-term savings and mortgages, and tend to have a worse performance in managing their cash flows. This way, a low level of numeracy concurs to a lower level of financial literacy, which will contribute to a worse financial behaviour (lack of or inefficient participation in assets markets, worse performance in managing cash-flows…), aligning with the results seen previously.

2.2. Personality

Personality is defined as the set of psychological characteristics (emotional, motivational, and cognitive) which influence individuals' response to external stimuli, and which make them unique (Dole & Schroeder, 2001). The concept of personality which will be considered in this study is "relatively enduring styles of thinking, feeling, and acting that characterize an individual" (Costa, McCrae, & Kay, 1995, p. 124). Numerous studies were done with the goal of tracing investors' profile, at personality level. Their aim was to find out if a determined trait of personality is constantly following certain standard choices (such as in terms of time horizon (Mayfield, Perdue, & Wooten, 2008) and risk aversion (Oehler, Wendt, Wedlich, & Horn, 2018)). The results have been quite positive in the sense that, not only does personality have a significant relationship with investments (Mayfield, Perdue, & Wooten, 2008; Oehler, Wendt, Wedlich, & Horn, 2018; Nicholson, Soane, Fenton-O'Creeevy, & Willman, 2005), but it also seems to be one of the strongest psychological factors influencing them (Nicholson, Soane, Fenton-O'Creeevy, & Willman, 2005).

[5] SHARE (Survey of Health, Aging and Retirement) is a study that provides multidisciplinary and cross-national panel European data. Its sample is composed of individuals from 18 countries aged fifty and over, focusing on economic, social and health areas. Nowadays, this study covers 27 European countries and Israel. Its quality data and alignment with relevant surveys performed in UK (ELSA) and USA (HRS) have made it important among the scientific community (Börsch-Supan, et al., 2013).

The far more used taxonomy is The Big-Five model (B5). This model is based on five types of personality: Extraversion, Openness, Agreeableness, Conscientiousness and Neuroticism (McCrae & Costa, A Five-Factor Theory of Personality, 1999). However, there are some attempts of creating new models or expanding this one, such as the HEXACO model. The HEXACO model is a six-factor model, which differs from B5 with the addition of one factor, Honesty-Humility. Additionally, it records some differences on neuroticism and agreeableness definitions (Lee & Ashton, 2004). It is important to mention that despite being of major consensus, not all authors agree with the Big-Five model validity, an example of it is seen in Block (1995). In his work, the author makes his dissatisfaction with the B5 clear from the beginning and reveals his lack of understanding of why most of the authors accepted the model so easily, as it is not that perfect. However, from the point of view of the present study, the B5 may not be ideal, but it will be used as a measure of participants' personality traits. The acceptance of this model, in this study, comes from the following idea. The scientific world is always changing and finding new results and, despite not being the most effective or ideal model, it is useful enough nowadays to have a common measure in most studies, so that they can be minimally comparable. Thus, when competing with the remaining existent taxonomies, this one is the most preferable for this study. In future studies, other models or expansions may come up, such as the HEXACO model case, and the intention is to strive for perfection, but until then, it should not be an obstacle for the scientific results being found or compared. Also, Mayfield, Perdue, & Wooten (2008) ensured the validity of the model with the support of previous analyses within this theme.

When talking about the B5, a name that comes up at once is the Revised NEO Personality Inventory (NEO-PI-R)[6]. Paul Costa and Robert McCrae created this personality inventory with the aim of measuring someone's personality traits. It was successful and is now the main and more validated way to do so. It is composed of 240 items corresponding to thirty traits and which redirect us to the five traits of personality that comprise the B5. Plus, there is also a version that is more assessable for teenagers called NEO-PI-3. All versions of the NEO scales were introduced together with their shortened

[6] As the name suggests, the NEO-PI-R is an update of the Neo Personality Inventory also known as NEO-PI (Costa, McCrae, & Kay, 1995), which is the original personality inventory and the first to be created by Paul Costa and Robert McCrae.

version, namely NEO-FFI-R (shortened version of NEO-PI-R) and NEO-FFI-3 (shortened version of NEO-PI-3). However, there were some other attempts to create variations from these scales (Costa, McCrae, & Kay, 1995; Costa Jr & McCcrae, 2014).

Regarding the existent data and conclusions, most of the literature have concluded that personality traits are somehow important to predict financial behaviour. However, the authors haven not come to a consensus of their impact. The paths they follow and the dimensions of financial behaviour they studied are not always the same and the results change with it. The disagreement between authors comes from the existence of five personalities traits (considering B5) and numerous conclusions about the significance of each of them to various dimensions of financial behaviour. However, and despite this lack of consensus, most authors agree with the importance of personality traits to predict financial behaviour. Ozer & Mutlu (2019) concluded from a sample of 1347 Turk individuals that agreeableness, conscientiousness, and openness had a significant relationship with financial behaviour. The authors highlighted how important it is to financial advisors and institutions to find a consensus on the relationship between personality and financial behaviour.

Nga & Yien (2013) used a sample of 314 undergraduate Malaysian students from a business school to analyse the impact their personality traits (using B5) had on financial behaviour. Through three financial decision-making dimensions (cognitive bias, sri, and risk aversion) the authors found that, indeed, personality traits are significant variables when predicting financial behaviour, although they can have different impacts depending on the decision-making dimension being considered. It does not exclude the fact that the authors found non-significant relationships between certain traits and dimensions. More details about their results will be seen further on.

Many other authors found different relationships between the B5 and investment choices. Tauni, et al. (2017) obtained a positive result when studying the relationship between B5 and the trading frequency of the Chinese stock market investors. Hamza & Arif (2019) proved a significant and direct relationship between the B5 and investment dimensions. In the same study, this very link was also confirmed through the analysis of financial literacy, which proved to be a significant relationship, leading to similar outputs. Through risk-taking analysis, and with a sample of students and teachers

of a business school in Kazakhstan, Pak & Mahmood (2015) observed comparable outcomes, namely that personality traits indirectly influenced investment decisions (in terms of stock, securities, and bonds). With a sample from Texas, there is a very cited study in which the authors state that, indeed, personality traits influence financial behaviour. However, it is necessary to use other variables, such as education, to help the prediction of it (Mayfield, Perdue, & Wooten, 2008). Nevertheless, most of these studies, which link the B5 with financial behaviour, tend to conclude that their relationship is significant, but most of the times the authors mean that most personality traits have an impact on financial behaviour. It means that most of the times the authors find one or two types of personalities which are not significant to financial behaviour (Ozer & Mutlu, 2019). These variables are usually different, depending on the sample and method used by the author(s).

2.2.1. Extraversion

Extraversion refers to people who are more interactive, expressive, sociable, and talkative (Lounsbury, Smith, Jacob, Leong, & Gibson, 2009). When this trait is more prominent, people tend to be more sensation-seeking, socially dominant, and ambitious (Bozionelos, 2004). These characteristics are usual in people who are more talk active with their peers and tend to see them as a source of information (Hong, Kubik, & Stein, 2004).

According to Hong, Kubik, & Stein (2004), while talking with their peers, people will be sharing ideas, learning, and getting more attracted to financial markets and their returns, encouraging them to participate in it. In addition, extraverted individuals tend to be overconfident of their knowledge and skills (Oehler, Wendt, Wedlich, & Horn, 2018). It was seen previously that there are authors who suggest that investors with high confidence of their skills tend to trade more frequently, leading them to have losses and decrease their expected utility (Barber & Odean, 2000). It is also in line with Tauni, et al. (2017), who suggest that extraverted people trade more frequently. In contrast with these findings of sociable investors trading frequently, Duran, Newby, & Sanghani (2008) found a negative relationship between extraversion and trading frequency in a sample composed of active Australian investors.

Regarding the securities invested, extraverted are more likely to invest in stocks and derivatives since, according to Wong & Carducci (2013), extraverted tend to have a positive relationship with risk tolerance. Stock and derivatives have a higher level of risk than deposits, so it is more likely that extraverted individuals focus their portfolio on these types of securities.

2.2.2. Conscientiousness

Within a social perspective, the Big Five model presents Conscientiousness. It is mainly defined by achievement striving (Costa Jr, McCrae, & Dye, 1991). To characterize it better, MacCann, Duckworth, & Roberts (2009) put together some empirical research involving the structure of conscientiousness. They verified that there are characteristics of this trait which are common in all analysed studies, namely orderliness, industriousness and responsibility or reliability. Thus, control, decisiveness and conventionality were also accentuated characteristics, although these were not presented in all studies. People with this type of personality are organized, responsible, and efficient (Tauni, et al., 2017). Due to their focus on achieving the best results and their sense of responsibility (Costa Jr, McCrae, & Dye, 1991), it is expected that people with this type of personality "fight" and get themselves informed the best way possible. Arduous work is known for bringing good results, and within this theme, these better results will bring an increase in trading (Tauni, et al., 2017).

According to Filbeck, Hatfield, & Horvath (2005), individuals who are organized and want to have control of their lives (such as conscientiousness people), tend to accept a greater variance of risk than others. It can, thus, be presupposed that, in terms of investment decisions, these people will not consider mainly the level of risk, but the relationship between every variable in question and the best strategy. It can be assumed that the same is verified in terms of home bias, since the strategy is more important than the country in which they are investing. It can be assumed that this trait will not show a significant impact on home bias, on the type of investment made, and on participation in the market (since according to this trait of personality, the person is more likely to participate in the market if the level of financial literacy is good enough to do so). Adittionally, Hamza & Arif (2019) confirmed that this type of personality is non-significant when it comes to investment decisions. For their part, Nga & Yien (2013)

found that conscientiousness has a significant and positive impact on risk aversion, which can bring, once more, a positive impact in terms of market participation, and in leading individuals to invest further in complex or riskier assets.

2.2.3. Neuroticism

Neuroticism, referred by many researchers as the opposite point in the scale of emotional stability, is simply characterised by a strong tendency to experience negative emotional states, such as anger, guilt, and sadness (McCrae & Costa Jr., 2008). The very name comes from neurosis, which is associated to disturbance in the nervous system and a mental illness linked with distress (Soto & John, 2017).

Depression is always characterised by the lack of motivation people feel and by gloom. It is logical that this negativity is likely to provoke a negative relationship with financial behaviour and investment decisions (Hamza & Arif, 2019; Chitra & Sreedevi, 2011). However, once more, there is no consensus on the impact of this type of personality on financial behaviour (Nga & Yien, 2013; Ozer & Mutlu, 2019). Aiming to find a relationship between personality traits and financial behaviour in a financial world with growing complexity, Ozer & Mutlu (2019) hypothesised a negative relationship between neuroticism and financial behaviour. However, their sample of 1347 individuals from Turkey did not confirm this hypothesis. The authors concluded that this type of personality is non-significant to financial behaviour. Moreover, with a Malaysian sample, Nga & Yien (2013) also concluded that this type of personality is non-significant to risk aversion and sri.

In a study where the authors analysed the preference between equity, derivatives, and commodities, of each type of personality, it was found that emotional stability is statistically significant when talking about equity and derivatives (Chitra & Sreedevi, 2011). It means that when choosing between taking more or taking less risk, this type of personality preferred to take more risk. It is expected that emotionally unstable individuals would behave in the opposite way and choose the less risky investment. Nevertheless, the non-participation in the market becomes a strong possibility since the individuals will not be facing any financial risk. It can also lead neurotics investors to invest only or mostly in the home market.

2.2.4. Agreeableness

Agreeableness is prominent in pacific, equable, pleasant, altruistic, warm, and cooperative people (Lounsbury, Smith, Jacob, Leong, & Gibson, 2009; Mayfield, Perdue, & Wooten, 2008). People with agreeableness as the most noticeable trait tend to help others without expecting anything in return (Akjtar, Muhammad, & Siddiqui, 2018).

Previous research shows that agreeableness has a positive impact on financial behaviour (Hamza & Arif, 2019; Ozer & Mutlu, 2019). Similarly to extraverted people, agreeable individuals find their source of financial information with their peers. Nevertheless, the difference between these two traits is that the extraverted collect information from their peers, and then have a critical opinion about what to do and what is best (Tauni, et al., 2017). Also, agreeable individuals are altruist, modest, and tend to value relationships and feelings more (Bozionelos, 2004).

Once more, the fact that they will be in touch with more information, will lead them to trade more frequently (Tauni, et al., 2017), even if it brings about more losses. On the other hand, some studies found that there is a negative relationship between the agreeableness trait and the stock market participation. It is the case of Akjtar, Muhammad, & Siddiqui (2018), and of Duran, Newby, & Sanghani, (2008), who found a negative relationship between agreeableness and the level of individual exposure to stock, and lastly of Brown & Taylor (2014), who justified this connection through the significant level of risk aversion linked with this personality trait.

Regarding home bias and the type of security invested, it has not been investigated yet. Due to the influence people with this type of personality can have, it would make sense if this trait of personality proved to be non-significant for these two subjects. However, this question will remain on standby until the results section of this study.

2.2.5. Openness

Openness is defined as the curiosity and willingness to accept new ideas, not only at the intellectual level, but it also includes the disposition to try new physical activities (Bartone, Eid, Johnsen, Laberg, & Snook, 2009). This B5 dimension is known for its balance between imagination and intellect (Mayfield, Perdue, & Wooten, 2008).

Ozer & Mutlu (2019) and Davey & George (2011) investigated the relationship between personality traits and financial behaviour. Their results were similar. Both studies showed that openness is statistically significant and has a positive effect on financial behaviour. However, financial behaviour has many dimensions (investments, savings, and consumption), so some studies can show different results (Hamza & Arif, 2019).

People with this type of personality tend to be sensation seeking and prefer complexity (Pak & Mahmood, 2015). Among the securities present in this study, derivatives are the most complex ones, so it can be hypothesised that people with this type of personality prefer derivatives to stocks and deposits. Additionally, it is important to refer that these individuals have a negative relationship with risk aversion, which helps to support this hypothesis (Tauni, et al., 2017). Although it is not always the case, people usually link international investments to a higher level of risk. Due to the negative relationship between openness and risk aversion, a hypothesis will be formulated that states that openness sets up a positive relationship with participation in the market and with investments in the international market.

Moreover, due to their ability to absorb new information, this type of individuals tend to trade more often to adapt their portfolio to changes in the market (Pak & Mahmood, 2015). Besides, to support this idea, Tauni, et al. (2017) affirmed that the more information individuals get, the more they trade.

2.3. Financial behaviour and sociodemographic variables

Some sociodemographic variables proved to be essential in these kind of studies both by influencing directly financial behaviour and by influencing it indirectly through financial literacy.

2.3.1. Gender

Regarding gender, the authors found a consensus on the differences it can provoke at financial behaviour level. The results demonstrate that men have a higher tolerance to risk than women (Slovic, 1966; Powell & Ansic, 1997; Larkin, Lucey, & Mulholland, 2013, Barber & Odean, 2001). It can be translated by women preferring to make a deposit and keep their savings in a bank, rather than investing in real state, as men would prefer to do (Parashar, 2010), and by men being more likely to participate in the stock market (Almenberg & Dreber, 2015).

In a study composed of 533 participants from ALP[7] waves, Yoong (2011) affirmed that women present lower levels of financial literacy. According to most of the literature about this theme, lower levels of financial literacy contribute to a worse financial behaviour. As pointed out in studies referred previously, there is here, once more, discrepancies between genders.

Walczak & Pieńkowska-Kamieniecka (2018) is a quite complete Polish study, which focuses on the relationship between gender and some specific points of financial behaviour. Their study led them to conclude that men are more active in financial markets than women, which also leads them to have more losses and less expected utility (Barber & Odean, 2001) Additionally, Graham, Harvey, & Huang (2009) affirmed that men tend to trade more frequently than women, due to their feeling of competence.

Men are also more likely to possess a credit card, to invest in production, trade and services and make profit in capital market instruments (i.e., stock and bonds). The only point where women presented bigger odds was on using banking services. Two of the possible explanations for these differences in both genders' behaviour come from the perception of knowledge, which is higher in men than women, and from the level of financial literacy, in which there are similar performances.

Regarding this subject, there are plenty of studies proving that women continue to have a lower level of financial literacy than men do, even after looking for some control variables. In addition, this data was confirmed to be persistent over a lifetime, in some cases (Lusardi, Mitchell, & Curto, 2010; Lusardi & Mitchell, 2008).

2.3.2. Age

With regard to the relationship between age and financial behaviour, evidence was found of older investors presenting weaker behavioural bias, showing this way a higher level of knowledge about financial issues, derived from experience. However, around the age of seventy investment skills run out abruptly, owing to cognition flaws caused by aging (Korniotis & Kumar, 2011).

Age is also strongly correlated with risk-taking. The existence of a non-linear relation between age and risk aversion was suggested. According to Riley Jr. & Chow

[7] The American Life Panel (ALP) is US representative panel, whose participants are 18 years and over. It helps researchers to fill in their research questionnaires by recruiting participants, so that they can have quality data. It is still on and so their data changes regularly.

(1992), risk aversion decreases with age until five years before retirement. From then on, it begins to increase, showing a reverse effect. Contrary to these findings, Grable, Lytton, O'Neill, Joo, & Klock (2006) concluded there was a concave relationship between risk tolerance and age. In other words, the risk aversion increases until a certain age, and from then on it starts to decrease as the years go by.

On the other hand, it was also found that age influences positively the net wealth invested in risky assets, which means that as investors get older, their risk tolerance increases (Wang & Sherman, 1997). In accordance with these results, Wang & Sherman (1997) affirmed that relative risk aversion decreases with age. In contrast, it is important to refer the existence of studies in which the relationship between the two variables in question is non-significant (Anbar & Eker, 2010).

2.3.3. Marital Status

Literature has also discussed another influencer in investment choice: marital status. Within this point researchers are once more divided, some believe that the risk tolerance is higher in single individuals than in married ones (Jianakoplos & Bernasek, 1998; Hallahan, Faff, & McKenzie, 2004), others affirm the opposite, which means married people are more risk tolerant than single individuals (Grable J. E., 2000). Lastly, some authors found that marital status is not statistically significant when it comes to investment choice (McInish, 1982) and risk aversion (Anbar & Eker, 2010). Nevertheless, Yao & Hanna (2005) found that single males are the ones who take more risk, followed by married males and single females, thus married females were the ones who demonstrated that they were less likely to take some risk.

Regarding portfolios, it was affirmed by Barber & Odean (2001) that despite the gender differences, marital status also influences financial behaviour. According to these researchers, women can influence their husbands' decisions and vice versa. This way, gender differences regarding the size of common stock portfolios is bigger when the individuals are married than when they are single. It is important to refer that the relationship is the same, women have worse financial behaviour, and namely, in this case, married and single women hold smaller portfolios than married and single men.

2.3.4. Education

The level of education is also an important factor within this theme. Previous studies concluded that the higher individuals' education level, the higher their tolerance

to risk (Haliassos & Bertaut, 1995; Sung, 1996; Grable J. E., 2000). In addition to previous results related with the level of education, it was found that risk aversion decreases with the increase of income (Hartog, Ferrer-i-Carbonell, & Jonker, 2002; Grable J. E., 2000). In the Graham, Harvey, & Huang (2009) study, the authors explored a little more about home bias. A relationship between education and home bias was found, namely a higher level of education leads to a higher international diversification. However, this is not a direct relationship since the results turned out to be non-significant. The conclusion was that education influences home bias through optimism, a variable not much studied, that authors found to be significative.

2.3.5. Income

Income is a variable which is also related with financial behaviour. Graham, Harvey, & Huang (2009) find that, similarly to education and gender, individuals' income influences their financial behaviour. According to the authors, the higher the income, the more competent the investors see themselves. This study focused on two dimensions, trading frequency, which is positively affected by income (the higher the income, the more competent the investors feel and the more they trade), and home bias, which is also positively affected by income (the higher the income, the more competent investors feel and the more they invest internationally).

In the study by Anbar & Eker (2010), the authors analysed the influence of income on risk aversion through more than one variable. Their results showed that students with higher income, students whose family's monthly income, and students whose family's total net assets were higher than the remaining, are less risk averse than their peers (this study has a sample constituted by university students aged from 21 to 30 years old).

3. Methodology

This section defines and explains in detail the hypotheses and methods used in this study. The first subsection (section 3.1.) concerns the hypothesis, which helps to understand the goal better; section 3.2. defines the method used to collect data and to do the regressions analysis; the detailed description of the survey's questions, as well as its justification are in section 3.3; the survey gave rise to some of the variables under study , which are presented in section 3.4, , and with them it was possible to build the models needed to study the hypotheses and achieve the study's goal, which can be found in section 3.5.

3.1. Hypotheses

The previous section (section 2) focused on the existence of a positive relationship between financial literacy and financial behaviour (Grable J. E., 2000; Abreu & Mendes, 2010; Almenberg & Widmark, 2011; Rooij, Lusardi, & Alessie, 2011; Xia, Wang, & Li, 2014; Fachrudin & Fachrudin, 2016; Hsiao & Tsai, 2018), which leads to the creation of the first hypothesis.

H1: Financial literacy has a positive influence on financial behaviour (namely in terms of market participation[8], international investments, and in trading frequency).

Since financial behaviour can be a more general concept, it is necessary to specify the relationships between financial literacy levels and the dimensions of financial behaviour under study. Authors such as Rooij, Lusardi, & Alessie (2011), and Xia, Wang, & Li (2014) analysed the relationship between financial literacy and stock market participation. They affirm that, in fact, higher levels of financial knowledge translate into greater rates of stock market participation. To reinforce the relationship, Almenberg & Widmark (2011) present the same findings and add that individuals who are more financially literate are the ones with mortgages and long-term savings. Plus, the effect that financial literacy has on market participation is also seen in the derivatives market, increasing the participation by about 58%. The impact of financial literacy is seen in the

[8] Note that market participation refers to the participation in the securities market.

derivatives markets, which are more complex and risky markets. Therefore, it can be expected that financial literacy has a positive impact on securities market in general.

H1.a): *Financial literacy has a positive impact on securities market participation.*

It was said earlier that one of the dimensions under study is trading frequency. Following Barber and Odean, they affirm that rational investors only trade if it increases their expected utility. On the other hand, overconfidence investors, which believe they are more capable than what they actually are, trade more often and have more losses, reflecting a worse financial behaviour (Barber & Odean, 2000; Barber & Odean, 2001). So, better financial behaviour is reflected in less trading frequency. Plus, financial literacy is known for improving financial behaviour (Grable J. E., 2000; Abreu & Mendes, 2010; Almenberg & Widmark, 2011; Rooij, Lusardi, & Alessie, 2011; Xia, Wang, & Li, 2014; Fachrudin & Fachrudin, 2016; Hsiao & Tsai, 2018), making this relationship more believabe.

H1.b): *Financial literacy has a negative impact on trading frequency.*

Regarding international diversification, French & Poterba (1991) concluded that one of the reasons that make people invest in domestic markets is their perception of risk, namely international markets are seen as having higher risks. However, Graham, Harvey, & Huang (2009) affirm that knowing more about the market in question makes individuals more comfortable about investing in it.

H1.c): *Financial literacy has a positive impact on international diversification.*

Earlier studies also highlight the importance that personality traits have on financial behaviour (Nga & Yien, 2013; Tauni, et al., 2017; Ozer & Mutlu, 2019). However, and differently from financial literacy, the number of studies which certify the consensus of a relationship between the traits and financial behaviour is not enough. Some of them point to a positive relationship between three traits (extraversion, conscientiousness, and openness) and financial behaviour (Hong, Kubik, & Stein, 2004; Davey & George, 2011; Filbeck, Hatfield, & Horvath, 2005; Nga & Yien, 2013; Ozer & Mutlu, 2019; Tauni, et al., 2017). However, there is an exception to the rule, namely these three traits are positively related with trading frequency (Tauni, et al., 2017), which is not good for financial behaviour, since it is highly associated with losses (Barber & Odean, 2000).

H2: Extraversion, conscientiousness and openness have a positive influence on financial behaviour (excepting for trading frequency in which have a negative influence).

Specifically, Hong, Kubik, & Stein (2004) affirm that extraverted individuals tend to participate more in markets due to their curiosity which is triggered in chats with friends.

H2.a): *Extraversion has a positive impact on market participation.*

Tauni, et al. (2017) maintain that extraverted individuals trade more often. This conclusion is confirmed by the overconfidence models (Odean, 1998; Gervais & Odean, 2001), since the reason it happens is due to overconfidence (Oehler, Wendt, Wedlich, & Horn, 2018). However, although overconfidence does lead to higher trading frequency, it also leads to losses, reflecting a worse financial behaviour.

H2.b): *Extraversion has a positive impact on trading frequency.*

Extraverted individuals are also associated with higher levels of risk tolerance (Wong & Carducci, 2013), which may lead them to prefer to hold stock and derivatives, instead of less risky products, such as deposits.

H2.c)*: Extraversion has a positive relationship with shareholding.*

H2.d): *Extraversion has a positive relationship with derivative (or other complex financial products) holding.*

Concerning conscientiousness, it is a highly organized and fighting trait (Tauni, et al., 2017). Its information seeking will lead individuals to trade more often (Tauni, et al., 2017).

H2.e): *Conscientiousness has a positive impact on trading frequency.*

Conscientiousness is also known for being a risk tolerant trait (Filbeck, Hatfield, & Horvath, 2005; Nga & Yien, 2013), which, once more, may lead to a higher market participation rate. Also, the risk tolerance suggests that individuals with this trait are more likely to hold stock.

H2.f): *Conscientiousness has a positive relationship with securities market participation.*

H2.g): *Conscientiousness has a positive relationship with shareholding.*

H2.h): *Conscientiousness has a positive relationship with derivative (or other complex financial products) holding.*

To support the idea previously referred, Tauni, et al. (2017) affirmed that this trait has a positive relationship with risk tolerance. This statement also suggests that open individuals have a positive impact on market participation, stock, and derivatives, and due to their adventurous spirit, with international diversification. Plus, openness is known for its sensation seeking and preference for complexity (Pak & Mahmood, 2015). This enables one to evaluate if indeed this trait has a preference for complex financial products.

H2.i): *Openness has a positive impact on securities market participation.*

H2.j): *Openness has a positive impact on shareholding.*

H2.k): *Openness has a positive impact on derivative (or other complex financial products) holding.*

H2.l): *Openness has a positive relationship with international diversification.*

Another characteristic of open individuals is their capability to absorb information, which according to Tauni, et al. (2017) leads to a higher trading frequency. To reinforce this idea, Pak & Mahmood (2015) maintain that this trait lead individuals to trade more to adapt their portfolio to market changes. Once more, information is the cause of a higher trading frequency.

H2.m): *Openness has a positive impact on trading frequency.*

Although some authors, namely Ozer & Mutlu (2019) and Hamza & Arif (2019), posit the existence of a positive relationship between agreeableness and financial behaviour, there is more empirical evidence affirming the contrary (Duran, Newby, & Sanghani, 2008; Brown & Taylor, 2014; Tauni, et al., 2017; Akjtar, Muhammad, & Siddiqui, 2018). Plus, this is not the only trait which is negatively related with financial behaviour, since neuroticism is also associated with this position (Chitra & Sreedevi, 2011; Hamza & Arif, 2019).

H3: Agreeableness and neuroticism have a negative impact on financial behaviour (apart from trading frequency, in the case of neuroticism).

Explicitly, agreeableness is like extraversion when it comes to the source of knowledge, which means that people with this trait tend to be in touch with more information, leading them to trade often (Tauni, et al., 2017).

H3.a): Agreeableness *has a positive impact on trading frequency.*

There is also evidence suggesting that this trait discourages individuals from participating in the market, specially to avoid stock (Duran, Newby, & Sanghani, 2008; Akjtar, Muhammad, & Siddiqui, 2018), due to their risk aversion (Brown & Taylor, 2014).

H3.b): *Agreeableness has a negative impact on securities market participation.*

H3.c) *Agreeableness has a negative impact on shareholding.*

Due to the social and altruist side of this trait (Mayfield, Perdue, & Wooten, 2008; Lounsbury, Smith, Jacob, Leong, & Gibson, 2009; Akjtar, Muhammad, & Siddiqui, 2018), it would be interesting to study the relationship between agreeableness and socially responsible funds.

H3.d): *Agreeableness has a positive impact on socially responsible funds.*

Concerning neuroticism, it is seen as the opposite point in a scale of emotional stability. Chitra & Sreedevi (2011) found that individuals with the characteristic of emotional stability tend to prefer riskier (such as derivatives) instead of less risky products. Taking this into account, it can be supposed that neurotics individuals would react in the opposite way, preferring less risky products. Also, it is logical that these individuals would be affected by home bias instead of having international diversification. However, there is an option which takes less risks than actually holding lower risk products or home markets, namely the option to not participate in the market.

H3.e): *Neuroticism has a negative relationship with securities market participation.*

H3.f): *Neuroticism has a negative relationship with complex financial products.*

H3.g): *Neuroticism has a negative relationship with international diversification.*

3.2. Method

To verify the hypotheses, and thereby reach the goal of the study, it is necessary to define the methods to be used, namely in terms of data collection and regression analysis.

Regarding the data collection, an attitude[9] and explanatory[10] survey designed by the author was built but based on the existing literature. The need to create a questionnaire comes from the need for a mix of questions from different studies (namely psychology and finance studies), so that the required data is collected. The advantages of this type of surveys are the low costs, the anonymous responses, the comfort people have in terms of time, and the extensive geographical area that it can cover (May, 2001). Also, the use of a questionnaire drops bias caused by the different words and intonation that may be unconsciously used in the interview case (May, 2001). Nevertheless, it is necessary to verify the replicability of the survey and ensure its validity and reliability (May, Social Research, 2011), which will be measured through a Cronbach's alpha test (Cronbach, 1951). It is important to keep in mind that this type of survey also brings some disadvantages, such as systematic bias [11]in data (May, 2001). However, considering its advantages, and the global pandemic situation, the online platform (self-completion questionnaire) is the best way to achieve the study's goal with a safer, comfortable, and more reliable approach. It is also important to refer that, despite being a probability sample[12], the universe understudy comprises residents in Portugal and Portuguese speakers aged 18 or older.

After the data collection comes the definition of the models and regressions (OLS, Probit, and Ordered Probit) for the statistical analysis. First, multiple linear regressions are the starting point of the statistical analysis. It defines the relationship between a dependent variable and the respective independent variables (Greene, 2012). However,

[9] Attitude surveys try to assess the relationship between attitudes and behaviours. Measuring the personality traits is an attitude survey (May, 2001).

[10] Usually, most surveys are explanatory since they try to understand the relationship between a certain behaviour and a certain variable. It is used to test hypotheses of existing theories (May, 2001).

[11] According to May (2001), since the survey is being applied to the general population and not only to a specific group (i.e., if it was only applied to current investors), the rate of return will be lower and "it is possible that only some groups will reply and not others. The replies might then be systematically biased towards one part of the population" (May, 2001, p. 97).

[12] In probability samples the participants are randomly selected (May, 2001).

to trace the impact's direction objectively, it makes six main assumptions, namely the relationships between the dependent and independent variables are linear (A1), the nonexistence of collinearity (A2), endogeneity (A3), autocorrelation (A4), and heteroscedasticity (A5), and the residuals follow a normal distribution (A6) (Greene, 2012). After testing and correcting the unverified assumptions, there are conditions to proceed to regressions.

Nevertheless, some dependent variables are binary, and the OLS regressions do not fit it. This way, in the case of binary variables as dependent variables a Probit regression will be applied, and to categorical dependent variables an extension of Probit, namely Ordered Probit regression, is applied. The Probit family of regressions use the cumulative distribution function of the standard normal distribution, and are usually compared with Logit regressions, which use the cumulative distribution function of the logistic distribution, and have equivalent results (May, 2001). However, despite being similar, the Probit regression accentuates its values at the end of each tail, meaning that the impact is seen more clearly (May, 2001). This way, and since the Logit and Probit regressions are of indifferent use, in this study Logit regressions are not part of the methods. Regarding the Probit regressions, the results presented will not be the coefficients, since these are not of easy interpretation and are not as useful as their marginal effect (Stock & Watson, 2007; Wooldridge, 2009). Instead, this study resorts to the marginal effects of the Probit and Ordered Probit regressions.

3.3. Questionnaire construction

The questionnaire aims for simplicity, clarity and tries not to be ambiguous. Its last version can be seen in Appendix 1. It begins with some background and simple instructions and follows the structure explained in section 3.3. 1. Once the questionnaire was drawn up, the first draft, meant to be the official survey, was sent to a small group of ten people to be evaluated. The choice of participants tried to be diversified in terms of age, education, and professional situation. The feedback was positive, and most participants affirmed that despite being a long questionnaire, it was easy to complete and was not boring. Some negative comments pertained to the existence of specific financial questions, being more targeted to current investors, and to some lack of instructions. These few negative comments were addressed by including the instructions that were

lacking, namely when the participants were not current investors, they should put themselves in an investor position, considering their own preferences (imagining a hypothetical scenario). Lastly, the specific questions on the questionnaire could not be changed since it is a questionnaire specifically for the financial area, and one of the goals is to ascertain the impact of different financial literacy levels on some financial behaviour dimensions. After these corrections, the final questionnaire, which can be seen in Appendix 1, was shared on the internet.

3.3.1. Survey structure

This section covers in detail the questionnaire structure, which can be seen in Appendix 1. It presents the purpose of each section and question, as well as the studies which they drew on.

- **Section I – Personal questions-** The section of personal questions assesses sociodemographic data and individuals' sources of knowledge. May (2001) refers that this section may be at the beginning of the inquiry or at the end of it. Both options have disadvantages, namely when it is at the beginning, it may discourage people, and adding it at the end of the questionnaire may threaten the analysis of a certain group because of its previous answer. Since both options have weaknesses, this section is at the beginning due to the size of the questionnaire which was taken into account. It means that there is no incentive for participants and due to the high number of questions, it may be encouraging for participants to start with an easy section.

Thus, this segment (from question 1 to 7) did not draw on any specific study because these are direct and simple asks. It collected data for variables which frequently mentioned in the literature, namely participants' gender (Lusardi & Mitchell, 2008; Graham, Harvey, & Huang, 2009; Lusardi, Mitchell, & Curto, 2010; Yoong, 2011; Almenberg & Dreber, 2015; Walczak & Pieńkowska-Kamieniecka, 2018), age (Riley Jr. & Chow, 1992; Wang & Sherman, 1997; Grable, Lytton, O'Neill, Joo, & Klock, 2006; Korniotis & Kumar, 2011), marital status (Jianakoplos & Bernasek, 1998; Grable J. E., 2000; Barber & Odean, 2001; Hallahan, Faff, & McKenzie, 2004; Yao & Hanna, 2005), education level (Haliassos & Bertaut, 1995; Sung, 1996; Grable J. E., 2000; Hartog, Ferrer-i-Carbonell, & Jonker, 2002), professional situation, and monthly income (Graham, Harvey, & Huang, 2009; Anbar & Eker, 2010).

Plus, there is one more question (question 7) which was included in this section, despite not being related with sociodemographic matters, namely the source of knowledge. When talking about personality traits, extraversion and agreeableness stand as social traits which tend to learn about the financial world with their friends and family, influencing them to participate in it (Hong, Kubik, & Stein, 2004). Thus, it can be said that individuals' source of financial knowledge may have an impact on the way they behave. To analyse this relationship, question 7 seeks to ascertain the individuals' main sources of financial knowledge.

- **Section II – Investment decisions -** This section is composed of five questions which intend to collect data about individuals' financial preferences. Even though these are only questions related with financial choices, it is completely appliable to non-investor participants. In fact, one of the first notes says that when the participants think the questions do not apply to them, they are requested to keep in mind a hypothetical scenario where they are investors, so that it is possible to capture their financial preferences.

The first question of this section (question 8) tries to understand which financial products attracted the participants enough so that they must have them. It was based on a CMVM study, which is still in progress. The second question (question 9) is also based on the same CMVM study question, but this time it is projected to the future, to see if there is any financial product that raises individuals' curiosity, even though they do/did not own the specific product in the present/past. With these two questions it is possible to understand the type of products that each participant is more attracted to.

The following two questions (questions 10 and 11) are from a 2002 inquiry made by CMVM, named "2.º Inquérito sobre o Perfil do Investidor Português On-Line**"**. The first one (question 10) seeks to determine the time horizon that each participant considers the most. The second question (question 11) tries to pick up the frequency at which investors intervene in the securities market. Question 11 is focused on the current trading frequency, not being related with the past as question 8. This way it also allows one to distinguish between the participants which are current investors in the securities market from those who are not.

Lastly in this section, question 12 collects information about investors' preferences regarding international diversification, a home currency (question 12.b) and a foreign currency (question 12.c), and investing in sri (question 12.a). This data is obtained through a Likert scale where the participants select their level of agreement with the three sentences corresponding to these three topics. These questions were added to the study to incentivize further studies on these themes.

- **Section III - Risk aversion -** Section III (questions 13 to 15) focuses on perceiving the participants' level of risk aversion, which is often related with financial behaviour and personality (French & Poterba, 1991; Mayfield, Perdue, & Wooten, 2008; Wong & Carducci, 2013; Nga & Yien, 2013; Brown & Taylor, 2014; Pak & Mahmood, 2015). This way, this section is based on Rooij, Lusardi, & Alessie's (2011) work, and it was chosen firstly due to one of the authors, Annamaria Lusardi who is a reference author on this subject, and secondly because this group of questions can identify four levels of risk aversion with only three questions, which can be quickly answered. However, the evaluation of the level of risk aversion was changed to ease the linear interpretation of the results (see section 3.4.).
- **Section IV - Numeracy –** For numeracy questions Skagerlund, Lind, Strömbäck, Tinghög, & Västfjäll (2018) have a questionnaire that was a result of a combination of the method used by Lisa Schwartz, Steven Woloshin, William Black, and Gilbert Welch[13], and the Berlin Numeracy Test (BNT)[14]. These two measures are widely known and used as the main measures of numeracy. The mix between them was also defended by the BNT's authors (Cokely, Galesic, Schulz, Ghazal, & Garcia-Retamero, 2012) and puts an end to the problem of BNT fitting better high educated populations. However, this questionnaire has a big disadvantage for the present study. As previously stated, the participation in this study is voluntary and is not monetarily compensated. In

[13] Their method linked numeracy with the ability women have to evaluate the benefit of a mammography after receiving quantitative information.

[14] BNT is a well-known questionnaire created by Cokely, Galesic, Schulz, Ghazal, & Garcia-Retamero (2012), built over two big works (from Isaac Lipkus, Greg Samsa and Barbara Rimer in 2001, and Lisa Schwartz, Steven Woloshin, William Black, and Gilbert Welch in 1997) to assess numeracy. It can be applied in diverse cultures and languages. However, its big limitation is that it was created for skilled samples. Plus, the questions were designed to measure not only numeracy but also risk literacy.

these terms, the group of questions presented by the author is too long and may discourage participants from filling in the questionnaire until the end.

So, the set of questions used to elaborate this section belongs to Lusardi A. (2012). Once more, it relies on a well-known name in the financial literacy field, and the number of questions is lower, only five questions for five numeracy elements. Three of these elements, called "Percentage Calculation", "Lottery Division" and "Compound Interest"were used in the 2004 wave of HRS. The other two elements were added and used in ELSA. However, in the present study's questionnaire the hardest question was eliminated, namely the compound interest question. The reason is that this questionnaire has a section aimed at financial literacy, which is the theme of the question. With this set of four questions (question 16 until 19, inclusive), it is possible to compute the participants' numeracy level in a good and shorter way.

- **Section V - Financial Literacy –** Section V (questions 20 until 24) pertains to one of the most important sections in this study and measures the participants' level of financial literacy. There are equally good questionnaires with distinct characteristics (Rooij, Lusardi, & Alessie, 2011; Lusardi & Mitchell, 2011) which can be used to fulfil the goals without losing quality when collecting information (see section 2.1.2). However, this study draws on the Big Five for financial literacy, created by Annamaria Lusardi and Olivia Mitchell (Lachance, 2014).
- **Section VI - Personality traits –** It was referred previously, in the literature review (section 2), that the Big Five model (B5) of personality would be the one to be followed in this study. Unfortunately, due to some restrictions regarding the NEO scales use, it will not be possible to apply or make use of them to build the personality section. To work around this issue, an alternative questionnaire will be used, which is also widely used and is part of the top three questionnaires to assess personality out of the NEO scales (Gosling, Rentfrow, & Swann Jr., 2003). This way it will be used as the base for the Big Five Inventory (question 25) created by Oliver John, Donahue and Kentle in 1991 (John & Srivastava, 1999), and composed of forty-four items assessed with a Likert scale. It was created with the aim of making up for the lack of a shorter and alternative measure to assess personality traits, namely the ones described by the B5 (John & Srivastava, 1999).

3.4. Variable description

This questionnaire gives rise to the variables under study. To understand more about it, this section aims to give a detailed description of the variables, as well as their computation. It is also divided into two subsections, section 3.4.1., which refers to the description of the dependent variables, and section 3.4.2., which covers the independent variables.

3.4.1. Dependent variables

Regarding the dependent variables, there is a variable for being a current investor (*investor*), thirteen variables related with financial products (*struct_deposits*, *gov_bonds*, *stock*, *corp_bonds*, *inv_funds*, *rsp*, *complex_finpro*, *insurance*, *houseloans*, *otherloans*, *crowdfunding*, and *digitalcoins*), three linked with time horizon (*time_horizon*), trading frequency (*frequency*) and socially responsible funds (*sri*) , respectively, and two more variables pertaining to international diversification (*euro_markets* and *int_markets*).

Table 2 shows the corresponding label of each dependent variable. The first variable, *investor*, is derived from the trading frequency question. There were two ways of getting variables like this one. The first way was to create a dummy which is equal to one if the participants state that they hold a security in question 8 (related with the financial products that individuals hold/held), as seen in Appendix 1. However, this question does not only refer to current investors. Instead, it would create a variable which would equal to 1 if the individual is or was an investor, since it also sees the financial products that individuals held in past. The second possibility, the approach followed, is through question 11 (see Appendix 1) related with trading frequency. In the survey, the question is made in the present, focuses on the securities market, namely it mentions more securities than in question 8, and it has the option of never trading. It allowed the participants to select the option of never trading in the securities market or trading with a certain frequency. Despite being possible to know if a participant is currently an investor through these two questions, through the earlier information given, it is easily recognized that the number of participants obtained from the two possibilities is not the same. Table 1 presents the number of investors through both possibilities. As can be seen, the number of investors would be much bigger through question 8. The difference

between values is easily explained through the existence of participants who used to hold securities, but do not anymore. However, as explained earlier, question 11 includes all securities, and sticks to present time, contrary to question 8.

Table 1 - Number of investors from two different variables

	Question 8	Question 11
Non-investor	157	202
Investor	136	91

Note: Table 1 presents the number of investors through questions 8 (second column), and through question 11 (third column).

The following thirteen variables, in table 2, are all interpreted similarly, namely all of them are dummies which equal to 1 if the participant holds or held the respective financial product. In case of *struct_funds*, it is equal to 1 if the participant holds or held structured deposits and equals to 0 otherwise. It means that the same happens for *gov_bonds* with savings or treasury certificates; for *stock* with stock; for *corp_bonds* with corporate bonds or commercial paper; for *inv_funds* with investment funds, including retirement savings funds; for *rsp* with retirement savings plans; for *pension_fund* with pension funds; for *complex_finpro* with complex financial products; for *insurance* with health, life or car insurances; for *houseloans* with house loans; for *otherloans* with other loans such as personal, car loans....;for *crowdfunding* with crowdfunding investments; and for *digitalcoins* with Bitcoin, ICO, or other digital coin.

Variable *time_horizon* pertains to the time horizon considered the most by participants. It is a non-equidistant categorical variable. It is equal to 1 if individuals consider day-trade the most, is equivalent to 2 if they prefer most of the times short-term investments up to 6 months. It links to 3 if individuals ponder investment periods between 6 and 12 months the most, and lastly it corresponds to 4 if individuals consider long-term investments (more than 12 months) the most.

The *frequency* pertains to trading frequency. Similarly to *time_horizon*, it is a non-equidistant categorical variable. This variable equals 1 if participants never trade, equals 2 if individuals trade daily, equals 3 if they trade weekly, equals 4 if they trade monthly, and,lastly, equals 5 if individuals trade annually.

Variables *sri*, *euro_markets*, and *int_markets* pertain to the intention of investing

Table 2- Dependent variables description

Variable	Label
investor	= 1 if the participant is an investor in the securities market
struct_deposits	= 1 if the participant holds/held structured deposits
gov_bonds	= 1 if the participant holds/held savings or treasury certificates
stock	= 1 if the participant holds/held stock
corp_bonds	= 1 if the participant holds/held corporate bonds or commercial paper
inv_funds	= 1 if the participant holds/held investment funds, including retirements saving funds
rsp	= 1 if the participant holds/held retirement savings planning
pension_fund	= 1 if the participant holds/held a pension fund
complex_finpro	= 1 if the participant holds/held complex financial products
insurance	= 1 if the participant holds/held health, life or car insurance
houseloans	= 1 if the participant holds/held house loans or mortgages-backed credits
otherloans	= 1 if the participant holds/held other loans, such as personal, car loans...
crowdfunding	= 1 if the participant holds/held crowdfunding investments
digitalcoins	= 1 if the participant holds/held Bitcoin, ICO or other digital coins
time_horizon	Time horizon considered the most
frequency	Trading frequency considered the most
sri	Level of interest for socially responsible investments
euro_markets	Level of interest for euro zone markets
int_markets	Level of interest for international markets out of euro zone

Note: This table presents the dependent variables for models of tables 18 to 23, in column 1, and the respective labels in column 2.

in socially responsible investments, in euro zone markets, and in international markets out of the euro zone. These variables were obtained through a Likert scale. Following Johnson & Creech (1983) and Norman (2010), these types of scales can be used as continuous variables without any problem, as long as they have at least 5 categories. This way, in this study *sri*, *euro_markets* and *int_markets* are continuous variables whose score increases with the level of agreement with the statements of question 12 (see Appendix 1).

3.4.2. Independent variables

Table 3 presents the independent variables in question and their respective meanings. Among these variables there is *numeracy, financial_literacy*, *extraversion*,

openness, *agreeablenness*, *conscientiousness*, *neuroticism*, *risk_aversion*, *professional_exp*, *pexp_hobbies*, *newspapers*, *internet_social*, *family_friends*, *female*, *age*, *age_sqrd*, *marital_status*, *schooling*, *professional*, and *income*, which are described as following.

Numeracy section has four questions, with one point being awarded for each correct answer. After its summation, it was possible to obtain each individual's score, represented by variable *numeracy*. The higher the score, the higher the individual's level of numeracy. However, it is important to refer that there were many and diversified answers due to the fact that they were open-ended questions. Therefore, besides the obvious answers being considered as correct, one point was also attributed to those who considered taxes in their responses, despite not being required, as long as their was correct. For *financial_literacy*, the same logic was used, namely each correct answer corresponds to one point and at the end all points were summed, resulting in the score. The higher the score, the higher the individual's level of financial literacy. This approach is in line with Lachance (2014).

In terms of personality traits, there are five variables, namely *extraversion*, *agreeableness*, *conscientiousness*, *openness,* and *neuroticism*. Each of them is the result of a sum of the Likert scale points corresponding to the category selected by individuals. At the end of Appendix 1 the questions linked to each trait of personality are written down, and the questions with reverse score are also signalled. This way, it is possible to see what an increase of each added point in a certain trait provokes in the dependent variable.

The variables *study*, *professional_exp*, *pexp_hobbie*, *newspapers*, internet_social, and *family_friends* pertain to the sources of financial knowledge. These dummy variables equal 1 if the participant has the respective knowledge source in his top 3. For instance, *professional_exp* equals 1 if one of the individual's main sources of financial knowledge is his own professional experience. The same happens with *study*, courses, and trainings*; pexp_hobbie* and personal experience and hobbies; *newspapers* and magazines, newspapers and books; *internet_social* and the internet, including social networks; and *family_friends* and family, friends and colleagues.

Table 3-Independent variables description

Variables	Label
numeracy	Level of numeracy
financial_literacy	Level of financial literacy
extraversion	Extraversion score
openness	Openness score
agreeableness	Agreeableness score
conscientiousness	Conscientiousness score
neuroticism	Neuroticism score
studies	= 1 if courses,and training are in the main sources of financial knowledge
professional_exp	= 1 if professional experience is in the main sources of financial knowledge
pexp_hobbie	= 1 if personal experience or hobbies are in the main sources of financial knowledge
newspapers	= 1 if newspapers and magazines are in the main sources of financial knowledge
internet_social	= 1 if the internet, including social networks, is in the main sources of financial knowledge
family_friends	= 1 if family and friends are in the main sources of financial knowledge
female	=1 if female
age	Age
age_sqrd	Age squared
marital_status	= 1 if single; = 2 if non-marital relationship; = 3 if married; = 4 if ex_married
schooling	= 1 if basic education; = 2 if high school; = 3 if bachelor; = 4 if masters; = 5 if PhD
professional	= 1 if student; = 2 if student-worker; = 3 if self-employed; = 4 if employee; = 5 if unemployed; = 6 if retired
income	= 1 if no income; = 2 if €501<income<€1000; = 3 if €1001<income<€1500; = 4 if €1501<income<€2000; = 5 if €2001<income<€2500; = 6 if income>€2501

Note: Table 3 presents the independent variables and their respective labels.

In relation to sociodemographic variables, *female* is a dummy variable that equals 1 if the participant is female, and zero if the participant is male. *Age* is a continuous variable which indicates the participant's age. *Age_sqrd* is the square of variable *age*, and it is needed to shape the curve to changes of direction. The *marital_status* is a categoric variable with four categories, which describe the participants' marital status. It equals 1 if the participant is single, equals 2 if the participant is in a non-marital partnership, equals 3 if the participant is married and equals 4 if the participant is divorced or widower/widow (ex_married). Similarly, *schooling* is grouped following the structure

of the Portuguese education system. It equals 1 if the participant only has the basic education, it equals 2 if the participant has only completed high school, it corresponds to 3 if they have a bachelor's degree, it equates to 4 if they have a master's degree, and to 5 if they have a PhD. Regarding *professional* it represents individuals' professional situation. It equals 1 if the individual is still a student, it equals 2 if the participant is a student-worker, it equals 3 if they are self-employed, it equals 4 if the participant is an employee, it equals 5 if they are unemployed, and equals 6 if they are retired. There is one more variable which was analysed, specifically the *income*. This variable indicates the category which the participant's income falls into. It equals one if the participant does not have any income, it matches 2 if the participant's income is between €501 and €1000, it equates to 3 if it is between €1001 and €1500, corresponds to 4 if it is between €1501 and €2000, to 5 if it is between €2001 and €2500, and equals 6 if it is higher than €2501.

3.5. Models under analysis

OLS, Probit, and Ordered Probit regressions are used in the statistical analysis. The difference between the use of the two types of regressions is the dependent variable under analysis Explicitly, to continuous variables it is applied an OLS, to dummies a Probit, and to categoric variables an Ordered Probit regression. Also, continuous dependent variables are presented in the logarithmic form, so that their coefficients may be interpreted as percentages (Wooldridge, 2009). The independent variables are the same in every model.

The first model analyses the impact that every independent variable understudy has on financial literacy. Its purpose is to see if there are variables which do not directly affect the financial behaviour but do it indirectly through financial literacy. This model is considered an exception since it is the only one understudy where financial_literacy (in this case, its logarithmic form) is a dependent variable instead of independent variable. It is given by:

$$lnfinancial\_literacy = \beta_0 + \beta_1\, numeracy + \beta_2\, extraversion + \beta_3\, openness + \beta_4\, agreeableness + \beta_5\, conscientiousness + \beta_6\, neuroticism + \beta_7\, study + \beta_8\, professional\_exp + \beta_9\, pexp\_hobbie + \beta_{10}\, newspapers + \beta_{11}\, internet\_social + \beta_{12}\, family\_friends + \beta_{13}\, female +$$

β_{14} *age* + β_{15} *age_sqrd* + β_{16} *marital_status* + β_{17} schooling + β_{18} *occupation* + β_{19} *income* + ε (1)

where ε is the error term.

This study deals with twenty independent variables, which are the same in every regression (with the exception of model 1), and to see the variation of their impact, the first model with *financial_literacy* as regressor is:

investor = β_0 + β_1 *financial_literacy* + ε (2)

Where ε is the error term.

The remaining variables will be gradually added to this model, , namely the second model adds the numeracy and personality traits to it. It is represented by:

investor = β_0 + β_1 *financial_literacy* + β_2 *numeracy* + β_3 *extraversion* + β_4 *openness* + β_5 *agreeableness* + β_6 *conscientiousness* + β_7 *neuroticism* + ε (3)

Where ε is the error term.

The third model adds the sources of knowledge:

investor = β_0 + β_1 *financial_literacy* + β_2 *numeracy* + β_3 *extraversion* + β_4 *openness* + β_5 *agreeableness* + β_6 *conscientiousness* + β_7 *neuroticism* + β_8 *study* + β_9 *professional_exp* + β_{10} *pexp_hobbie* + β_{11} *newspapers* + β_{12} *internet_social* + β_{13} *family_friends* + ε (4)

Where ε is the error term.

Lastly the main model adds the sociodemographic variables and corresponds to expression (5). This model is equal to the remaining regressions. It is expressed through:

Dependent variable = β_0 + β_1 *financial_literacy* + β_2 *numeracy* + β_3 *extraversion* + β_4 *openness* + β_5 *agreeableness* + β_6 *conscientiousness* + β_7 *neuroticism* + β_8 *study* + β_9 *professional_exp* + β_{10} *pexp_hobbie* + β_{11} *newspapers* + β_{12} *internet_social* + β_{13} *family_friends* + β_{14} *female* + β_{15} *age* + β_{16} *age_sqrd* + β_{17} *marital_status* + β_{18} schooling + β_{19} *occupation* + β_{20} *income* + ε (5)

Where ε is the error term, and the dependent variables are *lnsri*; *lneuro_markets*, and *lnint_markets,* in case of continuous variables; *investor*, *struct deposits*,

gov_bonds, *stock*, *corp_bonds*, *inv_funds*, *rsp*, *pension_funds*, *complex_finpro*, *insurance*, *house_loans*, *other_loans*, *crowdfunding*, *digital_coins,* as binary variables; and *frequency*, *time_horizon* in categorical variables situation.

4. Data

The universe under analysis is restricted to Portuguese speakers (residents in Portugal, but also Portuguese speakers living in a foreign country), who are 18 years old, or more. The language restriction comes from the survey itself which is worded in Portuguese (see Appendix 1). The age restriction comes from 18 years old being the moment at which individuals are considered adults and have different responsibilities. Therefore, this section comprises the data collection description (section 4.1), the sample description (section 4.2.), as well as some data analysis (section 4.3.), such as multicollinearity analysis.

4.1. Data collection

The data was collected through an online survey, which was shared three times in fifteen days, from 06/01/2021 to 20/01/2021. The survey used to collect the data reached a total of 301 participants. This data was clean and coded in Excel and exported to Stata for statistical treatment. From the total number of participants, eight were dropped because five participants did not agree with the conditions for the data collection, one participant did not comply with the only restriction to participate in the study (namely, was less than 18 years old), and lastly two more participants used inappropriate answers to the open-ended questions. The total sample used is composed of 293 participants.

4.1.1. Reliable consistency analysis

To evaluate the internal consistency of the questionnaire used, a well-known measure named Cronbach's alpha (Cronbach, 1951) was applied. This measure is based on the analysis of two variances, and its results can vary from 0 to 1, the higher it is, the more reliable the instrument is. Its computation was done without considering the sociodemographic section, since this one is not the most relevant for this study. The results can be seen in the following table, table 4.

Table 4 - Cronbach's alpha

NUMBER OF ITEMS IN THE SCALE	**76**
SCALE RELIABILITY COEFFICIENT	**0.8476**

Notes: This table has the number of items used to compute the Cronbach's alpha, and its respective result.

In Maroco & Garcia-Marques (2006), the authors refer some values of alpha which are considered reliable in the literature, namely values of 0.60 and 0.70. In this study, the Cronbach's alpha is 0.8476 (table 4), which is an excellent result to conclude that the two desired characteristics for the questionnaire are fulfilled, namely reliability and validity. It leads to more solid results that can be taken from this study, since this survey is reliable.

4.2. Data description

Table 5 presents the descriptive analysis for variable *age*. As referred previously, the minimum age is 18 years old, and the maximum age registered is 68 years old. It is important to refer that this is a young sample, since the mean age is 37 years old. Plus, 25% of the sample is at most 22 years old, 50% of it is at most 40 years old and 75% of it is at most 48 years old. Considering the Portuguese population, which is known for being an aged population, it is concluded that the sample is not a good representative of it, since comprises the younger age groups.

Table 5-Descriptive statistics: *age*

	N	Mean	Std. Dev.	min	max	p25	Median	p75
Age	293	37.276	13.505	18	68	22	40	48

Notes: This table presents the descriptive statistic for variable *age*, namely the number of observations, its mean, standard deviation, minimum age, maximum age, the age at percentile 25, 50 and 75.

Table 6 presents some descriptive statistics about the sample's sociodemographic characteristics. Sixty-one percent are women, 47.10% are single and 37.88% are married individuals. It also shows that, considering the education level and the professional situation, a bachelor's degree is the level of education concluded by half of the participants (49.83%), followed by high school (24.91%) and a master's degree (20.82%). About 52% of the sample is composed of employees. Self-employed people only correspond to 12%. Of all respondents, 28% are students, being the second group with more representativeness in this category. Student-workers represent 1.37% of the respondents. Furthermore, 5.12% of the participants are unemployed and 1.71% are retired.

According to table 6, 79% of the participants have an income lower than €1500, 29% do not have own income, 19% have an income between €501 and €1000, and 31% have an income between €1001 and €1500. The remaining categories weights are 11%, 5% and

Table 6-Descriptive statistics: *female*, *marital_status*, *schooling*, *professional*, *income*

female	Freq.	Percent	Cum.
Male	116	39.59	39.59
Female	177	60.41	100.00
Total	293	100.00	
marital_status			
Single	138	47.10	47.10
Non-marital partnership	20	6.83	53.92
Married	111	37.88	91.81
Ex_married	24	8.19	100.00
Total	293	100.00	
schooling			
Basic education	5	1.71	1.71
High school	73	24.91	26.62
Bachelor	146	49.83	76.45
Masters	61	20.82	97.27
PhD	8	2.73	100.00
Total	293	100.00	
professional			
Student	82	27.99	27.99
Student-worker	4	1.37	29.35
Self-employed	34	11.60	40.96
Employee	153	52.22	93.17
Unemployed	15	5.12	98.29
Retired	5	1.71	100.00
Total	293	100.00	
income			
No income	84	28.67	28.67
€501<income<€1000	55	18.77	47.44
€1001<income<€1500	92	31.40	78.84
€1501<income<€2000	31	10.58	89.42
€2001<income<€2500	14	4.78	94.20
Income>€2501	17	5.80	100.00
Total	293	100.00	

Notes: This table shows descriptive statistics for the sociodemographic categorical data. Freq. = absolute frequency, Percent = relative frequency, and Cum. = cumulative frequency. Ex_married represents individuals who were married in the past, namely divorced individuals, and widowers/ widows.

6% for income between €1501 and €2000, between €2001 and €2500, and for incomes higher than €2501, respectively. The last point of the sociodemographic section is participants' source of financial knowledge (table 7). Before the analysis of this table 7, it is

important to keep in mind that participants learn from more than one source, and this is the reason why the sum of the numbers of times that participants selected a certain source, presented in table 4 is not 293, but instead it is 598 (= studies + personal experience or hobbies + newspapers and magazines + internet (including social networks) + family and friends). Thus, half of the participants of this study, 48.12% of the sample, learn mainly from personal experience. Besides, the internet is the second most selected source, which means that about 46% of the participants have it as one of their main sources of financial knowledge, logically social networks are within this category. The third most common source of participants' financial knowledge is their study area, it includes studies, training and courses. This characteristic is present in about 43% of the individuals in the study. The two less common sources are family and friends (including colleagues) and newspapers and magazines (includes books), with about 38% and 30% of the sample, respectively.

Table 7-Descriptive statistics: *studies*, *pexp_hobbie*, *newspapers*, *internet_social*, and *family_friends*

studies	**Freq.**	**Percent**	**Cum.**
Studies	125	42.66	42.66
Otherwise	168	57.34	100.00
Total	293	100.00	
pexp_hobbie			
Personal experience/hobbies	141	48.12	48.12
Otherwise	152	51.88	100.00
Total	293	100.00	
newspapers			
Newspapers/magazines	87	29.69	29.69
Otherwise	206	70.31	100.00
Total	293	100.00	
internet_social			
Internet (including social networks)	135	46.08	46.08
Otherwise	158	53.92	100.00
Total	293	100.00	
family_friends			
Family and friends	110	37.54	37.54
Otherwise	183	62.46	100.00
Total	293	100.00	

Notes: This table presents descriptive statistics to the main financial sources of knowledge participants use. Freq. = absolute frequency, Percent = relative frequency, and Cum. = cumulative frequency.

Table 8 shows the main descriptive statistics for the levels of numeracy, financial literacy, and personality traits., It can be seen in the table that the numeracy score can go from 0 to 4. Its mean of 3.549 points is a high mean since it says that most individuals from the sample, answered more than half of the questions correctly. Also, financial literacy presents a mean of 2.82 points, which corresponds to more than half of the questions presented (which is 2.5 in a score that goes from 0 to 5). However, it is not much higher than 2.5 and the standard deviation is not that low either. Thus, the values are spread out, which means that there are individuals with very good scores, and individuals with very low scores. In this topic, the disparities are higher than in numeracy. It can be ascertained that not everyone with a satisfactory level of numeracy also has a good level of financial literacy. There are more people achieving a good score in numeracy than in financial literacy.

Table 8-Descriptive statistics: numeracy, financial_literacy, extraversion, openness, agreeableness, conscientiousness, and neuroticism

	N	Mean	Std. Dev.	min	max
Numeracy	293	3.549	.764	0	4
Financial literacy	293	2.823	1.325	0	5
Extraversion	293	26.608	5.236	12	40
Openness	293	35.311	5.879	16	48
Agreeableness	293	33.812	5.019	19	45
Conscientiousness	293	31.57	4.97	20	45
Neuroticism	293	23.478	5.341	8	40

Notes: This table presents descriptive statistics for the level of numeracy and financial literacy, and for the personality traits (Extraversion, Openness, Agreeableness, Conscientiousness, Neuroticism) scores. Specifically, it presents the number of observations, the mean, standard deviation, the minimum and the maximum for each category.

Still in the same table, table 8, the rows with extraversions, openness, agreeableness, conscientiousness, and neuroticism, correspond to personality traits. There are no reference values for the minimum and maximum scores. However, in table 8, the values were all very close, apart from the minimum value of neuroticism. Additionally, standard deviation in each case is similar, so the discrepancies that can be found in the score of each personality trait will not be very different from trait to trait. Considering this, it can be said that by looking at the means, the most present trait in the sample is openness, with a mean of 35.311 points, followed by agreeableness and conscientiousness, with a mean of 33.81 and 31.57 points, respectively.

Table 9-Descriptive statistics: struct_deposits, gov_bonds, stock, corp_bonds, inv_funds, rsp, pension_fund, complex_finpro, insurance, houseloans, otherloans, crowdfunding, and digitalcoins

struct_deposits	**Freq.**	**Percent**	**Cum.**
Does not hold	252	86.01	86.01
Holds	41	13.99	100.00
Total	293	100.00	
gov_bonds			
Does not hold	211	72.01	72.01
Holds	82	27.99	100.00
Total	293	100.00	
stock			
Does not hold	223	76.11	76.11
Holds	70	23.89	100.00
Total	293	100.00	
corp_bonds			
Does not hold	268	91.47	91.47
Holds	25	8.53	100.00
Total	293	100.00	
inv_funds			
Does not hold	203	69.28	69.28
Holds	90	30.72	100.00
Total	293	100.00	
rsp			
Does not hold	197	67.24	67.24
Holds	96	32.76	100.00
Total	293	100.00	
pension_fund			
Does not hold	274	93.52	93.52
Holds	19	6.48	100.00
Total	293	100.00	
complex_finpro			
Does not hold	275	93.86	93.86
Holds	18	6.14	100.00
Total	293	100.00	
Insurance			
Does not hold	56	19.11	19.11
Holds	237	80.89	100.00
Total	293	100.00	
houseloans			
Does not hold	186	63.48	63.48
Holds	107	36.52	100.00
Total	293	100.00	
otherloans			
Does not hold	213	72.70	72.70
Holds	80	27.30	100.00
Total	293	100.00	

crowdfunding	**Freq.**	**Percent**	**Cum.**
Does not hold	275	93.86	93.86
Holds	18	6.14	100.00
Total	293	100.00	
digitalcoins			
Does not hold	274	93.52	93.52
Holds	19	6.48	100.00
Total	293	100.00	

Notes: This table presents descriptive statistics for the financial products under study. Freq. = absolute frequency, Percent = relative frequency, and Cum. = cumulative frequency.

Then extraversion and neuroticism are the personality traits with lower means, of 26.61 and 23.79 points. Neuroticism is the least represented personality trait in the sample.

Regarding investment decisions and starting with the type of securities that are or were held by participants, seen in table 9, deposits (current and term deposits) and insurance (health, life, and car insurance) are by far the most popular, with 90% and 80% of the sample, respectively. Next, at quite a distance, are house loans, which are/were held by 36.52% of the sample, followed by, retirement savings plans mentioned by 33% of the individuals. Investment funds with about 31% of the sample, government bonds with about 28%, other loans (for example car credit) with 27% and stock with 24% of the participants come next The financial products which are the least popular are structured deposits with only 14%, corporate bonds with 9% of the individuals referring it, crowdfunding investments, and complex financial products, with 6.14% each and, lastly, digital coins and pension funds with 6.48% each .

Table 10 presents the descriptive statistics for the variable *investor*. Following the method described and used in earlier sections, main information provided is that, 31% of the sample are current investors in the securities market.

Table 10-Descriptive statistics: *investor*

investor	Freq.	Percent	Cum.
non-investor	202	68.94	68.94
investor	91	31.06	100.00
Total	293	100.00	

Notes: This table presents descriptive statistics for the variable investor. Freq. = absolute frequency, Percent = relative frequency, and Cum. = cumulative frequency.

Table 11 presents the statistics for the variables *frequency* and *time_horizon*. Considering *frequency*, table 11 shows that 69% of the sample never trades while 15% of the individuals trade annually. Nine percent of the individuals trade monthly, 5% of them do it weekly, and only 3% of them trade daily.

Regarding *time_horizon*, it can be said first that most participants prefer short-terms investments, 7.17% of the participants do day-trade investments, 17.41% invest with a time horizon of less than 6 months and 31.4% invest for a period between 6 and 12 months. The remaining participants, namely 44% of the total, would rather have long-term investments (time horizon higher than 12 months), instead of short term.

Table 11 - Descriptive statistics: *frequency* and *time_horizon*

Frequency	Freq.	Percent	Cum.
Never	202	68.94	68.94
Daily	9	3.07	72.01
Weekly	14	4.78	76.79
Monthly	25	8.53	85.32
Annually	43	14.68	100.00
Total	293	100.00	

Notes: This table presents descriptive statistics for variables *frequency* and *time_horizon*. Freq. = absolute frequency, Percent = relative frequency, and Cum. = cumulative frequency.

Table 12 provides the main descriptive statistics for the variables *sri*, *euro_markets*, and *int_markets*.

Regarding *sri*, the mean for this variable is 3.42, translating the willingness that participants have to invest in sri. Regarding international diversification, participants do, in fact, consider investing internationally, but within the same currency, which justifies the mean of 3.24 points. However, when the international diversification refers to investing in foreign currencies, their opinion changes. The mean of 2.60 points, near the middle point seems to show that the intention of investing in foreign currencies decreases, and although participants do consider it more, it is not at the same intensity as it is for euro markets.

The standard deviations for all variables of table 12 reveal the existence of discrepancies between answers. Meaning that the participants' opinions are not close, in fact they are quite different and "push" to different sides of the scales.

Table 12-Descriptive statistics: *sri*, *euro_markets*, and *int_markets*

Variable	Obs	Mean	Std. Dev.	Min	Max
sri	293	3.42	1.21	1	5
euro_markets	293	3.003	1.262	1	5
int_markets	293	2.601	1.214	1	5

Notes: This table presents descriptive statistics for the investment decisions. Freq. = absolute frequency, Percent = relative frequency, and Cum. = cumulative frequency.

4.3. Multicollinearity analysis

Multicollinearity[15] exists in every dataset and among many variables (Gujarati & Porter, 2009). However, it must be tested and controlled so that it does not become a problem in the model estimation. These problems of multicollinearity emerge when the correlation coefficient between two variables is high enough to mean a perfect or almost perfect correlation between those variables (Gujarati & Porter, 2009). Why is this a problem? The consequences it can bring are: variances and covariances can be harder to estimate precisely (usually the existence of multicollinearity creates higher variances (Greene, 2012)), which can have impact on the confidence intervals and consequently making it easier to accept the null hypothesis, or it can also bring more statistically non-significant coefficients (it does not implies a lower R^2); lastly, it can make standard errors fluctuate more with small data changes (Gujarati & Porter, 2009). Many authors disregard multicollinearity because, if variables are not perfect correlated, the OLS assumptions are satisfied, and the estimators remain BLUE. Due to what was previously said and to the lack of understanding which surrounds this theme, the consensus view appears to be that the less multicollinearity, the better (Gujarati & Porter, 2009; Wooldridge, 2009; Stock & Watson, 2007).

Bearing this in mind, table 13 presents the correlation matrix where it is possible to see the linear relations among the different independent variables under study. Note that

[15] Note that it only exists for linear relations between variables.

TABLE 13-CORRELATION MATRIX

	numeracy	financial_literacy	extraversion	openness	agreeableness	conscientiousness	neuroticism	study	professional_exp	pexp_hobbie	newspapers	internet_social	family_friends	female	age	marital_status	schooling	professional	income
numeracy	1																		
financial_literacy	0.300***	1																	
extraversion	-0.0306	0.0793	1																
openness	0.0495	0.0541	0.307***	1															
agreeableness	-0.0355	0.00785	0.177***	0.251***	1														
conscientiousness	-0.0332	0.172***	0.222***	0.249***	0.363***	1													
neuroticism	0.0982*	-0.0552	-0.215***	-0.146**	-0.193***	-0.209***	1												
study	0.0119	0.251***	0.0291	-0.0939	0.00339	0.0678	-0.0307	1											
professional_exp	-0.0815	0.110*	0.0107	-0.115*	-0.0379	0.0613	-0.208***	0.172***	1										
pexp_hobbie	0.0584	0.0105	0.0736	0.0922	0.0293	0.0904	-0.167***	-0.154***	0.00971	1									
newspapers	0.0900	-0.0314	0.0245	-0.0433	-0.00249	-0.0792	0.0482	-0.168***	-0.181***	-0.148**	1								
internet_social	0.0522	-0.0623	-0.0590	0.0526	-0.0624	-0.0689	0.0802	-0.271***	-0.262***	-0.137**	0.179***	1							
family_friends	-0.0965*	-0.210***	-0.0227	0.0767	0.0178	-0.0607	0.0799	-0.355***	-0.277***	-0.182***	0.00521	0.132**	1						
female	-0.140**	-0.240***	0.0674	-0.0713	0.187***	0.0649	0.159***	0.0210	-0.139**	-0.0583	-0.0390	-0.134**	0.224***	1					
age	-0.0416	-0.0105	0.193***	0.0395	0.108*	0.123**	-0.201***	-0.187***	0.231***	0.144**	0.0255	-0.157***	-0.184***	-0.0517	1				
marital_status	-0.0766	-0.000651	0.185***	0.0293	0.184***	0.105*	-0.131**	-0.102*	0.190***	0.0940	0.0743	-0.181***	-0.234***	0.0278	0.758***	1			
schooling	0.120**	0.116**	0.120**	0.122**	0.0940	0.149**	-0.106*	-0.00381	-0.0766	0.111*	0.0261	-0.00202	-0.0597	0.0493	0.265***	0.255***	1		
professional	-0.125**	-0.0359	0.243***	0.123**	0.145**	0.137**	-0.250***	-0.131**	0.231***	0.152***	-0.0628	-0.130**	-0.0959	0.0191	0.690***	0.510***	0.226***	1	
income	-0.0506	0.0964*	0.259***	0.0609	0.112*	0.179***	-0.249***	-0.0320	0.320***	0.162***	-0.0591	-0.208***	-0.187***	-0.0501	0.684***	0.578***	0.419***	0.614***	1

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table represents the correlation matrix for all independent variables under study. It presents the Pearson correlation coefficients, which measure the correlation degree between two variables. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

there is one variable missing in the matrix, namely the age squared. This omission is intentional because it is, as the name says, a variable created by squaring the variable *age*. This way, it would show a strong, almost perfect, level of correlation, and would not add much to its relationship with other variables. However, this variable is important to shape the effect of *age* reported in some literature. Proceeding to the analysis of the correlation among the variables under study, which were computed with the default coefficient, the Pearson coefficient, most statistically significant correlations do not seem to be troubling. For the numeracy example, it is possible to see a positive correlation (=0.300) with financial literacy, for a significance level of 0.1% (as expected this relation is a positive one, and its effects can be seen in 99,90% of the sample). Similarly, for numeracy, financial literacy is negatively related with women, which is in accordance with numerous studies which continue to prove this relation (i.e., Lusardi, Mitchell, & Curto, 2010).

However, this effect covers a higher percentage of the sample when dealing with financial literacy, than when dealing with numeracy. These weak correlations, which are repeated in many other variables, as can be seen in table 13, do not seem to be a problem for the study. Even those variables with higher value, such as the correlation between age and marital status, or even age and occupation or income, which show superior values that do not present much danger (Gujarati & Porter, 2009), a number below 0.8 is, usually, not considered to be troubling.

To study multicollinearity in more detail, a very similar to model 2 was built, and the Variation Inflation Factor (VIF) was computed. This indicator shows the increase of a certain variance in the presence of multicollinearity, in other words it shows how variances are inflated by multicollinearity.

Thus, the higher the collinearity, the bigger the VIF value is (Gujarati & Porter, 2009). VIF results can be seen in table 14. Similarly, for the covariance matrix, VIF results present very satisfying values for the existence of little multicollinearity (the existence of no multicollinearity is never a problem, except for *education*).

Contrary to the Pearson coefficient, there is consensus on the value at which the VIF results are dangerous, and the lower the VIF results, the better. Multicollinearity can become a problem when the results are greater than 10 (Wooldridge, 2009). The higher

VIF values correspond to age and *age_sqrd*. As expected, both of these variables have an elevated level of multicollinearity since *age_sqrd* is created through age. However, in table 15, when this variable is dropped, it is proved that these values are, in fact, limited to this pair. However, and as said earlier, *age_sqrd* is present in the models to shape the age effect.

Table 14-Variation Inflation Factor (VIF)

Variable	**VIF**	**Variable**	**VIF**
numeracy	**1.29**	schooling	
financial_Literacy	**1.40**	high school	**13.77**
extraversion	**1.39**	bachelor	**18.60**
openness	**1.38**	masters	**12.90**
agreeableness	**1.37**	PhD	**3.17**
conscientiousness	**1.34**	professional	
neuroticism	**1.31**	student-worker	**1.40**
study	**1.73**	self-employed	**4.04**
professional_exp	**1.55**	employeed	**6.99**
pexp_hobbie	**1.39**	unemployed	**2.10**
newspapers	**1.19**	retired	**1.67**
Internet_social	**1.37**	income	
family_friends	**1.61**	€501<income<€1000	**4.46**
female	**1.41**	€1001<income<€1500	**6.31**
age	**109.54**	€1501<income<€2000	**4.06**
age_sqrd	**88.66**	€2001<income<€2500	**2.69**
marital_status		€2501<income	**2.99**
non-marital part-nership	**1.52**		
married	**3.12**		
ex_married	**2.08**		
		Mean VIF	**9.39**

Notes: This table represents the VIF results for each variable and respective category. Values greater than 10 are warning for the existence of multicollinearity. The suppressed base categories are the single for the *marital_status* variable, basic education for variable *schooling*, and no income for variable *income*.

Table 15 presents the VIF values without the variable *age_sqrd*. It is seen that the higher VIF values correspond to *schooling* categories. In the variable *schooling*,

namely in three of its categories, the VIF is greater than 10 (high school=13.72; bachelor=18.60; masters=12.90). Taking this variable out, the highest value in the table corresponds to a 6.61 in the *category* "employee" from the *professional v*ariable. Since the correlation matrix (table 13) did not show worrying values, it will not be a problem. Therefore, *schooling* will not be present in the models, and the study will proceed with the remaining values, which are very favourable.

Table 15-Variation inflation factor (VIF) without *age_sqrd*

Variable	**VIF**	**Variable**	**VIF**
numeracy	**1.28**	schooling	
financial_literacy	**1.40**	high school	**13.72**
extraversion	**1.38**	bachelor	**18.60**
openness	**1.38**	masters	**12.90**
agreeableness	**1.37**	PhD	**3.17**
conscientiousness	**1.34**	professional	
neuroticism	**1.31**	student-worker	**1.40**
study	**1.69**	self-employed	**3.83**
professional_exp.	**1.55**	employee	**6.61**
pexp_hobbie	**1.38**	unemployed	**1.94**
newspapers	**1.18**	retired	**1.67**
internet_social	**1.37**	income	
family_friends	**1.59**	€501<income<€1000	**4.38**
female	**1.38**	€1001<income<€1500	**6.10**
age	**4.50**	€1501<income<€2000	**4.03**
marital_status		€2001<income<€2500	**2.69**
non-marital partnership	**1.47**	€2501<income	**2.96**
married	**2.99**		
ex married	**2.07**		
		Mean VIF	**3.58**

Notes: This table represents the VIF results for each variable and respective category, without variable *age_sqrd*. Values greater than 10 are warning for the existence of multicollinearity. The suppressed base categories are the single for the *marital_status* variable, basic education for variable *schooling*, and no income for variable *income*.

It is also important to see the collinearity between two dependent variables, namely *frequency* and *time_horizon*. Since the investment time horizon may be related

with the trading frequency, the regression of one variable may capture the other variables' coefficient significance. Table 16 pertains to the correlation between *time_horizon* and *frequency*.

Table 16-Correlation matrix between *time_horizon* and *frequency*

	frequency	time_horizon
frequency	1	
time_horizon	0.213***	1

Notes: This table represents the correlation matrix for the variables *frequency* and *time_horizon*. It presents the Pearson correlation coefficients, which measure the correlation degree between two variables. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5. Results and discussion

This section focuses on the analysis and discussion of the models' results. Subsection 5.1. is dedicated to financial literacy determinants; subsection 5.2. studies the variables that may influence the securities market participation; subsection 5.3 deals with the type of financial products that are/were held by the participants; subsections 5.4 and 5.5 analyse the preferred trading frequency and time horizon, respectively; subsection 5.6 examines the willingness participants have to invest in sri; and, lastly, subsection 5.7 concerns international diversification.

5.1. Financial literacy determinants

Table 17 presents the coefficients of an OLS regression for variable lnfinancial_literacy. From the table, it is seen that when individuals' numeracy score varies by 1 point, their financial literacy increases on average 16%, ceteris paribus. The robust standard error is small (0.0331), meaning that the variations seen surrounding the mean are small, and the more accurate the results are for a bigger population. Regarding the personality traits, no variable proved to be relevant to individuals' financial literacy.

Of the personality traits variables, only extraversion and conscientiousness are statistically significant with a level of 10% and 1%, respectively. The level of financial literacy increases 1% with an increase of a marginal point in the extraversion score. It means that extraverted people are financially more literate. Being this the most social trait, it suggests the individuals learn a lot with their peers (Hong, Kubik, & Stein, 2004). It may be the reason why they are more literate than the remaining traits. Regarding *conscientiousness*, as people get more conscientious, the more financially literate they become. Specifically, one more point in the conscientiousness score, increases the individual's financial literacy level 1.52%. on average Earlier in this study, mention was made of the responsibility and control associated to this trait (Tauni, et al., 2017). These two characteristics make this coefficient completely acceptable. To control their investments, and their lives, people with this trait need to be informed, and as said previously they do their utmost to have the best results, including in financial markets. This result proves this rational line.

Table 17-OLS regression for *lnfinancial_literacy*

Variables	lnfinancial_literacy	Robust std. errors
numeracy	0.1633***	(0.0327)
extraversion	0.0099*	(0.0054)
openness	0.0006	(0.0053)
agreeableness	-0.0017	(0.0068)
conscientiousness	0.0152***	(0.0055)
neuroticism	0.0005	(0.0050)
study	0.1553**	(0.0645)
professional_exp	0.0192	(0.0616)
pexp_hobbie	-0.0377	(0.0588)
newspapers	0.0230	(0.0587)
internet_social	-0.0200	(0.0563)
family_friends	-0.0194	(0.0641)
female	-0.1715***	(0.0530)
age	-0.0064	(0.0185)
age_sqrd	0.0001	(0.0002)
marital_status (Base group: single)		
non-marital relationship	-0.0251	(0.1293)
married	-0.0469	(0.0866)
ex_married	0.0503	(0.1180)
professional (Base group: student)		
student-worker	0.1472	(0.1506)
self-employed	-0.2470*	(0.1330)
employee	-0.1479	(0.1089)
unemployed	-0.1575	(0.1486)
retired	-0.1861	(0.1615)
income (Base group: no income)		
€501<income<€1000	0.2581**	(0.1269)
€1001<income<€1500	0.1275	(0.1456)
€1501<income<€2000	0.2096	(0.1749)
€2001<income<€2500	0.2543	(0.1733)
Income>€2501	0.3315*	(0.1718)
Constant	0.1160	(0.4584)
Observations	293	
R-squared	0.2536	

Notes: This table reports the coefficients of an OLS regression for the variable lnfinancial_literacy. To correct heteroscedasticity, the robust standard errors were computed. Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Regarding the sources of knowledge, as expected the study, training and courses area contributes significantly to a good financial literacy level. Explicitly, when individuals undertake any type of training in the financial area, they become on average 16% more financially literate than those who did not. Ican, thus, be concluded that

incentivizing people to get financially more informed can lead them to make better choices and display better financial behaviours (Grable J. E., 2000; Abreu & Mendes, 2010; Almenberg & Widmark, 2011; Rooij, Lusardi, & Alessie, 2011; Xia, Wang, & Li, 2014; Fachrudin & Fachrudin, 2016; Hsiao & Tsai, 2018).

In accordance with the literature (Lusardi & Mitchell, 2008; Lusardi, Mitchell, & Curto, 2010; Yoong, 2011), the results related with gender showed that women have on average 17% less financial literacy than men. This relationship is seen in 99% of the sample. Considering the variable *professional*, only one category is statistically significant, namely self-employed individuals are on average 25% less financially literate than students. This result may be a reflection of the increase in information in the younger generation, including at economic and financial levels.

Regarding the income, people with an income between €500 and €1000 areon average 26% more financially literate than those without an income of their own. The same happens to people with an income higher than €2501, who are on average 33% more literate than those without income. This model explains 25% of the financial literacy levels.

5.2. Investors' description

This section analyses the variables which contribute the most for people to enter the securities market. Table 18 shows the marginal effects of four Probit regressions with *investor* as a dependent variable. In the first model of table 18 (M#2), the only independent variable under analysis is *financial_literacy*, and it is statistically significant for a level of 1% and an increase of one point in the financial literacy score makes individuals 14% more likely to enter the securities market. This result leads to the acceptance of *H1.a)* and is in line with Almenberg & Widmark (2011), Rooij, Lusardi, & Alessie (2011), and Xia, Wang, & Li (2014) conclusions which affirm that financial literacy has a positive impact on stock market participation, and with Hsiao & Tsai (2018) who concluded the same in relation to the derivatives market.

The second model of table 18 (M#3) includes a variable for numeracy, which is not statistically significant, and five more for personality traits. From these five new variables, agreeableness and neuroticism are statistically significant for a level of 1%. Regarding *agreeableness*, it shows that when the score of this trait increases by one point,

the individuals become 1.6% less likely to enter the securities market. The same happens to *neuroticism*, which makes individuals 1.4% less likely to enter this market for each added point. Both relationships contribute to the acceptance of hypothesis *H3*. Specifically, in line with Duran, Newby, & Sanghani (2008) and Akjtar, Muhammad, & Siddiqui (2018), agreeableness contributes to share market avoidance. This study leads to the conclusion that this trait contributes to the avoidance of the securities market in general (acceptance of *H3.b)*). Also, the *neuroticism* coefficient leads to the acceptance of *H3.e)*. Its result is not shocking, since this trait is very associated to strong and negative relationships in many aspects of life, including the financial ones (Nga & Yien, 2013; Bozionelos, 2004; Hamza & Arif, 2019). Plus, the fact that under-confidence (a characteristic of neuroticism) makes individuals less likely to participate in the share market (Xia, Wang, & Li, 2014), making it easier to justify the result. Additionally, despite going against Nga & Yien's (2013) findings, individuals with neuroticism as a main trait of personality, prefer to take as few risks as possible. Plus, the same conclusion is reached in the rational line seen in section 3.1 and based on Chitra & Sreedevi's (2011) study. Nevertheless, the impact that *financial_literacy* has with the addition of these six variables decreases one percentage point. Now, for each point of increase in its score, individuals are 13% more likely to enter the securities market. Hypotheses *H2.a)*, *H2.f)* and *H2.i)* could not be accepted nor rejected since extraversion, conscientiousness and openness are statistical non-significant in the models displayed in table 18.

Next is model M#4, which adds to M#3 six more variables corresponding to the six sources of knowledge being studied. Regarding the variables previously seen, they did not vary much, namely *financial_literacy* decreased 0.6 percentage points, agreeableness increased 0.19 percentage points and neuroticism increased 0.44 percentage points. Regarding *professional_exp*, it is states that when individuals learn finance through their professional experience, they are 15% more likely to enter the securities market, than those who learn from another source. Despite being less impactful, personal experience (*pexp_hobbie*) also make individuals 11% more likely to enter this market than those who learn finance from another source. These two variables show the importance of experience (being it personal or professional) for the individuals' feeling of confidence to enter the securities market.

Table 18-Marginal effects of Probit regressions: *investor*

VARIABLES	Investor M#2	Investor M#3	Investor M#4	Investor M#5
financial_literacy	0.1424***	0.1323***	0.1317***	0.1134***
	(0.0176)	(0.0184)	(0.0199)	(0.0190)
numeracy		0.0079	0.0152	0.0155
		(0.0353)	(0.0378)	(0.0341)
extraversion		-0.0013	-0.0010	-0.0011
		(0.0049)	(0.0050)	(0.0049)
openness		-0.0011	-0.0007	-0.0008
		(0.0043)	(0.0045)	(0.0043)
agreeableness		-0.0162***	-0.0143***	-0.0122**
		(0.0052)	(0.0051)	(0.0051)
conscientiousness		0.0069	0.0058	0.0041
		(0.0054)	(0.0053)	(0.0053)
neuroticism		-0.0143***	-0.0099**	-0.0078
		(0.0046)	(0.0048)	(0.0048)
study			-0.0475	-0.0254
			(0.0549)	(0.0593)
professional_exp			0.1476***	0.0700
			(0.0541)	(0.0543)
pexp_hobbie			0.1078**	0.1044**
			(0.0514)	(0.0482)
newspapers			0.0294	0.0245
			(0.0549)	(0.0512)
internet_social			-0.0173	-0.0072
			(0.0519)	(0.0511)
family_friends			0.0176	0.0520
			(0.0577)	(0.0567)
Observations	293	293	293	293

Notes: This table presents the marginal effects of four Probit regressions. The dependent variable is the same for the four of them, namely *investor*. It equals one if the participant is an investor in the securities market (see section 3.4.1. for more information about the creation of the variable). The first model of the table M#2 has one independent variable, namely *financial_literacy*. M#3 adds to the first a variable for numeracy level (*numeracy*) and five more for personality traits (*extraversion*, *openness*, *agreeableness*, *conscientiousness*, and *neuroticism*). The third model of the table, M#4 , adds to the previous one six more variables for the sources of knowledge (*study*, *professional_exp*, *pexp_hobbie*, *newspapers*, *internet_social*, and *family_friends*). The fourth model, M#5 adds to M#4 the sociodemographic variables (*female*, *age*, *age_sqrd*, *marital_status*, *schooling*, *occupation*, and *income*). The sociodemographic variables (*female*, *age*, *age_sqrd*, *marital_status*, *professional*, and *income*) are omitted from the table. Robust standard errors in parentheses to correct heteroscedasticity. * p<0.1, ** p<0.05, *** p<0.01

The last model of table 18, M#5, has the full model estimation (the sociodemographic variables were added). With all the variables under study, in the regression, an added point in *financial_literacy* makes individuals 11% more likely to be investors in

the securities market. A variation of one point in the agreeableness score makes individuals 1.2% less likely to enter the market. This result became less significant, going from a significance level of 1% to 5%. Plus, in this model, neuroticism is statistically non-significant. When people learn finance through personal experience (*pexp_hobbie*), they are 10% more likely to become investors in the securities market. Similarly to *neuroticism*, despite being more impactful, *professional_exp* is a statistically non-significant variable in M#5.

5.3. Type of financial products

Many of the previously examined relationships have been widely discussed in the literature. However, this study goes forward. In addition to these questions and results, this study intends to specify and analyse the influence that these variables have on some investment decision topics (i.e., time horizon...).

Table 19.a) presents the estimations of more daily and ordinary products, such as retirement savings plan (*rsp*), pension funds (pension_funds), insurance (*insurance*), house loans (*houseloans*) and others (*otherloans*).

Considering one of the main variables under study, financial literacy, it only has a significant effect on house loans, namely an additional point in financial literacy, makes individuals 4% more likely to have one, which is somehow linked with the study of Almenberg & Widmark (2011), which refers that individuals with higher level of financial literacy are the ones holding mortgages.

Extraversion has a positive impact on the three models of table 19. An increase of one point in the extraversion score, makes individuals 1.4% more likely to have a retirement savings plan, 0.6% more likely to hold pension funds, and 0.58% more likely to have other loans (includes car loans and private credit). Also with a positive relationship, when the conscientiousness score varies one point, individuals become 1.1% more likely to have a retirement savings plan, it is very probable that this precautionary measure for the future comes from their conscientiousness that the future may not go as well as wished. So, they are trying to preserve their future, by forsaking a little of their present well-being. Besides, it fits perfectly with their sense of life control. Agreeable individuals have a negative relationship with insurance. When the score of this trait increases by one point, individuals are 0.9% less likely to have insurance, be it car, personal or any

Table 19.a)-Marginal effects of Probit regressions: *rsp*, *pension_funds*, *insurance*, *houseloans*, and *other-loans*

Variables	rsp	pension_funds	insurance	houseloans	other-loans
financial_literacy	0.0021	-0.0122	-0.0278	0.0412**	0.0194
	(0.0215)	(0.0145)	(0.0190)	(0.0183)	(0.0196)
numeracy	-0.0139	0.0228	0.0308	-0.0102	0.0029
	(0.0331)	(0.0182)	(0.0342)	(0.0312)	(0.0346)
extraversion	0.0142***	0.0058**	0.0009	0.0069	0.0095*
	(0.0050)	(0.0026)	(0.0046)	(0.0048)	(0.0055)
openness	-0.0061	-0.0051**	0.0092**	-0.0037	0.0016
	(0.0045)	(0.0026)	(0.0045)	(0.0044)	(0.0046)
agreeableness	-0.0043	0.0010	-0.0090*	0.0072	0.0021
	(0.0053)	(0.0029)	(0.0052)	(0.0048)	(0.0055)
conscientiousness	0.0105*	-0.0025	-0.0008	0.0046	-0.0074
	(0.0054)	(0.0023)	(0.0051)	(0.0050)	(0.0055)
neuroticism	0.0030	-0.0062**	0.0052	0.0040	-0.0069
	(0.0049)	(0.0030)	(0.0044)	(0.0042)	(0.0050)
study	0.0036	0.0416	0.1014*	0.0187	-0.0351
	(0.0595)	(0.0345)	(0.0586)	(0.0574)	(0.0650)
professional_exp	0.0633	0.0305	0.1707***	-0.0348	-0.0251
	(0.0579)	(0.0248)	(0.0628)	(0.0507)	(0.0574)
pexp_hobbie	-0.0910	-0.0189	-0.0310	0.0235	0.0153
	(0.0553)	(0.0292)	(0.0537)	(0.0505)	(0.0536)
newspapers	-0.0451	-0.0175	0.0301	0.0548	0.0275
	(0.0544)	(0.0244)	(0.0494)	(0.0527)	(0.0568)
internet_social	-0.0351	-0.0118	0.0290	-0.0210	0.0267
	(0.0541)	(0.0278)	(0.0504)	(0.0532)	(0.0553)
family_friends	0.0724	-0.0201	-0.0655	0.1222**	-0.0216
	(0.0570)	(0.0335)	(0.0566)	(0.0549)	(0.0595)
Observations					

Notes: This table reports the marginal effects of five Probit regressions. The dependent variables are five dummies: *rsp* (equals 1 if the individuals holds/held a retirement saving plan), *pension_funds* (equals 1 if the individual holds/held a pension fund), *insurance* (equals 1 if the individual holds/held health, life or car insurance), *houseloans* (equals 1 if the individual holds/held house loans or mortgage-backed credits), and *otherloans* (equals 1 if the individual holds/held other loans, such as personal, car loans,...). The models pertaining to *pension_funds*, *insurance*, and *otherloans* do not have the total observations, since some were automatically dropped by Stata due to sociodemographic variables perfectly predicting failure/success. The sociodemographic variables (*female*, *age*, *age_sqrd*, *marital_status*, *professional*, and *income*) are omitted from the table. To correct heteroscedasticity, the robust standard errors were computed. Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

other type . On the other hand, openness presents a positive relationship with insurance (a marginal point in its score makes individuals 0.9% more likely to have insurance, ceteris paribus), and a negative one with pension funds (an added point in its score makes individuals 0.51% less likely to have it). It is interesting to see that open individuals are

more likely to have a product that protects their present but are less likely to hold a product which protects their future. Therefore, these individuals may also be characterised as being individuals focused on the present and on living the moment, instead of be concerned about the future, which is in accordance with the sensation-seeking that Pak & Mahmood (2015) referred. As expected, neuroticism shows a negative impact on pensions funds, since one more point in its score makes individuals 0.6% less likely to being involved with it (Chitra & Sreedevi, 2011, and Hamza & Arif, 2019).

Regarding the sources from which individuals get financially informed, it can be said that study of finance has a positive impact on insurance. Specifically, when individuals have courses and training in finance, they are 10% more likely to have insurance than those who learn from other sources. Also, professional experience makes individuals 17.1% more likely to have insurance, than those who do not learn from this source. Joining the labour market can be considered a big step as far as independence is concerned. It is when individuals start to have their own income and are able to pay their own expenses. Most of the times these charges include travelling to and from work, and some people prefer to do it using private transportation. Thus, when they start to work, many people buy, for example, a car and need car insurance. It means that people who learn from professional experience have a job and are mostly likely to own a car with insurance, and this is only an example of insurance that it is related with the labour market. Additionally, when individuals get financially informed with family and friends, they are 12% more likely to have house loans, ceteris paribus.

Table 19.b) presents the marginal effects of four Probit regression for the second group of financial products. Regarding numeracy, it only is statistically significant when considering stock, which is in accordance with the studies by Calvet, Campbell, & Sodini (2007), and Almenberg & Widmark (2011). An increase in the numeracy score (variation of one point) makes individuals 8.3% more likely to own stock. Financial literacy is non-significant in every model of table 19.b), apart from stock, where it makes individuals 6.2% more likely to own them, per added point in its score. It reaffirms the conclusions reached by Abreu & Mendes (2010), Almenberg & Widmark (2011), Xia, and by Wang, & Li (2014).

Table 20-Marginal effects of Probit regressions: *struct_deposits*, *gov_bonds*, *stock*, and *inv_funds*

VARIABLES	struct_deposits	gov_bonds	stock	inv_funds
financial_literacy	0.0036	0.0303	0.0623***	0.0241
	(0.0183)	(0.0208)	(0.0185)	(0.0203)
numeracy	-0.0062	0.0482	0.0828**	-0.0156
	(0.0273)	(0.0374)	(0.0386)	(0.0328)
extraversion	0.0024	-0.0086*	-0.0013	0.0070
	(0.0047)	(0.0048)	(0.0048)	(0.0052)
openness	-0.0008	0.0042	-0.0036	-0.0008
	(0.0041)	(0.0047)	(0.0042)	(0.0049)
agreeableness	0.0011	-0.0078	-0.0103**	-0.0035
	(0.0046)	(0.0052)	(0.0051)	(0.0059)
conscientiousness	0.0098*	0.0126**	0.0051	-0.0021
	(0.0051)	(0.0051)	(0.0050)	(0.0057)
neuroticism	0.0029	-0.0050	-0.0054	-0.0097*
	(0.0039)	(0.0048)	(0.0045)	(0.0050)
study	0.0062	0.0493	-0.0550	-0.0709
	(0.0499)	(0.0586)	(0.0531)	(0.0616)
professional_exp	0.0174	0.0755	0.0255	0.0694
	(0.0529)	(0.0553)	(0.0507)	(0.0595)
pexp_hobbie	0.0664	0.0819	0.0320	-0.0086
	(0.0460)	(0.0550)	(0.0470)	(0.0543)
newspapers	0.0450	0.0958*	-0.0680	-0.0146
	(0.0480)	(0.0524)	(0.0495)	(0.0549)
internet_social	-0.0273	0.1339**	0.0238	0.0573
	(0.0483)	(0.0555)	(0.0484)	(0.0545)
family_friends	0.1204**	0.1523***	0.1237**	0.0385
	(0.0486)	(0.0573)	(0.0524)	(0.0628)
Observations	268	289	293	293

Notes: This table reports the marginal effects of 4 Probit regressions. The dependent variables are 4 dummies: *struct_deposits* (equals 1 if the individual holds/held structured deposits), *gov_bonds* (equals 1 if the individual holds/held savings or treasury certificates / treasury bonds), *stock* (equals 1 if the individuals holds/held stock), and *inv_ funds* (equals 1 if the individual holds/held investment funds, including retirement savings funds). The models pertaining to *struct_funds* and *gov_bonds* do not have the total observations, since some were automatically dropped by Stata due to sociodemographic variables perfectly predicting failure/success. The sociodemographic variables (*female*, *age*, *age_sqrd*, *marital_status*, *professional*, and *income*) are omitted from the table. To correct heteroscedasticity, the robust standard errors were computed. Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Regarding personality traits, and starting with extraversion, it has a negative impact on *gov_bonds*, making individuals 0.9% less likely to hold government bonds when its score increases by one point. With a negative impact, agreeableness makes, for each point increased in its score, individuals 1% less likely to own stock. It leads to the acceptance of *H3.c).* This data is in line with Duran, Newby, & Sanghani 's (2008) results

that do not find a plausible justification for this relationship. However, the studied by Akjtar, Muhammad, & Siddiqui (2018), and Brown & Taylor (2014) concluded that there was the same negative relationship and justified it through the risk aversion that this personality trait brings about. Similarly, neuroticism has a similar result to agreeableness, but this time it makes individuals 0.97% less likely to hold investment funds, which is in accordance with the avoidance expectation that this trait of personality has with market participation. On the other hand, with a positive impact, an increase of one point in the conscientiousness score makes the individuals 0.98% more likely to own structured deposits, and 1.26% more likely to hold government bonds, ceteris paribus. Hypotheses *H2.c)*, *H2.g)* and *H2.j)* could not be accepted nor rejected since they are statistically non-significant.

This time, more sources of financial knowledge showed their relevance and importance, mainly government bonds, where individuals learning from newspapers, the internet, and from family and friends are 10%, 13% and 15% more likely to hold it, respectively, than those who did not learn from these sources. It is interesting to think that newspapers, despite including magazines and books, and family and friends are both strong sources of government information and for the sharing of ideas. It can also be seen on the internet but with less frequency. For its part, learning from family and friends also contributes to increasing the probability of individuals having their own structured deposits by 12% and stock by 12.4%, which is in line with Hong, Kubik, & Stein (2004).

Lastly, table 19.c) reports the marginal effects of a Probit regression of four more models, where the dependent variables are: *corporate bonds*, *complex financial products*, *crowdfunding investments*, and *digital coins*.

In the first model of table 19.c), the dependent variable is *corporate bonds*. Financial literacy has a positive relationship with this variable, since a marginal increase in its scores, makes individuals, on average, 2.7% more likely to hold commercial paper and corporate bonds. Additionally, one of the variables representing the financial sources of knowledge showed its importance. By looking at its effect on *corporate bonds* it can be interpreted as the following: when individuals learn finance through their friends or family, they are 7.7% more likely to hold this product. Once more it is possible

to see, in a different market, the effect that learning from friends and family has on market participation (Hong, Kubik, & Stein, 2004).

Regarding *complex financial products*, the only statistically significant variable is *conscientiousness*, which makes individuals 0.52% less likely to hold complex financial products, per additional point in its score. It leads to the rejection of hypothesis *H2.h)*. Thus, in relation to personality traits variables, *H2.d), H2.k)* and *H3.f)* could not be accepted nor rejected, due to their statistical non-significance.

The third model displayed in table 19.c) has as dependent variable *crowdfunding*. Financial literacy has a positive relationship with this variable (an increase of one point in financial literacy score, makes the individuals, on average, 3.5% more likely to hold crowdfunding investments). Once more it is seen here an extension of the results of Abreu & Mendes (2010), Almenberg & Widmark (2011), and Xia, Wang, & Li (2014) for another type of investment, namely crowdfunding investments. It is an unquestionable result, since all the clues this variable has given point to the fact that a higher level of financial literacy has mostly a positive impact on the financial world. Regarding *openness*, the investor is 0.58% more likely to hold this type of financial products for each marginal point in the personality trait score. This type of investment can be seen as an experience for this type of personality, namely, to try something big but with a low level of risk. However, this result can go against Pak & Mahmood (2015) and Tauni, et al. (2017) findings. By looking at the financial sources of knowledge, it is possible to see that there is one significant source, the internet and social networks (*internet_social*). When people learn from the internet or social networks, they are 9% more likely to hold crowdfunding investments, than those who learn from other financial sources. This type of investment is made through online platforms and, as was seen, learning from them may incentivize it.

Going now to the last model presented in table 19.c), the one dedicated to a more recent financial product, digital coins (*digitalcoins*). Individuals are 3% more likely to hold digital coins for each additional point in the numeracy score. Financial literacy has a lower effect on *digitalcoins* than numeracy, namely individuals are, on average, 2% more likely to have digital coins for each marginal point in the financial literacy score.

Table 21-Marginal effects of Probit regressions: *corp_bonds*, *complex_finpro*, *crowdfunding*, and *digitalcoins*

VARIABLES	corp_bonds	complex_finpro	crowdfunding	digitalcoins
financial_literacy	0.0266**	0.0140	0.0349***	0.0193**
	(0.0119)	(0.0127)	(0.0116)	(0.0087)
numeracy	0.0017	0.0253	-0.0148	0.0283*
	(0.0213)	(0.0276)	(0.0188)	(0.0159)
extraversion	0.0006	0.0024	0.0002	0.0033
	(0.0029)	(0.0027)	(0.0035)	(0.0021)
openness	-0.0004	0.0013	0.0058*	0.0036
	(0.0030)	(0.0023)	(0.0030)	(0.0027)
agreeableness	-0.0044	-0.0004	-0.0039	-0.0108***
	(0.0038)	(0.0031)	(0.0038)	(0.0028)
conscientiousness	-0.0017	-0.0052**	-0.0045	-0.0014
	(0.0030)	(0.0022)	(0.0031)	(0.0021)
neuroticism	-0.0042	-0.0013	-0.0019	-0.0079***
	(0.0027)	(0.0028)	(0.0029)	(0.0022)
study	0.0174	-0.0386	-0.0378	-0.0292
	(0.0363)	(0.0304)	(0.0298)	(0.0262)
professional_exp	0.0384	0.0311	0.0277	0.0165
	(0.0374)	(0.0275)	(0.0336)	(0.0252)
pexp_hobbie	0.0218	0.0018	-0.0061	-0.0342
	(0.0300)	(0.0256)	(0.0297)	(0.0246)
newspapers	0.0009	0.0243	0.0171	-0.0058
	(0.0363)	(0.0264)	(0.0347)	(0.0285)
internet_social	0.0246	-0.0186	0.0881**	0.0756***
	(0.0323)	(0.0301)	(0.0381)	(0.0242)
family_friends	0.0774**	-0.0042	-0.0454	-0.0366
	(0.0385)	(0.0285)	(0.0330)	(0.0287)
Observations	278	288	251	261

Notes: This table reports the marginal effects of four Probit regressions. The dependent variables are 4 dummies: *corporate bonds* (equals 1 if the individual holds/held corporate bonds/commercial paper), *complex financial products* (equals 1 if the individuals holds/held complex financial products), *crowdfunding investments* (equals 1 if the individual holds/held investments in crowdfunding), and *digital coins* (equals 1 if the individual holds/held investments in Bitcoins, ICO or in other digital coins). The models seen in this table do not have the total observations, since some were automatically dropped by Stata due to sociodemographic variables perfectly predicting failure/success. The sociodemographic variables (*female*, *age*, *age_sqrd*, *marital_status*, *professional*, and *income*) are omitted from the table. To correct heteroscedasticity, the robust standard errors were computed. Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

While extraversion has a positive impact on holding this type of products, agreeableness and neuroticism have a negative one. Regarding agreeableness, the likelihood

of having these products decreases by 1.1% and in neuroticism by 0.8% for each marginal point in each trait's score. With regard to agreeableness, there are many individuals who continue to be unprogressive and against innovative ideas. Obviously, a trait associated with a lack of critical opinion, such as agreeableness, may be influenced by such people and consider these new ideas as a bad investment and end up avoiding them. For its part, neuroticism is associated to introversion and is perceived as a very demotivating trait that is not open to trying anything new.

Since the product in question is a digital product, it makes sense that people who use it are technologically inclined, so it is very probable that these people learn on the internet, read books in digital format, and are more tuned in to the digital world. Table 19.c) shows that individuals who learn on the internet are indeed 8% more likely to have digital coins.

5.4. Trading frequency

As was seen previously, the variable *frequency* also provides information on who is or is not an investor. Table 20 presents the marginal effects of an Ordered Probit model for the variable *frequency*. The category "Never" is not presented in table 20 since it is representative of non-investors, and its analysis is seen in table 18.

By looking at table 20, it can be noted that financial literacy has a positive impact on all options of *frequency*. When the financial literacy score varies in one point, individuals are 0.5% more likely to transact daily, 0.95% more likely to do it weekly, 2% more likely to transact monthly, and lastly, 6.7% more likely to transact annually. Despite the positive impact on every category of *frequency*, one more point in the score of financial literacy has a decreasing effect as the trades get more frequent, which leads to the acceptance of *H1.b)* and goes in line with Barber & Odean's (2000; 2001) findings.

Regarding personality traits, only *agreeableness* is statistically significant in the model. An additional point in its score makes individuals 0.061%, 0.11%, 0.25% and 0.78% less likely to transact daily, weekly, monthly, and annually, respectively. It is seen that despite all the negative values, this type of individual prefers to do more frequent transactions instead of less frequent ones. It proves the acceptance of *H3.a)*, which is explained by their great contact with information, while socializing with their peers

(Tauni, et al., 2017), it reflects a worse financial behaviour Barber and Odean (2000; 2001).

Table 20-Marginal effects of an Ordered Probit regression for four categories with variable *frequency*

	daily	weekly	monthly	annually
financial_literacy	0.00522***	0.00948***	0.0210***	0.0667***
	(0.00199)	(0.00283)	(0.00505)	(0.0137)
numeracy	-0.0000402	-0.0000731	-0.000162	-0.000514
	(0.00174)	(0.00315)	(0.00698)	(0.0222)
extraversion	0.0000101	0.0000184	0.0000408	0.000129
	(0.000261)	(0.000474)	(0.00105)	(0.00334)
openness	-0.000115	-0.000209	-0.000463	-0.00147
	(0.000224)	(0.000401)	(0.000888)	(0.00285)
agreeableness	-0.000609*	-0.00111**	-0.00245**	-0.00778**
	(0.000329)	(0.000551)	(0.00111)	(0.00341)
conscientious-ness	0.000156	0.000284	0.000629	0.00200
	(0.000283)	(0.000497)	(0.00110)	(0.00352)
neuroticism	-0.000339	-0.000615	-0.00136	-0.00433
	(0.000266)	(0.000472)	(0.00102)	(0.00307)
study	-0.00106	-0.00193	-0.00428	-0.0136
	(0.00297)	(0.00536)	(0.0120)	(0.0375)
professional_exp	0.00196	0.00357	0.00790	0.0251
	(0.00288)	(0.00511)	(0.0113)	(0.0355)
pexp_hobbie	0.00475*	0.00863*	0.0191*	0.0607*
	(0.00286)	(0.00495)	(0.0102)	(0.0319)
newspapers	0.000275	0.000499	0.00110	0.00351
	(0.00259)	(0.00470)	(0.0104)	(0.0330)
internet_social	-0.0000319	-0.0000579	-0.000128	-0.000407
	(0.00266)	(0.00483)	(0.0107)	(0.0340)
family_friends	0.00234	0.00425	0.00941	0.0299
	(0.00294)	(0.00524)	(0.0117)	(0.0371)
N	293	293	293	293

Notes: This table reports the marginal effects of Ordered Probit regressions. The dependent variable is *frequency* and despite having 5 categories, in this table only four are represented. The second column refers the regression for transacting daily, the third to transacting weekly, the fourth to transacting monthly, and lastly the fifth column shows the results for the category of transacting annually. The sociodemographic variables (*female*, *age*, *age_sqrd*,

marital_status, *professional*, and *income*) are omitted from the table. To correct heteroscedasticity, the robust standard errors were computed. Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

The remaining variables related with personalities traits are not statistically significant, which leads to *H2.b)*, *H2.e)* and *H2.m)* not being rejected neither accepted.

From the sources of knowledge, only *pexp_hobbie* is statistically significant. Meaning that when people learn through their personal experience/ hobbies, they are 0.5% more likely to trade daily, 0.9% more likely to trade weekly, 0.2% more likely to trade monthly, and 0.6% more likely to trade annually. Clearly there is a preference for annually transactions, followed by monthly. There is a negative relationship between personal experience and trading frequency. It can be concluded that this source leads mainly to better financial behaviour in the trading frequency dimension.

5.5. Time horizon

Regarding table 21, it presents the marginal effects of an Ordinal Probit for the variable *time_horizon*. Numeracy is one of the few variables which are statistically significant in it. Its effect increases with the time horizon, namely one marginal point in its score makes individuals, on average, 2.9% less likely to day-trade, on average 4% less likely to trade in the short-term, in a period up to 6 months, and on average 2% less likely to trade in the short term, in a period between 6 months and 12 months. However, when looking at long term investments (more than 12 months), this variable starts to have a positive impact on it. For each increase of one point in the numeracy score, individuals are, on average, 8.4% more likely to make long-term investments. Similarly, financial literacy helps to determine the time horizon that individuals consider the most in their portfolios. One more point in the financial literacy score makes the individual 1.8% less likely to day-trade, 2.4% less likely to consider investments up to 6 months at the most, 1% less likely to make investments with a time horizon between 6 months and 12 months, and 5.3% more likely to make long-term investments. Thus, an additional point in the numeracy and financial literacy scores increases the probability of the individual making investments with a higher time-horizon. These results are interesting, because, similarly to the previous table (table 20), financial literacy, and in this case also numeracy, have a positive tendency for fewer trades and longer investments. Indeed, Odean strongly suggests that passive investment strategies have greater performances

than active strategies (Barber & Odean, 2000). It may justify the preference of individuals who are more literate for long-term investments, as well as for trading annually.

Table 22- Marginal effects of an Ordered Probit regression: *time_horizon*

	Day-trade	<6 months	6 months < time_horizon < 12 months	12 months <
financial_literacy	-0.0178**	-0.0235**	-0.0112**	0.0526**
	(0.00776)	(0.00968)	(0.00531)	(0.0212)
numeracy	-0.0285**	-0.0376**	-0.0180**	0.0841**
	(0.0128)	(0.0162)	(0.00860)	(0.0352)
extraversion	0.0000169	0.0000223	0.0000107	-0.0000499
	(0.00184)	(0.00242)	(0.00116)	(0.00542)
openness	-0.000744	-0.000980	-0.000469	0.00219
	(0.00161)	(0.00212)	(0.00103)	(0.00475)
agreeableness	0.00192	0.00253	0.00121	-0.00566
	(0.00191)	(0.00247)	(0.00122)	(0.00552)
conscientious-ness	0.00244	0.00321	0.00154	-0.00719
	(0.00189)	(0.00242)	(0.00119)	(0.00539)
neuroticism	-0.000659	-0.000868	-0.000415	0.00194
	(0.00172)	(0.00225)	(0.00107)	(0.00504)
study	0.0133	0.0175	0.00836	-0.0391
	(0.0201)	(0.0268)	(0.0130)	(0.0596)
professional_exp	0.0218	0.0288	0.0137	-0.0643
	(0.0216)	(0.0283)	(0.0138)	(0.0629)
pexp_hobbie	0.00106	0.00140	0.000668	-0.00313
	(0.0187)	(0.0246)	(0.0118)	(0.0550)
newspapers	0.00146	0.00192	0.000918	-0.00430
	(0.0200)	(0.0263)	(0.0126)	(0.0589)
internet_social	-0.00765	-0.0101	-0.00482	0.0226
	(0.0181)	(0.0240)	(0.0117)	(0.0537)
family_friends	0.0129	0.0170	0.00813	-0.0380
	(0.0215)	(0.0283)	(0.0137)	(0.0632)
N	293	293	293	293

Notes: This table reports the marginal effects of an Ordinal Probit. The dependent variable is *time_horizon*. The second column presents the marginal effects of a Probit regression for day-trade investments (day-trade), the second column does it for investments with a time horizon up to 6 months (< 6 months), the fourth column shows the results for investments with a time horizon between 6 and 12 months (6 months < time_horizon <12 months), and lastly the last column refers to long term investments (12 months <). The sociodemographic variables (*female*, *age*, *age_sqrd*, *marital_status*, *professional*, and *income*) are omitted from the table. To correct heteroscedasticity, the robust standard errors were computed. Robust standard errors in parentheses. * p<0.1; ** p<0.05; *** p<0.01

5.6. Socially responsible investments (sri)

Table 22 reports the results of an OLS estimation for the variable *lnsri.* The only variable which is statistically significant is financial_literacy, and its effects are seen in

99% of the sample. For each additional point in financial literacy score, individuals are 7% more likely to invest in sri. Usually for investors, it matters if they are doing well, but society is more and more aware of the social and environmental practices that should be applied. However, it does not mean that in an extreme case every investor will prefer to make a loss just to invest in sri. This way, the relationship between financial literacy and sri seen in this study, may be two-sided: on the one hand, investors who look for a sri with a better performance than the remaining options and invest in it and on the other hand, albeit less likely investors who may not mind having less profit and actually hold a sri, rather than profit more from a non-socially responsible investment. Yet, there is a third possibility. When talking about preferences, it means that if there are two

Table 23-OLS regression for *lnsri*

Variables	lnsri	Robust std. errors
financial_literacy	0.0673***	(0.0248)
numeracy	0.0658	(0.0451)
extraversion	-0.0065	(0.0059)
openness	0.0032	(0.0056)
agreeableness	0.0068	(0.0059)
conscientiousness	0.0062	(0.0067)
neuroticism	-0.0068	(0.0056)
study	0.0252	(0.0650)
professional_exp	0.0013	(0.0690)
pexp_hobbie	0.0220	(0.0646)
newspapers	0.0891	(0.0595)
internet_social	0.0483	(0.0625)
family_friends	-0.0241	(0.0698)
Constant	0.7162	(0.4991)
Observations	293	
R-squared	0.1560	

Notes: This table reports the coefficients of an OLS regression. The sociodemographic variables (*female*, *age*, *age_sqrd*, *marital_status*, *professional*, and *income*) are omitted from the table. To correct heteroscedasticity, the robust standard errors were. Robust standard errors in parentheses in the third column.* $p<0.1$; ** $p<0.05$; *** $p<0.01$

stocks with the same conditions issued by two different firms, one with socially responsible practices and the other which does not apply it, investors would prefer the stock from the socially responsible company.

To clarify the difference existing here, preference is not a rule. Investors may prefer sri, and do not have any in their actual portfolio. Thus, it makes sense that there is a growing preference for sri in a more conscious world.

It was expected that agreeableness, which is such an altruistic trait, Mayfield, Perdue, & Wooten, 2008; Lounsbury, Smith, Jacob, Leong, & Gibson, 2009; Akjtar, Muhammad, & Siddiqui, 2018) would also have an impact on this type of investments. However, it was not the verified, so hypothesis *H3.d)* cannot be accepted nor rejected.

This model only explains 16% of the preference for sri.

5.7. International markets

Concerning the type of market that individuals prefer, the euro zone market and markets outside the euro zone (which implies currency exchange) were analysed. To analyse it, two OLS regressions were computed, one for propensity to invest in internationally inside the euro zone (*lneuro_zone*), and the other for propensity to invest in international markets outside the euro zone (*lnint_markets*). Table 23.a) presents the coefficients of the OLS regression for *lneuro_markets*. Table 23.b) shows the coefficients of an OLS regressions for *lnint_markets*.

First, regarding the euro zone markets, table 23.a) shows that an increase of one point in the financial literacy score, makes individuals 9% more likely to invest in international markets with the same currency. Recalling the idea presented in the financial literacy section, which refers that French & Poterba (1991) studied the reasons why people tend to invest more in domestic markets, one of the reasons was people's perception of risk. However, knowing more about the market, leads people to feel more comfortable about investing in it (Graham, Harvey, & Huang, 2009).

Also, learning from family and friends or colleagues has a negative impact on this model. When individuals learn directly with their peers and family, they are 14% less likely to invest in these markets. The power of the information which the individual is in contact with seems to make its presence felt. International financial subjects are

widely discussed in groups mainly when there is a negative shock. Thus, learning in chats makes individuals more informed about the negative things, and it may be the cause of these negative coefficients, because their perception of risk is accentuated.

Table 24 - OLS regression for variable *lneuro_markets*

Variables	lneuro_markets	Robust std. errors
financial_literacy	0.0916***	(0.0268)
numeracy	-0.0097	(0.0410)
extraversion	0.0028	(0.0064)
openness	-0.0088	(0.0056)
agreeableness	-0.0046	(0.0063)
conscientiousness	0.0035	(0.0076)
neuroticism	-0.0064	(0.0066)
study	0.0357	(0.0727)
professional_exp	0.0308	(0.0725)
pexp_hobbie	0.0517	(0.0726)
newspapers	0.1111	(0.0682)
internet_social	0.0693	(0.0670)
family_friends	-0.1392*	(0.0757)
Constant	1.6997***	(0.5219)
Observations	293	
R-squared	0.2093	

Notes: This table reports the coefficients of an OLS regression for the variable *euro_markets.* The sociodemographic variables (*female*, *age*, *age_sqrd*, *marital_status*, *professional*, and *income*) are omitted from the table. To correct heteroscedasticity, the robust standard errors were v computed. Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 23.b) presents the coefficients of an OLS regression for the variable lnint_markets. It should be noted that financial_literacy decrease its impact when talking about investing in a foreign currency. It may be a question of information (people not being so informed about out of euro zone subjects) or a question of risk perception. When the score of financial literacy varies in one point, people are 7% more likely to

invest in international markets with foreign currencies. Bearing this in mind, *H1.c)* is accepted due to its statistical significance and the positive relationship between financial literacy and both types of international markets.

Regarding the sources of knowledge, as referred earlier, *internet_social* and *family_friends* are important to the model. Therefore, when people learn on the internet, they are 13.5% more likely to invest in international markets which do not belong to the euro zone. The internet is no-barrier world, which means that there are no countries or separation of information, the information seen in Portugal is the same shown in Australia, for example. Thus, people who learn from the internet are currently bombarded with world news, and once more, it makes them more informed and confident about transacting in a different currency. In contrast, learning finance with family and peers may have a slight negative impact on investing outside the euro borders. When individuals learn from this source, they are 14% less likely to invest in the same markets.

Table 25 - OLS regression for variable *lnint_markets*

Variables	lnint_markets	Robust std. errors
financial_literacy	0.0686**	(0.0269)
numeracy	-0.0041	(0.0461)
extraversion	-0.0000	(0.0070)
openness	0.0001	(0.0059)
agreeableness	-0.0044	(0.0066)
conscientiousness	0.0049	(0.0074)
neuroticism	-0.0051	(0.0065)
study	0.0063	(0.0839)
professional_exp	0.0404	(0.0806)
pexp_hobbie	0.0432	(0.0694)
newspapers	-0.0129	(0.0749)
internet_social	0.1345*	(0.0684)
family_friends	-0.1398*	(0.0781)
Constant	1.3642**	(0.5668)
Observations	293	
R-squared	0.1846	

Notes: This table reports the coefficients of an OLS regression for the variable *int_markets*. To correct heteroscedasticity, the robust standard errors were computed. Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Since personality traits are statistically significant in both models (of tables 23.a) and 23.b)), hypotheses *H2.i)* and *H3.g)* cannot be accepted nor rejected.

6. Conclusions

This study intended to go further in the analysis of the impact that personality traits and financial literacy have on financial behaviour. The financial behaviour dimensions in study are the type of financial products, time horizon, trading frequency, sri, and international diversification. Through an online survey shared with Portuguese speakers aged 18 and over, it was possible to collect the data needed. The use of OLS, Probit and Ordered Probit regressions defined the econometric method used.

It was confirmed that financial literacy has a positive impact on financial behaviour. Specifically, it incentivizes individuals to hold stock (Xia, Wang, & Li, 2014; Abreu & Mendes, 2010; Almenberg &Widmark), corporate bonds and commercial paper, and crowdfunding investments, but also to enter the securities market in general. Plus, it makes investors more likely to have house loans (Almenberg & Widmark, 2011), digital coins, to trade annually and in long-term investments (Almenberg & Widmark, 2011). Financial literacy also incentivizes international diversification and sri. Due to the vast influence financial literacy has on the several financial behaviour dimensions under study, it is quite advisable to encourage more t financial level training from a younger age. The goal of doing so is to promote better financial behaviours in society.

Also, for financial advisement, it may be useful to take into account that extraversion contributes to future planning, and low risk products. This is because extraverted individuals are more likely to hold retirement savings plans and pension funds, than the remaining. They are also more likely to hold car and personal loans. Furthermore, they are less likely than the remaining individuals to have government bonds, which goes in accordance with their high tolerance to risk mentioned by Wong & Carducci (2013). Contrary to those who are extraverted, open individuals proved to be focused on the present. They are more likely to have insurance than individuals with other prominent traits, but they are also less likely to have a pension fund. The social side of this trait is seen in the positive relationship with crowdfunding investments. Regarding agreeableness, it proves to have a negative influence on most variables, which are statistically significant. With regard to neuroticism, as individuals become more agreeable or neurotics, they are also less likely to become investors in the securities market and

to hold digital coins. In the agreeableness case, it makes individuals less likely to participate in the stock market. The last trait analysed is conscientiousness. Individuals who are dominant in this trait seem to be cautious with risk taking, and are prepared for the future, but do not forget the present. To prove it, this study showed that they are likely to have a retirement savings plan, and considerably lower risk investments, namely in structured deposits and government bonds. To reaffirm their low tolerance to risk, empirical evidence was found that they are not likely to have complex financial products. Thus, it is possible to see in this study that not every trait of personality provokes a good behaviour, and when it does, it is not in every financial behaviour dimension.

It is important to refer that although some results are statistically non-significant, as is the case of the relationship between conscientiousness and sri, the same variable may affect financial behaviour indirectly, for example, conscientiousness contributes to higher levels of financial literacy, which in itself promotes better financial behaviours.

However, this study has some limitations. It did not have a large enough sample when considering all the groups in which it was divided (for example, there were only 5 retired people). This problem could lead to some bias in the results of the models. Also, despite the sociodemographic variables not being presented in the tables, this study does have the omitted variable bias (Wooldridge, 2009). The omission is seen in some sociodemographic categories. Plus, this study could not confirm the justifications given for some outputs, and in some cases, there was not any previous empirical research to support it.

This study also has some recommendations for future studies, such as the addition of overconfidence and perception of risk as explanatory variables. Also, these results must be studied in more detail and with bigger samples. Thus, due to technological, social and markets evolutions, many studies should be redone so that it is possible to have more updated data.

7. Notas

i. Despite some of the mentioned studies having questionnable samples, it is still important to refer them since they contribute to finding a consensus in global literature by ascertaining if in fact the results are similar across countries and cultures.

ii. All the values presented in the models are “on average” and considering the ceteris paribus philosophy.

iii. All models present robust standard errors to correct heteroscedasticity.

iv. The robust standard deviations present very low values, which is favorable to the study. It shows that the observations are not very spread, making the values accurate for bigger populations.

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Appendix 1

A influência que a literacia financeira e os traços de personalidade têm nas decisões de investimento

Este questionário insere-se no âmbito de uma dissertação de Mestrado em Finanças, na Universidade do Minho, intitulada "De que forma a personalidade e a literacia financeira influenciam as decisões de investimento". O objetivo é analisar a relação existente entre a personalidade, a literacia financeira e a decisão de investimento, de forma a contribuir para um perfil de investidor mais completo.

Sempre que alguma questão não se aplique (por não ser investidor no mercado de valores mobiliários ou não intender vir a ser), tenha em conta um cenário hipotético em que se coloca na posição de investidor e responda tendo em conta as suas preferências atuais.

É assegurada a confidencialidade e o anonimato dos dados recolhidos, que servirá apenas o propósito deste trabalho de investigação.

Este questionário é orientado para adultos com mais de 18 anos, não havendo qualquer outro tipo de restrição.

Caso intenda obter mais informações ou esclarecer alguma dúvida, por favor, contacte através do email: pg39515@alunos.uminho.pt

Desde já, agradeço a sua valiosa colaboração,

Ana Isabel Araújo

Aceito participar no presente estudo:

☐ Sim ☐ Não

Secção I – Sociodemográficos

1. Género

   ☐ Masculino ☐ Feminino ☐ Outro: _____

2. Idade: _____
3. Estado Civil

   ☐ Solteiro(a)
   ☐ União de facto
   ☐ Casado(a) por separação de bens
   ☐ Casado(a) por comunhão de bens e adquiridos
   ☐ Casado(a) por comunhão total de bens
   ☐ Divorciado(a)
   ☐ Viúvo(a)
   ☐ Outro:

4. Escolaridade

   ☐ 1º Ciclo (4º ano/4ª classe)
   ☐ 2º Ciclo (6º ano)
   ☐ 3ºCiclo (9º ano)
   ☐ Secundário (12º ano)
   ☐ Licenciatura-1º Ciclo do Ensino Superior
   ☐ Mestrado-2º Ciclo do Ensino Superior
   ☐ Doutoramento-3º Ciclo do Ensino Superior

5. Situação profissional
   - ☐ Trabalhador(a) por conta própria
   - ☐ Trabalhador(a) por conta de outrem
   - ☐ Estudante
   - ☐ Estudante-Trabalhador(a) por conta própria
   - ☐ Estudante-Trabalhador(a) por conta de outrem
   - ☐ Desempregado(a)
   - ☐ Reformado(a) / Aposentado(a)
   - ☐ Outro: _____
6. Indique o seu escalão de rendimento mensal líquido atual
   - ☐ Sem rendimento próprio
   - ☐ Entre 501€ e 1000€
   - ☐ Entre 1001€ e 1500€
   - ☐ Entre 1501€ e 2000€
   - ☐ Entre 2001€ e 2500€
   - ☐ Entre2501€ e 3500€
   - ☐ Entre 3501€ e 5000€
   - ☐ Mais de 5001€
7. Qual / Quais a(s) principal/principais fonte(s) do seu conhecimento financeiro? (Selecione no máximo 3 opções)

☐ Área(s) de estudo(s)-cursos profissionais, ensino superior e/ou outras formações

- ☐ Experiência profissional
- ☐ Experiência pessoal
- ☐ Hobbies
- ☐ Jornais de notícias
- ☐ Internet
- ☐ Internet
- ☐ Redes sociais
- ☐ Familiares
- ☐ Amigos e colegas
- ☐ Outro: _____

Secção II – Decisões de investimento

8. Que tipo de produtos financeiros detém ou já deteve?

	Detém	Não detém
Depósitos à ordem/ a prazo	☐	☐
Depósitos estruturados	☐	☐
Certificados de aforro ou do tesouro/Obrigações do tesouro	☐	☐
Ações	☐	☐
Obrigações de empresas/ papel comercial	☐	☐
Fundos de investimento (incluindo fundos de poupança reforma)	☐	☐
Planos de poupança reforma (PPR)	☐	☐
Fundos de pensões	☐	☐
Produtos financeiros complexos	☐	☐
Seguros (de saúde, vida ou automóvel)	☐	☐

	Detém	Não detém
Crédito à habitação ou com garantia hipotecária	☐	☐
Outros créditos (ex. automóvel, pessoal, ...)	☐	☐
Investimento em crowdfunding	☐	☐
Investimentos em Bitcoins, ICO ou outras moedas digitais	☐	☐

9. Que tipo de produtos pensa vir a deter no futuro? (Selecione no máximo 3 produtos)

☐ Depósitos à ordem/ a prazo
☐ Depósitos estruturados
☐ Certificados de aforro ou do tesouro/Obrigações do tesouro
☐ Ações
☐ Obrigações de empresas/ papel comercial
☐ Fundos de investimento (incluindo fundos de poupança reforma)
☐ Planos de poupança reforma (PPR)
☐ Fundos de pensões
☐ Produtos financeiros complexos
☐ Seguros (de saúde, vida ou automóvel)
☐ Crédito à habitação ou com garantia hipotecária
☐ Outros créditos (ex. automóvel, pessoal, ...)
☐ Investimento em crowdfunding
☐ Investimentos em Bitcoins, ICO ou outras moedas digitais

10. No planeamento dos seus investimentos, qual o horizonte temporal de aplicação dos seus investimentos que considera mais frequentemente? (caso não invista atualmente, tenha em conta um cenário hipotético)

☐ Compra e venda no mesmo dia (day-trade)

☐ Inferior a 6 meses

☐ Entre 6 e 12 meses

☐ Mais de 12 meses

11. Com que frequência costuma intervir no mercado de valores mobiliários (ou seja, mercados de ações, obrigações de empresas, obrigações de tesouro, unidades de participação em fundos de investimentos, futuros, opções, CFD/contracts for diferences, outros produtos derivados, produtos financeiros complexos, entre outros)?

☐ Nunca
☐ Diariamente
☐ Semanalmente
☐ Mensalmente
☐ Anualmente

12.

12.a. Invisto ou considero investir em investimentos socialmente responsáveis

☐ Discordo totalmente
☐ Discordo
☐ Indiferente
☐ Concordo
☐ Concordo totalmente

12.b. Invisto ou considero investir em mercados internacionais da zona euro

☐ Discordo totalmente
☐ Discordo
☐ Indiferente
☐ Concordo
☐ Concordo totalmente

12.c. Invisto ou considero investir em mercados internacionais expressos numa moeda estrangeira (implica riscos cambiais)

☐ Discordo totalmente
☐ Discordo
☐ Indiferente
☐ Concordo
☐ Concordo totalmente

Secção III – Aversão ao risco

13. Suponha que é o único que recebe rendimento na família, e que tem um bom emprego garantido que lhe proporciona o seu rendimento atual (familiar), para toda a vida. É lhe dada a oportunidade de aceitar um novo emprego igualmente bom, com 50% de probabilidade de duplicar o seu rendimento, e com 50% de probabilidade de o reduzir em um terço (33%). Você aceitaria o novo emprego?[16]

☐ Sim ☐ Não ☐ Não sei

14. Suponha agora que as probabilidades seriam:50% de duplicar o seu rendimento e 50% de o reduzir para metade. Você aceitaria o novo emprego?[17]

☐ Sim ☐ Não ☐ Não sei

15. Suponha que as probabilidades seriam de 50% para duplicar o seu rendimento e de 50% para o reduzir em 20%. Você aceitaria o novo emprego?

☐ Sim ☐ Não ☐ Não sei

Secção IV – Numeracia

Nesta secção as perguntas apresentadas serão de resposta aberta e curta. Caso não saiba a resposta, indique "Não sei" no campo de resposta.

16. Se a probabilidade de ficar doente é 10%. Em 1000 pessoas, quantas são esperadas que fiquem doentes? _____
17. Se 5 pessoas tiverem todas elas o número vencedor da lotaria, e o prémio for de 2 milhões de euros, quanto vai receber de prémio cada um dos vencedores? _____
18. Uma loja está em promoções e tem todos os seus produtos a metade do preço. Antes das promoções, um sofá custava €3000. Qual é o seu preço com promoção? _____
19. Um vendedor de carros em segunda mão está a vender um carro por €6000. Este preço é dois terços do valor de um carro novo igual. Quanto é que um carro igual a este custa se for novo? _____

[16] Se o participante responder "Sim", avança para a pergunta 14. Caso o participante responda "Não" ou "Não sei", avança para a pergunta 15.

[17] Independentemente da resposta, o participante avançará para a pergunta 16.

Secção V – Literacia financeira

20. Suponha que tem €100 numa conta poupança e que a taxa de juro é de 2% por ano. Ao fim de 5 anos, quanto terá nessa conta, se não efetuar movimentos?

☐ Mais de €102
☐ Exatamente €102
☐ Menos de €102
☐ Não sei
☐ Prefiro não responder

21. Considere que a taxa de juro da sua conta poupança é 1% por ano, e a taxa de inflação é de 2% por ano. Ao fim de um ano, quanto seria capaz de comprar com o dinheiro dessa conta?

☐ Mais que hoje
☐ Exatamente o mesmo que hoje
☐ Menos que hoje
☐ Não sei
☐ Prefiro não responder

22. Se as taxas de juro aumentam, o que acontece, normalmente, ao preço dos títulos de divida?

☐ Não existe relação entre o preço dos títulos e das taxas de juro
☐ Aumentam
☐ Continuam os mesmos
☐ Descem
☐ Não sei
☐ Prefiro não responder

23. Uma hipoteca de 15 anos normalmente exige pagamentos mensais mais elevados do que uma hipoteca de 30 anos, mas os juros totais que são pagos ao longo da vida do empréstimo serão menores.

☐ Verdadeiro
☐ Falso
☐ Não sei
☐ Prefiro não responder

24. Comprar ações de uma única empresa, geralmente oferece um retorno mais seguro do que um fundo mútuo de ações.

☐ Verdadeiro
☐ Falso
☐ Não sei
☐ Prefiro não responder

Secção VI – Traços de personalidade

Nesta secção ser-lhe-ão apresentadas algumas características e é pedido que indique o seu nível de concordância.

Não há respostas certas ou erradas. É pedido a máxima genuinidade.

Relembra-se o anonimato das respostas.

25. Vejo-me como alguém que....[13]

	1-Discordo Totalmente	Discordo Moderadamente	Nem concordo, nem discordo	Concordo Moderadamente	5-Concordo Totalmente
1- É falador(a)	☐	☐	☐	☐	☐
2-Tende a encontrar os defeitos dos outros	☐	☐	☐	☐	☐
3-Faz um trabalho cuidadoso	☐	☐	☐	☐	☐
4-É deprimido(a)	☐	☐	☐	☐	☐
5-É original, tem sempre novas ideias	☐	☐	☐	☐	☐
6-É reservado(a)	☐	☐	☐	☐	☐
7-É prestável e não inveja os outros	☐	☐	☐	☐	☐
8-Por vezes pode ser um pouco descuidado(a)	☐	☐	☐	☐	☐
9-É relaxado(a), ida bem com o stress.	☐	☐	☐	☐	☐
10-É curioso(a) acerca de muitas coisas diferentes	☐	☐	☐	☐	☐
11-É cheio(a) de energia	☐	☐	☐	☐	☐
12-Começa discussões/brigas com outros	☐	☐	☐	☐	☐
13-É um(a) trabalhador(a) confiável	☐	☐	☐	☐	☐
14-Pode ficar tenso	☐	☐	☐	☐	☐
15-É engenhoso(a), um(a) pensador(a) profundo	☐	☐	☐	☐	☐
16-Gera muito entusiasmo	☐	☐	☐	☐	☐
17-Perdoa com facilidade	☐	☐	☐	☐	☐
18-Tende a ser desorganizado(a)	☐	☐	☐	☐	☐
19-Preocupa-se muito	☐	☐	☐	☐	☐
20-Tem uma imaginação ativa	☐	☐	☐	☐	☐
21-Tende a ser sossegado(a)	☐	☐	☐	☐	☐
22-Geralmente é de confiança	☐	☐	☐	☐	☐
23-Tende a ser preguiçoso (a)	☐	☐	☐	☐	☐
24-É emocionalmente estável, não se aborrece facilmente	☐	☐	☐	☐	☐
25-É inventivo(a)	☐	☐	☐	☐	☐
26-Tem uma personalidade assertiva	☐	☐	☐	☐	☐

	1-Discordo Totalmente	Discordo Moderadamente	Nem concordo, nem discordo	Concordo Moderadamente	5-Concordo Totalmente
27-Pode ser frio(a) e indiferente	☐	☐	☐	☐	☐
28-É reservado(a) até a tarefa estar concluída	☐	☐	☐	☐	☐
29-Pode ser temperamental	☐	☐	☐	☐	☐
30- Valoriza experiências artísticas e estéticas	☐	☐	☐	☐	☐
31-É um pouco tímido(a) e inibido(a)	☐	☐	☐	☐	☐
32-É atencioso(a) e bondoso(a) com quase toda a gente	☐	☐	☐	☐	☐
33-Faz as coisas de forma eficiente	☐	☐	☐	☐	☐
34-Permanece calmo(a) em situações tensas	☐	☐	☐	☐	☐
35-Prefere trabalho rotineiro	☐	☐	☐	☐	☐
36-É sociável, amigável	☐	☐	☐	☐	☐
37-Por vezes é rude para outras pessoas	☐	☐	☐	☐	☐
38-Faz planos e segue em frente com os mesmos	☐	☐	☐	☐	☐
39-Fica nervoso(a) com facilidade	☐	☐	☐	☐	☐
40-Gosta de refletir, brincar com ideias	☐	☐	☐	☐	☐
41-Tem poucos interesses artísticos	☐	☐	☐	☐	☐
42-Gosta de cooperar com os outros	☐	☐	☐	☐	☐
43Distrai-se facilmente	☐	☐	☐	☐	☐
44-É talentoso(a) na arte, música ou literatura	☐	☐	☐	☐	☐

Nota: "R" = itens de pontuação revertida. Extroversão: 1, 6R, 11, 16, 21R, 26, 31R, 36; Amabilidade= 2R, 7, 12R, 17, 22, 27R, 32, 37R, 42; Conscienciosidade: 3, 8R, 1, 18R, 23R, 28, 33, 38, 43R; Neuroticismo: 4, 9R, 14, 19, 24R, 29, 34R, 39; Abertura para a experiência: 5, 10, 15, 20, 25, 30, 35R, 40, 41R, 44