

# Stock market participation and household characteristics in Europe

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## STOCK MARKET PARTICIPATION AND HOUSEHOLD CHARACTERISTICS IN EUROPE

### PURPOSE OF THE STUDY

The purpose of this study is to shed more light to limited stock market participation which has been found to have many implications on both household level and public at large. To reach this goal, I analyze a comprehensive list of stock market participation drivers and compare their explanatory power. Even though limited stock market participation is widely studied in the field of household finance, this is the first paper to comprehensively summarize a range of household characteristics associated with stock market participation and to test the robustness of these characteristics in explaining stock market participation, controlling for all relevant demographic variables.

This study focuses both on the established drivers of stock ownership, that is, wealth, risk aversion and education, and on the more recently studied drivers of stock ownership, that is, social interaction, trust, personal values, cognitive skills and health. In addition, this study introduces two new stock market participation drivers to household finance, that is, life satisfaction and conservatism, and is the first to analyze the direct effect of religiousness on the probability of holding stocks.

### DATA

This study employs data from the cross-European Survey on Health, Ageing and Retirement in Europe (SHARE), which includes a comprehensive set of questions related to various aspects of life as well as information on the respondents' financial wealth. The second wave of SHARE used in this paper includes in total 34,415 respondents and covers fourteen European countries.

### RESULTS

I find that, in addition to demographic variables and risk aversion, sociability, personal values, cognitive skills, health, life satisfaction and religion play a statistically significant role in stock market participation. Risk aversion stands out as the single most economically significant driver of stock market participation, and furthermore, all characteristics included in this study seem to explain the level of individual risk aversion. After risk aversion and demographic variables, sociability and political orientation have the most explanatory power in the probability of holding stocks. Surprisingly, trust has an insignificant effect on stockholding throughout the study. Cognitively able persons are more likely to participate in the stock market but none of the individual skills, numerical skills, recall ability and verbal fluency, stand out from the rest. Life satisfaction increases the likelihood of holding stocks, whereas poor health, religiousness and conservatism have an adverse effect on stock market participation.

### KEYWORDS

Stock market participation, risk aversion, sociability, political orientation, interpersonal trust, cognitive skills, health, life satisfaction, religiousness

## STOCK MARKET PARTICIPATION AND HOUSEHOLD CHARACTERISTICS IN EUROPE

## TUTKIELMAN TAVOITE

Tutkielman tavoitteena on valaista syitä kotitalouksien alhaiseen osakemarkkinoille osallistumiseen, koska tämä vaikuttaa sekä kotitalouksiin että yhteiskuntaan laajemmalla tasolla. Tämän tavoitteen saavuttamiseksi analysoin kattavasti osakemarkkinoille osallistumiseen vaikuttavia tekijöitä ja vertailen eri tekijöiden selittävää voimaa. Vaikkakin alhaista osakemarkkinoille osallistumisen tasoa on laajalti tutkittu kotitalouksien näkökulmasta, tämä on ensimmäinen tutkielma, joka kokoaa yhteen skaalan osakemarkkinoille osallistumiseen yhdistettyjä kotitalouksien piirteitä ja testaa näiden tekijöiden selitysvoiman kestävyyttä relevantteja demograafisia muuttujia kontrolloiden.

Tämä tutkielma keskittyy sekä vakiintuneisiin osakesijoittamiseen vaikuttaviin tekijöihin, varakkuuteen, riskiaversioon ja koulutukseen, että viimeaikoina tutkittuihin tekijöihin, sosiaaliseen aktiivisuuteen, luottamukseen, henkilökohtaisiin arvoihin, kognitiivisiin kykyihin ja terveyteen. Lisäksi esittelen tutkielmassani kaksi uutta osakesijoittamiseen vaikuttavaa tekijää, elämäntyytyväisyyden ja konservatismiin, ja tutkin ensimmäisenä uskonnollisuuden suoraa vaikutusta osakeomistamisen todennäköisyyteen.

## AINEISTO

Tämä tutkielma hyödyntää Euroopassa toteutetun kyselyn, Survey on Health, Ageing and Retirement in Europe (SHARE), aineistoa. SHARE-aineisto sisältää kattavasti tietoa vastaajien eri elämän osa-alueilta ja heidän rahallisesta varallisuudestaan. Tässä tutkielmassa käytetyssä SHARE-kyselyn toisessa aallossa on haastateltu 34,415 henkilöä ja kysely kattaa neljätoista eri Euroopan maata.

## TULOKSET

Tulokseni osoittavat, että demograafisten muuttujien ja riskiaversioon lisäksi sosiaalisuus, henkilökohtaiset arvot, kognitiiviset kyvyt, terveys, elämäntyytyväisyys ja uskonnollisuus vaikuttavat tilastollisesti merkittävästi osakemarkkinoille osallistumiseen. Riskiaversio on yksittäisistä osakesijoittamiseen vaikuttavista muuttujista merkittävin, ja lisäksi muut tässä tutkielmassa mukana olevat muuttujat vaikuttavat vastaajien yksilölliseen riskiaversio-tasoon. Riskiaversioon ja demograafisten muuttujien jälkeen sosiaalisuus ja poliittinen orientaatio vaikuttavat voimakkaimmin osakeomistamisen todennäköisyyteen. Yllättäen luottamus ei vaikuta merkittävästi osakemarkkinoille osallistumiseen tässä tutkielmassa. Kognitiivisesti taidokkaat henkilöt sijoittavat todennäköisemmin osakkeisiin, mutta yksittäisten kognitiivisten kykyjen, numeeristen kykyjen, muistin ja verbaalisen sujuvuuden, merkityksessä on vaihtelua. Elämäntyytyväisyydellä on positiivinen vaikutus osakesijoittamiseen, kun taas huono terveydentila, uskonnollisuus ja konservatismi vaikuttavat negatiivisesti osakesijoittamisen todennäköisyyteen.

## ASIASANAT

Osakemarkkinoille osallistuminen, riskiaversio, sosiaalisuus, poliittinen orientaatio, ihmistenvälinen luottamus, kognitiiviset kyvyt, terveys, elämäntyytyväisyys, uskonnollisuus

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## 1 INTRODUCTION

### 1.1 Background and motivation

Looking into the reasons why people shy away from stock market participation is important both on aggregate and on individual level. Previous studies suggest that on aggregate level stock market participation is associated with equity premium as introduced by Mehra and Prescott (1985). The equity premium puzzle originates from the fact that aggregate consumption growth correlates too little with stock returns to justify the large observed risk premium on stocks (Heaton and Lucas, 2000; Vissing-Jorgensen, 2000; Brav, Constantinides and Geczy, 2002). Mankiw and Zeldes (1991) show that differences in stockholders' and non-stockholders' consumption patterns tend to lower the questionably high levels of risk aversion necessary to justify for the size of the equity premium.

As a result of the significant equity premium, individuals participating in the stock market are able to accumulate more wealth compared to those who choose not to, controlling for the level of active saving (Mehra and Prescott, 1985). In addition to asset accumulation, stock market participation facilitates consumption smoothing which can have a significant effect on household welfare. It has been estimated that the welfare loss from not investing in stocks can be substantial, almost 2% of annual consumption in calibrated life-cycle models (Cocco, Gomes and Maenhout, 2005). Furthermore, prior studies have shown that limited stock market participation influences distribution of wealth and wealth effects on consumption. Guvenen (2006) studies a calibrated business cycle model with limited stock market participation and heterogeneity in individual elasticities of inter-temporal substitution, drawing a conclusion that limited stock market participation creates wealth inequalities. Wealth effects, on the other hand, refer to the cascade where increasing real values of assets stimulate consumption (Dynan and Maki, 2001), which in terms of stockholding means that stock price changes influence stockholders' spending patterns.

Stock market participation is relevant for a variety of public policies ranging from taxation issues to retirement plans and financial regulation. From the financial regulation and legislation point of view, those who hold stocks and other financial assets may have different attitudes towards corporate taxation issues, investment income taxation issues and redistribution compared to those who choose not participate in the stock market (e.g. Sears and Funk, 1991; Claessens and Perotti, 2007; Heinemann and Hennighausen, 2010).



Furthermore, European pension reforms are likely to increase the role of individual retirement accounts and simultaneously investors' exposure to the stock market. While these new investment opportunities come with higher expected returns, poor judgment and insufficient knowledge of allocation and trading can create financial distress and lower realized returns (Barber and Odean, 2000). More profound understanding of the factors that affect individual investors' stock market participation decisions will help to improve the quality of financial information and financial advising and investors' awareness.

Stock market participation puzzle stems from the fact that most households do not invest in stocks despite the significant risk premium and gains from diversification involved. Traditional finance theory posits that investors' willingness to take financial risks depends simply on investment opportunities and risk aversion (Markowitz, 1995; Sharpe, 1964), whereas more advanced dynamic portfolio choice models allow for changing investment opportunities, wealth, and transaction and information costs to affect household financial decisions (e.g. Samuelson, 1969; Merton, 1969, 1971; Brennan, Schwartz and Lagnado, 1997; Xia, 2001).

As household behavior does not seem to comply with the existing models, studies in the field of behavioral finance have introduced several new factors that affect household financial decisions, and the search of variables able to explain the patterns of portfolio choice in microeconomic data continues in the empirical front. However, most of the prior research on stock market participation focuses on only one determinant or one area at a time in analyzing influential individual characteristics. Recent studies have provided insight into the effect of, for example, social activity (Hong, Kubik and Stein, 2004; Georgarakos and Pasini, 2009), trust, (Guiso, Sapienza and Zingales, 2004, 2008), cognitive skills (Christelis, Jappelli and Padula, 2010; Grinblatt, Keloharju and Linnainmaa, 2010) and health (Rosen and Wu, 2004) on stock market participation.

To take a step further, this thesis is the first study to summarize a wide range of variables presumed to have an effect on individual stock market participation. The aim is to check the robustness of these variables and to define the most influential factors behind households' decision to participate in the stock market. This paper compares the effect of well-known established determinants of participation, that is, wealth, risk aversion and education, to the effect of newly adduced drivers of stock market participation, that is, social interaction, trust,

personal values, cognitive skills and health. In addition, this paper introduces two new factors behind the decision to participate in the stock market, that is, life satisfaction and conservatism, and is the first to analyze the direct effect of religiousness on stock market participation.

This thesis employs a new and unused dataset in the finance field, data from the Survey of Health, Ageing and Retirement in Europe<sup>1</sup> (SHARE). SHARE is a multidisciplinary survey on health, socio-economic status and social networks targeted at individuals aged 50 and above in fourteen European countries. Because of its comprehensive nature and broad geographical focus, SHARE fits extremely well for this study. Moreover, the second wave of SHARE has not been used in household finance studies before, thus, these results add new evidence to existing literature.

## 1.2 Results

Risk aversion stands out as the single most significant driver of stock market participation. The results also show that all other characteristics included in this study, that is, sociability, trust, political orientation, cognitive skills, life satisfaction and religion, strongly explain the level of individual risk aversion. Therefore, risk aversion seems to be an important channel through which also other drivers of stock market participation operate.

After risk aversion, sociability and political orientation are the most significant single variables to explain stock market participation. The results show that social activity and right-wing orientated personal values increase the likelihood of holding stocks supporting the findings of prior studies (e.g. Hong et al., 2004; Brown, 2008; Kaustia and Knüpfer, 2010; Kaustia and Torstila, 2010). Surprisingly, the effect of interpersonal trust remains minor throughout the analyses, which contradicts various studies in prior literature (e.g. Guiso et al., 2004, 2008; Georgarakos and Pasini, 2009).

Individuals with good cognitive abilities are more likely to invest in stocks and good cognitive abilities also reduce risk aversion, in line with findings of prior studies (e.g. Cole

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<sup>1</sup> This paper uses data from SHARE release 2.3.0, as of November 13th 2009. SHARE data collection in 2004-2007 was primarily funded the European Commission through its 5th and 6th framework programmes (project numbers QLK6-CT-2001- 00360; RII-CT- 2006-062193; CIT5-CT-2005-028857). Additional funding by the US National Institute on Aging (grant numbers U01 AG09740-13S2; P01 AG005842; P01 AG08291; P30 AG12815; Y1-AG-4553-01; OGHA 04-064; R21 AG025169) as well as by various national sources is gratefully acknowledged (see <http://www.share-project.org> for a full list of funding institutions).

and Shastri, 2009; Christelis et al., 2010; Grinblatt et al., 2010). The combined effect of all cognitive skills, that is, numeracy, recall ability and verbal fluency, is quite strong and even more economically significant than the effects of sociability and political orientation. However, none of the individually tested skills stand out from the rest. The significance and mutual order of the cognitive skills varies between different specifications and subsamples.

Poor health makes individuals forego investing in risky assets and reduces the probability of becoming a stockholder. It seems that individuals try to balance the effect of increased health risks by reducing the level of financial risks they face as suggested by Edwards (2008). Life satisfaction has not been studied in household finance before and it seems to have a similar effect on stock market participation as moderate optimism (Felton, Gibson and Sanbonmatsu, 2003; Puri and Robinson, 2007). As a result, individuals who are satisfied with their lives are more likely to make sensible economic decisions and make a conscious effort in order to improve their financial well-being. Religion has been studied before in the context of trust (Guiso et al., 2003) and sociability (Hong et al., 2004) but not in direct association with stock market participation. The results here show that religiousness clearly reduces the probability of stock market participation and increases the individual level of risk aversion. In addition, religiousness combined with strong right-wing political orientation, namely conservatism, has an adverse effect on the probability of being a stockholder.

As mentioned above, risk aversion has clearly the most explanatory power in households' stock market participation, measured as a change in the probability of being a stockholder with one standard deviation unit change in the independent variable. The second most economically significant drivers of participation are education and wealth, although, the third most economically significant factors, sociability, political orientation, religion, health and life satisfaction, do not fall short behind. Trust has a relatively small effect on stock market participation compared to other factors included in the analysis.

The effects of sociability, political orientation, life satisfaction and religion become stronger in a group of low-wealth individuals compared to high-wealth individuals. Naturally, it is easier for high-wealth individuals to overcome the barriers of stock market participation (e.g. Bertaut, 1998; Guiso et al., 2003), irrelevant of whether the barriers are defined as fixed costs, information costs or psychological costs. Low-wealth individuals in turn are more likely to take advantage of alternative information sources. In addition, the results show that females

are slightly more sensitive to the effects of personal values on stock market participation, since both political orientation and religion play more important roles in the probability of female stockholding. Sociability, on the other hand, plays a more important role in male stock market participation.

### **1.3 Contribution of the study**

This is the first paper to combine a broad list of drivers of stock market participation introduced in prior literature and to test the robustness of household characteristics associated with stockholdings. Some earlier findings, such as the effect of sociability, political orientation and cognitive skills can be confirmed even using a more comprehensive set of control variables, whereas this study fails to find support for some widely studied variables, such as trust. In addition, this study introduces two new drivers of stock market participation to household finance, that is, life satisfaction and conservatism, and is the first to study the direct effect of religion on stock market participation.

### **1.4 Structure of the study**

The rest of this thesis is structured as follows. Chapter 2 reviews briefly some previous research on household stock market and financial market participation from a behavioral point of view. Chapter 3 discusses the hypotheses. Chapter 4 describes the data and chapter 5 methodology. Chapter 6 provides the empirical results of this study. Finally, chapter 7 summarizes the results and chapter 8 concludes.

## 2 LITERATURE REVIEW

In this chapter, I first discuss the traditional theories of household financial decision making. The following sections focus on more recent findings regarding stock market participation of households in the field of behavioral finance. In the table below, I have summarized the most relevant findings of prior research.

### Panel 1. Empirical findings on limited stock market participation

The table summarizes the most important prior studies on limited stock market participation for this study. First in order are the traditional explanations, wealth, education and risk aversion, after which the table moves on to more recent explanations of limited stock market participation.

Characteristic	Effect on participation	Relevant studies
Wealth	Wealth and income are positively correlated with stock market participation. This is explained with a better ability to pay the fixed costs of participation and to diversify the household portfolio.	e.g. Bertaut (1998), Guiso, Haliassos and Jappelli (2003), Vissing-Jorgensen (2000, 2004)
Education	Education is strongly positively correlated with stock market participation even controlling for wealth and income.	e.g. Haliassos and Bertaut (1995), Campbell (2006), Cole and Shastry (2009)
Risk aversion	Risk aversion reduces the probability of investing in risky assets. Risk aversion has been found to decrease with wealth and women in general are found to be more risk averse than men.	e.g. Jianakoplos and Bernasek (1998), Sundén and Surette (1998)
Social interaction	Socially active households are more likely to invest in stocks and household stock market participation rates are positively correlated with community participation rates.	e.g. Hong et al. (2004), Brown (2008), Kaustia and Knüpfer (2010)
Trust	High levels of trust and social capital enhance financial development and increase household stock market participation. In addition, trusting individuals are more likely to invest in stocks.	e.g. Guiso et al. (2004, 2008), Georgarakos and Pasini (2009)
Personal values	Left-wing voters and politicians are less likely to hold stocks, controlling for age, gender, wealth, income and education.	Kaustia and Torstila (2010)

Cognitive skills	Strong cognitive skills reduce the human capital investment needed to participate in the stock market lowering the information costs related to stock ownership and increasing the likelihood of investing in stocks.	e.g. Cole and Shastry (2009), Christelis et al. (2010), Korniotis and Kumar (2009), Grinblatt et al. (2010)
Health	Households in poor health are less likely to hold risky financial assets in their portfolio compared to households in good health.	e.g. Rosen and Wu (2004), Edwards (2008)

## 2.1 Traditional explanations of limited stock market participation

### 2.1.1 Wealth and education

The determinants of household stock market participation are relatively well-established in the prior literature. Majority of prior literature has focused on transaction and information costs in explaining the limited stock market participation (Vissing-Jorgensen, 2004). If fixed costs are defined as time and money spent in order to invest in stocks, it is easy to understand that stock market participation increases strongly with wealth. For wealthier households the fixed costs of investing in the stock market are less likely to be a barrier of entry (e.g. Bertaut, 1998; Guiso et al., 2003). Based on empirical estimates (Paiella, 2001; Vissing-Jorgensen, 2002), relatively small fixed costs of stock market participation, being either one-time entry costs or periodic costs, can explain the low observed stock market participation rates.

However, there is significant variation in stock market participation even amongst the wealthy households (Mankiw and Zeldes, 1991; Heaton and Lucas, 2000), which challenges the theory of transaction and information costs. Another alternative is to define fixed costs as psychological barriers instead of in monetary terms. Consequently, it is not the wealth or income of a household that determines stock market participation but the psychological barriers that make participation uncomfortable for some households (Campbell, 2006). It is known that individual stock market participation interacts with some basic demographics, such as age, gender and marital status, and stock market participation has a general tendency to increase with education (Campbell, 2006).

Many papers have documented that men trade more aggressively compared to women, and that men are more likely to invest in stocks with the aggressiveness becoming more evident in the investment behavior of single men (Jianakoplos and Bernasek, 1998; Sundén and Surette, 1998; Barber and Odean, 2001). Education is found to have a strong positive effect on stock market participation of households even controlling for wealth and income (Haliassos and Bertaut, 1995). In addition, several studies have addressed the effect of education on financial decision-making in different contexts. First, Bernheim and Garrett (2003) report a significant increase in general and retirement savings rates with the provision of employer-based financial education. Second, Woodward and Hall (2010) show that college education is associated with a notable reduction in average broker fees on mortgages suggesting that broker fees may be lower for sophisticated households as less sophisticated households are willing to pay higher fees. Lastly, Cole and Shastry (2009) study education by exploiting the changes in schooling laws and report a remarkable 7% to 8% increase in the probability of financial market participation with only one additional year of schooling.

Nonetheless, it is not yet settled how education influences household investment decisions. Education can change individuals' behavior and decision making in several ways; through increasing financial literacy and cognitive skills, or by affecting social networks, job opportunities and beliefs and attitudes (Cole and Shastry, 2009). Therefore, it can be argued that education reduces the costs of stock market participation defined in broad terms, as it is easier for educated investors to understand the risk-reward trade-off of markets and to actually execute trades (Campbell, 2006). However, the nature of transaction and information costs is not yet fully understood and the distinct factors that prevent stockholding still remain a challenge for the current research.

### ***2.1.2 Risk aversion***

It has been widely documented in prior literature that risk aversion reduced the probability of stock market participation. More generally, differences in risk aversion should affect individuals' investment choices so that the more risk averse are ready to forego relatively higher expected returns for returns with lower variability. From the point of view of standard portfolio theory, the amount of wealth an individual is willing to invest in risky assets depends on his degree of risk aversion so that more risk averse investors hold safer portfolios. Some earlier literature even suggests that all differences across individuals in observed

portfolio composition should originate from differences in risk preferences (e.g. Merton, 1969; and Gollier, 2001).

Risk aversion can be argued to affect, not only portfolio composition, but the overall decision of becoming a stockholder. As mentioned above, fixed costs of investing affect individuals' stock market participation decisions (e.g. Bertaut, 1998; Paiella, 2001; Guiso et al., 2003; Vissing-Jorgensen, 2002). Therefore, strongly risk averse individuals, who in the absence of these costs would optimally invest little in the risky assets, may decide not to participate in risky asset market at all and enjoy the excess return. In this case, differences in individual risk aversion can also predict who will become a stockholder and who will not.

Risk aversion is found to be negatively correlated with wealth. Already Cohn et al. in 1975 suggested that risk aversion decreases with increasing levels of wealth resulting in wealthier households investing more in risky assets. As one could rationally expect, the effect of wealth on risk aversion becomes stronger with extremely high levels of wealth (Riley and Chow, 1992). Furthermore, gender differences are usually linked to risk aversion as mentioned above. It has been shown that men are more willing to take risks than women, and that the differences between genders grow larger in single households (Jianakoplos and Bernasek, 1998; Sundén and Surette, 1998; Barber and Odean, 2001). As wealth increases, the proportion of wealth held as risky assets is estimated to increase by a smaller amount for single women than for single men (Jianakoplos and Bernasek, 1998).

## **2.2 Explanations of limited stock market participation in recent literature**

Studies by Grinblatt and Keloharju (2001) and Stulz and Williamson (2003) first emphasized the impact of culture on stockholding and brought the cultural aspect into the attention of the finance community. Grinblatt and Keloharju (2001) find in an intra-country analysis of Finnish stockholders that households are apt to the influence of distance, language and culture, whereas Stulz and Williamson (2003) find that cultural aspects explain cross-country variation in individual stockholder rights even controlling for the legal origin of a country. Moreover, the integration of cultural aspect and financial questions has led to the development of the concept "cultural bias" (Shiller, 1999), studies on its implications for financial markets (e.g. Statman, 2006, 2008) and even to the proposition of separating "cultural finance" to its own autonomous discipline (Breuer and Quinten, 2009).



As better techniques and expanded data have become available, culture and the systematic differences in individual preferences have become an important issue in the economic field (Guiso et al., 2006). The first three aspects of more recent directions in stock market participation and investment behavior literature introduced here are broadly categorized under the heading of social stance, including social activity, trust and political orientation. I will first review the literature related to these three social stance factors in explaining individual stock investment decisions. After this, I will continue to cognitive skills, health, life satisfaction and religion as explanations of limited stock market participation.

### ***2.2.1 Social interaction***

Sociability has been one of the main focuses in recent behavioral finance research. Stock market participation can be influenced by social interaction in several different ways and through different networks. Earlier studies focus on the importance of peer-group effects on individual financial decision making, for example, it has been shown that decisions over participating in employer-sponsored retirement plans are influenced by the choices of co-workers (Madrian and Shea, 2001; Duflo and Saez, 2002).

Later on more precise channels of social interaction have been introduced to research in behavioral finance. Hong et al. (2004) describe two mechanisms through which social interaction can stimulate stock market participation. First, information can be exchanged by means of word-of-mouth communication or observational learning (Bikhchandani, Hirshleifer and Welch, 1992; Banerjee, 1992; Ellison and Fudenberg, 1993, 1995). This basically means that individuals will rather learn about investing by talking to their friends than by contacting financial professionals, which lowers the fixed psychological costs of stock market participation discussed above. Second, individuals may also enjoy discussing investments with their peers and, therefore, be more likely to invest in stocks if the participation rate is high among one's friend or other social network.

Hong et al. (2004) find that households interacting with their neighbors or attending church are more likely to participate in the stock market than non-social households. In addition, they demonstrate that sociability has stronger effect on participation in states where the overall stock market participation rate is high, and that the participation differences between social and non-social households have widened with the increase in overall stock market participation rates. Furthermore, Brown (2008) establishes a causal relation between

individual and community stock market participation and shows that on average a 10% increase in community stock ownership increases the probability of individual stock market participation by 4%. Kaustia and Knüpfer (2010) find that individuals' stock market entry decisions are affected by the stock market performance of their local peers in the previous month. Interestingly, the authors find that the peer performance effect is limited only to peers' positive financial outcomes.

Social interaction influencing stock market participation may also reflect a "keeping up with the Joneses" effect. It could be that after becoming aware of financial decisions made within one's social group, individuals follow the example and try to maintain the same level of consumption. Behavior like this is based on individuals' worry about standing out in a group, especially in a negative light. Bernheim (1994) introduces a model of conformity, where individuals conform to a homogenous standard of behavior and believe that even small departures of the common norm will impair their status. Habit formation models may also have similar effects on stock market participation (Campbell and Cochrane, 1999), as well as individuals' concerns about their relative wealth in a community (DeMarzo, Kaniel and Kremer, 2004).

Despite the results of recent research, concerns linger about the potential for unobserved characteristics that drive both stock market participation decisions and the measures of social interaction. Measures used to reflect sociability, such as education, activity in organizations and clubs, religious participation and marital status, correlate with each other in addition to correlating with stock market participation. For example, Feng and Seasholes' (2004) findings suggest that common reaction to public information, rather than word-of-mouth effects, seems to be a primary determinant of investors' trading behavior in China. Thus, the influence of social interaction on stock market participation remains partly unclear.

Social interaction and social learning function also as an additional channel for financial awareness if information distribution otherwise is scarce. Widespread financial unawareness and illiteracy raises concerns as households are facing ever more complex options in household finance and retirement planning. Guiso and Jappelli (2005) analyze the role of deficient financial awareness as an information barrier to financial market participation. The authors conclude that financial awareness is partly determined by the distributors of financial assets since dissemination of information depends on the probability of the information

receiver to actually buy assets and the costs involved in distributing information. More specifically, financial awareness is positively correlated with long-term bank relationships, intensity of social interaction and national newspaper readership. Based on the results, enhancing financial awareness would significantly increase stock market participation but not completely explain the observed low rates of stock ownership.

### ***2.2.2 Trust***

One of the recent focuses in cultural research has been on the role of trust in economic development and household financial decision making. One of the earliest studies in this area is the one of Guiso et al. (2004) identifying the effect of social capital, defined as resource of individuals that emerges from social ties and measured by voting activity and blood donations, in financial development in Italy. According to the authors, high social capital enhances the level of trust in a society, which in turn boosts financial development and increases household stock market participation. Guiso et al. (2008) further investigate the effect trust on stock market participation using the World Values Survey. In this further study they conclude that trusting individuals are significantly more likely to buy stocks and invest a larger share of their total wealth in the stock market. Interestingly, the effect of trust remains equally strong for wealthier households. Georgarakos and Pasini (2009) come to similar results in their study of trust, sociability and stock market participation with the addition that the effect of regional changes in trust is strongest in those countries where the prevailing level of trust is low.

### ***2.2.3 Political orientation***

Besides trust, this study attempts to identify the effect of political orientation on stock market participation under the broad social stance heading. Naturally political orientation, like any other individual preference, can affect investing behavior through several channels, such as risk taking, trust and social capital, and economic incentives. In a study conducted in Finland, Kaustia and Torstila (2010) find a strong positive correlation between voting for right-wing and investing in stocks. The authors address four possible explanations for the link between voting and investment behavior; political and institutional development, personal values, differences in risk aversion and change in voting behavior through changed economic incentives. The relationship appears not to be driven by differences in attitudes towards risk, and the fact that the relationship between right-wing voting and investing in stocks remains

strong even after controlling for wealth and income implies that the relationship is based on not only economic incentives but on personal values.

#### ***2.2.4 Cognitive skills***

Financial decisions are often complicated. Managing a portfolio involves a specific human capital investment in terms of effort and time from the investor to first familiarize himself or herself with the concepts involved in investing and later on to follow the market development to make justifiable financial decisions. As mentioned above, information costs can be a significant barrier of entry in the stock markets and low cognitive abilities are likely to further increase these costs.

Frederick (2005) studies the relationship between cognitive reflection and time and risk preferences. According to his findings, individuals with high scores in the Cognitive Reflection Test (CRT), which is a brief three-item cognitive ability test developed by Frederick himself, are on average more patient and appear to have lower discount rates based on questions asked on delayed monetary rewards. Interestingly, the results on risk preference show that individuals with high CRT scores are more willing to take risks in the domain of gains but less willing to take risks in the domain of losses compared to their peers with lower CRT scores. This directly contradicts the predictions of prospect theory first introduced by Tversky and Kahneman in 1979. In line with prospect theory, people will be more willing to take risks to avoid losses than to achieve gains, which means that people will switch from risk aversion to risk seeking when the prospects change from positive to negative. Thus, in Frederick's (2005) sample individuals with low CRT scores seem to best act according to prospect theory.

Similarly, Benjamin, Brown and Shapiro (2006) find using US Longitudinal Survey of Youth that more cognitively able individuals are more risk neutral over small stakes and more patient over short time horizons. Consequently, cognitively able individuals are less likely to display behaviors associated with high risk aversion or impatience, such as low levels of asset accumulation, obesity, smoking and low levels of financial market participation. In addition, Dohmen, Falk, Huffman and Sunde (2010) study a random sample of 1,000 German adults and report that lower cognitive abilities are associated with greater risk aversion and impatience even controlling for education, income and credit constraints. From this point of

view, cognitive abilities affect individual decision making through changes in time and risk preferences in addition to higher information costs.

Research in the economic and financial field regarding cognitive abilities is in line with the psychological research results above. From the economic point of view, Hanushek and Woessman (2008) show that individual earnings are systematically related to cognitive skills and that the distribution of skills in a society appears to be closely related to the distribution of income comparing developed and developing countries in a variety of international cognitive achievement tests<sup>2</sup>.

Research from the financial point of view supports the important role of cognitive skills also in financial decision making. First, Cole and Shastry (2009) use the US Longitudinal Survey of Youth to conclude that cognitive ability plays a major role in the overall decision to participate in the financial markets, whereas acquired knowledge is only associated with the decision to invest in the specific class of stocks, bonds and mutual funds. Second, Christelis et al. (2010) report, using the math, verbal and recall tests of Survey on Health, Aging and Retirement in Europe (SHARE), that cognitive abilities are strongly correlated with investment in the stock market. Finally, Grinblatt et al. (2010) find that IQ scores measured in early twenties are a significant predictor of stock market participation in the later life, controlling for all relevant demographic and occupational variables. Moreover, IQ scores remain a significant driver of stock market participation even amongst the most affluent 10% of the total sample, and high IQ individuals are also more likely to diversify their portfolios and invest in mutual funds and individual stocks. The findings of Grinblatt et al. (2010) show that mathematical subcomponent is the most influential of all IQ score subcomponents.

The psychological studies on cognitive aging indicate that both physical and cognitive abilities, especially memory, decline with age (e.g. Horn, 1968; Fair, 1994; Salthouse 2000). Agarwal, Driscoll, Gabaix and Laibson (2009) study the life-cycle patterns of financial mistakes, such as, suboptimal use of credit card balance transfer offers, misestimation of the

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<sup>2</sup> Amongst other: The Trends in International Mathematics and Science Study (TIMSS, 2003) under International Association for the Evaluation of Educational Achievement (IEA), The Programme for International Student Assessment (PISA) under Organization for Economic Co-operation and Development (OECD), The U.S. National Assessment of Educational Progress (NAEP) and the International Adult Literacy Survey (IALS).

value of one's house, and excess interest rate and fee payments. The authors find that individuals' financial sophistication and economic behavior varies with age and the pattern is similar to the relationship between cognitive abilities and age. Furthermore, Korniotis and Kumar (2009) study the role of cognitive aging on the stock investment decisions of older investors. Consistent with the financial sophistication life-cycle, the authors find that older investors have inferior investment skills and they earn on average 3% to 5% lower returns annually on a risk-adjusted basis. However, their findings indicate that older investors have accumulated greater knowledge on investing and older investors demonstrate this knowledge with wiser portfolio choices, for example, stronger preference for diversification and trading less frequently. The relationship between cognitive aging and financial decisions is particularly important for this study because of the high concentration on middle aged and older investor population.

Counter arguing the fact that superior cognitive skills lead to better reasoned financial decisions and higher probability of stock market participation, it may be also possible that low cognitive skills increase stock market participation. Oechssler, Roeder and Schmitz (2009) find a link between low cognitive ability and overconfidence in a web-based survey of 1,250 respondents in Germany. The authors use CRT to measure respondents' cognitive abilities and find that respondents with low CRT scores were significantly more likely to be subject to the conjunction fallacy, to conservatism with respect to probability updating, and to overconfidence. Numerous studies show that overconfidence increases individuals' trading activity (Barber and Odean, 2001; Grinblatt and Keloharju, 2009; Statman et al., 2006). Moreover, overconfidence is likely to manifest itself when individuals face relatively difficult tasks, such as investment decisions. Individuals with low cognitive abilities may therefore underestimate financial risks and be in fact more prone to invest in stocks.

### ***2.2.5 Health***

Rosen and Wu (2004) analyze the role of health status on household portfolio decisions using self-perceived health status data from the Health and Retirement Study (HRS) in the U.S. The authors find that households in poor health are less likely to hold financial assets compared to healthy households, and that poor health is also associated with a smaller share of financial wealth in risky assets. In addition, the study looks into the different mechanisms through which health can influence portfolio decisions but is unable to identify relation through either risk aversion, length of planning horizon, bequest motives or health insurance status. Thus,

Rosen and Wu (2004) establish a relationship between health status and portfolio choice but the channels through which it operates are not clarified.

In another health related study, Edwards (2008) examines data from the Study of Assets and Health Dynamics among the Oldest Old (AHEAD) focusing on financial risk taking after retirement. With aging and after retirement, individuals' income risk diminishes but is replaced with a higher health risk. Edwards (2008) shows that retired individuals view their health status to be risky and try to hedge against it by decreasing their exposure to financial risk. The study offers two main motivations for declining financial risk exposure; either retired investors are alarmed by the increasing medical expenditure risk or they anticipate that adverse health shocks will raise their marginal utilities by complicating home production. However, being married and having bequest motives seem to reduce the effect of poor health on financial risk taking by partially offsetting the risk of impaired home production. As the prior literature shows, health status affects individuals' willingness to take financial risks and is therefore included in this study as one potential determinant of stock market participation.

### ***2.2.6 Life satisfaction***

One completely new characteristic included in this study is self-reported life satisfaction. It can be linked to optimism which has been studied in prior research. The link between these two characteristics is relatively obvious since optimistic persons are most likely to be more satisfied with their lives, and pessimistic persons, on the other hand, are more likely to be dissatisfied with their lives. Optimism is considered to be a stable difference in individuals' tendency to hold positive generalized outcome expectancies for future events (Scheier and Carver, 1985), which can be generalized to apply to individuals who report high levels of life satisfaction.

Optimism is likely to increase effort, commitment and persistence during actions towards a chosen goal and the ability to cope with uncontrollable circumstances. Thus, optimism is often linked to various positive effects, such as better physical and mental well-being which, in turn, increase life satisfaction (Scheier and Carver, 1985, 1992). Optimists can be thought of being more likely to take active steps to improve their current or future situation since, unlike pessimists, they believe that the further effort will be useful. Consequently, as an optimistic person is confident about future success, he or she also has a greater tendency to choose risky options (Weinstein, 1980, 1984).

Even though the effects of optimism are well-documented in the health domain, the evidence on optimism and its effects in the financial domain are still versatile. Unrealistic optimism may result in investor engaging in unduly risky investment alternatives or making rushed changes in investment strategy due to active coping patterns. Felton et al. (2003) suggest that optimistic investors are more likely to search information on risky investment opportunities and that optimists may be more likely to think that risky investment will pay off in the future. Their study focuses on gender differences and trait optimism, and concludes that the difference between male and female risk taking is mainly due to optimistic male investors' behavior. Particularly unrealistic optimism can be seen as one of the precursors of overconfidence linking overconfident behavior to overly optimistic individuals. Barber and Odean (2001) report that the average male trades more frequently than the average female, and the authors suggest that the difference is caused by male overconfidence in stock picking ability. Consistent with the link between overconfidence and optimism and the results of Barber and Odean (2001), Jacobsen, Lee and Marquering (2008) show that men are more optimistic about their own future financial situation as well as the general economic outlook.

Puri and Robinson (2007) study the importance of optimism on individual economic decision making and use individuals' subjective life expectancy as a measure of optimism. The authors find that moderate levels of optimism are associated with sensible economic decisions, whereas extreme levels of optimism are associated with irrational decision making. According to the results, moderate optimists are more likely to save money, and with increasing level of optimism individuals become "stock-pickers", that is, they are more likely to have direct stockholdings and to have a larger share of their equity wealth directly invested in stocks as opposed to mutual funds and other equity investment instruments.

### ***2.2.7 Religion***

The impact of religion on economics on macro level has been established in the prior literature (e.g. Barro and McCleary, 2003; Stulz and Williamson, 2003). However, few studies have looked into how religious beliefs affect individuals' financial decision making on economic micro level. There are various potential channels through which religion can affect individual investment decisions, such as trust, sociability and risk aversion. Religious affiliation has been shown to have a significant effect on trust; being raised religiously raises the level of trust by 2% and regular attendance in religious services by 20% (Guiso et al., 2003). Therefore, it could be that religion increases the likelihood of investing in stocks by



raising overall and interpersonal trust. On the other hand, religious affiliation may have a positive effect on household social activity which could affect stock market participation through increased social interaction and social learning (Hong et al., 2004). Increased number of social interaction may also have other positive effects, such as increased level of social capital in religious regions.

On the other hand, Guiso et al. (2003) also find that stronger religious affiliation is associated with higher importance of drift and economic living. Miller and Hoffmann (1995) link risk aversion with gender differences in religiousness, whereas Hilary and Hui (2008) study religion in corporate environment and report that firms located in highly religious counties in the U.S. show lower risk exposure measured in return on equity and return on assets. The relationship between religious affiliation and drift appreciation combined with the findings that religious orientation is positively correlated with risk aversion could lead to the assumption that religious individuals are less likely to invest in risky assets such as stocks.

### 3 HYPOTHESES

#### 3.1 The effect of household characteristics on stock market participation

As the previous chapter shows, limited stock market participation has been a target of extensive interest in the household finance community over the past decade, and there are numerous monetary, informational and psychological factors that might be barriers for household stock investing. To better illustrate the different channels through which individual characteristics may affect stock market participation, one needs to consider the static standard portfolio model. In the model, investors choose to allocate wealth  $w$  between risk-free assets and risky assets. The gross return on the risk-free assets is  $R$ , and the excess return on the risky assets is  $\tilde{R}$ . The share of the risky assets of total financial wealth is  $\alpha$ .

Individuals allocate their wealth between risk-free and risky assets by solving the following problem:

$$\max_{\alpha} Eu[(\alpha\tilde{R} + R)w]$$

The first order condition of the problem is:

$$E\tilde{R}u'[(\alpha\tilde{R} + R)w] = 0$$

If the expectation of the excess return is strictly positive,  $E(\tilde{R}) > 0$ , risk averse individuals invest a positive amount in the risky asset ( $\alpha > 0$ ). Taking a first order expansion of the marginal utility around  $\alpha = 0$ ,  $u'(Rw) + \alpha w u''(Rw) \tilde{R} = 0$ , multiplying both sides by  $\tilde{R}$ , taking expectations and defining the degree of relative risk aversion as:

$$\rho(Rw) = -\frac{Rw u''(Rw)}{u'(Rw)}$$

one obtains a well-known approximation for the optimal share invested in the risky assets:

$$\alpha^* \approx \frac{RE(\tilde{R})}{\rho(Rw)E(\tilde{R}^2)}$$

where  $\rho(Rw)$  depends on wealth and other investors' characteristics. To determine the participation decision, investors compare the value of the portfolio with the participation cost  $\varphi$ ,

that is  $[\alpha^* w E(\tilde{R})] - \varphi > 0$ , which implies:

$$w > \frac{\varphi \rho(Rw) (E\tilde{R}^2)}{R[E(\tilde{R})]^2} = \frac{\varphi \rho(Rw)}{R} \left( \frac{1}{S^2} + 1 \right) \quad (1)$$

where  $S = \frac{\mu}{\sigma}$  is the portfolio Sharpe ratio;  $\mu = E(\tilde{R})$  and  $\sigma^2 = E(\tilde{R}^2) - [E(\tilde{R})]^2$  are, respectively, the mean and variance of the excess return. Condition (1) indicates that there exists a sufficiently high level of wealth that triggers participation. Condition (1) also implies that high stock market participation is associated with low fixed costs  $\varphi$  (as entry costs approach zero, all investors buy stocks), low risk aversion  $\rho(Rw)$ , and high Sharpe ratio  $S$ . The relation between individual characteristics and stock market participation may depend on each of these factors.

### 3.2 Hypothesis formation

First, stock market participation is dependent on the costs of investing. Positive correlation between wealth and stockholding is intuitive, as well as the fact that costs matter especially for those with fewer financial means. For wealthier individuals the fixed costs of investing  $\varphi$  are less likely to be a barrier of stock market participation (e.g. Bertaut, 1998; Paiella, 2001; Vissing-Jorgensen, 2002; Guiso et al., 2003). High level of wealth also reduces risk aversion  $\rho(Rw)$ , which in turn increases the probability of stock market participation (Cohn et al., 1975; Riley and Chow, 1992). Naturally, individuals with originally low level of risk aversion are more likely to invest in stocks.

However, financial market development is making stockholding ever easier for the public, simultaneously bringing down the fixed costs of stock market participation. For example, online stock trading has made stock investments faster and cheaper for investors. From theoretical point of view, the democratization of stock market access has reduced the effect of wealth and income on stockholding. Therefore, the new barriers explaining limited stock market participation are likely to rise from psychological and behavioral origins. Psychological and behavioral barriers of entry are hard to identify, address and overcome as removing these barriers requires changes in personal beliefs and behavior.

In addition to costs of investing, stock market participation is dependent on information barriers. Access to information on how to start investing and on portfolio management through familiar networks instead of contacting any formal parties most likely reduces the information gathering costs of investing, bringing the fixed costs  $\varphi$  down. Socially active households have more social interactions through which to accumulate information, and social households are therefore more likely to participate in the stock market (Hong et al., 2004). Furthermore, interpersonal trust and trust in institutions enhances financial development and motivates households to contact and seek for assistance from financial intermediaries increasing stockholding in a community (e.g. Guiso et al., 2004, 2008; Georgarakos and Pasini, 2009). Right-wing in politics is often linked to supporting free markets and capitalism, so it is natural to conclude that stockholders' and right-wing voters' personal values concur and they share the same risk preferences (Kaustia and Torstila, 2010).

However, even if a household has access to information on investing, stock market related issues are often complex and require basic knowledge of common economic concepts. This is

where education and cognitive abilities have a major role. As it is more straightforward for cognitively able or highly educated individuals to interpret financial and economic concepts, the stock market participation costs  $\varphi$  measured in time and effort are reduced resulting in a higher likelihood of participation (Cole and Shastry, 2009; Christelis et al., 2010). It has also been shown that low cognitive skills tend to increase risk aversion  $\rho(Rw)$  decreasing the likelihood of becoming a stockholder (Benjamin et al., 2006; Dohmen et al., 2007).

As mentioned above, household and individual risk tolerance can either hinder or stimulate stock market participation. I am linking high life satisfaction with optimism in this study and expecting that high life satisfaction will have similar effects on stock market participation. Optimists expect good things to happen in the future and are less intimidated by risks in general and by risks in the financial market (Felton et al., 2003). Thus, optimism and life satisfaction change individual risk preferences reducing risk aversion  $\rho(Rw)$ .

In addition, religion has been found to increase trust and be associated with social activity, which lower both risk aversion  $\rho(Rw)$  and fixed costs of participation  $\varphi$  (Guiso et al., 2003; Hong et al., 2004). However, the risk level a household or individual is able to accept in the end is related to risks stemming from other areas of life. If poor health status poses uncertainties about the future, households are less likely to engage in additional activities that are perceived to be risky (Haliassos and Bertaut, 1995; Rosen and Wu, 2004). Therefore, high levels of background risk reduce the likelihood of household stock market participation.

As a conclusion, my hypothesis is that wealth and education will have a positive effect on stock market participation, whereas risk aversion will have a negative effect on stock market participation decisions. Regarding social stance indicators, social activity, high level of trust and right-wing political orientation will be positively correlated with the probability of holding stocks. Furthermore, cognitively skilled individuals will be more likely to have stock investments. Finally, good health, high level of life satisfaction and religiousness will have a positive effect on stock market participation.

## **4 DATA**

### **4.1 SHARE data**

This thesis employs data from the Survey of Health, Ageing and Retirement in Europe (SHARE), which is a multidisciplinary and cross-national panel database on health, socio-economic status and social networks of individuals aged 50 and above and their spouses independent of their age. The interviews have been conducted in two waves, first one taking place in 2004 with in total 31,115 participants and the second one taking place between 2006 and 2007 with in total 34,415 participants. The first “baseline” wave covers diversely different regions of Europe; Scandinavia (Denmark and Sweden), Central Europe (Austria, Germany and Switzerland), Western Europe (France, Belgium and the Netherlands), and Southern Europe (Greece, Spain and Italy). Also Ireland, Czech Republic and Poland entered SHARE project in the second wave. On a household level, the survey covers 21,319 households in the first wave and 23,559 households in the second wave. The longitudinal dimension of the first two waves includes altogether 18,471 participants and 13,781 households, and data collection for the third wave of SHARE is currently in progress.

The initial goal of SHARE project was to use probability sampling in all participating countries. However, due to institutional constraints SHARE sample design is chosen in each country based on the sampling frames available. Complying with the country specific constraints, the survey sample designs use either national or multi-stage regional population register, or telephone directories sampling followed by screening on field. The objective is to reach the same number of households in the target group in each country applying country specific anticipated response rates.

The basic questionnaire has held its form through the two waves. Because of slight improvements in question format and more suitable questions for this research objective, the second wave is the primary interest of this study. The main questionnaire is partly based on the U.S. Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (ELSA), and similarly, asks detailed questions on demographics, physical and mental health, employment, income, assets, financial transfers, social activities and expectations. All questions are standardized across the fourteen countries taking part in the survey, allowing consistent international comparisons.

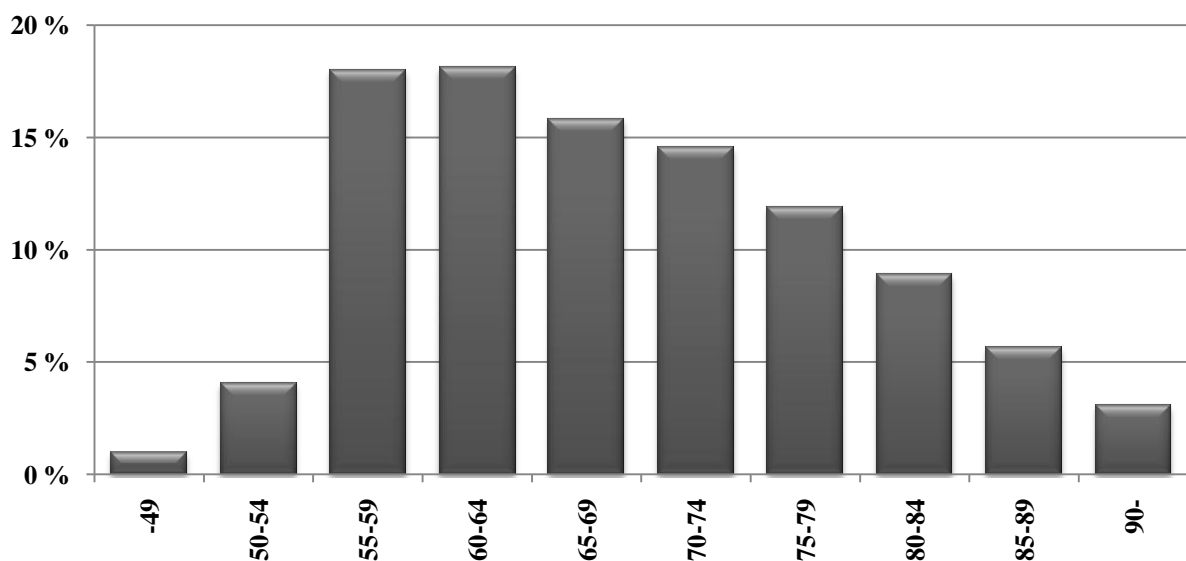
Most of the questions in SHARE (e.g. questions related to cognitive abilities, health, social activities, employment status and future expectations) are posed separately to both the main respondent and his/her partner. However, it is possible for a household to appoint one household member as a “finance responsible” to answer questions related to assets and financial transfers on behalf of the entire household. “Financial responsible” is the household member who is responsible for making financial decisions, and his/her responses are assumed to apply to all other household members.

#### 4.2 Data description

It is important to acknowledge the concentration of SHARE sample to above 50-year-old and middle-aged Europeans. The average age of the respondents is as high as 67 years (approximately 66 - 68 years in each country), the youngest participant being just under 20 years old and the oldest closer to 100 years old. The “oldest-old” individuals, aged 85 and older, constitute a large part, closer to 7%, of the whole sample. Thus, the results obtained here give a general view on how the different factors included in the study affect household stock market participation amongst the mature population in Europe. The figure below shows the age distribution of the respondents in the second SHARE wave, which is used in this study. As one can see, individuals aged 55 and above constitute a major part of the sample.

#### Figure A. Age distribution of the respondents

The figure describes the age distribution of respondents participating in the second wave of the SHARE project between 2006 and 2007. Total number of respondents in the second wave sample is 33,281 after omitting those respondents whose birth year is missing from the data.



In addition to information on different aspects of socio-economic life, SHARE dataset contains detailed information on financial and real assets owned by households. Financial assets are divided into seven different categories in the questionnaire: bank and other transaction accounts, government and corporate bonds, stocks, mutual funds, individual retirement accounts, contractual savings for housing and life insurance policies. Three main indicators of wealth are derived based on the financial assets, liabilities and real assets sections of SHARE survey. First, *financial wealth* is defined as the sum of all seven categories of financial assets: bank and other transaction accounts, government and corporate bonds, stocks, mutual funds, individual retirement accounts, contractual savings for housing and face value of life insurance policies owned by a household. *Net financial wealth* is defined as *financial wealth* less financial liabilities.

Second, *real assets* is defined as the sum of the illiquid assets of a household, that is, the sum of the value of the primary residence, the value of other real estate and the owned share of own business. *Net real wealth* is defined as *real wealth* less mortgage on real estate. Third, *household wealth* is defined as the sum of *financial wealth* and *real wealth*. *Net wealth* is the sum of *net financial wealth* and *net real wealth*. *Net wealth* describes the total amount of resources available to a household, which can be used to finance consumption after retirement, buffer the increased health risk of the late years or left as a bequest to future generations.

This study uses both direct stock ownership and indirect stock ownership to analyze the determinants of stock market participation. Direct ownership is defined as directly held stocks and indirect ownership as stocks held through mutual funds and investment accounts. Unfortunately, SHARE dataset does not include information on the exact composition of mutual funds and investment accounts between stocks, bonds and other assets. The questionnaire does, however, include information on whether the amount invested through these instruments is invested mostly in stocks, roughly equally in stocks and bonds or mostly in bonds. Stockowners are defined as those respondents who invest directly in stocks or have indirect stock investments in which the invested amount is roughly equally allocated between stocks and other instruments or mostly allocated in stocks.

The figure on the next page shows the direct and indirect stock ownership rates of households by country. As one can see, the ownership rates vary substantially across Europe; in northern

parts of Europe stock ownership is most common and the rates decline sharply moving on to the southern parts of Europe. Highest direct and indirect stock ownership rates are found from Sweden (52% and 47%, respectively), with Denmark close behind in direct ownership (47%). Stock market participation is roughly twice as high in Sweden as in Switzerland and Belgium, and more than twice as high as in France and Germany. In turn, the lowest direct stock ownership rates are found from Italy, Greece and Spain (7%, 6% and 6%, respectively), Czech Republic and Poland (4% and 1%, respectively).

**Figure B. Direct and indirect stock market participation by country**

The figure presents the country specific percentage of households having direct and indirect stockholdings. The figure is based on the second wave sample and includes fourteen European countries participating in SHARE project between 2006 and 2007. Direct ownership is defined as directly held stocks and indirect ownership as stocks held through mutual funds and investment accounts with at least half of the assets allocated to stocks.

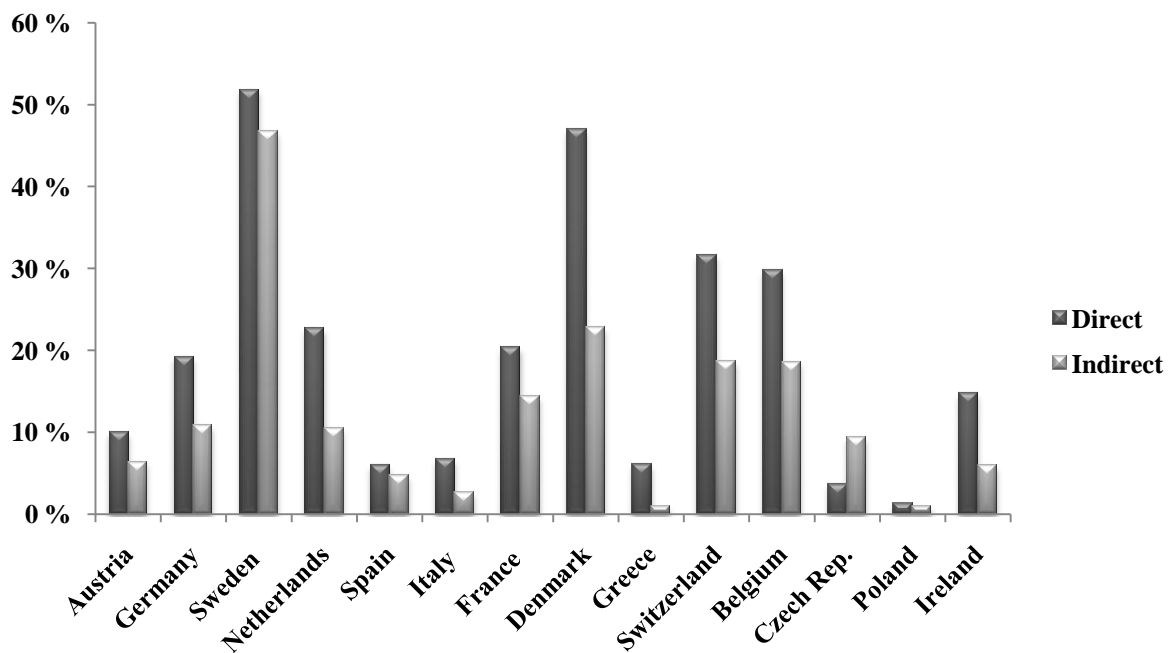


Figure B suggests that country effects are potentially quite important in explaining stockholding decisions of European investors. There are considerable differences between European countries in terms of financial markets development which also affects individual stock market participation, for example, through growth of mutual funds, role of public pension schemes and privatization programs of public utilities. Therefore, cross-country interaction is taken into account in the regression framework. On the other hand, financial market liquidity has increased in Europe as a whole. European Union directives have contributed to financial integration, liberalization and removal of remaining capital controls,



introduced International Financial Reporting Standards, as well as improved standards on corporate governance increasing transparency. These developments have expanded households' investing opportunities and lowered the costs of investing.

Table 1 on the next page summarizes the drivers of stock market participation by stock market participation status. Direct stockowners are those respondents who have invested directly in the stock market, whereas indirect stockowners have invested in stocks through funds that consist roughly equally or mostly of stocks. As established in the traditional investor behavior literature, on average both direct and indirect stock investors have higher education than non-investors (on ISCED scale from zero to six, direct stock investors exhibit average level of education of 3.38, direct and indirect stock investors the average level of 3.30 and non-investors the average level of 2.34), and stockowners are more wealthy (median net wealth of direct stockowners is EUR 305,000; of indirect and direct stockowners EUR 265,772; and of non-investors EUR 110,200) and have higher monthly incomes (median monthly income of direct stockowners is EUR 1,879; of indirect and direct stockowners EUR 1,800; and of non-investors EUR 1,200).

As one would expect, stock investors also show lower level of risk aversion median risk aversion being three for investors and four for non-investors. In line with prior literature, stock investors are socially more active (direct stockowners report 1.35, indirect and direct stockowners 1.29, and respondents with no stock ownership 0.65 activities per month on average), have higher interpersonal trust (direct stockowners report 6.41, direct and indirect stockowners 6.34, and respondents with no stock ownership 5.47 score of interpersonal trust on a scale from zero to ten), and are politically more right-wing orientated compared to non-investors (direct stockowners report 5.57, direct and indirect stockowners 5.45, and respondents with no stock ownership 5.19 score on left-right axis political orientation scale from zero to ten). Stock investors also seem to have on average higher cognitive skills measured with the numerical test (direct stockowners score on average 3.81, direct and indirect stockowners 3.79, and respondents with no stock ownership 3.21 on a scale from one to five), as well as measured with the recall ability and verbal fluency tests.

**Table 1. Descriptive statistics - Summary by stock market participation status**

This table summarizes individual characteristics by stock market participation status. The respondents are divided into three groups: direct ownership, indirect and direct ownership and no ownership. In the first group respondents have invested directly into stocks, in the second group respondents hold stocks either directly or indirectly through funds consisting mostly of equity. In the third group respondents hold no stock investments. Age is reported as a number value by the respondents. Respondents' education level is classified based on UNESCO's International Standard Classification of Education (ISCED) ranging from zero (=preprimary education) to six (=second stage of tertiary education). Risk aversion, social activity, life satisfaction, health, numeracy score, trust and left-right political orientation are reported by the respondents using the scales shown below each variable. Income is the respondents' monthly income after taxes. Net wealth is the sum of financial and real wealth less total liabilities, as reported by the respondents.

	N	Age	Education ISCED (0-6)	Risk aversion (1-4)	Social activity (0-6)	Life satisfaction (0-10)	Health (0-10)	Numeracy (1-5)	Trust (0-10)	Left-right (0-10)	Religion (0-5)	Income (€)	Net wealth (€)
Stock market participation status:													
<b>Direct</b>	5,459												
Average		65.47	3.38	3.16	1.35	8.24	7.71	3.81	6.41	5.57	1.53	2,984	578,150
Median		64	3	3	1	8	8	4	7	5	1	1,879	305,000
St.dev.		9.28	1.44	0.84	1.26	1.39	1.60	1.06	2.37	2.18	1.73	9,710	2,967,258
<b>Direct and indirect</b>	8,182												
Average		64.68	3.30	3.23	1.29	8.19	7.67	3.79	6.34	5.45	1.45	2,634	489,621
Median		63	3	3	1	8	8	4	7	5	1	1,800	265,772
St.dev.		9.19	1.44	0.81	1.24	1.41	1.61	1.05	2.36	2.23	1.71	7,894	2,544,030
<b>Non-investors</b>	25,044												
Average		67.94	2.34	3.82	0.65	7.34	6.73	3.21	5.37	5.19	2.35	1,762	230,185
Median		67	2	4	0	8	7	3	5	5	2	1,200	110,200
St.dev.		10.64	1.42	0.47	0.98	1.84	1.99	1.16	2.55	2.29	1.90	4,448	1,910,351
<b>Total</b>	33,226												
Average		67.15	2.61	3.68	0.81	7.56	6.97	3.35	5.61	5.27	2.13	2,102	301,727
Median		66	3	4	0	8	7	3	6	5	2	1,432	150,000
St.dev.		10.42	1.48	0.62	1.09	1.78	1.95	1.17	2.54	2.27	1.89	5,989	2,087,494

Both direct and indirect stockholders report higher self-perceived health status compared to the group of non-investors (direct stockowners report on average 7.71, indirect and direct stockowners 7.67, and non-investors 6.73, on a scale from zero to ten, where ten represents excellent health). In line with the health results, stock investors also report on average higher life satisfaction compared to the non-investors (direct stockowners 8.24, indirect and direct stockowners 8.19, and non-investors 7.34, on a scale from zero to ten). Interestingly, stock investors seem to be on average less religious compared to the non-investing group (direct stockowners 1.53, indirect and direct stockowners 1.45, and non-investors 2.35, on a scale from zero to five where zero stands for non-religiousness). As religious affiliation is measured with a question on how often the respondents pray, the measure of religious affiliation does not seem to capture the aspect of higher social activity that is associated with intensity of religious affiliation in prior literature (Hong et al., 2004). Moreover, religiousness does not

seem to increase respondents' interpersonal trust as suggested by Guiso et al. (2003). Instead, it seems that religiousness affects respondents' risk aversion and as a result it may lower the probability of investing in stocks.

Table 2 on the next page summarizes the determinants of stock market participation included in this study showing the country-level differences in wealth, risk aversion, sociability, trust, political orientation, cognitive skills, health, life satisfaction and religious affiliation. As Table 2 shows, the sample used in this study is evenly distributed between the fourteen European countries including all together 34,415 individual respondents.

Individuals in Denmark, Germany, Switzerland and Ireland are most likely to have a university or other post-secondary education degree. The respondents hold the least post-secondary degrees in Spain, Italy and Greece, where only approximately one tenth have completed any form of higher education. Cognitive test results show mixed results between the countries, and it seems that numeracy and recall ability tests are most correlated with actual education level. Spain, Italy and Poland perform the poorest on average in the numerical skills test, while the other countries perform more constantly. Similarly, Spain, Italy and Poland underperform other countries in the recall ability test. On the contrary, the Netherlands, Greece and Ireland score slightly lower test results compared to the rest of the countries in the verbal fluency test.

As expected, the risk aversion levels do not differ significantly between countries. All countries are strongly tilted towards high risk aversion and the average scores are situated close to the total sample average of 3.68 on a scale from one to four, where four represents the highest level of risk aversion. The median risk aversion is four in each of the fourteen countries; Sweden holds the lowest average risk aversion of 3.31 and Spain the highest risk aversion of 3.91.

Social activity is measured in the number of social activities in last month. The most socially active countries are Sweden and Ireland (average of social interactions 1.34 and 1.30 per month, respectively), and the most socially inactive countries are Poland and Spain (average of social interaction 0.26 and 0.29 per month, respectively). Denmark and Sweden have the highest average level of interpersonal trust (on a scale from zero to ten, 7.34 and 6.55 respectively). The lowest interpersonal trust levels are in France, Greece and Italy (on average

**Table 2. Descriptive statistics - Summary by country**

This table summarizes individual characteristics by country. The study includes altogether fourteen European countries. Age is reported as a number value by the respondents. Respondents' education level is classified based on UNESCO's International Standard Classification of Education (ISCED) ranging from zero (=preprimary education) to six (=second stage of tertiary education). Risk aversion, social activity, life satisfaction, health, numeracy score, trust and left-right political orientation are reported by the respondents using the scales shown below each variable. Income is the respondents' monthly income after taxes. Net wealth is the sum of financial and real wealth less total liabilities, as reported by the respondents. The statistics for left-right orientation in France are not presented because of major item non-response.

	N	Age	Education ISCED (0-6)	Risk aversion (1-4)	Social activity (0-6)	Life satisfaction (0-10)	Health (0-10)	Numeracy (1-5)	Trust (0-10)	Left-right (0-10)	Religion (0-5)	Income (€)	Net wealth (€)
<b>Country:</b>													
<b>Austria</b>	1341												
Average		69.08	2.92	3.81	0.70	7.63	6.65	3.69	5.62	5.22	2.00	1,514	167,071
Median		68	3	4	0	8	7	4	5	5	2	1,450	114,000
St.dev.		9.64	1.32	0.46	1.03	1.93	1.03	1.06	2.33	2.12	1.64	849	256,266
<b>Germany</b>	2568												
Average		67.28	3.40	3.70	0.84	7.65	6.79	3.68	5.38	4.81	1.72	2,303	230,765
Median		67	3	4	0	8	7	4	5	5	1	1400	130000
St.dev.		9.67	1.06	0.55	1.10	1.76	1.99	1.13	2.38	1.81	1.76	10,078	1,155,154
<b>Sweden</b>	2745												
Average		68.81	2.74	3.31	1.34	8.31	7.46	3.63	6.55	5.26	1.01	1,769	391,411
Median		67	3	4	1	8	8	4	7	5	0	1,629	138,979
St.dev.		10.25	1.55	0.95	1.26	1.52	1.90	1.09	2.41	2.57	1.52	1,640	3,477,708
<b>Netherlands</b>	2661												
Average		66.17	2.81	3.69	1.23	7.93	7.47	3.66	6.32	5.42	1.99	2,019	293,671
Median		64	2	4	1	8	8	4	7	5	1	1,500	185,750
St.dev.		9.92	1.37	0.60	1.26	1.16	1.35	1.16	2.09	2.15	2.10	5,259	1,287,118
<b>Spain</b>	2228												
Average		68.87	1.62	3.91	0.29	7.27	6.45	2.51	5.60	4.85	2.32	2,137	464,921
Median		68	1	4	0	8	7	3	6	5	2	1,200	165,000
St.dev.		11.01	1.35	0.34	0.62	1.85	2.08	1.07	2.29	2.09	1.83	5,986	5,044,434
<b>Italy</b>	2983												
Average		67.68	1.91	3.82	0.37	7.20	6.87	2.93	4.71	5.17	2.90	2,130	279,718
Median		67	1	4	0	8	7	3	5	5	3	1,300	200,000
St.dev.		9.69	1.23	0.47	0.73	1.87	1.90	1.08	2.69	2.56	1.77	4,940	370,983
<b>France</b>	2968												
Average		67.22	2.50	3.74	0.87	7.32	7.07	3.11	4.57	-	1.88	2,209	376,457
Median		66	3	4	1	8	8	3	5	-	0	1,589	205,600
St.dev.		11.16	1.73	0.54	1.13	1.78	1.88	1.23	2.81	-	2.44	3,416	2,127,061
<b>Denmark</b>	2616												
Average		66.30	3.37	3.42	1.21	8.50	7.70	3.59	7.34	5.63	1.20	2,304	360,306
Median		65	3	4	1	9	8	4	8	5	1	2,094	211,993
St.dev.		10.76	1.42	0.77	1.13	1.43	1.91	1.16	2.08	2.12	1.57	4,365	615,551
<b>Greece</b>	3243												
Average		66.43	2.17	3.75	0.56	7.06	6.91	3.40	4.70	5.45	3.32	1,817	298,991
Median		65	2	4	0	7	2	3	5	5	4	1,200	120,000
St.dev.		10.89	1.53	0.58	0.77	1.59	1.75	1.11	2.31	2.49	1.42	2,596	3,156,730
<b>Switzerland</b>	1462												
Average		67.02	2.95	3.62	1.24	8.37	7.81	3.83	6.49	5.24	2.28	4,673	477,377
Median		66	3	4	1	9	8	4	7	5	2	2,468	246,761
St.dev.		10.73	1.16	0.62	1.31	1.46	1.71	1.01	2.21	2.04	1.79	13,094	1,111,035
<b>Belgium</b>	3169												
Average		67.22	2.77	3.67	1.02	7.63	7.22	3.36	5.25	5.17	1.78	2,000	294,042
Median		65	3	4	1	8	8	3	5	5	1	1,600	226,500
St.dev.		10.69	1.50	0.58	1.18	1.45	1.61	1.10	2.42	2.06	1.78	2,560	355,023
<b>Czech Rep.</b>	2830												
Average		66.21	2.47	3.67	0.47	7.03	6.26	3.49	5.76	5.15	0.92	599	58,458
Median		65	2	4	0	7	6	4	6	5	0	441	46,214
St.dev.		10.02	1.11	0.55	0.75	1.94	2.09	1.10	2.20	2.34	1.50	853	57,216
<b>Total</b>	34415												
Average		67.15	2.61	3.68	0.81	7.56	6.97	3.35	5.61	5.27	2.13	2,102	301,727
Median		66	3	4	0	8	7	3	6	5	2	1,432	150,000
St.dev.		10.42	1.48	0.62	1.09	1.78	1.95	1.17	2.54	2.27	1.89	5,989	2,087,494

**Table 2. Descriptive statistics - Summary by country (continued)**

This table summarizes individual characteristics by country. The study includes altogether fourteen European countries. Age is reported as a number value by the respondents. Respondents' education level is classified based on UNESCO's International Standard Classification of Education (ISCED) ranging from zero (=preprimary education) to six (=second stage of tertiary education). Risk aversion, social activity, life satisfaction, health, numeracy score, trust and left-right political orientation are reported by the respondents using the scales shown below each variable. Income is the respondents' monthly income after taxes. Net wealth is the sum of financial and real wealth less total liabilities, as reported by the respondents.

	N	Age	Education ISCED (0-6)	Risk aversion (1-4)	Social activity (0-6)	Life satisfaction (0-10)	Health (0-10)	Numeracy (1-5)	Trust (0-10)	Left-right (0-10)	Religion (0-5)	Income (€)	Net wealth (€)
<b>Country:</b>													
<b>Poland</b>	2467												
Average		66.27	2.27	3.88	0.26	6.55	5.63	2.92	5.14	5.71	3.43	407	40,694
Median		64	3	4	0	7	5	3	5	5	4	269	25,994
St.dev.		10.21	1.30	0.41	0.60	2.14	2.17	1.12	2.66	2.53	1.52	468	78,628
<b>Ireland</b>	1134												
Average		66.22	3.27	3.66	1.30	8.18	7.65	3.36	6.19	5.56	3.51	4,384	672,286
Median		64	4	4	1	8	8	4	7	5	4	2,000	377,500
St.dev.		9.95	1.69	0.65	1.36	1.64	1.78	1.11	2.66	1.92	1.54	12,577	1,862,846
<b>Total</b>	34415												
Average		67.15	2.61	3.68	0.81	7.56	6.97	3.35	5.61	5.27	2.13	2,102	301,727
Median		66	3	4	0	8	7	3	6	5	2	1,432	150,000
St.dev.		10.42	1.48	0.62	1.09	1.78	1.95	1.17	2.54	2.27	1.89	5,989	2,087,494

4.57, 4.70 and 4.71, respectively). The most politically left-wing orientated respondents are in Germany and Spain (with political orientation on a scale from zero to ten on average 4.81 and 4.85, respectively). In turn, the most right-wing orientated respondents are in Poland and Denmark (with political orientation on average 5.71 and 5.63, respectively).

The percentage of couples is on average 75% in the whole sample but varies considerably across the survey countries ranging from 61% in Austria to 80% in Italy. As expected, the percent of retired individuals in each SHARE country is significant. A more surprising finding is the somewhat large variation in cross-country retirement rates. For example, in the Netherlands and Ireland only one third of the sample respondents are retired, whereas nearly two thirds of the Austrian and Czech samples are retired individuals. On average, the respondents report their health to be slightly better than fair. Average health scores range from 5.63 to 7.81 on a scale from zero to ten, where ten stands for excellent health. Poorest health is reported in Poland and Czech Republic, and the best health conditions in Denmark and Switzerland. Only around one fifth of the whole sample report having physical limitations that disturb daily activities, consistently with the health scores. In line with the health results, Denmark and Switzerland seem to have the most satisfied respondents (on scale from zero to ten, on average 8.50 and 8.37, respectively) and Poland, Czech Republic and Greece the most dissatisfied respondents (on average 6.55, 7.03 and 7.06, respectively).

Religious affiliation varies significantly across the countries. Religious orientation is most intense in Ireland, Poland and Greece (on a scale from zero to four, where zero stands for non-religious, on average 3.51, 3.43 and 3.32, respectively). The results are not surprising since religious practices are held in high esteem in both Ireland and Poland, where the majority of people are Roman Catholic. Similarly, the Orthodox Church in Greece has a relatively strong position in society compared to other European countries. As expected, the most non-religious countries are Czech Republic (average 0.92), Sweden (average 1.01) and Denmark (average 1.20). Czech Republic is commonly known as the most atheist country in Europe, and religion in general plays a less important role in the Nordic countries. As in Finland, also in Sweden and Denmark most people belong to the church but are inactive members and do not regularly attend to service.

Household gross financial wealth also varies widely across Europe, with Switzerland clearly above the rest (with on average EUR 79,000 in financial assets), followed by Sweden, while households in Italy, Spain, Greece, Czech Republic and Poland report the lowest gross financial wealth (on average clearly under EUR 10,000 per respondent). The ranking between Scandinavian and Mediterranean countries is somewhat reversed if one looks at real assets, with Switzerland, France and Spain holding the lead, Sweden, the Netherlands and Belgium the middle places, and Poland, Czech Republic and Austria holding the least real assets. Household net wealth on average is highest in Ireland, Switzerland and Spain and lowest in Poland and Czech Republic. Also in terms of individual monthly income Switzerland and Ireland rank the highest, and Poland and Czech Republic the lowest individual income.

The correlations between the different variables are shown in the correlation matrix on next page, in Table 3. None of the relationships between different variables stand out as especially correlated or surprising in the direction of correlation. One of the most interesting results in the table can be seen in the first column. It seems that risk aversion is most strongly correlated with stockholding, taking into account all other variables in the analyses, even individual net wealth. This suggests that risk aversion has also the strongest explanatory power in stock market participation.

**Table 3. Correlation matrix**

This matrix shows the correlations between the variables explaining stock market participation. Stock ownership (dummy) expresses whether respondent has either directly or indirectly invested in stocks. Secondary and post-secondary dummies express the respective education levels. Risk aversion expresses that respondents' willingness to take financial risks. Net wealth is the sum of financial and real wealth less total liabilities, as reported by the respondents. Sociability, trust, left-right political orientation, numeracy, recall ability, health, life satisfaction and religion are reported by the respondents using the scales shown next to each variable. Verbal fluency is measured by asking the respondent to name as many animals in one minute as he or she can recall, and the verbal fluency score is the number of animals the respondent names. Correlation coefficients above the threshold of 0.30 (and below -0.30) are highlighted.

N = 15269	Stock ownership (dummy)	Age	Male (dummy)	Secondary (dummy)	Post-secondary (dummy)	Riskaversion (1-4)	Log (net wealth)	Sociability	Trust (0-10)	Left-right (0-10)	Numeracy (1-5)	Recall ability (0-10)	Verbal fluency	Self-reported health (0-10)	Life satisfaction (0-10)	Religion (0-5)
Stock ownership (dummy)	1															
Age	-0.135	1														
Male (dummy)	0.082	0.027	1													
Secondary (dummy)	0.194	-0.282	0.067	1												
Post-secondary (dummy)	0.207	-0.123	0.085	<b>0.307</b>	1											
Riskaversion (1-4)	<b>-0.408</b>	0.160	-0.122	-0.168	-0.195	1										
Log (net wealth)	0.269	-0.127	0.102	0.133	0.194	-0.207	1									
Sociability	0.241	-0.131	0.021	0.188	0.211	-0.189	0.162	1								
Trust (0-10)	0.173	-0.037	0.011	0.130	0.129	-0.123	0.070	0.180	1							
Left-right (0-10)	0.057	0.054	0.005	0.006	-0.022	-0.056	0.087	0.005	0.027	1						
Numeracy (1-5)	0.218	-0.234	0.178	<b>0.368</b>	0.254	-0.216	0.165	0.196	0.166	0.012	1					
Recall ability (0-10)	0.207	<b>-0.357</b>	-0.060	<b>0.337</b>	0.232	-0.172	0.148	0.222	0.149	0.005	<b>0.396</b>	1				
Verbal fluency	0.292	-0.274	0.022	<b>0.316</b>	0.242	-0.204	0.140	0.258	0.152	-0.012	<b>0.365</b>	<b>0.433</b>	1			
Self-reported health (0-10)	0.213	-0.230	0.047	0.188	0.163	-0.162	0.236	0.222	0.182	0.055	0.231	0.253	0.227	1		
Life satisfaction (0-10)	0.210	-0.049	0.058	0.147	0.120	-0.130	0.199	0.183	0.226	0.079	0.180	0.187	0.190	<b>0.489</b>	1	
Religion (0-5)	-0.207	0.163	-0.204	-0.186	-0.092	0.150	-0.018	0.033	-0.069	0.130	-0.172	-0.120	-0.206	-0.097	-0.065	1

### **4.3 Non-response**

Overall item non-response rate (respondent refuses to answer or answers “I don’t know”) is relatively small in SHARE project, although, non-response rates vary between different questionnaire sections. For example, there are hardly any missing responses in demographic, physical and mental health, and current job situation sections, but questions on income, assets and debts and personal values suffer more from non-response. The particularly important questions for this analysis regarding wealth and income have comparable non-response rates to related surveys, the English Longitudinal Survey of Aging (ELSA) and the Health and Retirement Study (HRS) in the U.S.

If the respondent refuses to respond or answers “don’t know” to a wealth or income related question, he or she is then offered an option to indicate an estimate of the right amount by stating whether it is less, between or more than three “value points” given to the respondent. The option to answer using the value points increases respondents’ willingness to give answers especially to questions regarding household finance. For example, in the question on employment income, approximately 83% of the sample employees give a continuous answer and half of the 17% original non-respondents give an answer using the value points. The samples collected from each SHARE country vary in sample design and apart from probability sampling due to institutional constraints. The overall household response rate is approximately 60%, thus, unit non-response could bias the results.

## **5 METHODS**

In this chapter, I will present the most important methodology employed in the study. The first section briefly discusses the regression model, and the following section is dedicated to explain the variables included in the analysis to measure the different individual characteristics used to explain stock market participation decisions.

### **5.1 Econometric specification**

As one could assume, many of the socio-economic variables describing individuals and households are correlated with each other. For example, education is positively correlated with wealth and income, as well as cognitive skills are positively correlated with education. To take into account this correlation and to isolate the effect of each factor while holding



others constant, household participation in the stock markets is estimated with probit regressions. The regressions control, not only for the wide range of potential drivers of limited stock market participation, but dummies for different participant countries and additional demographics, such as, age and gender. Measures to estimate the different variables explaining stock market participation are presented in Panel 2 on the next page.

When considering participation in the stock market, households compare the utility gain from being a stockowner to the market entry costs. Stockholders' utility function can be modeled with a function of respondent characteristics and an error term as follows:

$$y_i^* = X_i'\beta + u_i$$

In the function,  $i$  is the individual and  $X_i$  is the variables affecting the utility gain from stock ownership. Thus,  $X_i$  is the observable individual characteristics that potentially affect stock market participation decisions. Unobservable variables affect utility through the error term  $u_i$ , a standard normally distributed term. Individual  $i$  invests in stocks if  $y_i^* \geq 0$ , thus, the probability of stockownership is  $\Phi(X_i\beta)$ . If the unobserved variables  $u_i$  are normally distributed, probit model can be used in estimating  $\beta$  with standard maximum likelihood methods.

Country dummies are used in all of the specifications to allow the intercept and slope coefficients to differ across countries. A test regression without the country dummies is included in the Appendix (Table 27).

### 5.3 Variables

In this section, the variables in the econometric specification are presented. The panel below, Panel 2, summarizes these variables, and a more detailed description of the questions used in SHARE and individual characteristics included in this study can be found after the panel.

Stockholders' utility function takes the following form with the variables of the econometric specification included:

$$y_i^* = W_i\beta_i + E_i\beta_i + S_i\beta_i + T_i\beta_i + P_i\beta_i + C_i\beta_i + H_i\beta_i + L_i\beta_i + R_i\beta_i + u_i$$

## Panel 2. Measures of variables explaining stock market participation

The table summarizes the different measures used in the analysis to describe the different behavioral and psychological characteristics of individuals explaining stock market participation decisions.

Characteristic	Measure
Net wealth ( <i>W</i> )	Net wealth is the sum of net financial wealth and net real wealth. Net financial wealth is defined as the sum of financial assets less financial liabilities. Net real assets is the total value of primary residence, other real estate and owned share of own business less mortgage on real estate.
Education ( <i>E</i> )	Education is classified using ISCED-97 coding. A dummy denoting secondary degree is assigned to those who have completed secondary education degree (ISCED levels 2-4), and a dummy denoting post-secondary degree is assigned to those who have completed post-secondary non-tertiary or tertiary degree (ISCED levels 5-6).
Social interaction ( <i>S</i> )	Social activity is measured as the sum of activities participated in last month. Activities include voluntary or charity work, care for a sick or disabled, help for family, friends or neighbors, taking part in educational or training courses, sport, social or other clubs, religious organizations or political and community-related organizations. Social activity dummy is assigned to those who have participated in one or more social activities in last month.
Trust ( <i>T</i> )	Trust level is measured with a common interpersonal trust question where the answer is given on a scale from zero to ten (zero stands for “one can't be too careful” and ten stands for “most people can be trusted”). Trust dummy is assigned to those whose trust level is above five.
Political orientation ( <i>P</i> )	Political orientation is measured on a scale from zero to ten, where zero represents left-wing and ten represents right-wing. Right-wing dummy is assigned to those whose political orientation is above five in the left-right axis.
Cognitive skills ( <i>C</i> )	Numeracy is measured with four numerical questions and scored from one to five. The indicator of verbal fluency is based on a question to name as many different animals as possible in one minute time. Recall ability is measured with a 10-word list recall test.
Health ( <i>H</i> )	Health is based on self-estimated physical condition on a scale from zero to ten (zero stands for poor health and ten stands for excellent health). Poor health dummy is assigned to those who report health status lower than five on the scale from zero to ten.

Life satisfaction ( <i>L</i> )	The respondents score their life satisfaction on a scale from zero to ten; most satisfied equaling to the score of ten. High life satisfaction scores are considered to reflect optimism. A dummy for highly satisfied individuals is assigned to those who report a life satisfaction score above five.
Religion ( <i>R</i> )	Religion is measured on a scale from zero to five, where zero stands for being non-religious. Religion dummy is assigned to those who report to be religious.

### ***Wealth and income***

As mentioned above, *net wealth* is used as a wealth control in the econometric specifications, and it is defined as the sum of *net financial wealth* and *net real wealth*. *Net financial wealth* is the sum of all seven categories of financial assets: bank and other transaction accounts, government and corporate bonds, stocks, mutual funds, individual retirement accounts, contractual savings for housing and face value of life insurance policies, less financial liabilities. *Net real wealth* is defined as the sum of respondents' illiquid assets less mortgage on real estate. *Net wealth* is chosen as the wealth control variable because it describes the total amount of resources available to a respondent. These resources are available to be used to finance consumption after retirement, buffer the increased health risk of the late years or left as a bequest to future generations. To take into account the large variance in high-wealth individuals' net wealth, log transformation is used to normalize the *net wealth* data.

### ***Education***

The education level of the respondents is standardized using the International Standard Classification of Education 1997 (ISCED-97) coding (based on the guidelines of "Classifying Educational Programmes: Manual for ISCED-97 Implementation in OECD Countries"). ISCED coding was designed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1970s to enable internationally comparable scaling of education. In this study, both secondary and post-secondary education degree dummies are used. Secondary education dummy takes the value of one if the respondent has completed a degree corresponding levels 2-4 in ISCED coding. Similarly, post-secondary education dummy takes the value of one if the respondent has completed a degree corresponding levels 5-6 in ISCED coding.

### ***Risk aversion***

The concept of risk aversion is first introduced to the respondents and then a related question posed as follows: “When people invest their savings they can choose between assets that give low return with little risk to lose money, for instance a bank account or a safe bond, or assets with a high return but also a higher risk of losing, for instance stocks and shares. Which of the statements on the card comes closest to the amount of financial risk that you are willing to take when you save or make investments?” The possible responds are:

- a) Take substantial financial risks expecting to earn substantial returns
- b) Take above average financial risks expecting to earn above average returns
- c) Take average financial risks expecting to earn average returns
- d) Not willing to take any financial risks

Respondents who are not willing to take any financial risks are categorized as risk averse and risk aversion dummy is assigned to these respondents.

### ***Sociability***

The measure of sociability is based on the following question in the SHARE questionnaire: “How often in the last four weeks did you take part in the following activities?”

- Possible answers are:
- a) Voluntary or charity work
  - b) Care for a sick or disabled adult
  - c) Help for family, friends or neighbors
  - d) Attendance of an educational or training course
  - e) Participation in a sport, social or other kind of club
  - f) Taking part in a religious organization (e.g. church, synagogue)
  - g) Taking part in a political or community-related organization
  - h) None of these.

Social activity is measured as the sum of activities done in the last month on individual level. Sociability dummy takes the value of one if the respondent in question has participated in one or more social activities in last month. This follows the example of Georgarakos and Pasini (2009) who use SHARE questionnaire in studying the effects of trust and sociability on stock market participation.

### ***Trust***

The following question is used as the measure of trust: “Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?” This “Interpersonal Trust” question appears in similar form in almost all international comparative surveys, for example, World Value Survey. The respondent is asked to give the answer on a scale from zero to ten, where zero means “one can't be too careful” and ten means “most people can be trusted”. Trust dummy is assigned to those individuals who report their trust level to be above five on the scale from zero to ten.

### ***Political orientation***

The left-right political spectrum is a common way of classifying political positions. Here the following question is used as the measure of political orientation: “In politics people sometimes talk of “left” and “right”. On a scale from zero to ten, where zero means the left and ten means the right, where would you place yourself?” Following the example of Kaustia and Torstila (2010), dummy for right-wing supporter is included, defined as a score above five in the left-right spectrum.

### ***Cognitive skills***

SHARE questionnaire holds four questions on numeracy stated below. The answers are scored on a scale from one to five, where highest score is given for the most correct answers<sup>3</sup>. Possible answers are shown in a card to the respondent.

1. *If the chance of getting a disease is 10%, how many people out of one thousand would be expected to get the disease?*

The possible answers are:

- a) 100
- b) 10
- c) 90
- d) 900
- e) Other

---

<sup>3</sup> If the respondent answers Question 1 correctly he or she is then asked Question 3. If the respondent answers correctly again he or she is asked Question 4. Answering Question 1 correctly results in a score of three, answering Question 3 correctly, but not Question 4, results in a score of four. Answering Question 4 correctly results in a score of five. If the respondent answers Question 1 incorrectly, he or she is directed to Question 2. If the respondent answers Question 2 correctly he or she gets a score of two. If the respondent answers Question 2 incorrectly, he or she gets a score of one (Dewey and Prince, 2005).

2. *In a sale, a shop is selling all items at half price. Before the sale a sofa costs 300 euro. How much will it cost in the sale?*

The possible answers are:

- a) 150
- b) 600
- c) Other

3. *A second hand car dealer is selling a car for 6,000 euro. This is two-thirds of what it costs new. How much did the car cost new?*

The possible answers are:

- a) 9,000
- b) 4,000
- c) 8,000
- d) 12,000
- e) 18,000
- f) Other

4. *Let's say you have 2,000 euro in a saving account. The account earns ten per cent interest each year. How much would you have in the account at the end two years?*

The possible answers are:

- a) 2,420
- b) 2,020
- c) 2,040
- d) 2,100
- e) 2,200
- f) 2,400
- g) Other

The indicator of verbal fluency is based on a question to name as many different animals as possible in one minute time. The indicator is simply the number of valid animals named by the respondent. The maximum score achieved in this test is seventy and the minimum score is zero. Thus, a dummy for verbally fluent individuals is assigned to those who receive a score above thirty-five in the verbal fluency test.

To measure recall ability of the respondent, the interviewer reads a list of ten items and asks the respondent to name as many of the items as he or she remembers. The list includes the following items: Butter, Arm, Letter, Queen, Ticket, Grass, Corner, Stone, Book and Stick.

The recall score is the number of items recalled by the respondent in the end of the cognitive function part. High recall ability dummy is assigned to those respondents who score above five in the recall test.

### ***Health***

The special focus on the more mature generations will display itself in increased mortality risk and health risk compared to the population in general. Increasing mortality risk, especially at very old ages, shortens individuals' planning horizon affecting also financial decisions, and increasing health risks affect financial risk tolerance through uncertainty about future health related expenditure as discussed in the literature review. Self-perceived health status is assumed to capture the current health risks experienced by the respondents.

Naturally, objective health indicators are more reliable compared to subjective indicators because they are not affected by the differences in individual reporting styles, and people's perceptions and expectations on their health. However, in this study self-perceived health is potentially even more important health indicator than objective health since it is the individual perception of health risks that might affect risk aversion and financial decisions. Health status is based on the respondents' self-estimated physical condition on a scale from zero to ten, where zero represents poor health and ten represents excellent health. Poor health dummy takes the value of one if the respondent estimates his/her health condition to be below five on the scale from zero to ten.

### ***Life satisfaction***

The respondents are asked to rate their life satisfaction on a scale from zero to ten, where zero stands for the lowest level of dissatisfaction and ten stands for the highest level of life satisfaction. Satisfied dummy takes the value of one if the respondent rates his or her life satisfaction above five on the scale from zero to ten.

### ***Religion***

The respondents are asked how often they pray in normal circumstances. The answers are scaled so that zero stands for never praying and being non-religious. The scale runs from zero to five and reflects the intensity of the respondents' religious affiliation. Religion dummy takes the value of one if the respondent reports praying once a week or more often.

## **6 RESULTS**

The results have been divided into six different sections. First, I will present a univariate analysis on the variables explaining stock market participation. Second, I will move on to regression analyses and go through the main findings obtained with the whole sample. The third section consists of different demographic subsample analyses and the fourth section of geographical subsample analyses. The fifth section moves on to more detailed analysis of the results, concentrating on the economic significance of the drivers of stock market participation. Finally, the sixth section represents a few additional explanatory variables for stockholding.

### **6.1 Univariate analysis**

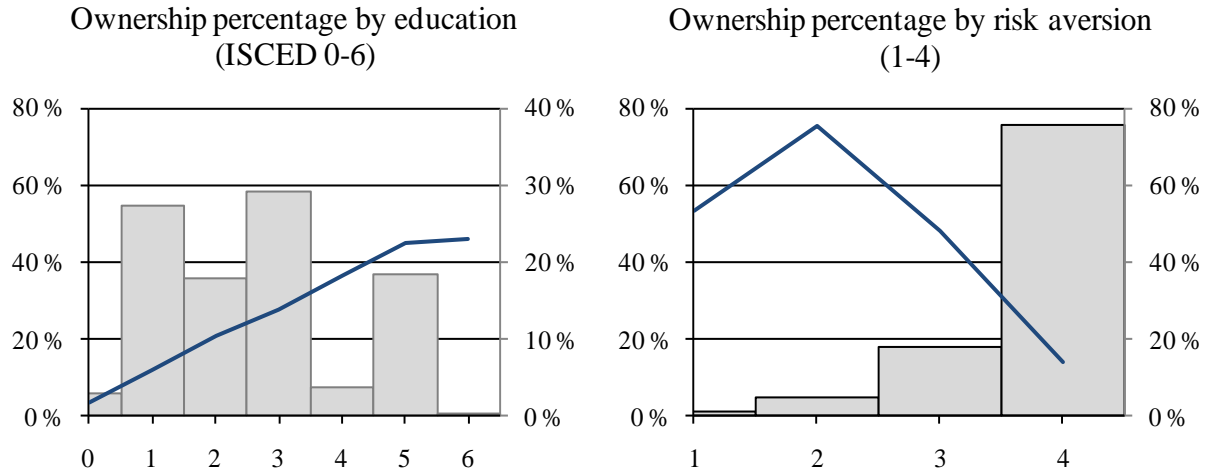
In this section, I will present univariate analyses on each explanatory variable. This is a simplified approach to show the general effect of these individual characteristics on stock market participation. All of the specifications include both direct and indirect stock ownership, direct ownership defined as direct stock investments and indirect ownership defined as investments in funds that are equally or mostly allocated to stocks. After this section, I will then continue to more elaborate regression analyses and subsample analyses.

The first specifications in Figure C include more established determinants of stock market participation, that is, education and risk aversion. As the figure shows, stock ownership percentage increases with higher levels of education, which is in line with findings in prior literature (Campbell, 2006). Risk aversion is in most of the risk aversion categories negatively correlated with stock ownership as predicted already in early studies (e.g. Merton, 1969; Gollier, 2001), except in the case of least risk averse respondents (risk aversion level of one). As one can see, the line is upward sloping at first but it takes a downward sloping turn at point two in the risk aversion scale. This is most rationally explained by the low number of respondents in the lowest risk aversion level, as only 1% of the respondents categorize themselves in the lowest level of risk aversion.



### Figure C. Education and risk aversion

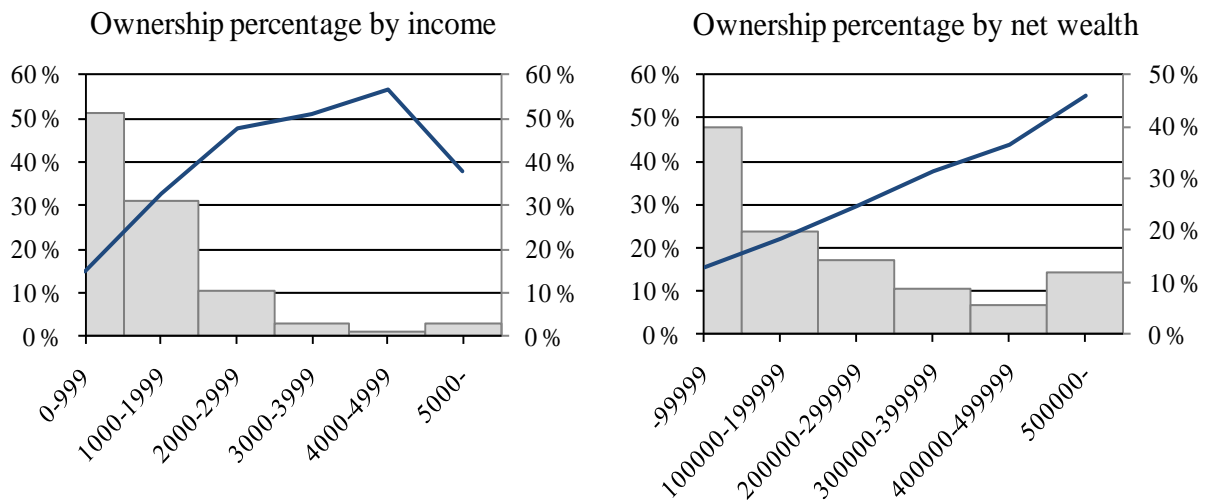
The below figures present the effect of education and risk aversion on stock market participation. Education is measured on ISCED scale from zero to six, where zero stands for pre-primary education and six for post-secondary education. Risk aversion is measured on a scale from one to four, where four represents those individuals who are not willing to take any risks to achieve financial gains. Ownership percentage is calculated as the percentage of respondents in each education and risk aversion class having either direct or indirect stock investments. Ownership percentage is presented on the left vertical axis and distribution of respondents in each class on the right vertical axis.



The next specifications focus on traditional explanations of stock market participation as well. Figure D presents the effect of income and net wealth on stock ownership percentage. Here income is defined as the after-tax monthly individual income and net wealth is defined as the sum of net financial wealth and net real wealth, that is, the sum of financial and real assets less financial liabilities and mortgages. In most parts, stock market participation increases when moving on to higher income and net wealth classes, in line with prior studies (e.g. Bertaut, 1998; Guiso et al., 2003). The only exception to increasing tendency is that stock ownership turns to decline in the highest monthly income class. This could again be explained by the low number of respondents included in the highest income class. Only 2% of the total sample earn more than EUR 5,000 per month. In addition, in certain highly-paid professions stock ownership is limited with regulation.

### Figure D. Income and net wealth

The figures below present the effect of income and net wealth on stock market participation. Income is measured as the after-tax monthly income and divided into the income classes shown below. Net wealth is the sum of net financial wealth and net real wealth, that is, the sum of financial assets less financial liabilities plus the sum of real assets less mortgages on housing. Net wealth is divided into classes shown below. Ownership percentage is calculated as the percentage of respondents in each income and net wealth class having either direct or indirect stock investments. Ownership percentage is presented on the left vertical axis and distribution of respondents in each class on the right vertical axis.



Next, it is time to move on to the more recent explanations behind stock market participation decisions. The first specifications in Figure E include political orientation, interpersonal trust and social activity.

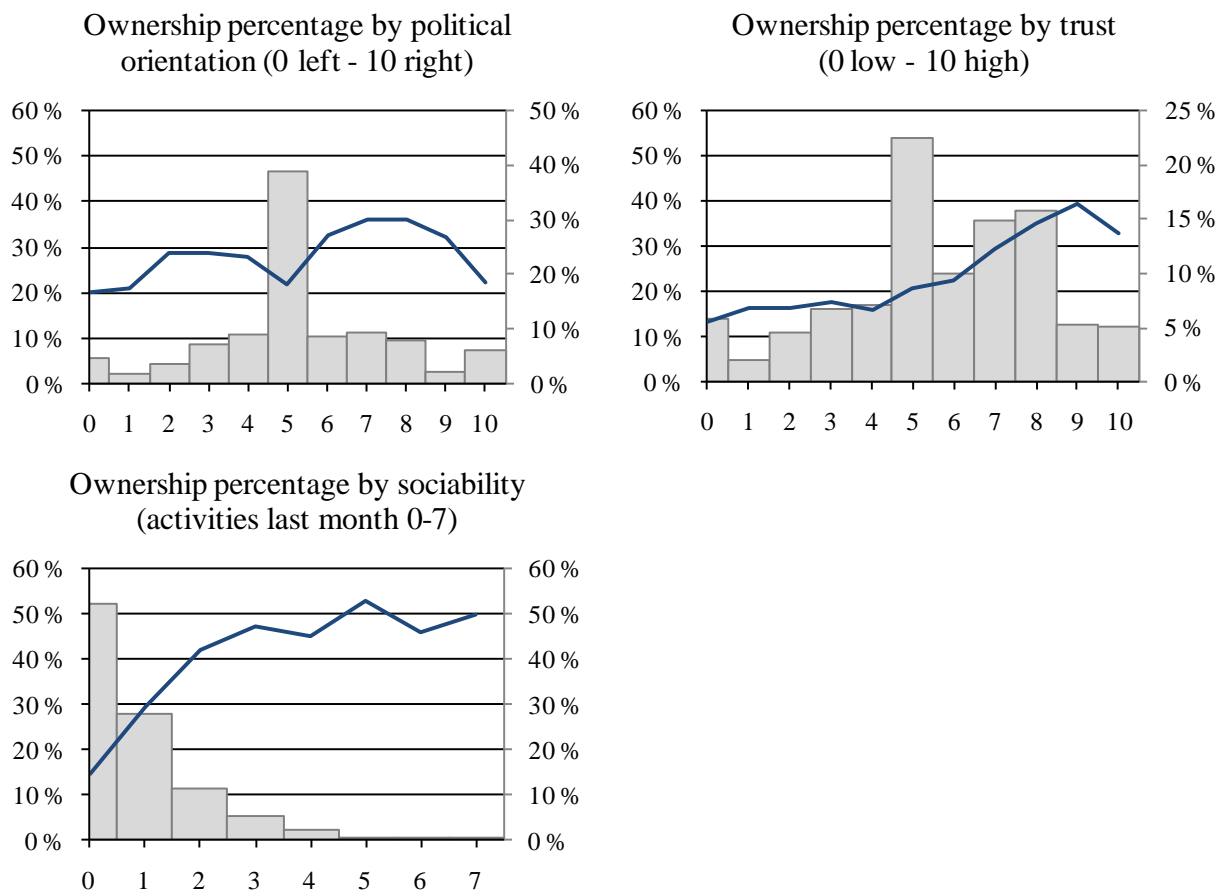
Political orientation is measured on a scale from zero to ten, where zero represents left-wing and ten represent right-wing orientation. The figure shows a slight positive trend between right-wing orientation and stock ownership, in line with findings of Kaustia and Torstila (2010). The percentage of stock ownership amongst left-wing voters remains under 30%, whereas the percentage of stock ownership amongst right-wing voters rises above 30% level. The extreme ends in the left-right axis show the lowest levels of stock ownership. It seems that both far-left liberalism and far-right conservatism have an adverse effect on the probability of holding stocks. Conservatism is studied in more detail in section 6.6.

Interestingly, center political orientation (five in the left-right axis) stands out as low stock market participation concentration similarly with the extreme ends of the left-right axis. It seems that on a scale from zero to ten, the middle category of five draws all the respondents who do not have any specific political ideology. It is the easiest choice without taking any

stand towards either right- or left-wing. Most important supporting evidence for this interpretation is that 39% of the respondents report five as their political orientation, whereas all the other political orientation categories, with the exception of extreme categories of zero and ten, have equally distributed support.

### Figure E. Political orientation, trust and social activity

The figures below present the effect of political orientation, interpersonal trust and sociability on stock market participation. Both political orientation and trust are measured on a scale from zero to ten, where in the case of political orientation ten stands for right-wing orientation and in the case of trust ten stands for high level of interpersonal trust. Sociability is measured as the number of social activities in last month, ranging from zero to seven activities. Ownership percentage is calculated as the percentage of respondents in political orientation, trust and social activity class having either direct or indirect stock investments. Ownership percentage is presented on the left vertical axis and distribution of respondents in each class on the right vertical axis.



Similarly with political orientation, trust is measured on a scale from zero to ten, where zero represents mistrust and ten represents the highest level of trust. The interpersonal trust specification shows that trust levels below the midpoint in the trust scale play no significant role in stock market participation. Only above the midpoint of five one can see the increasing trend between the trust level and stock market participation that has been found in several prior studies (e.g. Guiso et al., 2004, 2008; Georgarakos and Pasini, 2009). Thus, it seems that

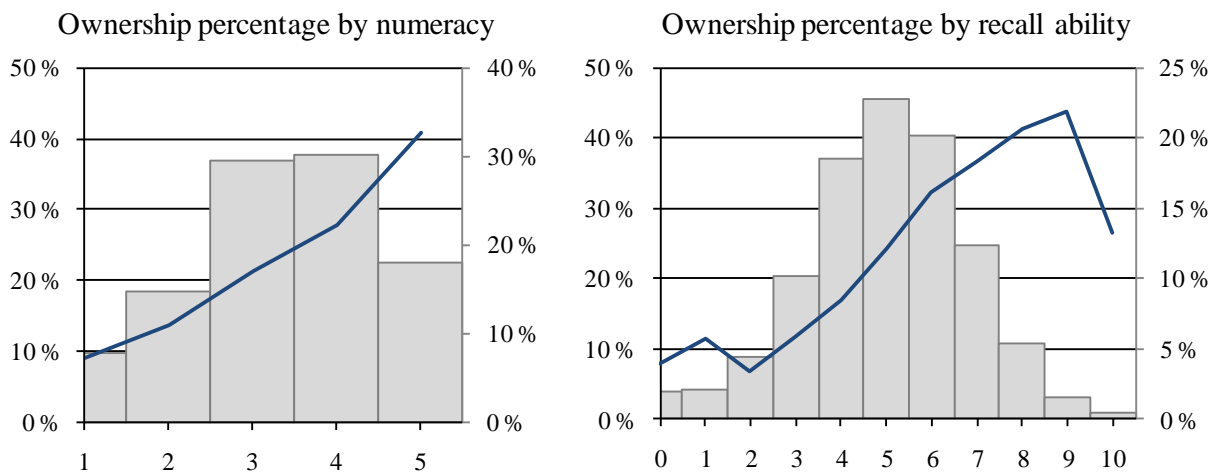
the level of mistrust (scale from zero to five) does not affect stock market participation but the level of trust (scale from five to ten) does have an effect on stock market participation.

Also social activity seems to have an interesting effect on the percentage of stockowners. Here social activity is measured by the number of social activities respondents took part in last month. Looking at the social activity figure, one could interpret that high levels of social activity do not have any significant influence on being a stockowner. The most important question seems to be whether the respondent is unsocial and has no social activities in his or her normal life, or whether the respondent has some social activities irrelevant of how many or how often.

The next specifications present the effect of cognitive skills, namely numerical skills and recall ability, on stock market participation. The results are in line with existing literature on cognitive skills and stock market participation (Cole and Shastry, 2009; Christelis et al., 2010; Grinblatt et al., 2010), and the figures show a clear increasing trend between cognitive skills and the percentage of stock market participation. Numeracy is scored from one to five, where five represents the highest score in the numerical test included in the SHARE survey. Recall ability is tested with a memory test where the score of ten represents the best recall ability.

### Figure F. Cognitive skills – numeracy and recall ability

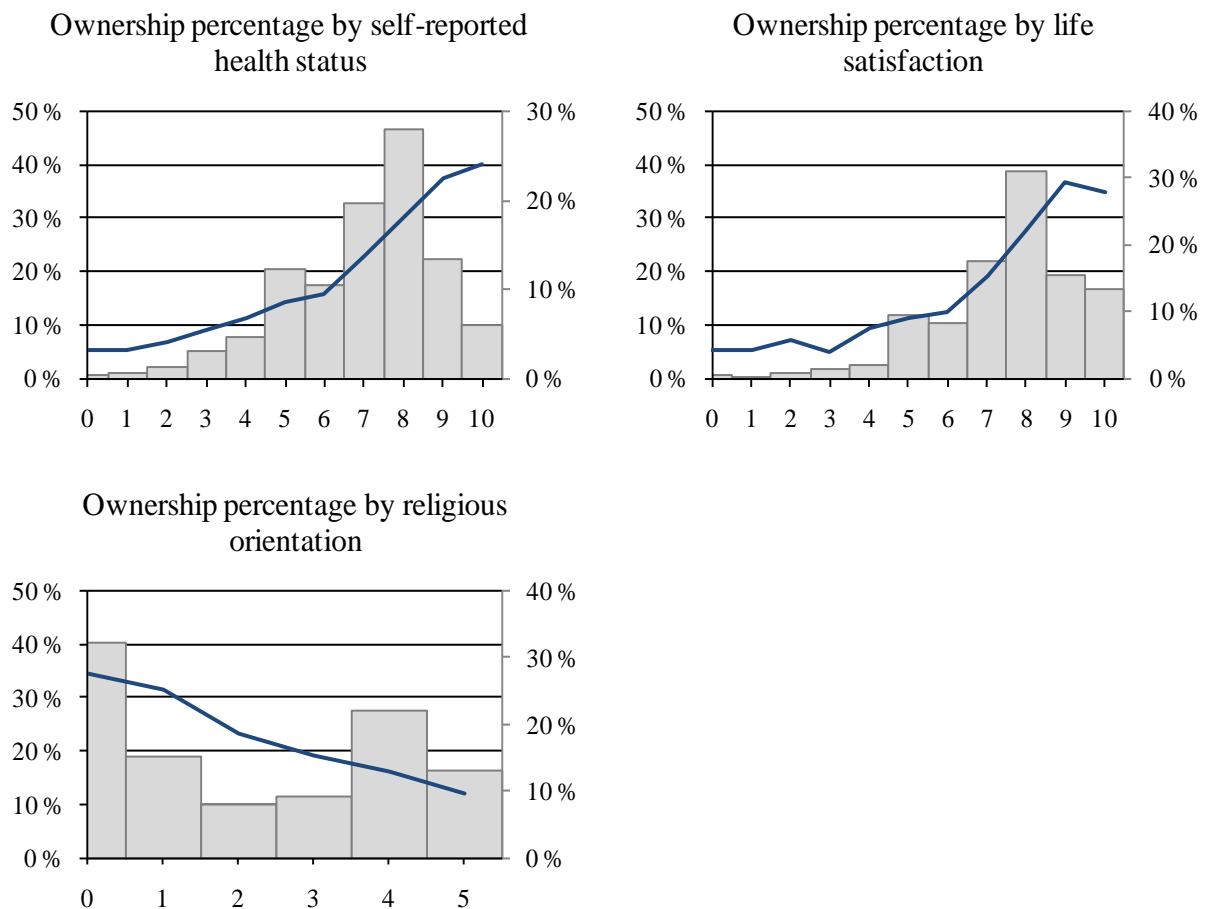
The figures below present the effects of cognitive skills, namely numeracy and recall ability, on stock market participation. Numeracy is scored on a scale from one to five, where the score of five represents the most correct answers in numerical question series. Recall ability is tested by asking the respondents to recall a 10-word list that was presented to them. The scale from zero to ten represents the number of words a respondent could recall from the wordlist. Ownership percentage is calculated as the percentage of respondents in each cognitive skill score class having either direct or indirect stock investments. Ownership percentage is presented on the left vertical axis and distribution of respondents in each class on the right vertical axis.



The last specifications focus on health status, life satisfaction and the intensity of religious affiliation. Health and life satisfaction are measured on a scale from zero to ten, where, in the case of health status, ten represents excellent health condition, and in the case of life satisfaction, ten represents the highest level of life satisfaction. As expected, the percentage of stock ownership increases with better health status, in line with the findings of Rosen and Wu (2004) and Edwards (2008), and with higher levels of life satisfaction. In both figures, the slope steepens in the domain above the scale midpoint, thus, the effect of good health status and life satisfaction is slightly stronger than the negative effect of poor health status and dissatisfaction with life.

### Figure G. Health, life satisfaction and religious orientation

The figures below present the effects of health status and life satisfaction as well as religious orientation on stock market participation. Both health and life satisfaction are measured on a scale from zero to ten, where in the case of health status ten represents excellent health and in the case of life satisfaction ten represents the highest level of life satisfaction. Religious affiliation is measured on a scale from zero to five, where zero stands for being non-religious and five strongly religious. Ownership percentage is calculated as the percentage of respondents in each health, life satisfaction and religious orientation class having either direct or indirect stock investments. Ownership percentage is presented on the left vertical axis and distribution of respondents in each class on the right vertical axis.



The religiousness specification partly differs from findings in prior literature on the relationship between religion and stock market participation (Guiso et al., 2003; Hong et al., 2004). This may be due to the fact that most previous studies have been conducted in the U.S. where religion has a significantly different role compared to Europe. Also, this could be a result of using different measures for religious affiliation, which in fact capture a bit different aspects of religion in the respondents' lives. Here, religious affiliation is measured by asking the respondents how often they pray. If the respondent answers never, he or she is categorized as being non-religious, and frequency of praying is then scaled to reflect the respondent's intensity of religious affiliation. Figure G on the next page shows that the intensity of religiousness is actually negatively correlated with the percentage of stockownership signifying that non-religious respondents invest the most in stocks. In some previous studies (Miller and Hoffmann, 1995; Guiso et al., 2003), it has been found that religiousness increases risk aversion and the appreciation of economic lifestyle, which may explain the adverse effect of religion on stock market participation.

## **6.2. Drivers of stock market participation**

In this section, I will analyze the individual characteristics affecting stock market participation decision by conducting probit regressions using the whole European sample. In the first regression, I use total stockownership as a dependent variable including both direct stock investments and indirect ownership through mutual funds and investment accounts. The following regressions concentrate first on direct stock market participation and then on indirect stock market participation. Lastly, I will analyze the determinants of risk aversion and the drivers of risky stockholding. The regressions include all fourteen countries of the second wave of SHARE and are conducted on individual investor basis.

In Table 4, the dependent variable is stockowner dummy, which takes the value of one if the respondent has invested directly in stocks or has invested in a fund of which half or more than half is allocated to stocks, and the value of zero otherwise. The regression table includes five specifications, the first one of the specifications being the basic case with only traditional and established drivers of stock market participation included. The traditional determinants are gender, age, education, wealth and risk aversion. More control variables are added in the specifications from (2) to (5). In the second specification, all variables related to social stance are included, that is, social activity, interpersonal trust and political orientation. In the third specification, results from cognitive skills tests are included, and in the fourth specification,

health status is added in the regression. The fifth specification includes, in addition to the variables already mentioned, life satisfaction and religious affiliation.

As the first specification shows, all traditional factors of stock market participation affect significantly the probability of holding stocks. Being male, age, education and net wealth are positively correlated and statistically significant with stock market participation, and risk aversion is strongly negatively correlated with stock ownership. Risk aversion has the largest effect on stock ownership and its explanatory power remains strong throughout the specifications.

As the second specification shows, right-wing orientation and social activity are the most significant social stance variables increasing the probability of stock market participation. An interesting finding is that trust seems to have a smaller effect on stock market participation, and the effect of trust further decreases as more control variables are included in the regression. By the last specification, the effect of trust has also lost in significance and is only statistically significant on 10% level. This contradicts many prior studies where trust has been found to have a significant effect on the likelihood of holding stocks (Guiso et al. 2004, 2008; Georgarakos and Pasini, 2009). Adding social stance variables in the regression reduces most the effect of education on participation decision. This suggests that social interaction, social learning and personal values slightly overcome the positive effect of education.

Recall ability stands out as the most significant cognitive skill affecting stock market participation in the third specification. Numeracy and recall ability are the only cognitive skill scores that remain significant throughout the specifications, whereas verbal fluency seems to be statistically insignificant in all of the three specifications. Adding cognitive skills in the regression equation seems to reduce especially the role of trust in explaining stock market participation. All of the cognitive skills variables take the value of one if the respondent scores above the midpoint of the score scales used in each test. The robustness of the effect of cognitive skills is tested also by combining the test scores in one cognitive skill index. The effect of combined cognitive skills is strong and statistically significant throughout the five specifications even on 1% significance level. The results from specifications with cognitive skill index are presented in Appendix in Tables 21 and 22.

As one could expect, poor health is negatively correlated with stock market participation. A rational interpretation is that respondents with increased health risks are less willing to assume any additional financial risks by investing in risky asset classes (Rosen and Wu, 2004). Moreover, respondents with poor health may be more constraint to make additional investments as health problems increase their health related expenditure (Edwards, 2008). As life satisfaction and religious affiliation are added in the regression in the fifth specification, the effect of health decreases in size and loses in statistical significance. This suggests that individual life satisfaction, that is, perceived level of well-being and happiness, overcomes the effect of increased health risks, and that religious affiliation has a more important role in stock market participation than poor health.

As anticipated based on prior literature (Felton et al., 2003; Puri and Robinson, 2007), self-perceived life satisfaction has a positive and statistically significant effect on stock market participation. This shows that the effect of life satisfaction is comparable to the positive effect of optimism. However, it is somewhat unexpected that religious individuals are less likely to invest in stocks. It seems that as the religion related question is posed as “how often do you pray?”, the question does not reflect the social or increased trust aspects of religious affiliation but the aspect of personal believes and perhaps even personal values. If the respondents were instead asked how often they attend to church, the results could be different. One rather straightforward explanation is that intensively religious individuals are more risk averse compared to less religious individuals. Also few prior studies have linked religiousness with risk aversion and higher appreciation of economic lifestyle (e.g. Miller and Hoffmann, 1995; Guiso et al., 2003).



**Table 4. Explaining stock market participation – Dummy variables**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	0.09*** (3.98)	0.08*** (2.98)	0.08*** (2.97)	0.08*** (2.95)	0.06** (2.33)
Age	0.02 (1.56)	0.02 (1.11)	0.02 (1.05)	0.02 (0.99)	0.02 (1.26)
Age (Sq)	0.00** (-2.52)	0.00* (-1.93)	0.00* (-1.79)	0.00* (-1.72)	0.00** (-1.98)
Secondary (dummy)	0.28*** (8.16)	0.26*** (6.82)	0.24*** (6.15)	0.24*** (6.09)	0.24*** (5.97)
Post-secondary (dummy)	0.22*** (7.60)	0.18*** (5.57)	0.15*** (4.75)	0.15*** (4.75)	0.15*** (4.74)
Log (net wealth)	0.17*** (18.64)	0.17*** (16.18)	0.17*** (15.92)	0.17*** (15.89)	0.17*** (15.82)
Riskaversion (dummy)	-0.89*** (-34.79)	-0.85*** (-30.27)	-0.84*** (-29.92)	-0.84*** (-29.85)	-0.84*** (-29.87)
Sociability (dummy)		0.21*** (7.40)	0.20*** (7.15)	0.19*** (6.95)	0.20*** (7.08)
Trust (dummy)		0.06** (2.29)	0.05* (1.94)	0.05* (1.84)	0.05* (1.83)
Right-wing (dummy)		0.16*** (5.96)	0.16*** (5.87)	0.16*** (5.80)	0.16*** (5.91)
Numeracy (dummy)			0.07** (2.36)	0.07** (2.33)	0.06** (2.15)
Recall ability (dummy)			0.08*** (2.70)	0.07** (2.58)	0.07** (2.50)
Verbal fluency (dummy)			0.05 (0.74)	0.05 (0.74)	0.05 (0.66)
Poor health (dummy)				-0.17*** (-2.78)	-0.15** (-2.31)
Life satisfaction (dummy)					0.11** (2.04)
Religion (dummy)					-0.07** (-2.50)
Constant	-3.23*** (-6.27)	-3.27*** (-5.49)	-3.3*** (-5.53)	-3.26*** (-5.46)	-3.45*** (-5.88)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.33	0.33	0.33	0.33	0.34
N	18797	15397	15360	15360	15269

For robustness, the regression specifications are reran with the corresponding continuous variables. The table on the next page, Table 5, shows the results generated with continuous variables instead of dummy variables. The dependent variable is the basic stockowner dummy, which takes the value of one if the respondent has either direct or indirect stockholdings and the value of zero otherwise, and the specifications one through five include the same independent variables as in Table 4.

As Table 5 on the next page shows, the results obtained with continuous variables are mostly in line with the results obtained with dummy variables, although some differences do appear. First, the main difference is that in the continuous variable version most of the variables stand out as statistically significant, even on 1% level, after all the control variables are added in the regression. Second, statistical significance of cognitive skills is slightly changed. In the continuous variable version, numeracy and verbal fluency gain in statistical significance, whereas in the dummy variable version recall ability was statistically most significant. Third, the explanatory power of health decreases when measured with continuous variable. As life satisfaction and religious affiliation are added in the regression in the fifth specification, the effect of health decreases in size and loses in statistical significance more in the continuous variable version compared to the dummy variable version. This suggests that individual life satisfaction, that is, perceived level of well-being and happiness, overcomes the effect of increased health risks, and that religious affiliation has a more important role in stock market participation than poor health.

**Table 5. Explaining stock market participation – Continuous variables**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. All of the cognitive skills scores vary on the scale written next to the variables. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	0.09*** (3.98)	0.08*** (3.26)	0.08*** (3.13)	0.08*** (3.09)	0.06** (2.05)
Age	0.02 (1.56)	0.02 (1.22)	0.02 (0.96)	0.02 (0.96)	0.02 (1.14)
Age (Sq)	0.00** (-2.52)	0.00** (-2.06)	0.00 (-1.57)	0.00 (-1.53)	0.00* (-1.69)
Secondary (dummy)	0.28*** (8.16)	0.27*** (6.95)	0.22*** (5.51)	0.21*** (5.42)	0.21*** (5.33)
Post-secondary (dummy)	0.22*** (7.60)	0.18*** (5.62)	0.13*** (3.97)	0.13*** (3.88)	0.13*** (3.87)
Log (net wealth)	0.17*** (18.64)	0.17*** (16.18)	0.16*** (15.59)	0.16*** (15.30)	0.16*** (15.09)
Riskaversion (dummy)	-0.89*** (-34.79)	-0.85*** (-30.33)	-0.83*** (-29.64)	-0.83*** (-29.56)	-0.84*** (-29.56)
Sociability		0.07*** (5.91)	0.06*** (4.98)	0.05*** (4.72)	0.06*** (5.31)
Trust (0-10)		0.02*** (3.06)	0.01** (2.45)	0.01** (2.04)	0.01* (1.75)
Left-right (0-10)		0.03*** (4.62)	0.03*** (4.67)	0.03*** (4.46)	0.03*** (4.65)
Numeracy (1-5)			0.04*** (2.99)	0.04*** (2.83)	0.04*** (2.69)
Recall ability (0-10)			0.02** (2.59)	0.02** (2.36)	0.02** (2.31)
Verbal fluency			0.01*** (5.83)	0.01*** (5.70)	0.01*** (5.53)
Health (0-10)				0.03*** (3.65)	0.02* (1.91)
Life satisfaction (0-10)					0.04*** (3.98)
Religion (0-5)					-0.03*** (-4.10)
Constant	-3.23*** (-6.27)	-3.45*** (-5.82)	-3.77*** (-6.26)	-3.94*** (-6.54)	-4.15*** (-7.01)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.33	0.33	0.34	0.34	0.34
N	18797	15397	15360	15360	15269

### ***6.2.1 Drivers of direct stock market participation***

The following regressions in Table 6 have the same structure as the previous regression analyses. Control variables are the same and the specifications are grouped in the same way as before, but here dependent variable is direct stock ownership.

As in the previous basic specifications, traditional determinants of stock market participation also affect strongly direct stock ownership. One of the major differences compared to the previous regression is that trust does not seem to have significant effect on direct stock market participation in any of the five specifications. This is not in line with the findings of Guiso et al. (2008) who suggest that the effect of trust is equally important to both direct and indirect stock market participation. Sociability and right-wing orientation, on the other hand, remain their explanatory power and statistical significance in all the five specifications explaining direct stockholding.

The overall effect of cognitive skills is less relevant in direct stock market participation compared to total stock market participation, and only recall ability remains statistically significant throughout the five specifications. Similarly, poor health does not seem to have significant negative effect on direct stock market participation. The positive effect of life satisfaction comes out as significant (even though only on 10% level), whereas the negative effect of religious affiliation is not statistically significant. The factors that most increase the probability of direct stock ownership are the traditional determinants of stock market participation, that is, risk aversion, education and net wealth, as well as social activity and right-wing political orientation. Based on this, it could be interpreted that direct stock market participation is mainly a result of individual risk aversion level, financial means to enable investing, personal values and intensity of social interaction, whether in the form of social learning or peer-group effects.

**Table 6. Explaining direct stock market participation – Dummy variables**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Direct ownership (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	0.07*** (2.72)	0.04 (1.34)	0.04 (1.46)	0.04 (1.45)	0.03 (1.11)
Age	0.05*** (2.91)	0.05*** (2.72)	0.05*** (2.65)	0.05*** (2.63)	0.06*** (2.91)
Age (Sq)	0.00*** (-2.98)	0.00*** (-2.64)	0.00** (-2.54)	0.00** (-2.51)	0.00*** (-2.78)
Secondary (dummy)	0.28*** (7.50)	0.25*** (5.90)	0.24*** (5.49)	0.23*** (5.47)	0.23*** (5.29)
Post-secondary (dummy)	0.18*** (5.87)	0.15*** (4.66)	0.14*** (4.27)	0.14*** (4.27)	0.14*** (4.19)
Log (net wealth)	0.20*** (17.22)	0.20*** (15.35)	0.20*** (15.19)	0.20*** (15.18)	0.20*** (15.10)
Riskaversion (dummy)	-0.78*** (-28.56)	-0.75*** (-25.22)	-0.74*** (-25.00)	-0.74*** (-24.98)	-0.75*** (-25.02)
Sociability (dummy)		0.19*** (6.35)	0.19*** (6.22)	0.19*** (6.14)	0.19*** (6.23)
Trust (dummy)		0.03 (0.97)	0.02 (0.75)	0.02 (0.71)	0.02 (0.77)
Right-wing (dummy)		0.14*** (4.87)	0.14*** (4.81)	0.14*** (4.78)	0.14*** (4.77)
Numeracy (dummy)			0.02 (0.77)	0.02 (0.77)	0.02 (0.65)
Recall ability (dummy)			0.07** (2.25)	0.07** (2.21)	0.06** (2.09)
Verbal fluency (dummy)			-0.08 (-1.06)	-0.08 (-1.07)	-0.08 (-1.12)
Poor health (dummy)				-0.07 (-1.03)	-0.05 (-0.71)
Life satisfaction (dummy)					0.10* (1.73)
Religion (dummy)					-0.05 (-1.51)
Constant	-5.10*** (-8.73)	-5.45*** (-8.05)	-5.46*** (-8.03)	-5.44*** (-8.00)	-5.68*** (-8.42)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.29	0.29	0.29	0.29	0.30
N	18749	15353	15316	15316	15219

Table 7 presents the same direct ownership specification with continuous variables to check the robustness of the results. The dummy variable version and the continuous variable version yield similar results, although some small differences do exist. As in the dummy variable version, the traditional explanations of stock market participation remain strong throughout the five specifications, as well as the effects of sociability and political orientation. Also the continuous variable version suggests that direct stock market participation is quite strongly influenced by sociability and the personal values of the investor. Compared to the dummy version, health seems to have no effect on stock market participation in the continuous variable version. On the contrary, religion gains in significance. The effect of religion on the probability of holding stocks is similar in size as the effect of life satisfaction in the continuous variable version, although being that the effect of religion is negative and the effect of life satisfaction is positive.

**Table 7. Explaining direct stock market participation – Continuous variables**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. All of the cognitive skills scores vary on the scale written next to the variables. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Direct ownership (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	0.07*** (2.72)	0.04 (1.56)	0.04 (1.45)	0.04 (1.44)	0.02 (0.79)
Age	0.05*** (2.91)	0.05*** (2.82)	0.05*** (2.65)	0.05*** (2.64)	0.06*** (2.85)
Age (Sq)	0.00*** (-2.98)	0.00*** (-2.76)	0.00** (-2.47)	0.00** (-2.44)	0.00*** (-2.63)
Secondary (dummy)	0.28*** (7.50)	0.25*** (6.00)	0.22*** (5.13)	0.22*** (5.11)	0.21*** (4.94)
Post-secondary (dummy)	0.18*** (5.87)	0.16*** (4.72)	0.12*** (3.71)	0.12*** (3.67)	0.12*** (3.58)
Log (net wealth)	0.20*** (17.22)	0.20*** (15.32)	0.20*** (14.94)	0.19*** (14.82)	0.19*** (14.68)
Riskaversion (dummy)	-0.78*** (-28.56)	-0.75*** (-25.27)	-0.74*** (-24.81)	-0.74*** (-24.79)	-0.74*** (-24.8)
Sociability		0.06*** (5.18)	0.05*** (4.61)	0.05*** (4.52)	0.06*** (4.88)
Trust (0-10)		0.01* (1.76)	0.01 (1.34)	0.01 (1.20)	0.01 (1.06)
Left-right (0-10)		0.03*** (4.34)	0.03*** (4.34)	0.03*** (4.26)	0.03*** (4.30)
Numeracy (1-5)			0.02 (1.55)	0.02 (1.51)	0.02 (1.42)
Recall ability (0-10)			0.02 (1.53)	0.01 (1.45)	0.01 (1.48)
Verbal fluency			0.01*** (3.74)	0.01*** (3.68)	0.01*** (3.56)
Health (0-10)				0.01 (1.20)	0.00 (0.22)
Life satisfaction (0-10)					0.03*** (2.80)
Religion (0-5)					-0.03*** (-2.97)
Constant	-5.10*** (-8.73)	-5.61*** (-8.31)	-5.81*** (-8.48)	-5.86*** (-8.53)	-6.09*** (-8.95)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.29	0.29	0.29	0.29	0.30
N	18749	15353	15316	15316	15219

### **6.2.2 Drivers of indirect stock market participation**

Table 8 on the next page presents the stock market participation specification with indirect stock ownership as dependent variable. The dependent variable takes the value of one only if respondent has indirect stock investments through funds mostly comprising of equity instruments. Otherwise the control variables and grouping of the variables in different specifications remain the same as in the previous regressions.

Compared with the direct stockholding specifications, it seems that direct investing is slightly more affected by age and indirect investing is more affected by gender. Secondary and post-secondary educations are statistically significant drivers of both direct and indirect stock market participation. As expected, net wealth plays a more important role in direct stock market participation. It is easier for high-wealth individuals to allocate their wealth efficiently and include also direct stockholdings in their portfolio. Naturally, high-wealth individuals also have more financial leeway to enable more risky stock-picking. Risk aversion understandably has a stronger negative effect on direct stock investing than indirect investing. Mutual funds managed by finance professionals are a safer and less time-consuming choice compared to direct stock investment and stock-picking, therefore, investing through mutual funds is a more comfortable option even for risk averse investors.

There are few major differences between the direct and indirect stock ownership analyses. First, trust plays a more important role in indirect stock market participation compared to direct participation. It may be that trust is more relevant to indirect stock market participation because in indirect investing individuals face more intermediaries and more complex organizations, as well as often more complex return formation, compared to direct investments. Therefore, it is not enough that investor trusts the market, he or she must trust the intermediary or the mutual fund company managing the investment as well.



**Table 8. Explaining indirect stock market participation – Dummy variables**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent has invested indirectly in stocks, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Indirect ownership (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	0.14*** (5.40)	0.15*** (5.19)	0.15*** (5.09)	0.15*** (5.06)	0.13*** (4.43)
Age	0.01 (0.64)	0.00 (0.04)	0.00 (-0.07)	0.00 (-0.13)	0.00 (-0.19)
Age (Sq)	0.00** (-2.04)	0.00 (-1.40)	0.00 (-1.24)	0.00 (-1.17)	0.00 (-1.07)
Secondary (dummy)	0.19*** (4.83)	0.19*** (4.27)	0.17*** (3.84)	0.17*** (3.78)	0.17*** (3.69)
Post-secondary (dummy)	0.17*** (5.47)	0.13*** (3.76)	0.11*** (3.21)	0.11*** (3.21)	0.11*** (3.18)
Log (net wealth)	0.13*** (13.14)	0.13*** (11.34)	0.12*** (11.16)	0.12*** (11.10)	0.12*** (10.97)
Riskaversion (dummy)	-0.69*** (-25.14)	-0.65*** (-21.78)	-0.64*** (-21.49)	-0.64*** (-21.43)	-0.64*** (-21.36)
Sociability (dummy)		0.16*** (5.06)	0.15*** (4.91)	0.15*** (4.69)	0.15*** (4.85)
Trust (dummy)		0.07** (2.42)	0.07** (2.18)	0.06** (2.08)	0.06* (1.96)
Right-wing (dummy)		0.11*** (3.68)	0.11*** (3.63)	0.11*** (3.55)	0.11*** (3.60)
Numeracy (dummy)			0.06* (1.95)	0.06* (1.92)	0.06* (1.80)
Recall ability (dummy)			0.04 (1.41)	0.04 (1.27)	0.04 (1.19)
Verbal fluency (dummy)			0.05 (0.72)	0.05 (0.72)	0.05 (0.78)
Poor health (dummy)				-0.23*** (-3.23)	-0.20*** (-2.67)
Life satisfaction (dummy)					0.12** (1.99)
Religion (dummy)					-0.08** (-2.54)
Constant	-2.55*** (-4.48)	-2.29*** (-3.52)	-2.27*** (-3.49)	-2.21*** (-3.39)	-2.22*** (-3.39)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.27	0.28	0.28	0.28	0.28
N	18708	15333	15296	15296	15205

Second, health affects indirect investing more strongly than direct investing. One could rationalize that poor health affects more the overall decision of investing in risky assets, since individuals in poor health try to hedge against the increased health risks by reducing the exposure to financial risks (Edwards, 2008). Thus, poor health is statistically significant in the decision of whether or not to invest in stocks at all, and less important in the decision of making direct stock investments. Third, religious affiliation seems to play more important role in indirect stock investment than direct investments. If religious affiliation affects stock market participation mainly through increased risk aversion as discussed above, it is reasonable that religiousness is more relevant in the case of indirect investing as direct stock investors are less risk averse compared to indirect stock investors.

There is a shift in the significance between direct and indirect stockholding in terms of cognitive skills. Recall ability remains statistically significant through specifications (3) to (5) in explaining direct stock market participation, whereas numeric skills remain statistically significant in explaining indirect stock market participation. Life satisfaction has roughly as much explanatory power in both direct and indirect stock market participation. It seems that the overall effect of life satisfaction corresponds to the effect of moderate optimism resulting in lower level of risk aversion and more sensible economic choices (Puri and Robinson, 2007) and in openness towards risky financial assets and their return potential (Felton et al., 2003). Hence, life satisfaction has a slight positive effect on the probability of stock market participation.

The table on the next page, Table 9, presents the indirect stock market specifications with continuous variables instead of dummy variables to check the robustness of the results. In the continuous variable version, both trust and political orientation seems to lose in significance in explaining indirect stock market participation as more variables are included in the regression. Although political affiliation still remains statistically significant at 10% level, its explanatory power is small compared to other variables. Trust becomes statistically insignificant in explaining stock market participation as life satisfaction and religion are included in the last specification. On the other hand, both numeracy and verbal fluency gain in statistical significance when analyzed with continuous variables, similarly as in the continuous variable version of total stockholding. Otherwise the results are quite well in line with the results obtained from the dummy version of indirect stock market participation. Also

with continuous variables, health, life satisfaction and religion have relatively strong effect on the probability of having indirect stock investments.

**Table 9. Explaining indirect stock market participation – Continuous variables**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent has invested indirectly in stocks, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. All of the cognitive skills scores vary on the scale written next to the variables. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Indirect ownership (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	0.14*** (5.40)	0.16*** (5.44)	0.15*** (5.23)	0.15*** (5.20)	0.13*** (4.40)
Age	0.01 (0.64)	0.00 (0.11)	0.00 (-0.15)	0.00 (-0.18)	-0.01 (-0.30)
Age (Sq)	0.00** (-2.04)	0.00 (-1.48)	0.00 (-1.06)	0.00 (-0.99)	0.00 (-0.83)
Secondary (dummy)	0.19*** (4.83)	0.19*** (4.39)	0.16*** (3.42)	0.15*** (3.30)	0.15*** (3.27)
Post-secondary (dummy)	0.17*** (5.47)	0.13*** (3.74)	0.09** (2.54)	0.08** (2.4)	0.08** (2.42)
Log (net wealth)	0.13*** (13.14)	0.13*** (11.40)	0.12*** (10.92)	0.12*** (10.58)	0.12*** (10.35)
Riskaversion (dummy)	-0.69*** (-25.14)	-0.65*** (-21.86)	-0.64*** (-21.25)	-0.64*** (-21.19)	-0.64*** (-21.13)
Sociability		0.05*** (4.35)	0.04*** (3.71)	0.04*** (3.43)	0.05*** (3.94)
Trust (0-10)		0.02*** (2.61)	0.01** (2.17)	0.01* (1.69)	0.01 (1.50)
Left-right (0-10)		0.01** (1.98)	0.01** (2.00)	0.01* (1.74)	0.01* (1.91)
Numeracy (1-5)			0.04*** (2.63)	0.04** (2.43)	0.04** (2.36)
Recall ability (0-10)			0.02** (2.00)	0.02* (1.73)	0.02 (1.62)
Verbal fluency			0.01*** (3.91)	0.01*** (3.79)	0.01*** (3.75)
Health (0-10)				0.04*** (4.27)	0.03*** (2.70)
Life satisfaction (0-10)					0.03*** (2.80)
Religion (0-5)					-0.03*** (-3.09)
Constant	-2.55*** (-4.48)	-2.41*** (-3.70)	-2.63*** (-4.02)	-2.83*** (-4.34)	-2.80*** (-4.27)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.27	0.28	0.28	0.28	0.29
N	18708	15333	15296	15296	15205

### **6.2.3 Role of risk aversion**

This section focuses on explaining risk aversion. Based on the finding presented in previous sections, it is interesting to see how the same control variables used in the basic and the direct and indirect stock market participation regressions affect individual level of risk aversion. As all the previous probit regression tables show, risk aversion is the major determinant of stock market participation. In addition, the correlation matrix presented earlier (Table 3) shows that risk aversion is most highly correlated with stock market participation taking into account all variables explaining stock market participation.

Table 10 on the next page shows the results of a probit regression analyzing the drivers of individual level of risk aversion. The dependent variable in these specifications is risk aversion dummy, which takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits, and the value of zero otherwise. As expected, almost all of the control variables have large explanatory power in individual risk aversion. Only age does not seem to affect the level of risk aversion, but this could be a result of the concentration on elderly population and small variation in age within the sample. Risk aversion is negatively correlated with education, wealth, social stance indicators and cognitive skills, and positively correlated with poor health status and religious affiliation. In addition, all the coefficients, except age, health and recall ability, are statistically significant at 1% level.

Post-secondary degree has the strongest adverse effect on risk aversion. This is in line with prior research that has shown that education and risk aversion are negatively correlated (Campbell, 2006). Also being male has a relatively strong negative effect on risk aversion, which as well has been well-documented in prior literature (Jianakoplos and Bernasek, 1998; Sundén and Surette, 1998; Barber and Odean, 2001). Although age has been found to have negative effect on risk aversion up until the age of 65 and a positive effect thereon (Riley and Chow, 1992), here age seems to have no impact on risk aversion. As mentioned above, it could be that the relationship between age and risk aversion does not show in these regressions because of the strong concentration on elderly age groups.

**Table 10. Explaining risk aversion**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent is not willing to take any financial risks and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Risk aversion (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	-0.30*** (-14.07)	-0.29*** (-12.67)	-0.28*** (-12.09)	-0.28*** (-12.07)	-0.27*** (-11.02)
Age	0.01 (0.37)	0.01 (0.80)	0.02 (1.01)	0.02 (1.09)	0.02 (1.17)
Age (Sq)	0.00 (1.20)	0.00 (0.54)	0.00 (0.18)	0.00 (0.08)	0.00 (-0.06)
Secondary (dummy)	-0.28*** (-9.37)	-0.23*** (-6.83)	-0.18*** (-5.25)	-0.17*** (-5.14)	-0.17*** (-5.08)
Post-secondary (dummy)	-0.34*** (-13.25)	-0.32*** (-11.41)	-0.28*** (-9.95)	-0.28*** (-9.97)	-0.28*** (-9.88)
Log (net wealth)	-0.15*** (-18.49)	-0.15*** (-15.86)	-0.14*** (-15.3)	-0.14*** (-15.25)	-0.14*** (-15.07)
Sociability (dummy)		-0.22*** (-8.82)	-0.21*** (-8.34)	-0.20*** (-8.13)	-0.21*** (-8.27)
Trust (dummy)		-0.13*** (-5.27)	-0.11*** (-4.45)	-0.11*** (-4.34)	-0.10*** (-3.90)
Right-wing (dummy)		-0.15*** (-6.10)	-0.14*** (-5.91)	-0.14*** (-5.83)	-0.14*** (-5.93)
Numeracy (dummy)			-0.16*** (-6.19)	-0.16*** (-6.12)	-0.15*** (-5.87)
Recall ability (dummy)			-0.11*** (-4.36)	-0.11*** (-4.21)	-0.10*** (-3.83)
Verbal fluency (dummy)			-0.11* (-1.83)	-0.11* (-1.82)	-0.11* (-1.84)
Poor health (dummy)				0.16*** (3.09)	0.11** (2.08)
Life satisfaction (dummy)					-0.14*** (-3.10)
Religion (dummy)					0.08*** (3.04)
Constant	2.25*** (4.75)	2.18*** (4.03)	2.14*** (3.94)	2.08*** (3.82)	2.08*** (3.81)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.14	0.15	0.15	0.15	0.15
N	19123	15653	15616	15616	15513

Based on the results presented in Table 10, we can assume that in addition to having a direct effect on stock market participation, the main channel through which the different drivers of stock market participation operate, is risk aversion. This may be one of the reasons why risk aversion receives such strong weight in the regressions explaining stock market participation. The risk aversion regression is also conducted with continuous variables to check the robustness of the dummy variable version results. The results of the continuous variable version are presented in Appendix in Table 23.

#### ***6.2.4 Risky stockholding conditional on participation***

The final section of this chapter focuses on risky stockholding conditional on stock market participation. In Table 11, the analysis is limited to only those who participate in the stock market, either directly or indirectly. The dependent variable is risky stockholding dummy and the purpose of this analysis is to see how individuals with extremely large stockholding differ from other investors. Risky stockholdings are defined as those holdings that in monetary terms are above the 75 percentile when taking into account stockholdings of all participants. Risky stockholding dummy takes the value of one if the respondent belongs to the highest quartile measured in Euro-valued stockholding, and zero otherwise. In the first specification risk aversion is included in the regression, whereas risk aversion is excluded in the second specification to see how the explanatory power of the remaining variables is affected. The same specifications reran with continuous variables can be found from Appendix (Table 24).

As the Table 11 on the next page shows, the sample size is significantly reduced in risky stockholding specifications. This is partly due to the limited amount of stock market participants in the total sample, and partly due to the fact that not all stockholders are willing to disclose the amount of their stock investment. Most of the variables are statistically insignificant in the regression with few exceptions. Age has a positive effect on the probability of a large stockholding. This is most likely due to the fact that older investors have had more time to accumulate financial wealth. Post-secondary education and net wealth have strong significant effects on the probability of large stockholding. Net wealth obviously enables large amounts to be allocated to stocks, and therefore, it is the most powerful explanatory variable explaining risky asset allocation. Risk aversion is naturally strongly negatively correlated with large stockholdings because stock investors with risky holdings are the least risk averse group of the total sample. High level of education lowers risk aversion which makes accumulating risky stockholding even more probable (Edwards, 2008).

**Table 11. Risky stockholding conditional on participation**

This specification includes only those who participate in the stock market. Dependent variable is risky stockholding which takes the value of one if the respondents' stockholding in Euros is above the 75 percentile limit calculated to all stockholders, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

Dependent variable: Risky stockholding (dummy)		
	(1)	(2)
Riskaversion (dummy)	-0.46*** (-8.23)	
Male (dummy)	0.02 (0.37)	-0.02 (-0.51)
Age	0.07* (1.80)	0.06** (1.98)
Age (Sq)	0.00 (-0.98)	0.00 (-1.14)
Secondary (dummy)	0.17* (1.77)	0.12 (1.63)
Post-secondary (dummy)	0.13*** (2.99)	0.16*** (3.48)
Log (net wealth)	0.54*** (15.91)	0.58*** (19.75)
Sociability (dummy)	0.03 (0.46)	0.07 (1.41)
Trust (dummy)	0.11* (1.91)	0.10** (2.18)
Right-wing (dummy)	0.01 (0.17)	0.02 (0.49)
Numeracy (dummy)	0.01 (0.13)	0.01 (0.24)
Recall ability (dummy)	-0.05 (-0.83)	-0.07 (-1.58)
Verbal fluency (dummy)	0.06 (0.59)	0.03 (0.34)
Poor health (dummy)	-0.08 (-0.51)	-0.05 (-0.42)
Life satisfaction (dummy)	-0.09 (-0.66)	-0.05 (-0.44)
Religion (dummy)	-0.14** (-2.48)	-0.12*** (-2.70)
Constant	-11.18*** (-8.43)	-11.53*** (-10.33)
Country fixed effects	Yes	Yes
Pseudo-R <sup>2</sup>	0.21	0.19
N	4073	6203

Surprisingly, interpersonal trust is the only one of the social stance indicators that is significant in explaining risky asset allocation, and it even gains in statistical significance after excluding risk aversion. The coefficients of sociability and political orientation increase slightly when risk aversion is excluded but the variables still do not stand out as statistically significant. Similarly with trust, religion has a relatively large negative effect on the probability of holding large share in risky assets. It could be that the low level of risk aversion is reflected to both trust and religiousness. High levels of interpersonal trust are associated with low levels of risk aversion (Guiso et al., 2003), and as the previous analyses have shown, also low religious affiliation and non-religiousness are associated with low levels of risk aversion. On the contrary to the other findings in this chapter, life satisfaction seems to be negatively correlated with risky stockholding. However, the result is not reliable as it is not statistically significant.

### **6.3 Subsample analyses**

In this section, I will move on to analyzing different subsamples. The first specification focuses on gender differences and differences between couple and single households in stockholding. The second specification focuses on comparison between high-wealth, middle-wealth and low-wealth individuals in explaining stock market participation decisions. Finally, the third specification looks into stock market participation of different age groups, thus, addressing the effect of having on average relatively aged sample of respondents.

#### ***6.3.1 Stock market participation by gender and by couple and single households***

Table 12 presents the differences between genders and couple and single households in the drivers of stock market participation. The same specification has been conducted with continuous variables for robustness, and the results from the continuous variable version can be found in Appendix (Table 25).

As one can see in Table 12, the traditional variables used to explain stock market participation affect almost equally strong both male and female stock market behavior. Age does not seem to impact stock market participation, whereas education, net wealth and especially risk aversion have a significant effect on the probability of investing in stocks. The effect of risk aversion is larger for male respondents, which may result from the fact that males on average are less risk averse in this sample (average risk aversion is 3.59 for males on a scale from one



to four) than females (average risk aversion for females is 3.76). Thus, it could be that higher risk aversion scores are more strongly weighted in the male specification.

Sociability has slightly stronger positive impact on male stock market participation compared to female stock market participation. It is interesting to see that trust actually explains male stock ownership but it does not seem to have any significant effect on female participation decisions. In turn, the impact of right-wing political orientation is somewhat stronger on female stock market participation. One possible interpretation is that males take more influences from their social connections than females, and that males are more likely to be “social learners” than females or more prone to the peer-group effects. On the other hand, females’ stock market participation decisions seem to be more influenced by their personal values and ideology.

Verbal fluency scores do not stand out as significant explanatory variable for either gender. Recall ability has slightly positive and equally strong impact on both male and female probability of owning stocks. Numeracy results are the most surprising in the cognitive skills section. As presented in Table 12, numeracy scores are actually negatively correlated, although not statistically significant, with stock market participation for males. For females, numeracy scores are positively correlated with stock ownership and statistically significant even on 1% level. Thus, it seems that numerical skills are more important from female point of view in stock market participation. It could be that as males in general are more likely to take risks than females, having higher cognitive skills play more important role in female stock market participation.

Poor health stands out as statistically significant for males but not for females, which suggests that health plays a more influential role in male stock market participation. On the contrary, religion has a stronger negative effect on female stock market participation than male stock market participation, similarly with political orientation. This also points to the direction that females are more prone to the effect of personal values and ideologies.

**Table 12. Stock market participation by gender and by couple and single households**

Both male and female and couple and single household specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)				
	Total sample	Male	Female	Couple	Single
Single (dummy)	-0.06* (-1.77)	-0.03 (-0.60)	-0.08* (-1.96)		
Male (dummy)	0.05* (1.94)			0.04 (1.19)	0.09* (1.65)
Age	0.02 (1.18)	0.03 (1.20)	0.01 (0.52)	0.03 (1.26)	0.00 (-0.08)
Age (Sq)	0.00* (-1.87)	0.00 (-1.64)	0.00 (-1.04)	0.00* (-1.75)	0.00 (-0.36)
Secondary (dummy)	0.24*** (5.99)	0.20*** (3.59)	0.28*** (5.10)	0.24*** (4.99)	0.24*** (3.40)
Post-secondary (dummy)	0.15*** (4.77)	0.21*** (4.83)	0.08* (1.68)	0.17*** (4.40)	0.12* (1.83)
Log (net wealth)	0.16*** (15.28)	0.18*** (11.23)	0.15*** (10.58)	0.18*** (12.20)	0.14*** (8.89)
Riskaversion (dummy)	-0.84*** (-29.87)	-0.90*** (-23.21)	-0.77*** (-18.68)	-0.84*** (-25.66)	-0.85*** (-15.33)
Sociability (dummy)	0.20*** (7.11)	0.24*** (6.12)	0.17*** (4.11)	0.22*** (6.54)	0.17*** (3.14)
Trust (dummy)	0.05* (1.83)	0.09** (2.39)	0.01 (0.16)	0.05 (1.49)	0.07 (1.25)
Right-wing (dummy)	0.16*** (5.92)	0.14*** (3.73)	0.18*** (4.60)	0.15*** (4.70)	0.19*** (3.75)
Numeracy (dummy)	0.06** (2.12)	-0.02 (-0.55)	0.14*** (3.42)	0.08** (2.27)	0.03 (0.51)
Recall ability (dummy)	0.07** (2.47)	0.07* (1.76)	0.07* (1.70)	0.04 (1.32)	0.12** (2.13)
Verbal fluency (dummy)	0.05 (0.65)	0.10 (0.94)	0.02 (0.19)	0.02 (0.26)	0.11 (0.77)
Poor health (dummy)	-0.15** (-2.32)	-0.21** (-2.22)	-0.08 (-0.96)	-0.18** (-2.32)	-0.11 (-1.07)
Life satisfaction (dummy)	0.10* (1.95)	0.07 (0.83)	0.13* (1.85)	0.05 (0.80)	0.18** (2.05)
Religion (dummy)	-0.07** (-2.52)	-0.05 (-1.24)	-0.09** (-2.15)	-0.07** (-2.15)	-0.09 (-1.49)
Constant	-3.36*** (-5.68)	-3.78*** (-4.01)	-3.08*** (-4.08)	-3.79*** (-4.93)	-2.34** (-2.37)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.34	0.34	0.32	0.34	0.32
N	15269	7421	7844	10669	4597

Table 12 also presents a subsample analysis on the differences between couple and single households. These specifications have the potential of showing whether differing preferences inside a household affect investment decisions. Prior research indicates that risk sharing and preference differences driven by age and income differences alter the savings behavior of couples (Browning, 2000; Mazzocco, 2004). In addition, empirical research shows that household members tend to differ in risk preferences, which affects household level investment decisions (Barsky, Juster, Kimball and Shapiro, 1997).

As with gender subsamples, couple households do not majorly differ from single households in terms of traditional characteristics affecting stock market participation, and surprisingly there are no differences between the effect of risk aversion between couple and single households. Being male has more explanatory power in single households' stockholding, whereas post-secondary education has less significance in single households' stock market participation. The effects of social activity, interpersonal trust and political orientation do not differ between couple and single households. The explanatory power of cognitive skills also remains fairly constant between the subsamples; only recall ability and numeracy receive slightly different emphasis between couples and singles. Generally, most of the explanatory variables are surprisingly homogenous between couple and single households.

Health turns out as statistically significant variable lowering the probability of couples to participate on the stock market. According to prior literature, being married reduces the effect of poor health on financial risk taking by partially offsetting the risk of impaired home production (Edwards, 2008). This does not seem to be the case here. It could be that as individual household members are subject to the cumulative health risks of the entire household, the effect of poor health is emphasized in households consisting of more than one member. Therefore, in a two- or more person household increased health risks affect all of the household members.

Life satisfaction, in turn, has a stronger positive effect on single respondents' stock market participation. According to prior literature, more optimistic and more satisfied individuals are more likely to take risks, seek information on risky assets and actively seek and adopt new solutions in all aspects of life, therefore, more likely to invest in stocks (Felton et al., 2003). Based on the results, it seems that single females benefit the most from life satisfaction in terms of stockholding. The positive effect of optimism on risk taking is straightforward in

single households, whereas in two- or more person households the investment decisions depend on the average of each of the financial respondents' optimism and risk aversion levels. Therefore, in a couple households each of the household members needs to accommodate their risk preferences to a mutually agreed level.

### ***6.3.2 Stock market participation by wealth***

Table 13 divides the total sample in high-wealth, middle-wealth and low-wealth individuals. The respondents in each country are pooled into three equal size wealth groups, which are then combined to high-, middle- and low-wealth groups. For robustness, the same analysis is conducted with continuous variables and the regression results are shown in the Appendix (Table 26).

It seems that being male has a significant effect on stock market participation only in the middle-wealth group, whereas the effects of age do not notably differ between the groups. Similarly, the effect of secondary education on stock market participation is strong in all wealth groups, whereas the effect of post-secondary education gains in statistical significance as wealth increases. The effect of net wealth is strong in all wealth groups. These findings are in line with prior studies, as both high net wealth and education have a reducing effect on risk aversion and they lower the adverse effects of fixed costs of investing (e.g. Riley and Chow, 1992; Campbell, 2006).

Risk aversion seems to have a stronger effect on high-wealth subsample's stock ownership. It was shown in the risk aversion regression in Table 10 that net wealth is negatively correlated with risk aversion. In line with this, high-wealth individuals are on average less risk averse compared to middle- and low-wealth individuals (high-wealth individuals report an average risk aversion of 3.48, middle-wealth individuals an average risk aversion of 3.69 and low-wealth individuals an average risk aversion of 3.79 on a scale from one to four, where four represents the highest level of risk aversion). It is rational to think that in the high-wealth subsample, the only real reason of choosing not to invest in stocks is extremely high level of risk aversion. With excess wealth as a buffer, financial risks and even high levels of background risks should not be a barrier for stock market entry, and neither should fixed costs in the form of information barriers.

Social activity and right-wing political orientation have slightly stronger positive effect on stock market participation amongst low-wealth individuals compared to middle- and high-wealth individuals. It could be that social interactions, social learning and personal values play a more important role in the lower-wealth group compared to the higher-wealth group because higher-wealth individuals are not so dependent on these additional influences. Interpersonal trust is slightly more important in the low-wealth individuals' stock market participation decisions compared to middle- and high-wealth individuals' stock market participation, although the results on trust are not statistically significant so no conclusions can be made based on them. This contradicts the findings of Guiso et al. (2008), according to which lack of trust explains especially the limited stock market participation of the more wealthy households. Instead, this finding could be rationalized with the importance of trust especially to low-wealth individuals. It is hard to imagine that low-wealth individuals would allocate their small amount of savings to risky assets, such as stocks, unless they trust the society at large and financial intermediaries.

Numeracy stands out as significant in explaining high-wealth individuals' stock market participation and recall ability in explaining low-wealth individuals' stock market participation. Verbal fluency does not have significant effect in any of the wealth subsamples. However, the overall effects of individual cognitive skills are mixed and mostly statistically insignificant.

One could expect that poor health and increased health risks have a stronger effect in the low-wealth subsample since low-wealth individuals are more constraint to protect themselves against health risks and high-wealth individuals have more resources to cope with health risks. However, it seems that there are no major differences in the effects of poor health between the three wealth subsamples, and although the poor health coefficients are negative in each subsample, the effects are not statistically significant.

**Table 13. Stock market participation by wealth**

The total sample is pooled into three equal size groups based on net wealth level on a country-by-country basis. All specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)		
	Low wealth	Middle wealth	High wealth
Male (dummy)	0.03 (0.54)	0.11** (2.28)	0.06 (1.30)
Age	0.03 (0.99)	0.03 (1.15)	-0.04 (-1.22)
Age (Sq)	0.00 (-1.40)	0.00 (-1.57)	0.00 (0.77)
Secondary (dummy)	0.20*** (2.94)	0.27*** (4.05)	0.17** (2.33)
Post-secondary (dummy)	0.13* (1.83)	0.13** (2.25)	0.14*** (2.93)
Log (net wealth)	0.09*** (5.10)	0.19** (2.33)	0.18*** (5.24)
Riskaversion (dummy)	-0.64*** (-10.57)	-0.85*** (-17.16)	-0.91*** (-20.82)
Sociability (dummy)	0.24*** (4.40)	0.16*** (3.30)	0.20*** (4.31)
Trust (dummy)	0.08 (1.56)	0.05 (1.06)	0.04 (0.89)
Right-wing (dummy)	0.24*** (4.45)	0.09* (1.95)	0.14*** (3.17)
Numeracy (dummy)	0.00 (0.01)	0.05 (1.04)	0.09* (1.82)
Recall ability (dummy)	0.17*** (3.11)	-0.03 (-0.52)	0.08* (1.75)
Verbal fluency (dummy)	0.08 (0.54)	0.19 (1.55)	-0.09 (-0.81)
Poor health (dummy)	-0.14 (-1.37)	-0.12 (-1.11)	-0.17 (-1.56)
Life satisfaction (dummy)	0.15* (1.80)	0.15 (1.61)	0.03 (0.31)
Religion (dummy)	-0.10* (-1.75)	-0.10* (-1.90)	-0.04 (-0.79)
Constant	-3.24*** (-3.05)	-4.24*** (-2.94)	-1.36 (-1.23)
Country fixed effects	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.26	0.32	0.35
N	4823	5079	5362

Furthermore, life satisfaction has a significant impact on low-wealth subsample's stock market participation but not on middle-wealth or low-wealth subsample's stock market participation. It could be that life satisfaction and optimism in general has a larger effect on the less wealthy individuals. It has been found that optimism is likely to increase effort and ability to cope with uncontrollable circumstances (Scheier and Carver, 1985, 1992), and that optimists are more likely to actively work to improve their current situation and to search information on risky investment opportunities (Felton et al., 2003). Moreover, Puri and Robinson (2007) link moderate optimism with sensible economic decisions. Thus, low-wealth individuals may be striving harder to increase their wealth and they may be more active in searching different ways to improve their quality of life in financial terms.

Finally, it seems that religious affiliation has a more powerful adverse effect on stock market participation in the low-wealth and middle-wealth subsamples. This could result from the fact that low- and middle-wealth individuals on average are more religious than high-wealth individuals (religious affiliation in low-wealth group is on average 2.11, in middle-wealth group 2.07 and in high-wealth group 2.03, on a scale from zero to five where zero stands for non-religiousness). Religiousness may also have a more dominant positive effect on risk aversion for low-wealth individuals since increasing wealth reduces the effect of risk aversion (Riley and Chow, 1992).

### ***6.3.3 Stock market participation by age***

To take into account the relatively large concentration on older generations in the sample, I have included an analysis on the effects of age on stock market participation. The first table, Table 14, shows the age distribution of respondents in different countries. As one can see from the table, the sample is quite evenly distributed. The portion of 55-year-old and younger individuals ranges from 6.0% in Austria to 17.4% in Denmark (total sample 12.8%), but the differences in age distribution slightly decrease as moving on to the older age groups. For example, the portion of 80-year-old and younger individuals ranges only from 83.7% in Spain to 89.8% in the Netherlands (total sample 87.5%).

**Table 14. Age distribution by country**

The table below shows age distributions of each country participating in the second wave of SHARE. The table presents the cumulative percentages of respondents in age groups with upper limits from 55 to 85 with five year intervals.

Country	Austria	Germany	Sweden	Netherlands	Spain	Italy	France
Age	Cumulative percentage						
55 and under	6.0	9.9	6.5	12.9	12.4	11.2	14.8
60 and under	20.7	29.8	22.7	33.0	27.4	25.3	33.3
65 and under	38.0	45.3	42.9	54.1	42.0	44.0	49.5
70 and under	59.6	64.3	60.9	69.3	56.0	62.0	63.5
75 and under	74.4	80.4	74.3	80.9	71.2	77.7	75.5
80 and under	85.8	89.2	84.2	89.8	83.7	89.6	85.2
85 and under	93.6	96.0	93.0	95.6	92.0	96.5	93.2
N	1,341	2,568	2,745	2,660	2,227	2,983	2,968

Country	Denmark	Greece	Switzerland	Belgium	Czech Republic	Poland	Ireland
Age	Cumulative percentage						
55 and under	17.4	15.1	15.0	12.9	13.7	15.3	13.4
60 and under	35.1	36.2	32.0	32.5	32.5	35.8	33.9
65 and under	53.2	52.5	50.0	50.3	53.7	53.6	53.8
70 and under	67.6	64.8	64.4	62.8	69.4	66.2	67.8
75 and under	78.3	78.4	76.9	75.6	80.1	78.8	80.2
80 and under	87.3	88.6	87.2	86.1	89.5	89.2	89.2
85 and under	94.5	94.8	94.3	94.8	95.4	95.9	96.6
N	2,615	3,241	1,462	3,169	2,827	2,467	1,134

Total sample	
55 and under	12.8
60 and under	31.0
65 and under	49.0
70 and under	64.3
75 and under	77.4
80 and under	87.5
85 and under	94.7
N	34,407

Table 15 represents results from regression analyses conducted on three different age groups: over 60 years old, 60 years old and younger and 55 years old and younger. Based on the results, there are some differences in the variables affecting stockholding between the age groups. It seems that education is least important to the youngest young respondents in the sample, that is, under 55-year-old individuals. However, there is no significant difference in the effect of education between the old (over 60 years old) and the young (under 60 years old) age groups. Risk aversion has a larger negative effect on the stock market participation decision of the older portion of the sample, which is in line with findings on increasing risk



aversion along ageing (Riley and Chow, 1992). There are no major differences in the effect of net wealth on stock holding between the age groups. The effect of sociability is similar between the old and the young age group, however, the youngest young group seems to be affected slightly more by social activity. Interestingly, interpersonal trust is more important for stock market participation decision within the younger age groups and political orientation in the older age group. Right-wing political orientation does not appear to be significant determinant of stock holding in the youngest young group.

Numeracy stands out in the cognitive skills section as a strong influence on the older age group's stock market participation. The effect of numeracy is significant even on 1% confidence level, whereas numeracy does not seem to have any effect on stock holding in the young and the youngest young groups. It could be that numeracy captures the negative effect of aging on cognitive skills. People, who remain at the same level in terms of cognitive skills even in the older ages, are more likely to hold stocks. Cognitive aging starts as early as around the age of 30 (Grady and Craik, 2000), but there has been found to be a sharp decline in cognitive abilities after the age of 70 (Lindenberger and Baltes, 1994). In the finance field, Korniotis and Kumar (2009) have shown that even though older investors' decisions reflect greater investing knowledge, investment skills decline with age due to the negative effect of cognitive aging.

As one could assume, poor health has a stronger impact on stock holding after the age of 60. Older individuals do face increased health risks compared to the younger individuals, and in line with the results of Edwards (2008), older individuals are more likely to hedge against increased health risks by decreasing their ownership in risky assets. Younger individuals may be better able to hedge against health risks with other means and younger individuals with steady income from employment may also be financially better prepared for dealing with increases in health expenditure. Life satisfaction seems to have a great impact on the stock market participation of the group of 60-year-old and younger respondents, and even greater impact in the youngest young group. However, the results are statistically significant only in the group of respondents aged 60 and under, so it is impossible to make reliable assumptions based on the results. The effect of religion is fairly constant throughout the different age groups, although the effect of religion is statistically significant only in the group of respondents aged 60 and under.

**Table 15. Stock market participation by age**

Total sample regression and all three age group specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)			
	Total sample	Over 60 years old	60 years old and under	55 years old and under
Male (dummy)	0.06** (2.33)	0.08** (2.28)	0.04 (0.84)	0.05 (0.68)
Age	0.02 (1.26)	-0.02 (-0.63)	-0.12 (-1.27)	-0.18 (-1.19)
Age (Sq)	0.00** (-1.98)	0.00 (0.17)	0.00 (1.22)	0.00 (1.06)
Secondary (dummy)	0.24*** (5.97)	0.22*** (4.87)	0.25*** (2.85)	0.35** (2.14)
Post-secondary (dummy)	0.15*** (4.74)	0.16*** (3.80)	0.15*** (2.91)	0.10 (1.22)
Log (net wealth)	0.17*** (15.82)	0.17*** (13.10)	0.16*** (8.74)	0.20*** (6.31)
Riskaversion (dummy)	-0.84*** (-29.87)	-0.88*** (-24.56)	-0.79*** (-17.05)	-0.68*** (-9.03)
Sociability (dummy)	0.20*** (7.08)	0.20*** (5.86)	0.20*** (4.14)	0.27*** (3.35)
Trust (dummy)	0.05* (1.83)	0.03 (1.01)	0.09* (1.82)	0.14* (1.73)
Right-wing (dummy)	0.16*** (5.91)	0.18*** (5.40)	0.12*** (2.63)	0.11 (1.47)
Numeracy (dummy)	0.06** (2.15)	0.09** (2.47)	0.01 (0.14)	-0.01 (-0.14)
Recall ability (dummy)	0.07** (2.50)	0.05 (1.53)	0.09* (1.95)	0.12 (1.59)
Verbal fluency (dummy)	0.05 (0.66)	0.08 (0.78)	0.03 (0.32)	0.05 (0.32)
Poor health (dummy)	-0.15** (-2.31)	-0.20*** (-2.69)	0.01 (0.12)	0.07 (0.36)
Life satisfaction (dummy)	0.11** (2.04)	0.07 (1.09)	0.17* (1.86)	0.23 (1.56)
Religion (dummy)	-0.07** (-2.50)	-0.06 (-1.59)	-0.10** (-1.99)	-0.07 (-0.90)
Constant	-0.25** (-2.29)	-1.85 (-1.42)	0.38 (0.15)	1.08 (0.29)
Country fixed effects	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.34	0.36	0.28	0.27
N	15269	10598	4671	1735

#### **6.4 Stock market participation by geographic areas**

This section focuses on the regional differences in the drivers of stock market participation. First, I will present the results from country specific regressions, and second, the results from larger scale subregional specifications. Table 16 presents the country specific regressions for all fourteen countries taking part in the second wave of SHARE. The sample size is quite small in some countries and non-response rates are also unevenly distributed between the countries. The main problem is that non-response rates in political orientation and religion in the French subsample are so high that both of the variables had to be omitted from the France specific regression. Therefore, although the regression results give a general picture of the possible country specific differences, they should not be relied upon without consideration in comparing the drivers of stock market participation.

In each country, risk aversion and education have strong explanatory power in stock market participation, and these results are mostly statistically significant at least on 5% level. Also the effect of net wealth is high in all countries. Age yields mixed results and it does not seem to have any significant influence on stock market participation across the countries. On the other hand, being male slightly increases the probability of stock market participation in most countries. All in all, the results relating to demographics and more established drivers of stock market participation are well in line with both prior literature and previous findings of this study.

Interestingly, sociability seems to have the strongest effect on being a stockowner in the Southern Europe, namely in Italy and Spain. On the contrary, sociability has least explanatory power in the Nordic countries, Sweden and Denmark, as well as in the Netherlands, France and Poland. One could argue that people in the southern parts of Europe are in general more outgoing and social and have larger social networks than people in the northern parts of Europe. Thus, in South Europe people are used to relying on and learning from their social connections, whereas in the Nordic people are more used to taking advantage of alternative and more formal information sources. The results on the effect of interpersonal trust are quite mixed across the countries and in most countries the effect of trust is not statistically significant.

Right-wing political orientation seems to increase the likelihood of being a stockowner in most of the countries, and only in Poland the effect is negative and statistically significant.

Germany, Sweden and Denmark stand out as countries where political orientation affects the most stock market participation decisions. It is hard to point out reasons why the Nordic countries and Germany seem to be more sensitive to political orientation than the rest of Europe. The whole Europe has gone through a right-wing swing in the 2000s starting from Germany and closely followed by other European countries, including Finland, Sweden and Denmark. One could reason that the difference in the effect of political orientation on the probability of stockholding stems from the differences between right-wing political parties in Europe. The right-wing parties in the Nordic countries are “right-central”, more liberal and in favor of corporate capitalism. In turn, the right-wing parties in South Europe are generally more conservative.

All in all, one can conclude that cognitive skills, numeracy, recall ability and verbal fluency, have positive effect on stock market participation, although the strength and statistical significance of the different skills varies between countries. Similarly, good health and life satisfaction seem to have an overall positive effect on the probability of stock market participation, although there is variance between the magnitude and statistical significance of these variables between the countries. Religion, on the contrary, has an overall negative effect on the probability of being a stockowner. The effect of religiousness is strongest in Sweden, the Netherlands and Switzerland, but it is hard to interpret why these countries stand out from the other countries because there does not seem to be any similarities in terms of religion between the countries. The major religion in Sweden is Lutheranism and most Swedish people do not regularly attend church. The Netherlands and Switzerland in turn are dominated by Catholicism and Protestantism but a notably larger population in Switzerland belongs to church compared to the Netherlands.

## 16. Stock market participation by country

All country specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. All of the cognitive skills scores vary on the scale written next to the variables. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively. The non-response rates in political orientation and religion are so high in France that both of the variables had to be omitted from the regression.

	Dependent variable: Stockowner (dummy)						
	Austria	Germany	Sweden	Netherlands	Spain	Italy	France
Male (dummy)	0.01 (0.08)	0.11 (1.25)	0.04 (0.48)	-0.19** (-2.11)	0.13 (0.84)	0.23* (1.86)	0.14* (1.79)
Age	-0.08 (-0.98)	0.16** (2.03)	-0.01 (-0.19)	-0.03 (-0.60)	0.09 (0.96)	0.00 (-0.01)	-0.01 (-0.21)
Age (Sq)	0.00 (0.90)	0.00** (-2.22)	0.00 (-0.06)	0.00 (0.63)	0.00 (-1.00)	0.00 (-0.09)	0.00 (0.20)
Secondary (dummy)	0.74** (2.20)	- -	0.22** (2.52)	-0.09 (-0.54)	0.40** (2.43)	0.13 (0.91)	0.18* (1.75)
Post-secondary (dummy)	0.12 (0.81)	0.15 (1.62)	0.21** (1.98)	0.16* (1.66)	0.39** (2.02)	0.06 (0.33)	0.19** (1.98)
Log (net wealth)	0.11*** (2.65)	0.16*** (5.17)	0.17*** (5.91)	0.21*** (6.37)	0.09 (1.57)	0.28*** (4.53)	0.16*** (6.14)
Riskaversion (dummy)	-1.12*** (-7.90)	-0.91*** (-9.93)	-0.93*** (-10.35)	-1.16*** (-12.94)	-1.08*** (-5.63)	-0.82*** (-7.00)	-1.04*** (-12.36)
Sociability	0.10* (1.67)	0.09** (2.46)	0.03 (0.82)	0.04 (1.19)	0.32*** (3.74)	0.24*** (4.18)	0.02 (0.56)
Trust (0-10)	-0.01 (-0.18)	0.02 (1.12)	-0.01 (-0.51)	0.03 (1.51)	-0.03 (-1.02)	0.00 (0.17)	-0.01 (-0.37)
Left-right (0-10)	0.01 (0.30)	0.06** (2.44)	0.05*** (3.11)	0.01 (0.28)	0.01 (0.43)	0.02 (1.10)	- -
Numeracy (1-5)	0.13 (1.46)	0.05 (1.01)	0.09** (2.18)	0.05 (1.01)	0.08 (1.05)	0.03 (0.41)	0.09** (2.24)
Recall ability (0-10)	-0.01 (-0.15)	-0.01 (-0.45)	0.02 (0.65)	0.03 (0.99)	0.00 (0.01)	0.04 (1.18)	0.05* (1.91)
Verbal fluency	0.02** (1.97)	0.02*** (3.02)	0.01 (1.03)	0.01* (1.81)	0.01 (0.78)	0.00 (0.35)	0.00 (0.28)
Health (0-10)	0.08* (1.69)	-0.03 (-0.91)	0.00 (-0.18)	0.01 (0.29)	0.06 (1.35)	0.00 (0.09)	0.04 (1.48)
Life satisfaction (0-10)	-0.01 (-0.11)	0.05 (1.56)	0.10*** (3.95)	-0.02 (-0.54)	0.03 (0.66)	0.06 (1.47)	0.02 (0.89)
Religion (0-5)	-0.03 (-0.62)	-0.04 (-1.60)	-0.05** (-2.05)	-0.07*** (-3.01)	-0.02 (-0.41)	-0.04 (-1.21)	- -
Constant	-0.73 (-0.23)	-7.98*** (-3.11)	-1.92 (-1.33)	-2.12 (-1.29)	-5.64* (-1.69)	-5.03* (-1.70)	-2.80* (-1.91)
Pseudo-R <sup>2</sup>	0.28	0.22	0.23	0.26	0.23	0.22	0.23
N	764	1238	1603	1401	820	1318	1576

**Table 16. Stock market participation by country (continued)**

All country specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. All of the cognitive skills scores vary on the scale written next to the variables. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)						
	Denmark	Greece	Switzerland	Belgium	CzechReb	Poland	Ireland
Male (dummy)	0.12 (1.57)	-0.16 (-0.90)	0.09 (0.85)	0.05 (0.67)	0.08 (0.91)	0.26 (1.36)	0.25* (1.75)
Age	0.05 (1.04)	0.00 (0.01)	-0.03 (-0.40)	0.06 (1.21)	0.11 (1.59)	1.53 (1.59)	-0.04 (-0.35)
Age (Sq)	0.00 (-1.24)	0.00 (-0.24)	0.00 (0.22)	0.00 (-1.46)	0.00* (-1.91)	-0.01* (-1.71)	0.00 (0.27)
Secondary (dummy)	0.06 (0.47)	0.20 (0.79)	0.43** (2.43)	0.40*** (3.73)	-0.03 (-0.26)	- -	0.29 (1.22)
Post-secondary (dummy)	-0.05 (-0.63)	0.50*** (2.85)	0.03 (0.18)	-0.09 (-1.04)	0.37*** (2.93)	0.17 (0.66)	-0.05 (-0.36)
Log (net wealth)	0.21*** (8.24)	0.15* (1.78)	0.27*** (6.02)	0.26*** (6.66)	-0.09*** (-3.30)	0.00 (-0.05)	0.14* (1.70)
Riskaversion (dummy)	-0.45*** (-5.68)	-1.24*** (-7.13)	-0.94*** (-8.77)	-1.06*** (-13.28)	-0.30*** (-3.53)	-0.59** (-2.59)	-1.19*** (-8.71)
Sociability	0.00 (0.06)	0.10 (1.13)	-0.07* (-1.76)	0.11*** (3.52)	0.12** (2.38)	0.02 (0.20)	0.08* (1.79)
Trust (0-10)	0.04** (2.13)	-0.03 (-1.01)	-0.01 (-0.36)	0.04** (2.52)	-0.02 (-1.08)	0.03 (0.82)	0.02 (0.52)
Left-right (0-10)	0.04** (2.13)	-0.02 (-0.55)	0.03 (1.32)	0.03 (1.45)	0.03 (1.54)	-0.08** (-2.19)	-0.01 (-0.17)
Numeracy (1-5)	-0.01 (-0.26)	-0.03 (-0.33)	0.00 (0.04)	-0.03 (-0.79)	0.09* (1.89)	0.19 (1.51)	0.16* (1.80)
Recall ability (0-10)	0.06** (2.14)	-0.06 (-1.02)	0.06 (1.62)	-0.02 (-0.64)	0.02 (0.51)	-0.01 (-0.18)	0.07 (1.40)
Verbal fluency	0.01 (1.51)	0.02 (1.01)	0.02* (1.88)	0.00 (0.47)	0.02*** (2.80)	0.02 (1.01)	0.02** (2.10)
Health (0-10)	0.05* (1.85)	0.08 (1.02)	0.00 (-0.10)	0.07** (2.22)	-0.01 (-0.34)	0.04 (0.69)	0.04 (0.66)
Life satisfaction (0-10)	0.03 (1.16)	0.12* (1.68)	0.02 (0.42)	0.00 (-0.07)	0.05* (1.67)	0.05 (1.00)	0.07 (0.92)
Religion (0-5)	0.01 (0.40)	0.03 (0.62)	-0.06* (-1.82)	-0.03 (-1.36)	0.01 (0.19)	0.01 (0.22)	-0.03 (-0.76)
Constant	-5.00*** (-3.30)	-3.71 (-1.14)	-2.90 (-1.32)	-5.50*** (-3.17)	-3.71 (-1.61)	-43.51 (-1.58)	-2.95 (-0.81)
Pseudo-R <sup>2</sup>	0.16	0.32	0.25	0.25	0.10	0.25	0.32
N	1418	1162	818	1612	1397	609	663

Table 17 presents regression results for geographical subregions; Southern, Northern, Eastern and Western Europe. South Europe includes Spain, Italy and Greece; North Europe includes Sweden and Denmark; East Europe includes Austria, Germany, Czech Republic and Poland; and West Europe includes the Netherlands, France, Switzerland, Belgium and Ireland<sup>4</sup>. The regional division does not accurately follow any cultural borders so the division is artificial to some extent. However, the purpose of this specification is to analyze the overall differences between Scandinavia, South Europe and Eastern and Western parts of Central Europe, for which the groups of countries form sufficiently representational subsamples. In addition, this allows for checking the robustness of the regional effects that were found in the previous country specific regressions.

The effect of post-secondary education is strongest in Southern and Eastern Europe. This is understandable since the education level in Spain, Italy and Greece is clearly lower compared to other parts of Europe, and the education levels in Poland and Czech Republic as well are below the total sample average. In the south, individuals in this sample have on average a lower secondary degree, whereas on average individuals in the total sample have an upper secondary degree. Net wealth and risk aversion are statistically significant drivers of stock market participation in each of the subregions.

Contradicting the results of Georgarakos and Pasini (2009), sociability plays the most important role in the South Europe and the least important role in the North Europe. Therefore, it seems that the effect of sociability is not driven by high stock market participation rates. As mentioned above in the country specific analysis, it is a well known stereotype that people in the south are more outgoing and have large family and other social networks compared to people in the north, who are often described as introvert and unsocial. Due to this difference, it may be that northern individuals are used to taking advantage of other information channels, such as media and finance professionals, whereas people in the southern parts of Europe are used to relying on their personal contacts also in financial decisions.

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<sup>4</sup> Europe subregion division follows the division in The World Factbook 2009 prepared by the Central Intelligence Agency (CIA).

**Table 17. Stock market participation by Europe subregions**

All subregion specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. South Europe includes Spain, Italy and Greece; North Europe includes Sweden and Denmark; East Europe includes Austria, Germany, Czech Republic and Poland; and West Europe includes the Netherlands, France, Switzerland, Belgium and Ireland (The World Factbook 2009). Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. All of the cognitive skills scores vary on the scale written next to the variables. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)			
	South Europe	North Europe	East Europe	West Europe
Male (dummy)	0.10 (1.22)	0.06 (1.11)	0.10* (1.79)	0.02 (0.53)
Age	0.02 (0.35)	0.02 (0.84)	0.07 (1.60)	0.00 (-0.03)
Age (Sq)	0.00 (-0.53)	0.00 (-1.14)	0.00** (-2.00)	0.00 (-0.20)
Secondary (dummy)	0.24** (2.46)	0.20*** (2.87)	0.15 (1.48)	0.27*** (3.58)
Post-secondary (dummy)	0.30*** (3.01)	0.04 (0.69)	0.23*** (3.71)	0.02 (0.42)
Log (net wealth)	0.17*** (4.74)	0.18*** (8.95)	0.06*** (3.59)	0.23*** (10.21)
Riskaversion (dummy)	-0.95*** (-11.38)	-0.66*** (-11.68)	-0.67*** (-12.34)	-1.07*** (-22.2)
Sociability	0.23*** (5.70)	0.01 (0.46)	0.10*** (3.92)	0.04** (2.30)
Trust (0-10)	-0.01 (-0.73)	0.01 (1.10)	0.00 (0.09)	0.03*** (2.67)
Left-right (0-10)	0.02 (1.07)	0.05*** (4.15)	0.02* (1.90)	0.02* (1.93)
Numeracy (1-5)	0.03 (0.74)	0.04 (1.27)	0.09*** (3.06)	0.02 (0.70)
Recall ability (0-10)	0.01 (0.29)	0.04** (2.23)	0.00 (0.01)	0.02 (1.44)
Verbal fluency	0.00 (0.89)	0.01* (1.67)	0.02*** (4.77)	0.01*** (2.80)
Health (0-10)	0.04 (1.33)	0.02 (1.18)	0.00 (0.21)	0.03 (1.62)
Life satisfaction (0-10)	0.06** (2.15)	0.07*** (3.51)	0.03** (2.00)	0.01 (0.59)
Religion (0-5)	-0.02 (-0.90)	-0.02 (-1.02)	-0.01 (-0.71)	-0.05*** (-4.03)
Constant	-4.03** (-2.16)	-3.41*** (-3.31)	-4.39*** (-3.14)	-3.29*** (-2.87)
Country fixed effects	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.24	0.19	0.21	0.27
N	3300	3021	4447	4501



Trust seems to have no effect on stock market participation in the subregions of Europe, with the exception of Western Europe. The effect of trust on the probability of being a stockholder is even negative in the South Europe, although the result is not statistically significant. These findings fail to support the results of Georgarakos and Pasini (2009), who report that prevailing level of trust increases stock market participation especially in countries where the general level of trust is low, such as, Italy (South Europe), Spain (South Europe) and Austria (East Europe).

Political orientation has moderate explanatory power in both Eastern and Western Europe but the most significant effect politics has in the northern parts of Europe. This observation may reflect the different statuses that right-wing parties have across Europe. Right-wing parties in the north are more central-right positioned, liberal and free market orientated, while right-wing parties in southern Europe are often seen to be more conservative and nationalist. Therefore, it is understandable that the power of right-wing orientation grows as moving from South Europe to North Europe.

Similarly as in the previous country specifications, the impacts of the different cognitive skills on stock market participation are mixed. Numeracy receives strong weight in the Eastern Europe, recall ability in the Northern Europe and verbal fluency in the Eastern and Western Europe. Thus, one can only conclude that cognitive skills have an overall positive effect on the probability of holding stocks, but not which measure is the most suitable for analyzing the effects of cognitive skills on the probability of stock market participation.

Surprisingly, health does not seem to have significant effect on stock market participation in any of the regions. All regions except East Europe show a slight positive correlation between health and stockholding, but none of these coefficients are statistically significant. Life satisfaction plays an important role in stock market participation in the southern, northern and eastern parts of Europe, whereas religion has a significant role only in the western parts of Europe. One could have assumed that religion would be most significant in the Southern Europe because southern countries in Europe are clearly the most religious.

## 6.5 Economic significance

This section continues onto further analysis of the drivers of stock market participation by analyzing the economic significance of the different explanatory variables. Table 18 on the next page presents marginal effects for a probit regression with stock market participation as dependent variable, including all demographic variables, as well as social stance, cognitive skill, health, life satisfaction and religion dummy variables as independent variables. Marginal effect is the effect of a discrete change of a dummy variable from zero to one, or the effect of an infinitesimal change in a continuous variable, on the probability of stock market participation. As in the previous regressions, the results are controlled for country fixed effects.

Not surprisingly, the largest single unit effects result from changes in risk aversion and education. One unit increase in risk aversion decreases the probability of stock market participation by 27.0 percentage points. Having completed a secondary level degree increases the probability of stock market participation by 6.4 percentage points, and having completed a post-secondary level degree increases the probability by 4.5 percentage points. It is a bit more challenging to interpret the effect of net wealth because log transformation is used to normalize the net wealth data. Taking into account that the results are calculated at the predicted probability when the independent variables take their mean values, approximately EUR 150,000 increase in net wealth would result in the 4.8 percentage point increase in the probability of being stockowner stated in the Table 18. Being male increases the likelihood of stock market participation by 1.8 percentage points.

**Table 18. Marginal effects**

Marginal effects are calculated based on a probit regression where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Marginal effect is the effect of a discrete change of a dummy variable from zero to one, or the effect of an infinitesimal change in a continuous variable, on the probability of stock market participation. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent positions himself above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent positions himself on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Standard errors are shown next to the marginal effects, and \*, \*\*, and \*\*\* represent significance of the regression coefficients on 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)		
	Marginal effect		Standard error
Male (dummy)	0.018	**	(0.008)
Age	0.006		(0.005)
Age (Sq)	0.000	**	(0.000)
Secondary (dummy)	0.064	***	(0.010)
Post-secondary (dummy)	0.045	***	(0.010)
Log (net wealth)	0.048	***	(0.003)
Riskaversion (dummy)	-0.270	***	(0.010)
Sociability (dummy)	0.057	***	(0.008)
Trust (dummy)	0.014	*	(0.008)
Right-wing (dummy)	0.047	***	(0.008)
Numeracy (dummy)	0.018	**	(0.008)
Recall ability (dummy)	0.020	**	(0.008)
Verbal fluency (dummy)	0.014		(0.021)
Poor health (dummy)	-0.039	**	(0.016)
Life satisfaction (dummy)	0.029	**	(0.014)
Religion (dummy)	-0.021	**	(0.008)
Country fixed effects	Yes		
Pseudo-R <sup>2</sup>	0.207		
N	15269		

Next, I will move on to marginal effects of the more recently introduced explanations of stock market participation. The most economically significant variables seem to be sociability,

political orientation and poor health. One unit change holding other variables constant results in 5.7 percentage point increase in the probability of stock market participation in the case of sociability, 4.7 percentage point increase in the case of left-right political orientation, and 3.9 percentage point decrease in the case of poor health. Also life satisfaction has relatively strong influence on stockholding and being satisfied increases the likelihood of stockholding by 2.9 percentage points. Religion, recall ability and numeracy are close to equal in terms of economic significance. Religiousness reduces the probability of being stockowner by 2.1 percentage points; whereas good recall ability and numeracy increase the probability of being a stockowner by 2.0 and 1.8 percentage points, respectively. The most ineffective drivers of stock market participation based on marginal effects are trust and verbal fluency, both having only 1.4 percentage points effect on the probability of stockholding.

Table 19, in turn, presents the changes in the probability stock market participation based on a probit regression with continuous variables and total stock ownership as dependent variable. The first column presents the change in the probability of stock market participation when the independent variables vary from their minimum values to their maximum values, that is, in the case of dummy variables from zero to one. The second column shows the change in the probability of stock market participation when the independent variables vary one unit in real value and the third column the change in the probability when the independent variables vary one unit in standard deviation. The last column shows the standard deviations of each variable. All the changes in probabilities are calculated at the predicted probability when the independent variables take their mean values.

As in the marginal effect analysis, risk aversion and education have a strong effect on the likelihood of becoming a stockowner in all three specifications. For example, one standard deviation change in risk aversion reduces the probability of stock market participation by 10.7 percentage points, one standard deviation change in secondary education by 2.6 percentage points and in post-secondary education by 1.5 percentage points. One standard deviation change in net wealth, that is approximately EUR 500,000 change, would result in 8.3 percentage point increase in the probability of being a stockholder. As in the previous analysis, gender also has a small effect on stock market participation (0.8 percentage points). On the contrary, one standard deviation change in age has quite strong effect on the probability of stock market participation (5.5 percentage points).

Results on social stance indicators, cognitive skills, health, life satisfaction and religion are quite well in line with the results obtained from the previous analysis with dummy variables. As already mentioned, the first two columns present the changes in probabilities with change from minimum to maximum value in the independent variables and with change of one unit in real value. Although these reflect well the economic significance of individual variables, the effects are not directly comparable with each other because of different scaling used in different variables. The standard deviation unit changes in the third column are most suitable in describing the differences in significance between the variables.

After the traditional predictors of stockholding, sociability seems to have the single economically most significant effect on the probability of stock market participation with 2.1 percentage point effect with one standard deviation change. Life satisfaction is not far behind with 2.0 percentage point effect on the probability of being stockowner. Most likely due to its relatively large standard deviation compared to other variables, verbal fluency also stands out as having a large, 2.5 percentage point, effect on the probability of stock market participation. The second most influential variables are political orientation with 1.8 percentage point positive effect with one standard deviation change, and religion with 1.8 percentage point negative effect with one standard deviation change.

Numeracy and recall ability have effects of similar size, that is, 1.2 and 1.1 percentage points respectively. However, the economic significance of cognitive skills is remarkable when all cognitive skill scores are combined to form one cognitive skill index. One standard deviation change in the combined cognitive skill index results in a 3.7 percentage point increase in the probability of stockholding, a change in probability that is even higher than the effect of sociability or education. Cognitive skill index is formed by taking the mean of standard scores (z-scores) calculated for numeracy, recall ability and verbal fluency. Both regression and economic significance analysis conducted with the cognitive skill index are presented in Appendix in Tables 21 and 22.

**Table 19. Change in probabilities**

Changes in probabilities are calculated based on a probit regression where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. All of the cognitive skills scores vary on the scale written next to the variables. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. The first column presents the change in the probability of stock market participation if the independent variable changes from its minimum value to its maximum value (in case of dummy variables from zero to one). The second column presents the change in the probability of stock market participation if the independent variable changes one unit in real value. The third column presents the change in the probability of stockholding if the independent variable changes one standard deviation unit calculated at the predicted probability when the independent variable takes its mean value. The fourth column presents the standard deviations of each variable.

Variable	Dependent variable: Stockowner (dummy)			
	Change from min to max	Unit change in real value	Unit change in stand.dev.	Standard deviation
Male (dummy)	0.016	0.016	0.008	0.500
Age	0.399	0.006	0.055	9.869
Age (Sq)	-0.479	0.000	-0.081	1374.500
Secondary (dummy)	0.058	0.061	0.026	0.434
Post-secondary (dummy)	0.037	0.036	0.015	0.413
Log (net wealth)	0.646	0.045	0.083	1.822
Riskaversion (dummy)	-0.267	-0.236	-0.107	0.451
Sociability	0.140	0.018	0.021	1.158
Trust (0-10)	0.030	0.003	0.007	2.444
Left-right (0-10)	0.079	0.008	0.018	2.258
Numeracy (1-5)	0.045	0.012	0.012	1.063
Recall ability (0-10)	0.062	0.006	0.011	1.697
Verbal fluency	0.396	0.003	0.025	7.463
Health (0-10)	0.054	0.005	0.009	1.760
Life satisfaction (0-10)	0.105	0.012	0.020	1.678
Religion (0-5)	-0.048	-0.010	-0.018	1.871
Country fixed effects	Yes			
N	15269			

The least effective variables in terms of one standard deviation change are health and trust with 0.9 and 0.7 percentage point effects on the probability of being a stockowner. Trust has only little explanatory power on stock market participation also in the previous marginal

effect analysis, whereas the marginal effect of health in the previous analysis is relatively strong compared to other independent variables.

The significance of the entire regression specifications is measured with pseudo  $R^2$ , also known as the McFadden's  $R^2$ . At its maximum,  $R^2$  takes the value of one, which means that regression equation explains perfectly the observed dependent variable. At its minimum,  $R^2$  takes the value of zero indicating that the regression equation has no explanatory power in the observed event. The  $R^2$  value for stock market participation, including both direct and indirect stockholdings, all control variables and all independent variables of interest, is as high as 0.34. This means that the independent variables included in the regression explain approximately one third of the variation in stock market participation. For comparison,  $R^2$  value from a regression that explains stock market participation only with country fixed effects is 0.18. Restricting the dependent variable to direct and indirect stock market participation separately decreases  $R^2$  values to 0.30 and 0.28, respectively. Also in subsample analyses  $R^2$  values remain quite high ranging from 0.27 to 0.34. In country specific regressions  $R^2$  values vary remarkably from 0.10 to 0.35, whereas in Europe subregion specific regressions  $R^2$  values vary only from 0.19 to 0.27.

## **6.6 Additional drivers of stock market participation**

In this section, I will test the power of a few additional individual characteristics in explaining limited stock market participation. Table 20 on the next page tests three other potential explanations for limited stock market participation, that is, conservatism, bequest motive and entrepreneurship.

First variable, conservatism, is an interaction variable between political orientation and religiousness calculated as the product of these variables. Right-wing orientated and highly religious respondents are assumed to represent the most conservative part of the total sample. The interaction variable ranges between zero and fifty, and conservatism dummy is assigned to those who have the highest, above forty, scores on this scale. As one can see from the results presented below, conservatism has a negative effect on stock market participation, even controlling for all other variables. In the first specification, conservatism is statistically significant at 10% confidence level. Thus, when political orientation is combined with religious affiliation, we are able to separate the effect of conservative set of personal values.

**Table 20. Additional explanations of limited stock market participation**

All specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy and right-wing dummies take the value of one if the respondent positions himself above five in the trust and left-right scales from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales in each test. Poor health dummy takes the value of one if the respondent reports being in below five on health scale from zero to ten (ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being above five on life satisfaction scale from zero to ten (ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being religious. Conservatism is an interaction variable, that is, product of right-wing orientation and religiousness (scale from 0 to 50, dummy assigned to those who score 40 or above). Bequest motive dummy is assigned to those who will leave an inheritance of over EUR 50,000 with a probability of 80% or above. Self-employed dummy is assigned to those who report being self-employed. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)				
	(1)	(2)	(3)	(4)	(5)
Conservatism (dummy)		-0.14* (-1.83)			-0.12 (-1.62)
Bequest motive (dummy)			0.13*** (4.28)		0.13*** (4.28)
Self-employed (dummy)				0.01 (0.22)	0.02 (0.42)
Male (dummy)	0.06** (2.33)	0.06** (2.29)	0.06** (2.16)	0.06** (2.31)	0.06** (2.07)
Age	0.02 (1.26)	0.02 (1.26)	0.02 (1.11)	0.02 (1.27)	0.02 (1.12)
Age (Sq)	0.00** (-1.98)	0.00** (-1.97)	0.00* (-1.85)	0.00** (-1.98)	0.00* (-1.85)
Secondary (dummy)	0.24*** (5.97)	0.23*** (5.94)	0.22*** (5.54)	0.24*** (5.97)	0.22*** (5.52)
Post-secondary (dummy)	0.15*** (4.74)	0.15*** (4.75)	0.15*** (4.59)	0.15*** (4.74)	0.15*** (4.59)
Log (net wealth)	0.17*** (15.82)	0.17*** (15.84)	0.15*** (13.49)	0.17*** (15.71)	0.15*** (13.42)
Riskaversion (dummy)	-0.84*** (-29.87)	-0.84*** (-29.84)	-0.84*** (-29.69)	-0.84*** (-29.85)	-0.84*** (-29.64)
Sociability (dummy)	0.20*** (7.08)	0.20*** (7.08)	0.19*** (6.78)	0.20*** (7.08)	0.19*** (6.79)
Trust (dummy)	0.05* (1.83)	0.05* (1.82)	0.05* (1.66)	0.05* (1.83)	0.05* (1.66)
Right-wing (dummy)	0.16*** (5.91)	0.17*** (6.18)	0.16*** (5.68)	0.16*** (5.89)	0.17*** (5.88)
Numeracy (dummy)	0.06** (2.15)	0.06** (2.12)	0.06** (2.12)	0.06** (2.15)	0.06** (2.09)
Recall ability (dummy)	0.07** (2.50)	0.07** (2.52)	0.07** (2.47)	0.07** (2.49)	0.07** (2.49)
Verbal fluency (dummy)	0.05 (0.66)	0.05 (0.66)	0.05 (0.67)	0.05 (0.66)	0.05 (0.67)
Poor health (dummy)	-0.15** (-2.31)	-0.14** (-2.30)	-0.13** (-2.12)	-0.14** (-2.30)	-0.13** (-2.10)
Life satisfaction (dummy)	0.11** (2.04)	0.11** (2.05)	0.10* (1.90)	0.11** (2.04)	0.10* (1.90)
Religion (dummy)	-0.07** (-2.50)	-0.06** (-2.16)	-0.07** (-2.40)	-0.07** (-2.50)	-0.06** (-2.10)
Constant	-3.45*** (-5.88)	-3.46*** (-5.89)	-3.20*** (-5.35)	-3.46*** (-5.88)	-3.21*** (-5.37)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.34	0.34	0.34	0.34	0.34
N	15269	15269	15011	15269	15011



The respondents are asked to estimate the likelihood of them leaving an inheritance over EUR 50,000 on a scale from 1 to 100. The second variable, “bequest motive” dummy, represents those who report leaving an inheritance of over EUR 50,000 highly likely (probability over 80%). The results here imply that having such bequest motive has a significant positive effect on the probability of being stockowner. According to Hurd (2002) time horizon interacts with individual’s bequest motive and bequest motives can extend individual’s time horizon reducing the effects of mortality risk. In this specification, over 80% chance of leaving an inheritance is assumed to imply that the respondent is accumulating wealth with a time horizon exceeding his or hers own lifespan. In addition, having a bequest motive slightly reduces the negative effect of poor health in line with the findings of Edwards (2008).

The third variable, “self-employed” dummy, is included in the analysis to look into the effects of entrepreneurship and assigned to those respondents who report to have their own business. Entrepreneurship can be associated with business-orientation, low risk aversion, ability to cope with uncertainty and even optimism. Although the results above suggest that self-employment has a slight positive effect on stock market participation, the explanatory power of the variable is not statistically significant. It could be that either entrepreneurship does not explain stock market participation, or that self-employment on its own does not reflect entrepreneurship in this sample.

## **7 DISCUSSION**

In the previous chapter, I have presented my findings on the drivers of stock market participation and attempted to specify the causes of limited stockholding by drilling into a wide range of subsample analyses. The purpose of this chapter is to summarize and bring these findings together to highlight the contribution of this study and to compare these results to the findings in prior literature. Like any other study, this study has its weaknesses and is subject to certain limitations. Hence, the data and methodologies employed in this study will be assessed in detail in this chapter. Finally, I will also present suggestions for future research stemming from this topic.

The objective of this study is to gather together a comprehensive range of different household characteristics and to analyze their relative strength in explaining limited stock market

participation. In order to do this, this study uses a relatively new dataset collected from fourteen different European countries, that is, Survey of Health, Ageing and Retirement in Europe (SHARE). In addition to being cross-European, SHARE includes questions related to employment, wealth, health, personal values, expectations and cognitive skills, which allows for testing a variety of drivers of stock market participation simultaneously, controlling for all relevant demographic variables.

Basic demographic variables, such as age, gender, education and wealth, are included in every analysis, as well as risk aversion level of each respondent. In addition, the study includes sociability, interpersonal trust and political orientation variables to describe the respondents' personal values and social stance. The effect of cognitive skills on stock market participation is taken into account by incorporating results from numeracy, recall ability and verbal fluency tests into the analysis. The effect of health risks on stock market participation is analyzed by including self-reported physical health in the analysis. Last but not least, the study focuses on the effects of life satisfaction and religiousness. Neither the effect of life satisfaction nor the direct effect of religiousness on stockholding has been studied in prior household finance literature.

The baseline specifications focus on the drivers of total stock market participation, including both direct and indirect investments. One variable that clearly stands out from the rest is risk aversion. Risk aversion has a strong negative effect on the probability of investing in stocks, and it also seems that all the other individual characteristics included in the study have quite large explanatory power in determining the individual risk aversion level. This is well in line with findings of prior literature, which show that wealth, gender and cognitive skills affect risk aversion (e.g. Jianakoplos and Bernasek, 1998; Sundén and Surette, 1998; Barber and Odean, 2001; Frederick, 2005; Benjamin et al., 2006; Grinblatt et al., 2010). One way to interpret the results is that all the other explanatory variables operate partly through risk aversion. This would explain the strong effect of risk aversion on stock ownership and the high correlation with stock market participation.

Another interesting finding relates to the relative strengths of personal values and social stance variables in explaining stock market participation. Contradicting various previous studies (e.g. Guiso et al. 2004, 2008; Georgarakos and Pasini, 2009), interpersonal trust plays a quite insignificant role in the decision to invest in the stock market. More specifically, trust

seems to have no effect on direct stock market participation and only minor effect on indirect stock market participation. It could be that trust is a relevant factor only when investors need to trust intermediaries in the process of becoming a stockowner and managing stockholdings, whereas trusting the market itself is not a significant driver of stock market participation.

Sociability and political orientation seem to play important roles in determining individual investing decisions. Being social increases the likelihood of being a stockholder by 5.7 percentage points and right-wing political orientation by 4.7 percentage points, which makes these the most influential drivers of stock market participation after risk aversion, education and wealth. In addition, sociability and right-wing orientation retain their explanatory power when analyzing direct and indirect stock market participation separately, as well as in the subsample analyses and in both dummy and continuous variable versions. These findings imply that sociability and personal values reflected in political orientation significantly influence individual decisions on stock market participation. The main differences arise in gender subsamples and between high-wealth and low-wealth groups. It seems that sociability is slightly more important driver of stock market participation for male investors than female investors, whereas political orientation is slightly more important for female investors compared to their male counterparts. Furthermore, both sociability and political orientation have more effect on stock ownership within the group of low-wealth individuals compared to high-wealth individuals.

Although the impact and relative strengths of different cognitive skills varies between the specifications, their overall effect is positive throughout the analyses. In addition, good cognitive skills reduce risk aversion, as has been proved in prior literature (Frederick, 2005; Benjamin et al., 2006), and affect stock market participation through this channel. Because of the mixed results, it is not possible to conclude which of the cognitive skills, numeracy, recall ability or verbal fluency, would be the most influential driver of stock market participation. However, when all three cognitive skills are combined to form one cognitive skill index, the effect of cognitive abilities on stockholding becomes stronger. The impact of this cognitive skill index is even more economically significant than the impacts of sociability and political orientation on the probability of stock market participation.

As anticipated, poor health reduces the likelihood of stock market participation. This is in line with the findings of Rosen and Wu (2004) and Edwards (2008), according to which poor

health and increased health risks result in declining financial risk exposure. Furthermore, it seems that poor health has more power in explaining indirect stock market participation decisions compared to direct stock market participation. This could reflect the fact that poor health affects the decision of whether or not to invest in risky assets at all rather than the decision of investing directly in stocks.

Edwards (2008) finds that being married reduces the effect of poor health on financial risk taking. On the contrary, findings in this study suggest that being married increases the effect of poor health. Poor health seems to have the largest effect on the older respondents' stock market participation, therefore, it could be that the offsetting power of being married loses its strength as a result of the concentration on elderly in this sample. If both members of a household are in poor condition, the offsetting power naturally does not work anymore. However, if only one member of a household is in poor health, it affects the decisions of the entire household and probably even more so in retired households with limited chances to otherwise hedge against financial risks.

Life satisfaction is a new characteristic to household finance, and as expected, it operates similarly as moderate optimism, which has been found to result in sensible economic decision making and tendency to search information on risky assets (Felton et al., 2003; Puri and Robinson, 2007). There is no significant difference in the effect of life satisfaction between direct and indirect stock ownership, thus, it seems that satisfied individuals are more likely to invest in risky assets and allocate their portfolios without the tendency to start overly optimistic stock picking. Furthermore, life satisfaction reduces risk aversion, which in turn increases the probability of becoming a stockowner. Interestingly, the effect of life satisfaction is strongest for the younger investors living in single households, whereas differences between genders in terms of life satisfaction are quite insignificant. It could be that younger single investors are the most optimistic but also make the most effort in order to do sensible economic decisions.

Religiousness has been found to increase trust (Guiso et al., 2003) and it has also been linked to sociability (Hong et al., 2004). However, the direct effect of religion on stock market participation has not been analyzed before. Religiousness is clearly negatively correlated with the probability of stock market participation and the findings are consistent throughout the different specifications. Furthermore, religiousness has a statistically significant positive

effect on risk aversion. Religiousness, like political orientation, affects females more than males. Based on these findings, it could be argued that females are more sensitive to their personal values in stock market participation decisions compared to males. In addition, the effect of religiousness is stronger within the group of low-wealth individuals compared to high-wealth individuals, similarly with political orientation.

SHARE survey is concentrated on individuals aged 50 and above, thus, the average age of the respondents is as high as 67 years. First, an important objective for future research would be to test these household characteristics with a sample including all relevant age groups. Although SHARE includes also under 50-year-old respondents, the portion of young people is small and it consists of the main respondents' spouses. More reliable and generalizable results could be obtained with a more representative sample. In addition, this would allow for comparisons between young adults, middle aged and elderly in the drivers of stock market participation. Second, the first wave of SHARE was collected in 2004 and the third wave between 2008 and 2009. As the time gap between the waves gets long enough, it would be interesting to analyze what kinds of changes ageing brings along in the longitudinal dimension of the survey, and which variables gain and which variables lose power in explaining individual stock market participation as respondents get older.

As well as posing an interesting suggestion for future research, concentration on elderly is also the major limitation of this study. The results cannot be generalized since the majority of respondents are aged between 55 to 85 years old. Another limitation of this study is item non-response. Especially financial domain suffers from non-response because individuals are unwilling to disclose their wealth and income information. In addition, there are differences in the response rates between countries, which affects especially country specific analyses. Because of this, the country specific sample sizes are in some cases so small that the results obtained from regression models are not reliable. Item non-response in political orientation and religion is clustered in France, which makes it impossible to analyze these variables exclusively with a French subsample.

## 8 CONCLUSIONS

In this paper, I study the effects of individual characteristics on stock market participation. The purpose is to gather a wide range of potential drivers of stock market participation in one study, and to analyze and compare the explanatory power of these variables. I show that individual stock market participation is not only explained by basic demographic variables, wealth, education and risk aversion, but subject to differences in social activity, personal values, cognitive skills, health status, life satisfaction and religiousness. The data used in this paper is from the cross-European Survey on Health, Ageing and Retirement in Europe (SHARE), which allows for including a comprehensive set of questions related to various aspects of life in this study and analyzing stock market participation in fourteen European countries.

Limited stock market participation has many implications on public at large and it has been in the interest of household finance for decades. The role of limited stock market participation has been recognized in wealth accumulation, consumption smoothing and unequal distribution of wealth. During recent years, many new factors affecting individual stock investment decisions have been introduced in the field. Despite this, an overall view incorporating comprehensively the established factors as well as the newly discovered factors behind stock market participation has been lacking. This study attempts to provide insight into the relation between well-known individual characteristics in household finance and to present a few new drivers of stock market participation.

The strongest single driver of stock market participation, or the decision to forego investing in stocks, is risk aversion. In addition to this, risk aversion is affected by all other variables included in this study, and it seems that risk aversion is an additional channel through which these individual characteristics operate. The most economically significant variables reflecting social stance and personal values are sociability and political orientation. More socially active individuals and right-wing orientated individuals are more likely to hold stocks. Surprisingly, the effect of interpersonal trust remains minor throughout the analyses, which contradicts various findings of prior literature.

Individuals with good cognitive abilities are more likely to invest in stocks and good cognitive abilities also reduce risk aversion. However, none of the tested skills, that is,

numeracy, recall ability and verbal fluency, stand out from the rest. The significance and mutual order of the different cognitive skills varies between the specifications and subsamples. A combined cognitive skill index gains in economic significance in explaining limited stockholding compared to the individually tested cognitive skills. Poor health and increased level of health risks make individuals forego investing in risky assets reducing the probability of becoming a stockholder. Life satisfaction has a similar effect on stock market participation as moderate optimism. Individuals who are satisfied with their lives are more likely to make sensible economic decisions and also allocate a share of their wealth into risky assets. Religiousness, on the other hand, clearly reduces the probability of stock market participation. In addition to the direct connection with stockholding, religiousness also has a positive effect on risk aversion.

As one can conclude from the description above, the drivers and barriers of stock market participation are complex, interrelated and can also stem from unexpected aspects of life. Naturally, much more research is needed to drill more deeply into the reasons behind individual stock investment decisions. In the previous chapter, I presented suggestions for further research related to this study, along with the weaknesses this study suffers from. New information on the different aspects affecting stock market participation has potentially some regulatory and public policy implications, but most of all it will assist finance professionals in their work and provide valuable information into training and educating individuals in their financial decision making. If we understand the underlying characteristics affecting stock market participation, we stand in a better position to address and prevent the problems caused by limited stock market participation.

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## APPENDIX

**Table 21. Explaining stock market participation with cognitive skill index**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. Cognitive skill index is the mean of z-scores (standard scores) calculated for numeracy, recall ability and verbal fluency. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	0.09*** (3.98)	0.08*** (3.26)	0.08*** (3.21)	0.08*** (3.17)	0.06** (2.09)
Age	0.02 (1.56)	0.02 (1.22)	0.02 (0.92)	0.02 (0.92)	0.02 (1.10)
Age (Sq)	0.00** (-2.52)	0.00** (-2.06)	0.00 (-1.53)	0.00 (-1.49)	0.00* (-1.65)
Secondary (dummy)	0.28*** (8.16)	0.27*** (6.95)	0.21*** (5.42)	0.21*** (5.33)	0.21*** (5.24)
Post-secondary (dummy)	0.22*** (7.60)	0.18*** (5.62)	0.13*** (3.98)	0.13*** (3.89)	0.13*** (3.88)
Log (net wealth)	0.17*** (18.64)	0.17*** (16.18)	0.16*** (15.60)	0.16*** (15.32)	0.16*** (15.10)
Riskaversion (dummy)	-0.89*** (-34.79)	-0.85*** (-30.33)	-0.83*** (-29.64)	-0.83*** (-29.56)	-0.83*** (-29.56)
Sociability		0.07*** (5.91)	0.06*** (5.05)	0.06*** (4.80)	0.06*** (5.38)
Trust (0-10)		0.02*** (3.06)	0.01** (2.39)	0.01** (1.99)	0.01* (1.70)
Left-right (0-10)		0.03*** (4.62)	0.03*** (4.66)	0.03*** (4.44)	0.03*** (4.64)
Cognitive skill index			0.19*** (8.32)	0.19*** (7.90)	0.18*** (7.66)
Health (0-10)				0.03*** (3.60)	0.02* (1.87)
Life satisfaction (0-10)					0.04*** (3.94)
Religion (0-5)					-0.03*** (-4.09)
Constant	-3.23*** (-6.27)	-3.45*** (-5.82)	-3.26*** (-5.42)	-3.45*** (-5.73)	-3.67*** (-6.20)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.33	0.33	0.34	0.34	0.34
N	18797	15397	15360	15360	15269

**Table 22. Change in probabilities with cognitive skill index**

Changes in probabilities are calculated based on a probit regression where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the number of social activities in last month. Both trust and political orientation (left-right) are measured on a scale from zero to ten, where ten stands for high trust and right-wing orientation, respectively. Cognitive skill index is the mean of z-scores (standard scores) calculated for numeracy, recall ability and verbal fluency. Health is reported on a scale from zero to ten, where ten stands for excellent health. Life satisfaction is reported on a scale from zero to ten, where ten stands for the highest level of life satisfaction. Religion is reported on a scale from zero to five, where zero stands for being non-religious. The first column presents the change in the probability of stock market participation if the independent variable changes from its minimum value to its maximum value (in case of dummy variables from zero to one). The second column presents the change in the probability of stock market participation if the independent variable changes one unit in real value. The third column presents the change in the probability of stockholding if the independent variable changes one standard deviation unit calculated at the predicted probability when the independent variable takes its mean value. The fourth column presents the standard deviations of each variable.

Variable	Dependent variable: Stockowner (dummy)			
	Change from min to max	Unit change in real value	Unit change in stand.dev.	Standard deviation
Male (dummy)	0.016	0.016	0.008	0.500
Age	0.386	0.005	0.053	9.869
Age (Sq)	-0.470	0.000	-0.079	1374.500
Secondary (dummy)	0.057	0.059	0.026	0.434
Post-secondary (dummy)	0.037	0.036	0.015	0.413
Log (net wealth)	0.646	0.045	0.083	1.822
Riskaversion (dummy)	-0.267	-0.235	-0.107	0.451
Sociability	0.142	0.018	0.021	1.158
Trust (0-10)	0.029	0.003	0.007	2.444
Left-right (0-10)	0.079	0.008	0.018	2.258
Cognitive skill index	0.331	0.051	0.037	0.725
Health (0-10)	0.053	0.005	0.009	1.760
Life satisfaction (0-10)	0.105	0.012	0.019	1.678
Religion (0-5)	-0.048	-0.010	-0.018	1.871
Country fixed effects	Yes			
N	15269			

**Table 23. Explaining risk aversion – Continuous variables**

Specifications one through five are probit regressions where the dependent variable takes the value of one if the respondent is not willing to take any financial risks and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Sociability is the sum of social activities participated in last month. Trust and political orientation are measured on scales from zero to ten, where ten stands for highest level of trust and right-wing orientation, respectively. All of the cognitive skills are measured on different scales. Health is measured on a scale from zero to ten, where ten stands for excellent health, similarly with life satisfaction (scale from zero to ten, where ten stands for high life satisfaction). Religion is measured on a scale from zero to five, where zero stands for non-religiousness. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Risk aversion (dummy)				
	(1)	(2)	(3)	(4)	(5)
Male (dummy)	-0.30*** (-14.07)	-0.30*** (-12.99)	-0.28*** (-11.83)	-0.28*** (-11.77)	-0.25*** (-10.41)
Age	0.01 (0.37)	0.01 (0.85)	0.02 (1.24)	0.02 (1.22)	0.02 (1.35)
Age (Sq)	0.00 (1.20)	0.00 (0.48)	0.00 (-0.14)	0.00 (-0.17)	0.00 (-0.36)
Secondary (dummy)	-0.28*** (-9.37)	-0.23*** (-6.85)	-0.16*** (-4.57)	-0.15*** (-4.47)	-0.15*** (-4.44)
Post-secondary (dummy)	-0.34*** (-13.25)	-0.32*** (-11.19)	-0.27*** (-9.25)	-0.26*** (-9.16)	-0.26*** (-9.07)
Log (net wealth)	-0.15*** (-18.49)	-0.15*** (-15.84)	-0.14*** (-15.05)	-0.14*** (-14.83)	-0.14*** (-14.68)
Sociability		-0.11*** (-10.4)	-0.10*** (-9.35)	-0.09*** (-9.12)	-0.10*** (-9.69)
Trust (0-10)		-0.02*** (-4.63)	-0.02*** (-3.63)	-0.02*** (-3.32)	-0.02*** (-3.16)
Left-right (0-10)		-0.03*** (-4.97)	-0.03*** (-4.91)	-0.02*** (-4.73)	-0.03*** (-5.23)
Numeracy (1-5)			-0.09*** (-6.99)	-0.09*** (-6.84)	-0.09*** (-6.64)
Recall ability (0-10)			-0.02*** (-2.86)	-0.02*** (-2.65)	-0.02*** (-2.44)
Verbal fluency			-0.01*** (-4.21)	-0.01*** (-4.08)	-0.01*** (-4.02)
Health (0-10)				-0.02*** (-3.04)	-0.02*** (-2.15)
Life satisfaction (0-10)					-0.01 (-1.14)
Religion (0-5)					0.03*** (4.41)
Constant	2.25*** (4.75)	2.31*** (4.29)	2.57*** (4.72)	2.70*** (4.96)	2.58*** (4.71)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.14	0.15	0.15	0.15	0.15
N	19123	15653	15616	15616	15513



**Table 24. Risky stockholding conditional on participation – Continuous variables**

This specification includes only those who participate in the stock market. Dependent variable is risky stockholding which takes the value of one if the respondents' stockholding in Euros is above the 75 percentile limit calculated to all stockholders, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the sum of social activities participated in last month. Trust and political orientation are measured on scales from zero to ten, where ten stands for highest level of trust and right-wing orientation, respectively. All of the cognitive skills are measured on different scales. Health is measured on a scale from zero to ten, where ten stands for excellent health, similarly with life satisfaction (scale from zero to ten, where ten stands for high life satisfaction). Religion is measured on a scale from zero to five, where zero stands for non-religiousness. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Risky stockholding (dummy)	
	(1)	(2)
Riskaversion (dummy)	-0.46*** (-8.27)	
Male (dummy)	0.02 (0.30)	-0.03 (-0.61)
Age	0.06* (1.74)	0.06** (2.02)
Age (Sq)	0.00 (-0.90)	0.00 (-1.17)
Secondary (dummy)	0.15 (1.63)	0.11 (1.49)
Post-secondary (dummy)	0.13** (2.21)	0.16*** (3.48)
Log (net wealth)	0.54*** (15.89)	0.58*** (19.69)
Sociability	-0.01 (-0.39)	0.01 (0.46)
Trust (0-10)	0.02 (1.50)	0.02* (1.93)
Left-right (0-10)	0.01 (0.65)	0.01 (1.30)
Numeracy (1-5)	0.01 (0.22)	0.00 (0.19)
Recall ability (0-10)	-0.02 (-1.29)	-0.03** (-2.34)
Verbal fluency	0.00 (1.00)	0.00 (1.08)
Health (0-10)	0.04** (1.98)	0.03** (2.14)
Life satisfaction (0-10)	-0.02 (-0.68)	-0.01 (-0.59)
Religion (0-5)	-0.04** (-2.49)	-0.03** (-2.48)
Constant	-11.39*** (-8.60)	-11.73*** (-10.59)
Country fixed effects	Yes	Yes
Pseudo-R <sup>2</sup>	0.21	0.19
N	4073	6203

**Table 25. Stock market participation by gender and by couple and single households – Continuous variables**

Both male and female and couple and single household specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the sum of social activities participated in last month. Trust and political orientation are measured on scales from zero to ten, where ten stands for highest level of trust and right-wing orientation, respectively. All of the cognitive skills are measured on different scales. Health is measured on a scale from zero to ten, where ten stands for excellent health, similarly with life satisfaction (scale from zero to ten, where ten stands for high life satisfaction). Religion is measured on a scale from zero to five, where zero stands for non-religiousness. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)				
	Basic	Male	Female	Couple	Single
Single (dummy)	-0.04 (-1.23)	0.00 (-0.05)	-0.07* (-1.7)		
Male (dummy)	0.05* (1.77)			0.03 (0.80)	0.11** (2.02)
Age	0.02 (1.09)	0.03 (1.24)	0.01 (0.39)	0.03 (1.22)	-0.01 (-0.19)
Age (Sq)	0.00 (-1.61)	0.00 (-1.58)	0.00 (-0.79)	0.00 (-1.59)	0.00 (-0.15)
Secondary (dummy)	0.21*** (5.35)	0.17*** (3.03)	0.26*** (4.72)	0.22*** (4.49)	0.21*** (2.98)
Post-secondary (dummy)	0.13*** (3.89)	0.18*** (4.10)	0.06 (1.18)	0.14*** (3.60)	0.09 (1.43)
Log (net wealth)	0.16*** (14.64)	0.18*** (10.84)	0.14*** (9.96)	0.17*** (11.7)	0.13*** (8.62)
Riskaversion (dummy)	-0.84*** (-29.55)	-0.90*** (-23.03)	-0.77*** (-18.44)	-0.84*** (-25.36)	-0.84*** (-15.14)
Sociability	0.06*** (5.34)	0.08*** (4.69)	0.05*** (2.91)	0.07*** (5.21)	0.04* (1.80)
Trust (0-10)	0.01* (1.76)	0.02** (2.40)	0.00 (0.19)	0.01 (1.27)	0.02 (1.52)
Left-right (0-10)	0.03*** (4.66)	0.02** (2.54)	0.04*** (4.03)	0.02*** (3.42)	0.04*** (3.44)
Numeracy (1-5)	0.04*** (2.65)	0.02 (0.89)	0.06*** (2.89)	0.05*** (2.95)	0.01 (0.52)
Recall ability (0-10)	0.02** (2.30)	0.03** (2.24)	0.01 (1.09)	0.01 (1.23)	0.04** (2.00)
Verbal fluency	0.01*** (5.51)	0.01*** (3.67)	0.01*** (4.25)	0.01*** (4.22)	0.02*** (3.82)
Health (0-10)	0.02* (1.95)	0.01 (0.42)	0.03** (2.24)	0.01 (1.05)	0.03* (1.93)
Life satisfaction (0-10)	0.04*** (3.83)	0.04*** (2.88)	0.04** (2.53)	0.04*** (2.84)	0.05** (2.59)
Religion (0-5)	-0.03*** (-4.11)	-0.03** (-2.46)	-0.04*** (-3.19)	-0.04*** (-3.71)	-0.03* (-1.86)
Constant	-4.08*** (-6.84)	-4.56*** (-4.83)	-3.78*** (-4.96)	-4.42*** (-5.76)	-3.27*** (-3.23)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.34	0.35	0.33	0.34	0.32
N	15269	7421	7844	10669	4597

**Table 26. Stock market participation by wealth - Continuous variables**

The total sample is pooled into three equal size groups based on net wealth level on a country-by-country basis. All specifications are probit regressions where the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Secondary dummy and post-secondary dummy take the value of one if the respondent has completed the corresponding education degrees. Net wealth is the sum of net financial wealth and net real wealth, as reported by the respondents. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks in order to accumulate profits. Sociability is the sum of social activities participated in last month. Trust and political orientation are measured on scales from zero to ten, where ten stands for highest level of trust and right-wing orientation, respectively. All of the cognitive skills are measured on different scales. Health is measured on a scale from zero to ten, where ten stands for excellent health, similarly with life satisfaction (scale from zero to ten, where ten stands for high life satisfaction). Religion is measured on a scale from zero to five, where zero stands for non-religiousness. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

	Dependent variable: Stockowner (dummy)		
	Low wealth	Middle wealth	High wealth
Male (dummy)	0.03 (0.64)	0.09* (1.89)	0.05 (1.21)
Age	0.02 (0.78)	0.03 (1.03)	-0.04 (-1.25)
Age (Sq)	0.00 (-1.05)	0.00 (-1.40)	0.00 (0.88)
Secondary (dummy)	0.17** (2.44)	0.26*** (3.77)	0.14** (1.99)
Post-secondary (dummy)	0.09 (1.27)	0.11* (1.93)	0.12** (2.38)
Log (net wealth)	0.09*** (4.67)	0.17** (2.11)	0.18*** (5.14)
Riskaversion (dummy)	-0.63*** (-10.46)	-0.84*** (-16.81)	-0.9*** (-20.69)
Sociability	0.07*** (3.03)	0.05** (2.27)	0.06*** (3.37)
Trust (0-10)	0.01 (1.22)	0.02 (1.49)	0.00 (0.43)
Left-right (0-10)	0.03*** (2.70)	0.02** (2.26)	0.02** (2.33)
Numeracy (1-5)	0.00 (0.15)	0.04 (1.44)	0.06** (2.33)
Recall ability (0-10)	0.06*** (3.38)	-0.02 (-0.93)	0.03* (1.89)
Verbal fluency	0.02*** (4.27)	0.01*** (3.04)	0.01** (2.16)
Health (0-10)	0.01 (0.84)	0.03 (1.55)	0.02 (1.12)
Life satisfaction (0-10)	0.04** (2.42)	0.05*** (2.79)	0.03* (1.74)
Religion (0-5)	-0.04** (-2.49)	-0.04*** (-3.08)	-0.02 (-1.61)
Constant	-3.95*** (-3.69)	-4.68*** (-3.22)	-2.10* (-1.91)
Country fixed effects	Yes	Yes	Yes
Pseudo-R <sup>2</sup>	0.26	0.33	0.35
N	4823	5079	5362

**Table 27. Explaining stock market participation without country dummies**

In this regression, the dependent variable takes the value of one if the respondent has invested directly in stocks or in a fund mostly comprising of equity, and zero otherwise. Country dummies are not included, and the table shows results from both dummy and continuous variable versions. Risk aversion dummy takes the value of one if the respondent is not willing to take any financial risks. Sociability dummy takes the value of one if the respondent has participated in one or more social activities in last month. Trust dummy takes the value of one if the respondent is above five in the interpersonal trust scale ranging from zero (=mistrust) to ten (=trust). Right-wing dummy takes the value of one if the respondent is on the right-wing side in the left-right axis scaled from zero to ten. All of the cognitive skills dummies take the value of one if the respondent scores above the midpoint of the score scales used in each test. Poor health dummy takes the value of one if the respondent reports being in poor health (below five on a scale from zero to ten, where ten stands for excellent health). Life satisfaction dummy takes the value of one if the respondent reports being satisfied with his/hers life (above five on a scale from zero to ten, where ten stands for high life satisfaction). Religion dummy takes the value of one if the respondent reports being non-religious. Heteroskedasticity corrected t-statistics are in the parentheses below the coefficients. \*, \*\*, and \*\*\* represent significance on the 10%, 5% and 1% levels, respectively.

Dependent variable: Stockowner (dummy)			
Dummy variables		Continuous variables	
Male (dummy)	-0.02 (-0.86)	Male (dummy)	-0.03 (-1.14)
Age	0.01 (0.69)	Age	0.00 (0.24)
Age (Sq)	0.00 (-0.64)	Age (Sq)	0.00 (-0.03)
Secondary (dummy)	0.19*** (5.44)	Secondary (dummy)	0.11*** (3.07)
Post-secondary (dummy)	0.13*** (7.81)	Post-secondary (dummy)	0.09*** (2.82)
Log (net wealth)	0.16*** (17.3)	Log (net wealth)	0.16*** (16.02)
Riskaversion (dummy)	-0.83*** (-32.08)	Riskaversion (dummy)	-0.82*** (-30.88)
Sociability (dummy)	0.40*** (15.56)	Sociability	0.13*** (12.32)
Trust (dummy)	0.19*** (7.38)	Trust (0-10)	0.04*** (7.62)
Right-wing (dummy)	0.17*** (6.83)	Left-right (0-10)	0.03*** (5.58)
Numeracy (dummy)	0.05* (1.70)	Numeracy (1-5)	0.02* (1.76)
Recall ability (dummy)	0.14*** (5.28)	Recall ability (0-10)	0.02** (2.21)
Verbal fluency (dummy)	0.24*** (3.74)	Verbal fluency	0.03*** (12.71)
Poor health (dummy)	-0.15*** (-2.65)	Health (0-10)	0.03*** (2.95)
Life satisfaction (dummy)	0.20*** (4.28)	Life satisfaction (0-10)	0.08*** (8.57)
Religion (dummy)	-0.48*** (-18.81)	Religion (0-5)	-0.14*** (-18.6)
Constant	-2.98*** (-5.43)	Constant	-4.09*** (-7.26)
Country fixed effects	No	Country fixed effects	No
Pseudo-R <sup>2</sup>	0.23	Pseudo-R <sup>2</sup>	0.25
N	15269	N	15269