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# The effect of birth order on financial risk-taking in older age

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**Abstract**

Using longitudinal data from the Survey of Health, Ageing and Retirement in Europe, this paper investigates whether birth order influences an individual's financial risk preferences and corresponding financial market participation in older age. The analysis employs two widely used measures for portfolio choices, a binary one for holding probabilities and a continuous one, using a two-part model, for the actual amounts held. Tobit censored regression models are used as robustness check. It is found that birth order does not have a significant effect on portfolio choices and the willingness to take at least some financial risk, except for the holding probabilities and amounts held of individual retirement accounts. Being a later-born individual decreases the holding probability of an individual retirement account as well as the amounts invested in such accounts *conditional* on ownership.

**Keywords:** Portfolio Choice, Birth Order, Financial Risk, Behavioural Finance

**JEL Codes:** G11, J13, G31, D14

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## 1. Introduction

A large body of empirical research documents that many individuals do not invest in stocks and other financial assets (Christelis, Jappelli and Padula, 2010). Understanding the reasons for this limited financial market participation is one of the most active areas of research in household finance and important in a number of ways. Firstly, the welfare loss of non-participation in the financial market is estimated to be between 1.5 and 2 per cent of consumption in calibrated life-cycle models (Cocco, Gomes and Maenhout, 2005). In addition, understanding this financial market participation will aid in explaining the equity premium puzzle[1] as well as provide insight into individual welfare (Campbell, 2006). As an individual's financial risk preferences play an important role in determining financial market participation, growing literature exists on understanding an individual's attitude towards financial risk. By using household surveys, economists have identified a wide range of individual characteristics such as age, gender, wealth, parental background, socioeconomic status and cognitive abilities that appear to be significantly correlated with an individual's willingness to take financial risks (see, e.g., Guiso and Paiella, 2008; Dohmen *et al*., 2011).

The majority of the investigations on an individual's financial risk attitude have examined factors that are present in adulthood. The effect of childhood conditions on an individual's financial risk preferences in older age remains, to a large extent, a 'black box'. Previous research on the relation between early life conditions and financial risk-taking in older age suggests that superior cognitive skills in childhood – especially mathematical skills – and childhood socioeconomic status are positively related with stock and mutual fund ownership in older age (see, e.g. Christelis, Dobrescu and Motta, 2012). The ownership of less risky assets such as bonds is not likely to be affected by early childhood conditions. Using data from the Survey of Consumer Finances, Malmendier and Nagel (2011) find evidence that an individual's willingness to take financial risks is affected by its macroeconomic experiences. Individuals who have experienced low stock market returns during their lives are less willing to take financial risks, have a lower chance of participating in the stock market, allocate a lower fraction of their liquid assets to stocks and are pessimistic about the future stock market returns.

This paper expands the work of Christelis *et al.* (2012) and Malmendier and Nagel (2011) and focuses on the effect of birth order, being an early life experience, on an individual's willingness to take financial risks and corresponding financial market

[1] The equity premium puzzle is characterized as the inability of standard intertemporal economic models to rationalize the statistics that have characterized the financial markets over the past century (Mehra, 2003).

participation in older age. The latter is defined as decisions concerning the ownership of four financial assets: bonds, directly held stocks, mutual funds and individual retirement accounts. Previous literature suggests that birth order can impact an individual's personal characteristics and behavior and thereby is an important determinant of (financial) risk preferences in older age (see, e.g., Sulloway, 1996; Roszkowski, 1999; Argys *et al*., 2006). Focusing on the effect of birth order on financial risk-taking, previous literature suggests later-born individuals to be significantly more financial risk tolerant compared to first-born individuals (see, e.g., Gilliam and Chatterjee, 2011; Morgan, 2009). Morgan (2009) clarifies this finding by arguing that first-born individuals have lower personal discount rates and are more long-term oriented than their later-born counterparts. Therefore, first-born individuals are more willing to wait to receive a higher payout and hence are more likely to prefer passive investment strategies with less risky financial assets.

Considering the relatively small, United States oriented, samples used for the analyses in the aforementioned literature, this paper complements the literature by using an extensive unique longitudinal data set, consisting of 10,435 individuals aged 50 and over from 12 European countries, on birth order with matching economic information of the individuals' investment portfolios. In addition, this paper will contribute to the previous literature by investigating the amounts invested in each of the four financial assets *conditional* on ownership. The research question is the following:

*Does birth order affect an individual's financial risk preferences and corresponding financial market participation in older age?*

In order to study the impact of birth order on an individual's financial risk preferences and corresponding financial market participation in older age, the Survey of Health, Ageing and Retirement in Europe (SHARE) has been chosen as data source, as it offers unique longitudinal data on birth order, demographic and socioeconomic variables with matching economic information on individual's investment portfolios. The latter consists of, among others, information on an individual's willingness to take financial risks, the ownership of four financial assets (bonds, directly held stocks, mutual funds and individual retirement accounts) and the amounts invested in each of these assets.

The remainder of this paper is set up as follows: Section 2 provides an overview of the relevant literature on the effects of birth order on the shaping of an individual's personal characteristics and its effects on an individual's (financial) risk preferences and presents the corresponding hypotheses. The data and methodology will be described in Section 3. First,

logistic models are used to analyze the influence on holding probabilities of bonds, directly held stocks, mutual funds, individual retirement accounts, (in)directly held risky financial assets and the willingness to take at least some financial risk. Second, to deal with the large number of respondents with zero values, a two-part model is employed to analyze the influence on the amounts held *conditional* on ownership. Tobit censored regression models are used as robustness check. The results of the analyses will be presented in Section 4. The empirical results suggest that birth order does not have a significant impact on an individual's willingness to take financial risk and the corresponding financial market participation, except for the ownership of individual retirement accounts and the amounts invested in these accounts *conditional* on ownership. A discussion is accommodated in Section 5 and Section 6 summarizes and concludes.

## 2. Literature Review

*2.1 An overview of the effects of birth order on personal characteristics and behavior*

A widespread belief exists that birth order is an important determinant of personality, intelligence and economic success (Argys, Averett, Rees and Witoonchart, 2006). As a result of the continued presence of older siblings and the arrival of younger ones, each child is reared in a different family environment. These differences have a significant impact on the development of individual differences between children within the same family (Davis, 1997).

Studying the effect of birth order on personal characteristics and behavior, Leman (2001) suggests first-born children to be more motivated to reach goals and make achievements than later-born children. As a consequence, first-born children are more likely to obtain future positions with high levels of authority or achievement. Using four diverse data sets, Paulhus *et al.* (1999) nominate first-born individuals as most achieving and most conscientious, whereas later-born individuals are nominated as most rebellious, liberal and agreeable. In their investigation of the relationship between birth order and risky adolescent behavior, Argys *et al*. (2006) find evidence that birth order is related to e.g. smoking, drinking, drugs use, sexual activity and crime. Their analysis reveals that adolescents with older siblings are more likely to have used e.g. tobacco, alcohol and marijuana, be sexually active, carry a gun, compared to their first-born counterparts. Additionally, for males, a positive relationship is found between being a later-born child and the likelihood to steal, whereas later-born female adolescents are more likely to destroy property. A possible explanation for the later-born individuals' greater willingness to engage in risky behavior may be the knowledge that they are typically rescued financially, physically and emotionally by

their family members in case one of their decisions leads to a negative outcome. Becoming older they often forget that their parents and older siblings are no longer close to recover their poorly made decisions and the risky behavior remains (Brown and Grable, 2015). In his book, *Born to Rebel*, Sulloway (1996) inspects several current and historical scientists and their personal characteristics. He finds that first-born individuals have a tendency to be much more conservative than later-born individuals, who are in general more risk seeking. Sulloway attributes this phenomenon to the assumption that first-born individuals have the tendency to imitate the characteristics of their parents by continuing the status quo of the family, whereas later-born individuals have the desire to take greater risks in order to find their own unique position within the family. Roszkowski (1999) attributes the finding of first-born children to be more risk averse than their later-born siblings to stronger parental influence. He believes that this parental influence causes first-born children to be more responsible and dependable, causing them not to take unnecessary risks. However, Behrman and Taubman (1986) show that differences in personal characteristics and behavior occur despite parental preferences. According to them, these differences exist since siblings adopt different strategies in order to gain the favor of their parents. Sulloway (1996) reaffirms this view by Behrman and Taubman (1986) and argues that the source of differences in personality and behavior is not, as traditionally argued, a different parental treatment of children of different birth orders (see, e.g., Hilton, 1967; Roszkowksi, 1999). He argues that these differences are caused by a competition among siblings as they fight for a family niche. Having the first choice of niche, first-born children try to please their parents in a traditional way, via educational success and responsible behavior. With younger siblings arriving, first-born children have to deal with threats to their natural priority in the sibling hierarchy. As a result, they become conscientious and conservative. In order to resist the higher hierarchy status of their earlier born siblings, later-born children seek alternative ways to distinguish themselves in the eyes of their parents. As a result, later-born individuals develop an adult character that is marked by an empathic interpersonal style, a striving for uniqueness and political views that are egalitarian and anti-authoritarian. Wang *et al.* (2009) argue that the greater risk seeking of later-born individuals is caused by their greater need to fight in siblings' competition for resources. In line with the findings of Sulloway (1996), Dohmen *et al.* (2012) show that first-born children are more similar in their risk attitudes to their parents than later-born children.

In their study, Paulhus *et al.* (1999) find first-born children to be more intellectually and financially achieving later in life compared to later-born children, however, their results differ in significance when different numbers of siblings are considered. This indicates that

besides birth order, also the number of siblings an individual has may affect personal characteristics and behavior. For example, studying the relationship between birth order and intellect, Zajonc and Markus (1975) state that some portion of the intellectual growth of children is determined by interaction with the intellectual levels of their siblings and parents. They find evidence that an increase in the number of family members as a result of new births will be associated with lower intellectual levels. They address this finding to the fact that the proportion of individuals with low absolute intelligence will increase with new births, thereby decreasing the average intelligence of the family. As a result, intellectual performance decreases with birth order. In addition, the last-born child shows a larger drop in intelligence scores because of the lack of opportunity to "teach". This finding corresponds to the finding by Belmont and Marolla (1973) that within each family size, the last-born child shows a greater decline in intellectual performance than any other birth rank. Focusing on status ambitions that individuals possess, David (1997) finds evidence that first-born individuals are more status-oriented than last-born individuals, where the degree of status-orientation is mediated by the number of siblings an individual has. The status ambitions of first-born individuals turn out not to be affected by the number of younger siblings they have, whereas the status ambitions of last-born individuals decrease with the number of older siblings they have.

*2.2 An overview of the effects of birth order on financial risk preferences in older age*

Only a few studies exist that have examined the relationship between birth order and financial risk tolerance specifically. Using a financial risk tolerance measure and a sample consisting of 368 married staff and faculty members of a large university located in the Southwest of the United States, Gilliam and Chatterjee (2011) reveal that first-born individuals are significantly less risk tolerant than their later-born counterparts. They find evidence that later-born males are more likely to have a majority of their portfolio invested in stocks, compared to first-born males. Additionally, later-born males are more likely to hold a larger fraction of their portfolio in stocks, compared to later-born females. This confirms previous literature on the role of gender on financial risk preferences (see, e.g., Dohmen *et al.*, 2011). Comparable to these findings, using data of 400 individuals obtained from a series of laboratory experiments at the University of South Carolina, Morgan (2009) finds that first-born individuals have lower personal discount rates than their later-born counterparts. First-born individuals are more willing to wait to receive a higher payout and are therefore more likely to prefer portfolios with less risky financial assets, such as money market funds, bonds

and blue-chip stocks. In addition, first-born individuals are more long-term oriented and thereby more likely to prefer passive investment strategies. Contradictory, later-born individuals are likely to favor more active investment strategies that entail portfolios with more risky assets such as stocks and derivatives, in order to earn higher short-term returns. Based on previous research, the following is hypothesized:

*H1: Compared to first-born individuals, later-born individuals are significantly more likely to be willing to take financial risks and participate in the financial market accordingly in older age.*

Kidwell (1981) suggests that research focusing on birth order as an independent variable should control for, among others, the number of siblings an individual has. In addition, as described above, previous literature shows that the last-born child shows a greater decline in intellectual performance than any other birth rank (see, e.g., Zajonc and Markus, 1975; Belmont and Marolla, 1973). Combining these two findings, using a sub-sample consisting of last-born individuals only and number of siblings as the independent variable, the following hypothesis will be analyzed:

*H2: Compared to last-born individuals with fewer siblings, last-born individuals with more siblings are significantly more likely to be willing to take financial risks and participate in the financial market accordingly in older age.*

## 3. Data and Methodology

### *3.1 Data*

The Survey of Health, Ageing, and Retirement in Europe (SHARE) has been chosen as data source, because it offers unique longitudinal data on birth order, demographic and socioeconomic variables with matching economic information on an individual's investment portfolio. SHARE surveys European citizens aged 50 and over and collects micro data on health, socio-economic status and social and family networks. All questions proposed by SHARE are standardized across countries, allowing consistent international comparisons. To date, SHARE has collected six panel waves (2004, 2006, 2010, 2013, 2015) of current living circumstances and retrospective life histories (2008, SHARELIFE) and is representative of the population of various regions in Europe, ranging from Scandinavia through Central Europe to the Mediterranean. In each wave there are new entrants into the survey to refresh the study population, hence, offering a unique longitudinal database. All data is collected by face-to-face, computer-aided personal interviews, which are supplemented by self-completion

paper and pencil questionnaires[2]. Due to its richness in information, SHARE had been used in many studies describing financial investment decisions of individuals (see, e.g., Christelis *et al*., 2012; Atella *et al*., 2012; Bressan *et al*., 2016).

*3.1.1 Data set construction*

As mentioned before, to date, SHARE has collected six panel waves of which the third wave (SHARELIFE) was different from the other waves as in addition to the standard socio-demographic characteristics, this wave included a section regarding an individual's childhood circumstances such as socioeconomic status, cognitive abilities and household formation when the individual was ten years old. The analysis of this paper is based on combined data from the first, second, third and fourth wave of SHARE, which took place in, respectively, 2004, 2006, 2008 and 2010 in 12 European countries (Austria, Belgium, Czech Republic, Denmark, France, Germany, Italy, Netherlands, Poland, Spain, Sweden and Switzerland)[3]. The analysis will be mainly based on the fourth wave of SHARE. However, since some questions of SHARE are only asked once, for example the questions on birth order and the number of siblings an individual has, this information needs to be subtracted from wave one and wave two for respondents for who the fourth wave is not their first wave. Considering the relation between cognitive skills and socioeconomic status during childhood and financial risk-taking in older age suggested by previous literature (see, e.g., Christelis *et al*., 2012), it is important to control for these variables when analyzing the effects of birth order on financial risk preferences and corresponding financial market participation in older age. The third wave, which focuses on childhood conditions, is used to retrieve information on an individual's cognitive abilities and socioeconomic status during childhood, when he or she was ten years old.

Each wave of SHARE covers several modules, which are provided in separate data sets and have to be 1) matched for each person within a single wave and 2) appended to a data set covering all four used waves. In a first step the different modules for each individual within the same wave are merged based on a unique identification number. Subsequently, all four waves are merged based on the same unique identification number, yielding a total of 17,242 individuals. Most of the questions proposed by SHARE refer to the individual, for instance questions on cognitive abilities, self-reported health status, family networks and

[2] For more information about SHARE and its conduction visit http://www.share-project.org/

[3] The first wave took place also in Israel and Greece, the second wave took place also in Israel, Greece and Ireland, the third wave took place also in Greece and Ireland, and the fourth wave took place also in Estonia, Hungary, Portugal and Slovenia, but given that the analysis is based on four-wave panel data the information on these countries will not be used.

social activities, while other questions refer to the household, for instance questions concerning bond, stock and mutual fund ownership. The questions regarding an individual's financial risk aversion and the ownership of an individual retirement account are asked at the individual level. Answering the latter, the respondent should choose from the following answers: respondent only, husband/wife/partner only or both. In case questions refer to the household, following the approach of Christelis, Jappelli and Padula (2010), the information on the household is aggregated over the two partners in a couple using the household identifier. In case an individual reported a negative amount for any of the financial asset classes, the answer has been removed. In addition, in case an individual indicated having a certain type of financial asset and the corresponding financial asset amount was equal to zero, the binary holding variable has been set equal to zero. As a minor adjustment, answers such as "refusal" or "don't know" are reported as missing values. Afterwards, individuals with missing values for any of the independent or dependent variables are dropped. This leads to a final data set covering 10,435 individuals. An overview of the used variables and their code names can be found in the Appendix (*Table A1*).

### *3.2 Methodology*

The following paragraph describes the employed research method and is divided into four subsections. The first section will describe the construction of the dependent variables, whereupon the second section will describe the construction of the independent variables and a set of control variables will be introduced in the third section. Lastly, the specification of an empirical strategy to measure the influence of the independent variables on the dependent variables describing an individual's financial risk preferences and corresponding financial market participation is introduced.

#### *3.2.1 Construction of the dependent variables*

In a first step, to analyze the impact of birth order on an individual's financial risk preferences and corresponding financial market participation in older age, the ownership of four financial assets will be studied: directly held stocks, mutual funds, individual retirement accounts and bonds, using a binary holding variable. Individuals can invest in stocks, which constitute the riskiest financial asset, either directly or indirectly, through mutual funds or individual retirement accounts. The degree of riskiness should typically be higher for directly held stocks than for mutual funds and individual retirement accounts (Christelis, Dobrescu and Motta, 2012). In order to examine the effect of birth order on actual financial risk-taking

in older age, both direct risky financial asset holding and indirect risky financial asset holding will be examined. For the latter, a binary variable will be created combining direct stockholding with mutual funds and individual retirement accounts. According to Christelis *et al.* (2012), the advantage of creating such a binary variable is that it reduces the misclassification error that could arise if respondents mistake one risky financial asset for another (e.g. if they have invested in stocks only through mutual funds and then report these holdings when asked about stocks).

In addition to direct (risky) financial asset holding and indirect risky financial asset holding, the effect of birth order on self-assessed financial risk aversion in older age will be analyzed. In the second wave respondents were asked to what degree they are willing to take financial risks with respect to their investments. Four possible answers could be given: 1) take substantial financial risks expecting to earn substantial returns; 2) take above average financial risks expecting to earn above average returns; 3) take average financial risks expecting to earn average returns and 4) not willing to take any financial risk. As only 26.50% of the respondents chose one of the first three options, a binary variable has been created that indicates one if the respondent is willing to take at least some financial risk, and zero otherwise. Given that the question on an individual's financial risk aversion is only asked in the second wave, it is assumed that this degree of financial risk aversion remains stable over time. Following Christelis *et al*. (2012), this approach is preferred to disregarding the financial risk aversion information in the analysis, given the well-established importance of financial risk preferences in the study of portfolio choices.

In a second step, the influence of birth order on the actual amounts held, *conditional* on ownership, is measured. As one can see in *Table 1*, each of the investigated variables is either highly or moderately positively skewed (Bulmer, 1979). Testing for normality, the null hypothesis of the variable being normally distributed can be rejected for each of the variables at the 1% significance level. As linear regression models ideally require normally distributed dependent variables, all financial asset amounts have been standardized using the natural logarithm, whereby 1 has been added to each series to deal with zero values. Doing so normalizes the skewness and kurtosis of the data. According to the rule of thumb set by Bulmer (1979), both the natural logarithm of amount of stocks and amount of mutual funds end up being moderately positively skewed, with a skewness between 0.5 and 1, whereas the natural logarithms of amount of individual retirement accounts and amount of bonds are approximately symmetric, with a skewness between -0.5 and 0.5.

**Table 1**
Skewness and kurtosis of each of the financial asset amount variables

| | Skewness | Kurtosis | Observations |
|---|---|---|---|
| Amount of bonds | 0.8812 | 1.8220 | 966 |
| Amount of stocks | 1.4845 | 3.2646 | 1,691 |
| Amount of mutual funds | 1.0963 | 2.2349 | 1,235 |
| Amount of IRA's | 1.0734 | 2.1952 | 686 |
| | | | |
| Log amount of bonds | 0.3948 | 1.4673 | 966 |
| Log amount of stocks | 0.7671 | 1.9488 | 1,691 |
| Log amount of mutual funds | 0.6652 | 1.6619 | 1,235 |
| Log amount of IRA's | 0.2656 | 1.3475 | 686 |

**Notes:** Amounts are conditional on ownership. Blumer (1979) suggests the following rule of thumb: if skewness is less than -1 or greater than +1, the distribution is highly skewed; if skewness is between -1 and -0.5 or between +0.5 and +1, the distribution is moderately skewed and if skewness is between -0.5 and +0.5 the distribution is approximately symmetric. A normal distribution has a kurtosis of 3.

### *3.2.2 Construction of independent variables*

In order to be able to analyze each of the two hypotheses, three independent variables have been created. The first hypothesis focuses on the relationship between birth order and the willingness to take financial risk and the corresponding financial market participation. Each wave of SHARE asks a question about whether an individual is the oldest, the youngest or an in-between sibling. As mentioned before, once questions with fixed answers are asked to the respondent, these questions will not be repeated in any of the subsequent waves. Therefore, information on birth order has to be subtracted from wave one and wave two for respondents for which wave four is not their first wave. A binary variable, $L_i$, has been created, indicating one if the individual is the youngest or an in-between sibling, and thereby a later-born individual, and zero otherwise.

The second hypothesis focuses on last-born individuals and the relationship between the number of siblings they have and their financial risk preferences and corresponding financial market participation. As mentioned before, the second hypothesis will be analyzed using a sub-sample consisting of last-born individual only. In order to create this sub-sample, a binary variable, $Y_i$, has been created. This binary variable indicates one if the individual is the youngest, and hence a last-born individual, and zero otherwise. In addition, an independent variable has been created indicating the number of siblings an individual has. In order to do so, a similar method is applied as for creating $L_i$ and $Y_i$. Within SHARE, each respondent is asked once how many brothers and how many sisters he or she has alive at the moment the survey is conducted. No data is available on the number of brothers and sisters an individual has had during his or her live, and, hence, it is assumed that the sum of the number

of brothers and sisters currently alive is a good proxy for the number of siblings an individual has (had).

*3.2.3 A set of control variables*

In addition to the dependent and independent variables, a set of control variables is used to assure the internal validity of the analysis. A set of variables is included that have been found to be important determinants of financial asset holding in the household finance literature. First, different socio-economic variables such as age, gender, being in a couple, having children, employment situation, education and financial wealth are used (see, e.g., Dohmen *et al*., 2011; Guiso and Paiella, 2008; Calvet and Sodini, 2014; Lupton and Smith, 2003; Guiso *et al.*, 2003; Bertocchi *et al*., 2011; Christiansen *et al*., 2015 and Love, 2010). Similar to the case of the financial asset amounts, the total household income, household real financial assets and household gross financial assets variables are highly skewed (see *Table 2*). Since these variables have zero values, and in the case of the latter two also negative values, an inverse hyperbolic sine transformation[4] has been performed as an alternative to the commonly used natural logarithm technique.

**Table 2**
Skewness and kurtosis of each of the financial control variables

| | Skewness | Kurtosis | Observations |
|---|---|---|---|
| Total household income | 6.6338 | 84.5389 | 10,435 |
| Household gross financial assets | 8.0726 | 133.3867 | 10,435 |
| Household real financial assets | 11.4921 | 256.4775 | 10,435 |
| | | | |
| Inverse hyperbolic sine transformation total household income | -0.4930 | 4.3080 | 10,435 |
| Inverse hyperbolic sine transformation household gross financial assets | 0.0278 | 2.0239 | 10,435 |
| Inverse hyperbolic sine transformation household real financial assets | -0.9497 | 2.8473 | 10,435 |

**Notes:** Blumer (1979) suggests the following rule of thumb: if skewness is less than -1 or greater than +1, the distribution is highly skewed; if skewness is between -1 and -0.5 or between +0.5 and +1, the distribution is moderately skewed and if skewness is between -0.5 and +0.5 the distribution is approximately symmetric. A normal distribution has a kurtosis of 3.

With an average age of 69.1, the data set focuses on the elderly. Comparable to the analysis by Christelis *et al*. (2010), it needs to be recognized that the elderly face substantial mortality risk and that, especially at advanced ages, this reduces their planning horizon. This planning horizon interacts with their inheritance motive. While both young and old individuals could have an inheritance motive, "… for a young person the event of a bequest is

[4] In order to perform an inverse hyperbolic sine transformation the following formula has been used:
$Inverse\ hyperbolic\ sine\ transformation(variable_i) = \log(variable_i + \sqrt{variable_i^2 + 1})$

so remote as not alter behavior. For the elderly, however, a bequest motive could extend the time horizon, reducing or eliminating any effects of mortality risk" (Hurd, 2002, p.433). In order to control for this inheritance motive, a variable is introduced indicating the probability of leaving an inheritance of at least 50,000 euros. In addition, while the retired individuals face less labor income risk, the elderly typically face a higher health risk and are therefore introduced to more uncertainty about medical expenditures. Using the Health and Retirement Study and the Survey on Asset and Health Dynamics Among the Oldest Old, Edwards (2005) investigates the role of self-perceived risky health on changes in financial risk-taking after retirement. He finds that risky health explains about 20 per cent of the age-related decline in financial risk-taking after retirement. In addition, Goldman and Maestas (2005) argue that health risks increase the variability of future medical expenditures, reducing the elderly's willingness to take financial risks. In order to control for the correlation between health risk and financial risk-taking, a self-reported health status variable is used. Self-reported health status is ranked on a 1-5 scale (1 = Excellent, 2 = Very Good, 3 = Good, 4 = Fair and 5 = Poor). A binary variable has been created indicating one if the respondent chose option one, two or three. The distribution of self-reported health status indicates that 62.54% of the respondents assesses its health as good or even better.

Examining the relationship between childhood conditions, such as socioeconomic status, cognitive abilities and health problems, Christelis *et al.* (2012) find evidence that superior cognitive skills in childhood are positively associated with the ownership of stocks and mutual funds in older age. In order to control for this effect, two dummy variables are created. In order to get information on a respondent's cognitive abilities during childhood, two questions of SHARELIFE that ask about their performance at school when ten, relative to their schoolmates, in mathematics and language, are consulted. Respondents could choose from five possible answers to each of the two questions: the performance was much better, better, about the same, worse or much worse. A dummy variable has been created indicating one if the respondent was either much better or better, and zero otherwise. In their analysis, Christelis *et al*. (2012) reveal that similar to cognitive abilities, childhood socioeconomic status is positively associated with the ownership of risky financial assets. In order to control for this relationship, a variable named childhood socioeconomic status has been created dividing the number of rooms by the number of people in the household when ten years old. In addition to the effects of cognitive abilities and socioeconomic status present during childhood on financial risk-taking in older age, Christelis *et al*. (2012) find significant evidence that the probabilities of direct and indirect stockholding are positively related with

numeracy scores at present. Therefore, a dummy variable has been created indicating one if the respondent scored "good" on the numeracy test, measuring the ability to perform basic numerical operations, and zero otherwise.

Based on the findings of Malmendier and Nagel (2011) that an individual's willingness to take financial risks is affected by its macroeconomic experiences and that individuals who have experienced low stock market returns during their lives are less willing to take financial risks, two dummy variables are included controlling for "war baby" and "depression baby". Following Malmendier and Nagel (2010), for the purpose of this analysis, depression babies are assumed to be individuals who experienced the Great Depression, which was a devastating worldwide economic depression that took place during the 1930s. Following the approach of Bucciol and Zarri (2015), depression babies are defined as individuals born between 1924 and 1930 and war babies are defined as individuals born between 1942 and 1947. With the data set focusing on the elderly, this becomes especially relevant as 31.61% of the individuals can be identified as "war baby" and 10.58% as "depression baby".

Based on recent research, it is found that significant heterogeneity exists in the rate of financial market participation, both within and across countries (Christelis *et al.*, 2010). In order to control for this multi-country variability and unobservable factors that affect the variables in a given country, country dummies are included.

### *3.2.4 Empirical strategy*

The main objective of the empirical strategy is to estimate the association between the independent, forcing variables, denoting birth order and number of siblings, and financial risk preferences and corresponding financial market participation in older age. The analysis employs two widely used measures for portfolio choices, a binary one for holding probabilities and a continuous one using a two-part linear regression model for actual amounts held.

In a first step, the association will be measured using a binary holding variable. The association will be expressed as marginal effects on the ownership probabilities of: 1) the four financial assets (bonds, stocks, mutual funds and individual retirement accounts); 2) (in)direct risky financial assets (stocks, mutual funds and individual retirement accounts) and 3) the willingness to take at least some financial risk. The analysis will be performed using a logistic regression. For the first hypothesis the variable later-born individual will be used as an independent variable. Since the second hypothesis solely takes into account last-born

individuals, a sub-sample consisting of last-born individuals only will be used for this hypothesis. The analysis of the second hypothesis will use the number of siblings as an independent variable.

In a second step, the association between the independent variables and the actual amounts held is measured. In order to cope with the large number of individuals holding zero values, a two-part linear regression model is employed (Manning, Duan and Rogers, 1987). As it is assumed that the decision to hold a financial asset class is independent to the amount of the same financial asset class held in the portfolio, both are modelled separately. This truncated regression model is employed using a first-part binary logit model similar to the one before. In a second step, a continuous linear regression model is estimated *conditional* on ownership. However, in case the amounts invested depend on an optimal amount invested as a threshold, and amounts invested below this threshold are unobserved, a censored regression model, using a tobit specification, would be better fitted (Bertaut and Starr-McCluer, 2002). Such a tobit model is designed to estimate linear relationships between variables when there is either left or right censoring in the dependent variable. A robustness check in *Section 4* will compare both methods.

*3.2.4.1 Financial asset holding probabilities and the willingness to take at least some financial risk*

For the binary model $B_i$ is a dummy variable indicating one if the individual holds bonds and zero otherwise. Similarly, $S_i$, $MF_i$ and $IRA_i$ are dummy variables indicating one if the individual holds stocks, mutual funds and individual retirement accounts, respectively, and zero otherwise. Lastly, $RA_i$ is a dummy variable indicating one if the individual holds at least one of the risky assets (stocks, mutual funds and/or individual retirement accounts) and zero otherwise. For the first hypothesis, the following logistic specification is used:

$$Y_i = \begin{cases} 1 & Y_i^* = \alpha + \beta L_i + X_i'\delta + \lambda_1 D_1 + \cdots + \lambda_N D_N + v_i > 0 \\ 0 & \text{else} \end{cases} \quad (1)$$

Where $Y$ can either be $B$, $S$, $MF$, $IRA$ or $RA$. With $L_i$ being the later-born individual dummy variable, $X_i$ the vector of control variables, $D$ the country dummy and $v_i$ the zero-mean residual. One country dummy is removed in order to avoid perfect multicollinearity.

As discussed before, a binary variable, $RP_i$, has been created, indicating one if the individual is willing to take at least some financial risk and zero otherwise. In order to test the effect of birth order on the willingness to take at least some financial risk in older age, a similar specification is used as with the holding probabilities of financial assets:

$$RP_i = \begin{cases} 1 & RP_i^* = \alpha + \beta L_i + X_i'\delta + \lambda_1 D_1 + \cdots + \lambda_N D_N + v_i > 0 \\ 0 & \text{else} \end{cases} \quad (2)$$

With the independent variables being similar to equation (1).

The second hypothesis considers the last-born individuals only and assesses the association between the number of siblings an individual has and its financial risk preferences and corresponding financial market participation. For the second hypothesis, the following logistic specifications are used:

$$Y_i = \begin{cases} 1 & Y_i^* = \alpha + \beta NS_i + X_i'\delta + \lambda_1 D_1 + \cdots + \lambda_N D_N + v_i > 0 \\ 0 & \text{else} \end{cases} \quad (3)$$

$$RP_i = \begin{cases} 1 & RP_i^* = \alpha + \beta NS_i + X_i'\delta + \lambda_1 D_1 + \cdots + \lambda_N D_N + v_i > 0 \\ 0 & \text{else} \end{cases} \quad (4)$$

Where $NS_i$ is the number of siblings variable and the dependent and other independent variables are similar to equation (1) and (2).

*3.2.4.2 Actual amounts held*

In order to assess the influence of the independent variables on the actual amounts held, natural logarithms of the monetary values of $B_i$, $S_i$, $MF_i$ and $IRA_i$ are used. The two-part linear regression model is conditioned on ownership and is specified as follows for hypothesis 1 and 2, respectively:

$$\ln(A_i) = \alpha + \beta L_i + X_i'\delta + \lambda_1 D_1 + \cdots + \lambda_N D_N + v_i \quad (5)$$

$$\ln(A_i) = \alpha + \beta NS_i + X_i'\delta + \lambda_1 D_1 + \cdots + \lambda_N D_N + v_i \quad (6)$$

With $\ln(A_i)$ being the natural logarithm of the amounts of $B_i$, $S_i$, $MF_i$ and $IRA_i$. Independent variables are similar to equations (1) to (4).

## 4. Analysis

*4.1 Descriptive statistics*

*Table 3* shows the summary statistics of the dependent variables. Country-specific information on the prevalence of the ownership of the four financial assets and the propensity to take at least some financial risk can be found in *Table A2*. Stocks are the most important type of financial asset – 16.21% of the individuals hold stocks. Approximately 9.26%, 11.84% and 6.57% hold bonds, mutual funds and individual retirement accounts respectively. The percentages of individuals owning bonds, stocks, mutual funds and individual retirement accounts and the willingness to take at least some financial risk greatly vary across countries, as can be seen in *Figure 1* to *Figure 6*. The percentage of individuals holding bonds ranges

from 0.56% in Poland to 19.07% in Switzerland; the percentage of individuals holding stocks ranges from 1.11% in Poland to 43.47% in Sweden. These two counties represent the two extremes also in the case of mutual funds (0.33% and 34.30%, respectively), individual retirement accounts (0.00% and 12.81%, respectively) and holding at least one of the risky financial assets (1.45% and 64.57%, respectively). In total 69.82% of the individuals do not possess any of the four financial assets. Analyzing the willingness to take at least some financial risk, 26.50% of the individuals is willing to do so. The highest propensity to take at least some financial risk can be found in Denmark (45.02%) whereas the lowest can be found in Spain (8.26%). Interestingly, only 26.26% of the individuals actually hold at least one the risky financial assets.

**Table 3**
Summary statistics dependent variables.

| | Mean | Standard deviation | Min | Max | Observations |
|---|---|---|---|---|---|
| Holding bonds | 0.0926 | 0.2898 | 0 | 1 | 10,435 |
| Log bonds | 15.3466 | 7.4860 | 0.1259 | 25.3284 | 966 |
| Holding stocks | 0.1621 | 0.3685 | 0 | 1 | 10,435 |
| Log stocks | 13.6109 | 7.1927 | 0.1050 | 25.3284 | 1,691 |
| Holding mutual funds | 0.1184 | 0.3230 | 0 | 1 | 10,435 |
| Log mutual funds | 14.7149 | 7.1098 | 0.6931 | 25.3284 | 1,235 |
| Holding IRA's | 0.0657 | 0.2478 | 0 | 1 | 10,435 |
| Log IRA's | 15.6689 | 7.4537 | 1.0986 | 25.3284 | 686 |
| Risky asset holding | 0.2626 | 0.4398 | 0 | 1 | 10,435 |
| Willingness to take at least some financial risk | 0.2650 | 0.4413 | 0 | 1 | 10,435 |

**Notes:** Table depicts the descriptive statistics of the dependent variables. All logarithmic values are conditional on ownership. Variable descriptions can be found in *Table A1*.

**Figure 1**
Bond holdings across Europe

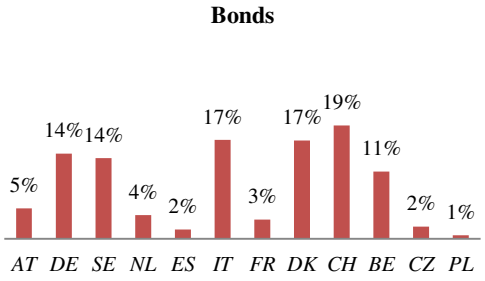



**Figure 2**
Stock holdings across Europe

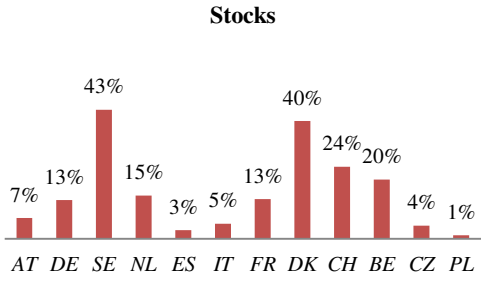


**Figure 3**
Mutual fund holdings across Europe

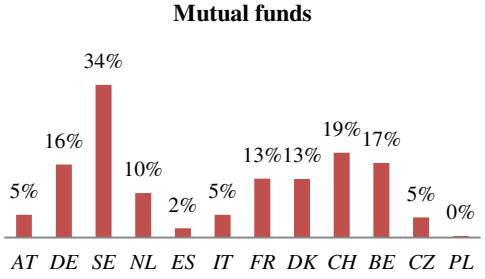



**Figure 4**
Individual retirement accounts holding across Europe

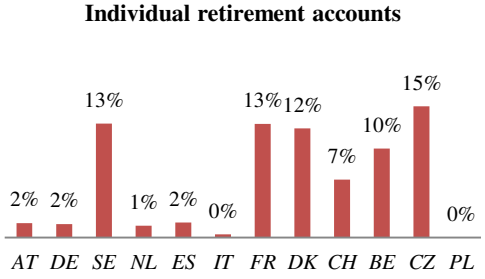



**Figure 5**
Risky financial asset holdings across Europe

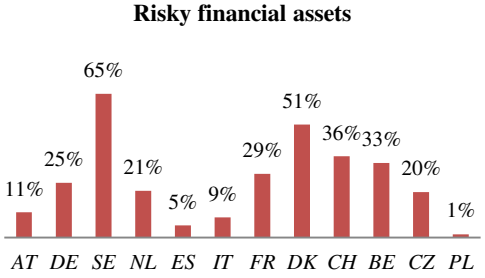
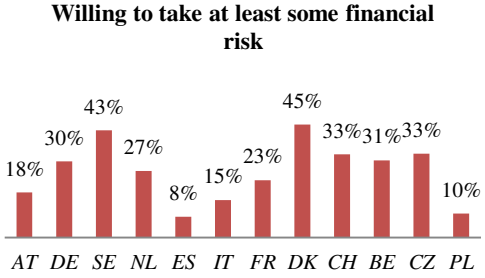



**Figure 6**
Willingness to take at least some financial risk across Europe




From *Table 4* it can be found that only 53.09% of the individuals who indicated that they are willing to take at least some financial risk are actually holding risky financial assets, where Poland represents the lower extreme with only 6.98%. This finding corresponds to the findings by earlier studies such as Warneryd (1996) and Zaleskiewicz (2001) that only little or no relationship can be found between the financial decision-making of an individual and its financial risk preference derived by means of a survey. In addition, in the context of this paper, one should bear in mind that the data on an individual's willingness to take at least some financial risk is retrieved from the second wave of SHARE whereas the data on the ownership of the financial assets is based on the fourth wave. As discussed before, following Christelis *et al.* (2012), it is assumed that the degree of financial risk aversion remains stable over time. However, considering the time period in which both waves were conducted, the second wave before and the fourth wave after the global financial crisis of 2007-2008, this assumption might not hold.

The mix between risky assets (stocks, mutual funds and individual retirement accounts) and relatively safe assets (bonds) signals the overall riskiness of the financial portfolio an individual has. Measuring this ratio by dividing the total amount of risky assets (stocks, mutual funds and individual retirement accounts) by the total amount of financial assets for each individual, it is found that (*Table 5*), *conditional* on ownership, on average 79.21% of the total portfolio is invested in risky assets. With respect to the mix between risky

assets and relatively safe assets, except for Italy, not much diversion is found between the countries; the percentage ranges from 32.07% in Italy to 93.38% in Czech Republic. Hence, in the case individuals do invest in the financial market, they invest relatively more in risky financial assets than in the relatively safer financial asset, bonds.

**Table 4**
Relation between willingness to take at least some financial risk and the actual holding of risky assets

| | Mean | Observations |
|---|---|---|
| Austria | 0.2687 | 67 |
| Germany | 0.4550 | 222 |
| Sweden | 0.8324 | 340 |
| Netherlands | 0.4751 | 261 |
| Spain | 0.1406 | 64 |
| Italy | 0.2635 | 167 |
| France | 0.6049 | 243 |
| Denmark | 0.6482 | 452 |
| Switzerland | 0.5702 | 235 |
| Belgium | 0.6057 | 383 |
| Czech Republic | 0.3020 | 245 |
| Poland | 0.0698 | 86 |
| Total | 0.5298 | 2,765 |

**Notes:** Table depicts the fraction of individuals who indicated that they are willing to take at least some financial risk actually holding risky financial assets.

**Table 5**
The fraction of the total financial portfolio allocated to risky financial assets, conditional on ownership

| | Mean | Observations |
|---|---|---|
| Austria | 0.7246 | 54 |
| Germany | 0.6650 | 226 |
| Sweden | 0.9000 | 544 |
| Netherlands | 0.8937 | 217 |
| Spain | 0.8112 | 49 |
| Italy | 0.3207 | 246 |
| France | 0.9337 | 314 |
| Denmark | 0.8056 | 561 |
| Switzerland | 0.7265 | 305 |
| Belgium | 0.8216 | 460 |
| Czech Republic | 0.9338 | 156 |
| Poland | 0.7353 | 17 |
| Total | 0.7921 | 3,149 |

**Notes:** Table depicts the fraction of the total financial portfolio allocated to risky financial assets, conditional on ownership. With this percentage being calculated as the sum of stocks, mutual funds and individual retirement accounts divided by the total value of the portfolio (bonds, stocks, mutual funds and individual retirement accounts).

*Table 6* provides an overview of the summary statistics of the independent variables. A country-specific overview can be found in *Table A3*. It is noted that 66.74% of the individuals can be identified as a later-born child, with this percentage being quite stable over the countries. As mentioned before, in order to analyze the second hypothesis only the last-born individuals will be considered, being approximately 38.14% of the full sample. Regarding the number of siblings, the lowest number is found in Czech Republic with 1.64 compared to 3.34 in the Netherlands. The average number of siblings of the full sample is 2.50, with a minimum of 0 and a maximum of 19.

**Table 6**
Summary statistics independent variables

| | Mean | Standard deviation | Min | Max | Observations |
|---|---|---|---|---|---|
| Later-born child | 0.6674 | 0.4712 | 0 | 1 | 10,435 |
| Last-born child | 0.3814 | 0.4858 | 0 | 1 | 10,435 |
| Number of siblings | 2.4956 | 1.9721 | 0 | 19 | 10,435 |
| Age | 69.1345 | 9.6030 | 41 | 104 | 10,435 |
| Gender | 0.4452 | 0.4970 | 0 | 1 | 10,435 |
| Couple | 0.6356 | 0.4813 | 0 | 1 | 10,435 |
| Having children | 0.8935 | 0.3085 | 0 | 1 | 10,435 |
| Not working | 0.6862 | 0.4641 | 0 | 1 | 10,435 |
| Post-secondary education | 0.2343 | 0.4236 | 0 | 1 | 10,435 |
| Probability of leaving an inheritance above 50,000 euro (%) | 57.8928 | 43.6353 | 0 | 100 | 10,090 |
| Self-reported health good | 0.6254 | 0.4840 | 0 | 1 | 10,435 |
| Good numeracy | 0.2024 | 0.4018 | 0 | 1 | 10,435 |
| Childhood socioeconomic status | 0.7224 | 0.4222 | 0 | 8.7500 | 10,331 |
| Was better than average at math in school when ten years old | 0.3658 | 0.4817 | 0 | 1 | 10,435 |
| Was better than average in language in school when ten years old | 0.3743 | 0.4840 | 0 | 1 | 10,435 |
| War baby | 0.3161 | 0.4650 | 0 | 1 | 10,435 |
| Depression baby | 0.1058 | 0.3076 | 0 | 1 | 10,435 |
| Gross household income (‘000s euros) | 3.7603 | 1.0797 | 0 | 7.6954 | 10,435 |
| Gross financial assets (‘000s euros) | 3.1857 | 1.9946 | 0 | 8.9697 | 10,435 |
| Real assets (‘000s euros) | 4.6462 | 2.3951 | -5.8206 | 10.3094 | 10,435 |

**Notes:** Table depicts the descriptive statistics of the independent variables. For the gross household income, gross financial assets and real assets an inverse hyperbolic sine transformation has been applied. Variable descriptions can be found in *Table A1*.

As discussed before, the full sample’s mean age is 69.1 with a median of 68, which is considerably higher compared to the actual median age of the countries included in the data

set with approximately 41.0 (Statista[5], 2010). However, since SHARE only surveys those individuals aged 50 and over, this finding is not surprising. This positive skewness towards older participants can be seen in the high percentage of war and depression babies as well, being 31.61% and 10.58% respectively. In addition, it further displays itself in the rather high percentage of individuals who are not working (due to retirement, unemployment or otherwise non-participation in the labor force). On average, 57.98% of the individuals expect to leave an inheritance of at least 50,000 euros. Given the relatively high age of the sample and the consequences these inheritance expectations may have for an individual's finance risk preferences, this number is especially relevant. In addition, 62.54% of the individuals self-report their health as excellent, very good or good. Lastly, with respect to the early cognition variables, large differences are found between the countries. These variables show that Swedes are most likely to perform above average in both mathematics and language (at around 46%), whereas the Spanish are the least likely to do so (roughly 22%). These findings correspond to the findings by Christelis *et al*. (2012).

### *4.2 Empirical results*

In this paragraph the results of the regression analyses are presented. For the logistic models, the regression coefficients, which are reported in the Appendix, provide an idea about whether the independent variables are positively or negatively related to the probability of holding either one of the financial asset classes, holding at least one type of risky financial asset and the willingness to take at least some financial risk. Marginal effects are reported within the main body of this paper, these marginal effects reflect the change in the relevant holding probability when the variables of interest change from zero to one for the dummy variables and by one unit in the case of continuous variables.

#### *4.2.1 Influence on financial assets holdings and the willingness to take at least some financial risk*

*Table 7* and *Table 8* report the marginal effects of the logistic regressions on ownership probabilities of bonds, stocks, mutual funds, individual retirement accounts and the ownership probability of at least one risky financial asset using the full sample. Looking at individual retirement accounts in column one of *Table 8*, one finds that being a later-born individual decreases the probability of holding an individual retirement account by 1.19 percentage points, significant at the 5%-level. Regarding the ownership of the other financial assets, the independent variable, later-born child, does not appear to have a significant effect

[5] www.statista.com, retrieved on April 26th 2017.

on the holding probabilities. The marginal effects of the independent and control variables on the willingness to take at least some financial risk, which is found among 26.50% of the individuals in the full sample, can be found in column three of *Table 8*. The independent variable turns out not to be significantly affecting the willingness to take at least some financial risk. Previous literature suggests subjects from smaller families to be significantly less risk accepting than their fellows from larger families (Jamieson, 1969), however, looking at column three of *Table 7*, one finds a negative relationship between the number of siblings an individual has and the mutual funds holding probability. A one unit increase in the number of siblings results in a 0.45 percentage points decrease in the holding probability of mutual funds. Interestingly, where Christelis *et al.* (2012) did not find a significant relationship between superior cognitive abilities in childhood and the willingness to take at least some financial risk in older age, this analysis finds that being better than average at math when ten years old increases the probability of being willing to take at least some financial risk in older age with 2.21 percentage points at the 5% significance level.

*Table 9* and *Table 10* report the marginal effects of the logistic regressions on ownership probabilities of bonds, stocks, mutual funds, individual retirement accounts, the ownership probability of at least one risky financial asset and the willingness to take at least some financial risk for the sub-sample consisting of last-born individuals only. As discussed before, it is hypothesized that the independent variable, number of siblings, is positively associated with the holding probabilities of the financial assets and the willingness to take at least some financial risk. However, the independent variable turns out not to be significant for any of the dependent variables.

In general, the control variables show patterns found by the previous literature. Higher educated individuals are more likely to hold mutual funds as well as to be willing to take at least some financial risk (Cooper and Zhu, 203). Investigating the full sample, being better than average at math in school when ten years old appears to be significantly positively correlated with the probability of holding stocks and mutual funds, as well as with the willingness to take at least some financial risk (Christelis *et al*., 2011). Surprisingly, in case of the sub-sample consisting of last-born individuals only, being better than average at math in school when ten years old appears to be only significantly positively correlated with the ownership of bonds. This contradicts the finding of Christelis *et al*. (2011) that the ownership of less risky assets such as bonds is not likely to be affected by early childhood conditions. In addition, individuals who self-report their health to be good are significantly more likely to hold bonds, stocks and mutual funds, confirming the finding by Edwards (2005).

Corresponding to the paper of Christelis *et al.* (2010), individuals with a higher probability of leaving an inheritance of at least 50,000 euros are also more likely to participate in the stock market. Another finding that corresponds to this paper is that individuals who score "good" on numeracy tests are more likely to hold stocks directly. Additionally, investigating the marginal effects of the country dummies, except for the case of individual retirement accounts, these effects appear to be mostly highly significant. These dummies are consistent with the analysis in the descriptive statistics of this paper as well as with previous literature (see e.g., Christelis *et al*., 2012; Guiso *et al*., 2003).

To summarize, investigating the full sample, birth order appears to be only significantly correlated with the ownership of individual retirement accounts. However, contrary to what was hypothesized, this relationship turns out to be negative. Therefore, the first hypothesis cannot be confirmed. Second, investigating the sub-sample consisting of last-born individuals only, the number of siblings variable does not turn out to be significantly correlated with any of the dependent variables. Therefore, also the second hypothesis cannot be confirmed. However, as shown in the previous literature, birth order is likely to impact e.g. the level of education of an individual, wealth levels and cognitive abilities. The associations found in the analysis are net of these effects, therefore, it is likely that the estimated marginal effects are conservative estimates of the overall effect of this variable on financial asset ownership and financial risk-taking in older age.

### *4.2.2 Influence on the amounts held conditional on ownership*

Even though, based on the logistic regressions, both hypotheses could not be confirmed, it is interesting to estimate whether an association between the independent variables and the amounts of each of the financial assets held, *conditional* on ownership, can be found using a two-part model. The marginal effects of this model can be found in *Table 11* for the first hypothesis and in *Table 12* for the second hypothesis. Similar to the case of holding probabilities, a negative association is found between being a later-born individual and the amount of individual retirement accounts held. Being a later-born individual decreases the amount of individual retirement accounts held by 217.99 percentage points. Regarding the second hypothesis no significant relationships are found between the, independent, number of siblings variable and the amounts of financial assets held.

*4.2.3 Robustness check*

In order to add further to the previous analysis and test the robustness of the two-part linear regression model results, a censored tobit regression is applied to determine the influence of the independent variables on the financial asset amounts held *unconditional* on ownership. The specification of such a censored tobit model is able to deal with the unobserved latent variables of the financial asset amounts, which can theoretically be negative. The marginal effects of these censored tobit regression models are presented in *Table A10* and *Table A11* in the Appendix.

The results from the censored tobit model are slightly differing from the two-part model. First, comparing the marginal effects of the two-part models and the censored tobit regression models, one finds the marginal effects of the censored tobit regression models to be much larger for both the full sample as well as for the sub-sample. Second, differences between significance levels and signs of the independent and control variables exist between the two methods. Investigating column four of *Table A10,* one finds, similar to the two-part model, a negative relationship between being a later-born individual and the amount of individual retirement accounts held. Being a later-born individual decreases the amount of individual retirement accounts held by 291.58 percentage points, significant at the 5%-level. Regarding the sub-sample, similar to the two-part model, no significant relationships are found between the dependent variables and the number of siblings an individual has.

Comparing the signs and significance levels between the binary choice and continuous stage of the two-part model, one can see that for some variables these are different. Therefore, the traditionally assumed drawback of the two-part model that both stages are treated independently does not appear to hold in this case. In addition, analyzing the Log-likelihood values of both methods, the higher Log-likelihood values of the two-part model in comparison to the censored tobit model indicate the two-part model to be a better fit.

**Table 7**
Marginal effects of the logistic regression on bonds, stocks and mutual funds.

| Variable | Bonds | | | Stocks | | | Mutual Funds | | |
|---|---|---|---|---|---|---|---|---|---|
| | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | |
| Later-born child | 0.0031 | 0.0056 | | 0.0105 | 0.0068 | | 0.0005 | 0.0062 | |
| Number of siblings | -0.0024 | 0.0015 | | 0.0004 | 0.0018 | | -0.0045 | 0.0018 | ** |
| Age | 0.0015 | 0.0004 | *** | 0.0006 | 0.0005 | | -0.0015 | 0.0005 | *** |
| Gender | -0.0130 | 0.0057 | ** | 0.0112 | 0.0068 | * | 0.0067 | 0.0062 | |
| Couple | 0.0000 | 0.0069 | | 0.0077 | 0.0079 | | -0.0122 | 0.0074 | |
| Having children | 0.0026 | 0.0087 | | -0.0095 | 0.0106 | | -0.0060 | 0.0097 | |
| Not working | 0.0169 | 0.0072 | ** | 0.0002 | 0.0085 | | 0.0144 | 0.0078 | * |
| Post-secondary education | 0.0070 | 0.0062 | | 0.0068 | 0.0073 | | 0.0133 | 0.0066 | ** |
| Probability of leaving an inheritance above 50,000 euro | 0.0000 | 0.0001 | | 0.0004 | 0.0001 | *** | 0.0002 | 0.0001 | ** |
| Self-reported health good | 0.0186 | 0.0065 | *** | 0.0116 | 0.0076 | | 0.0252 | 0.0074 | *** |
| Good numeracy | 0.0010 | 0.0064 | | 0.0197 | 0.0074 | *** | -0.0044 | 0.0070 | |
| Childhood socioeconomic status | -0.0053 | 0.0065 | | 0.0104 | 0.0077 | | -0.0055 | 0.0089 | |
| Was better than average at math in school when ten years old | 0.0070 | 0.0058 | | 0.0171 | 0.0071 | ** | 0.0123 | 0.0066 | * |
| Was better than average in language in school when ten years old | 0.0093 | 0.0058 | | -0.0123 | 0.0071 | * | 0.0117 | 0.0065 | * |
| War baby | 0.0022 | 0.0060 | | 0.0049 | 0.0073 | | 0.0138 | 0.0066 | ** |
| Depression baby | 0.0094 | 0.0106 | | -0.0207 | 0.0135 | | 0.0042 | 0.0132 | |
| Gross household income (‘000s euros) | 0.0063 | 0.0037 | * | 0.0190 | 0.0046 | *** | 0.0094 | 0.0041 | ** |
| Gross financial assets (‘000s euros) | 0.0525 | 0.0022 | *** | 0.0587 | 0.0023 | *** | 0.0569 | 0.0023 | *** |
| Real assets (‘000s euros) | 0.0029 | 0.0016 | * | 0.0046 | 0.0020 | ** | -0.0024 | 0.0017 | |
| Country dummy: Austria | 0.0652 | 0.0284 | ** | 0.0704 | 0.0310 | ** | 0.0317 | 0.0298 | |
| Country dummy: Germany | 0.1031 | 0.0244 | *** | 0.0728 | 0.0266 | *** | 0.1000 | 0.0243 | *** |
| Country dummy: Sweden | 0.0536 | 0.0246 | ** | 0.2097 | 0.0252 | *** | 0.1504 | 0.0237 | *** |
| Country dummy: Netherlands | -0.0015 | 0.0257 | | 0.0839 | 0.0259 | *** | 0.0519 | 0.0244 | ** |
| Country dummy: Italy | 0.1618 | 0.0233 | *** | 0.0200 | 0.0271 | | 0.0353 | 0.0250 | |
| Country dummy: France | -0.0548 | 0.0270 | ** | 0.0582 | 0.0263 | ** | 0.0597 | 0.0241 | ** |
| Country dummy: Denmark | 0.0748 | 0.0241 | *** | 0.1916 | 0.0253 | *** | 0.0258 | 0.0242 | |
| Country dummy: Switzerland | 0.0564 | 0.0248 | ** | 0.0686 | 0.0270 | ** | 0.0361 | 0.0249 | |
| Country dummy: Belgium | 0.0440 | 0.0241 | * | 0.0820 | 0.0256 | *** | 0.0634 | 0.0237 | *** |
| Country dummy: Czech Republic | 0.0604 | 0.0293 | ** | 0.0954 | 0.0301 | *** | 0.0820 | 0.0269 | *** |
| Country dummy: Poland | 0.0015 | 0.0382 | | 0.0039 | 0.0390 | | -0.0976 | 0.0527 | * |
| Observations | 9,997 | | | 9,997 | | | 9,997 | | |

**Notes:** Marginal effects denote the change in the relevant choice probability when the dummy variables change from zero to one and the continuous variables change by one unit. Standard errors are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table 8**
Marginal effects of the logistic regression on individual retirement accounts, risky financial asset holding and the willingness to take at least some financial risk.

| Variable | Individual Retirement Accounts | | All Risky Financial Assets | | Willingness to take at least some financial risk | |
|---|---|---|---|---|---|---|
| | M.E. | Std. Error | M.E. | Std. Error | M.E. | Std. Error |
| Later-born child | -0.0119 | 0.0049 ** | 0.0014 | 0.0073 | 0.0072 | 0.0085 |
| Number of siblings | 0.0001 | 0.0014 | -0.0026 | 0.0020 | -0.0004 | 0.0023 |
| Age | -0.0032 | 0.0005 *** | -0.0013 | 0.0005 ** | -0.0049 | 0.0006 *** |
| Gender | 0.0098 | 0.0050 * | 0.0116 | 0.0074 | 0.0854 | 0.0084 *** |
| Couple | 0.1017 | 0.0095 *** | 0.0304 | 0.0087 *** | -0.0026 | 0.0100 |
| Having children | 0.0184 | 0.0107 * | -0.0077 | 0.0120 | -0.0161 | 0.0135 |
| Not working | -0.0115 | 0.0063 * | -0.0050 | 0.0092 | 0.0060 | 0.0107 |
| Post-secondary education | -0.0013 | 0.0054 | 0.0113 | 0.0081 | 0.0571 | 0.0093 *** |
| Probability of leaving an inheritance above 50,000 euro | 0.0000 | 0.0001 | 0.0004 | 0.0001 *** | 0.0005 | 0.0001 *** |
| Self-reported health good | -0.0003 | 0.0061 | 0.0174 | 0.0080 ** | 0.0201 | 0.0092 ** |
| Good numeracy | 0.0016 | 0.0054 | 0.0118 | 0.0084 | 0.0452 | 0.0096 *** |
| Childhood socioeconomic status | -0.0122 | 0.0070 * | 0.0000 | 0.0094 | 0.0205 | 0.0104 ** |
| Was better than average at math in school when ten years old | 0.0054 | 0.0053 | 0.0204 | 0.0078 *** | 0.0221 | 0.0091 ** |
| Was better than average in language in school when ten years old | 0.0001 | 0.0053 | -0.0030 | 0.0077 | 0.0145 | 0.0091 |
| War baby | -0.0146 | 0.0058 ** | 0.0038 | 0.0079 | 0.0009 | 0.0091 |
| Depression baby | -0.0039 | 0.0171 | -0.0202 | 0.0151 | 0.0022 | 0.0185 |
| Gross household income (‘000s euros) | 0.0096 | 0.0035 *** | 0.0237 | 0.0050 *** | 0.0251 | 0.0055 *** |
| Gross financial assets (‘000s euros) | 0.0329 | 0.0020 *** | 0.0875 | 0.0023 *** | 0.0359 | 0.0026 *** |
| Real assets (‘000s euros) | 0.0032 | 0.0018 * | 0.0033 | 0.0020 * | 0.0083 | 0.0023 *** |
| Country dummy: Austria | -0.0162 | 0.0283 | 0.0579 | 0.0296 * | 0.0971 | 0.0328 *** |
| Country dummy: Germany | -0.0598 | 0.0222 *** | 0.0924 | 0.0243 *** | 0.1480 | 0.0271 *** |
| Country dummy: Sweden | 0.0498 | 0.0169 *** | 0.2859 | 0.0232 *** | 0.1986 | 0.0264 *** |
| Country dummy: Netherlands | -0.0805 | 0.0221 *** | 0.0542 | 0.0240 ** | 0.1093 | 0.0265 *** |
| Country dummy: Italy | -0.1023 | 0.0298 *** | 0.0040 | 0.0246 | 0.0557 | 0.0268 ** |
| Country dummy: France | 0.0698 | 0.0167 *** | 0.1038 | 0.0236 *** | 0.0789 | 0.0267 *** |
| Country dummy: Denmark | 0.0374 | 0.0169 ** | 0.1987 | 0.0233 *** | 0.2035 | 0.0259 *** |
| Country dummy: Switzerland | -0.0309 | 0.0187 | 0.0484 | 0.0255 * | 0.1064 | 0.0284 *** |
| Country dummy: Belgium | 0.0305 | 0.0169 * | 0.0971 | 0.0232 *** | 0.1158 | 0.0259 *** |
| Country dummy: Czech Republic | 0.1560 | 0.0173 *** | 0.2508 | 0.0244 *** | 0.2952 | 0.0270 *** |
| Country dummy: Poland | 0.0000 | (omitted) | -0.0416 | 0.0389 | 0.0688 | 0.0303 ** |
| Observations | 9,997 | | 9,997 | | 9,997 | |

**Notes:** Marginal effects denote the change in the relevant choice probability when the dummy variables change from zero to one and the continuous variables change by one unit. Standard errors all risky financial assets are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table 9**

Marginal effects of the logistic regression on bonds, stocks and mutual funds using a sub-sample including last-born individuals only.

| Variable | Bonds | | | Stocks | | | Mutual Funds | | |
|---|---|---|---|---|---|---|---|---|---|
| | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | |
| Number of siblings | -0.0022 | 0.0022 | | 0.0016 | 0.0024 | | -0.0016 | 0.0025 | |
| Age | 0.0014 | 0.0006 | ** | 0.0000 | 0.0007 | | -0.0018 | 0.0008 | ** |
| Gender | -0.0111 | 0.0088 | | 0.0155 | 0.0104 | | 0.0083 | 0.0103 | |
| Couple | 0.0115 | 0.0108 | | 0.0158 | 0.0124 | | -0.0122 | 0.0122 | |
| Having children | 0.0057 | 0.0142 | | -0.0243 | 0.0170 | | 0.0064 | 0.0163 | |
| Not working | 0.0130 | 0.0112 | | 0.0176 | 0.0136 | | -0.0007 | 0.0134 | |
| Post-secondary education | 0.0013 | 0.0096 | | -0.0034 | 0.0116 | | 0.0277 | 0.0111 | ** |
| Probability of leaving an inheritance above 50,000 euro | -0.0002 | 0.0001 | * | 0.0004 | 0.0001 | *** | 0.0002 | 0.0001 | |
| Self-reported health good | 0.0163 | 0.0100 | | 0.0243 | 0.0120 | ** | 0.0234 | 0.0121 | * |
| Good numeracy | 0.0005 | 0.0104 | | 0.0326 | 0.0114 | *** | 0.0091 | 0.0116 | |
| Childhood socioeconomic status | -0.0095 | 0.0119 | | 0.0050 | 0.0147 | | -0.0171 | 0.0147 | |
| Was better than average at math in school when ten years old | 0.0162 | 0.0090 | * | 0.0138 | 0.0112 | | -0.0078 | 0.0110 | |
| Was better than average in language in school when ten years old | 0.0045 | 0.0091 | | -0.0120 | 0.0111 | | 0.0238 | 0.0110 | ** |
| War baby | 0.0005 | 0.0095 | | -0.0082 | 0.0115 | | 0.0153 | 0.0112 | |
| Depression baby | 0.0279 | 0.0141 | ** | -0.0319 | 0.0203 | | 0.0020 | 0.0218 | |
| Gross household income (‘000s euros) | 0.0025 | 0.0061 | | 0.0178 | 0.0073 | ** | 0.0104 | 0.0071 | |
| Gross financial assets (‘000s euros) | 0.0439 | 0.0033 | *** | 0.0519 | 0.0035 | *** | 0.0537 | 0.0039 | *** |
| Real assets (‘000s euros) | 0.0067 | 0.0025 | *** | 0.0041 | 0.0031 | | -0.0056 | 0.0029 | * |
| Country dummy: Austria | 0.0700 | 0.0461 | | 0.0566 | 0.0510 | | 0.0219 | 0.0571 | |
| Country dummy: Germany | 0.1062 | 0.0382 | *** | 0.0540 | 0.0446 | | 0.1211 | 0.0447 | *** |
| Country dummy: Sweden | 0.0684 | 0.0386 | * | 0.1901 | 0.0415 | *** | 0.1858 | 0.0436 | *** |
| Country dummy: Netherlands | 0.0141 | 0.0389 | | 0.0895 | 0.0415 | ** | 0.0655 | 0.0440 | |
| Country dummy: Italy | 0.1570 | 0.0357 | *** | 0.0249 | 0.0433 | | 0.0317 | 0.0457 | |
| Country dummy: France | -0.0322 | 0.0421 | | 0.0664 | 0.0426 | | 0.0740 | 0.0442 | * |
| Country dummy: Denmark | 0.0983 | 0.0373 | *** | 0.1934 | 0.0412 | *** | 0.0362 | 0.0448 | |
| Country dummy: Switzerland | 0.0647 | 0.0386 | * | 0.0816 | 0.0436 | * | 0.0500 | 0.0453 | |
| Country dummy: Belgium | 0.0573 | 0.0371 | | 0.0920 | 0.0415 | ** | 0.0813 | 0.0433 | * |
| Country dummy: Czech Republic | 0.0382 | 0.0577 | | 0.0089 | 0.0636 | | 0.0243 | 0.0606 | |
| Country dummy: Poland | 0.0014 | 0.0561 | | 0.0279 | 0.0567 | | 0.0000 | (omitted) | |
| Observations | 3,793 | | | 3,793 | | | 3,793 | | |

**Notes:** Marginal effects denote the change in the relevant choice probability when the dummy variables change from zero to one and the continuous variables change by one unit. Standard errors are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table 10**
Marginal effects of the logistic regression on individual retirement accounts, risky financial asset holding and the willingness to take at least some financial risk using a sub-sample including last-born individuals only.

| Variable | Individual Retirement Accounts | | All Risky Financial Assets | | Willingness to take at least some financial risk | |
|---|---|---|---|---|---|---|
| | M.E. | Std. Error | M.E. | Std. Error | M.E. | Std. Error |
| Number of siblings | -0.0023 | 0.0022 | -0.0009 | 0.0027 | 0.0013 | 0.0032 |
| Age | -0.0028 | 0.0007 *** | -0.0015 | 0.0008 * | -0.0030 | 0.0010 *** |
| Gender | 0.0049 | 0.0085 | 0.0131 | 0.0112 | 0.0802 | 0.0131 *** |
| Couple | 0.0911 | 0.0159 *** | 0.0331 | 0.0134 ** | -0.0098 | 0.0155 |
| Having children | 0.0231 | 0.0197 | -0.0217 | 0.0186 | -0.0343 | 0.0209 |
| Not working | -0.0164 | 0.0107 | -0.0042 | 0.0144 | 0.0033 | 0.0167 |
| Post-secondary education | 0.0022 | 0.0091 | 0.0106 | 0.0129 | 0.0738 | 0.0147 *** |
| Probability of leaving an inheritance above 50,000 euro | 0.0002 | 0.0001 | 0.0006 | 0.0001 *** | 0.0004 | 0.0002 ** |
| Self-reported health good | -0.0070 | 0.0102 | 0.0214 | 0.0124 * | 0.0207 | 0.0145 |
| Good numeracy | -0.0030 | 0.0093 | 0.0194 | 0.0132 | 0.0548 | 0.0154 *** |
| Childhood socioeconomic status | -0.0250 | 0.0136 * | -0.0080 | 0.0160 | 0.0337 | 0.0197 * |
| Was better than average at math in school when ten years old | 0.0122 | 0.0093 | 0.0186 | 0.0123 | 0.0079 | 0.0145 |
| Was better than average in language in school when ten years old | -0.0014 | 0.0092 | -0.0085 | 0.0122 | 0.0010 | 0.0147 |
| War baby | -0.0114 | 0.0099 | -0.0030 | 0.0121 | 0.0096 | 0.0144 |
| Depression baby | -0.0326 | 0.0317 | -0.0305 | 0.0222 | -0.0192 | 0.0277 |
| Gross household income (‘000s euros) | 0.0097 | 0.0059 * | 0.0237 | 0.0080 *** | 0.0230 | 0.0088 *** |
| Gross financial assets (‘000s euros) | 0.0306 | 0.0034 *** | 0.0773 | 0.0035 *** | 0.0315 | 0.0040 *** |
| Real assets (‘000s euros) | 0.0001 | 0.0030 | -0.0008 | 0.0032 | 0.0114 | 0.0036 *** |
| Country dummy: Austria | 0.0466 | 0.0489 | 0.0669 | 0.0509 | 0.1543 | 0.0523 *** |
| Country dummy: Germany | -0.0282 | 0.0447 | 0.1053 | 0.0431 ** | 0.1733 | 0.0445 *** |
| Country dummy: Sweden | 0.0813 | 0.0366 ** | 0.3062 | 0.0412 *** | 0.2258 | 0.0437 *** |
| Country dummy: Netherlands | -0.0629 | 0.0445 | 0.0848 | 0.0411 ** | 0.1564 | 0.0416 *** |
| Country dummy: Italy | 0.0000 | (omitted) | 0.0115 | 0.0424 | 0.0772 | 0.0439 * |
| Country dummy: France | 0.1099 | 0.0358 *** | 0.1295 | 0.0414 *** | 0.1171 | 0.0432 *** |
| Country dummy: Denmark | 0.0695 | 0.0364 * | 0.2212 | 0.0408 *** | 0.2251 | 0.0422 *** |
| Country dummy: Switzerland | -0.0062 | 0.0391 | 0.0751 | 0.0437 * | 0.1570 | 0.0451 *** |
| Country dummy: Belgium | 0.0629 | 0.0361 * | 0.1234 | 0.0405 *** | 0.1404 | 0.0417 *** |
| Country dummy: Czech Republic | 0.1744 | 0.0375 *** | 0.2243 | 0.0453 *** | 0.3312 | 0.0460 *** |
| Country dummy: Poland | 0.0000 | (omitted) | -0.0177 | 0.0621 | 0.1366 | 0.0471 *** |
| Observations | 3,373 | | 3,793 | | 3,793 | |

**Notes:** Marginal effects denote the change in the relevant choice probability when the dummy variables change from zero to one and the continuous variables change by one unit. Standard errors all risky financial assets are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table 11**
Estimation results on the amounts of financial assets held conditional on ownership using a two-part model.

| | Log bonds | | | Log stocks | | | Log mutual funds | | | Log IRA's | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | |
| Later-born child | 0.0409 | 0.0963 | | 0.1262 | 0.1095 | | 0.0368 | 0.1024 | | -2.1799 | 0.0868 | ** |
| Number of siblings | -0.0476 | 0.0272 | * | 0.0064 | 0.0292 | | -0.0752 | 0.0301 | ** | 0.0025 | 0.0250 | |
| Age | 0.0258 | 0.0071 | *** | 0.0222 | 0.0081 | *** | -0.0163 | 0.0079 | ** | -0.0438 | 0.0082 | *** |
| Gender | -0.3309 | 0.0977 | *** | -0.1602 | 0.1094 | | -0.1174 | 0.1034 | | 0.0813 | 0.0886 | |
| Couple | -0.0317 | 0.1179 | | 0.1550 | 0.1293 | | -0.0850 | 0.1230 | | 1.7184 | 0.1787 | *** |
| Having children | -0.0750 | 0.1503 | | -0.2208 | 0.1711 | | -0.2550 | 0.1621 | | 0.1331 | 0.1905 | |
| Not working | 0.2655 | 0.1249 | ** | -0.1489 | 0.1389 | | 0.1925 | 0.1322 | | -0.3532 | 0.1119 | *** |
| Post-secondary education | 0.0992 | 0.1059 | | -0.0061 | 0.1159 | | 0.1155 | 0.1091 | | -0.0981 | 0.0947 | |
| Probability of leaving an inheritance above 50,000 euro | -0.0004 | 0.0013 | | 0.0068 | 0.0015 | *** | 0.0039 | 0.0014 | *** | 0.0001 | 0.0013 | |
| Self-reported health good | 0.2608 | 0.1132 | ** | 0.0623 | 0.1251 | | 0.4089 | 0.1241 | *** | 0.0526 | 0.1076 | |
| Good numeracy | 0.0230 | 0.1090 | | 0.2785 | 0.1165 | ** | -0.0639 | 0.1145 | | 0.0973 | 0.0949 | |
| Childhood socioeconomic status | 0.0028 | 0.1168 | | 0.3224 | 0.1300 | ** | -0.0234 | 0.1391 | | -0.2273 | 0.1240 | * |
| Was better than average at math in school when ten years old | 0.1303 | 0.1006 | | 0.2814 | 0.1131 | ** | 0.1868 | 0.1087 | * | 0.0032 | 0.0944 | |
| Was better than average in language in school when ten years old | 0.1685 | 0.1001 | * | -0.1398 | 0.1141 | | 0.1869 | 0.1082 | * | 0.0309 | 0.0940 | |
| War baby | 0.0508 | 0.1031 | | 0.0472 | 0.1176 | | 0.1504 | 0.1112 | | -0.2151 | 0.1028 | ** |
| Depression baby | 0.1611 | 0.1833 | | -0.3894 | 0.2252 | * | 0.0690 | 0.2232 | | -0.0342 | 0.3135 | |
| Gross household income ('000s euros) | 0.1278 | 0.0659 | * | 0.2694 | 0.0780 | *** | 0.1316 | 0.0719 | * | 0.0884 | 0.0611 | |
| Gross financial assets ('000s euros) | 0.8387 | 0.0414 | *** | 0.9138 | 0.0417 | *** | 0.8954 | 0.0428 | *** | 0.5282 | 0.0385 | *** |
| Real assets ('000s euros) | 0.0620 | 0.0278 | ** | 0.0604 | 0.0316 | * | -0.0420 | 0.0294 | | 0.0735 | 0.0330 | ** |
| Country dummy: Austria | 0.2260 | 0.5021 | | 1.2106 | 0.5935 | ** | 0.0736 | 0.5085 | | 0.2135 | 0.5167 | |
| Country dummy: Germany | 1.0723 | 0.4369 | ** | 1.0020 | 0.5061 | ** | 1.5425 | 0.4319 | *** | -0.8007 | 0.4069 | ** |
| Country dummy: Sweden | -0.0639 | 0.4372 | | 2.4187 | 0.4767 | *** | 1.8992 | 0.4157 | *** | 0.8357 | 0.3066 | *** |
| Country dummy: Netherlands | -0.5090 | 0.4658 | | 0.9334 | 0.4914 | * | 0.6970 | 0.4351 | | -0.7636 | 0.4031 | * |
| Country dummy: Italy | 2.1925 | 0.4222 | *** | 0.8279 | 0.5252 | | 0.9339 | 0.4510 | ** | -0.8922 | 0.5439 | |
| Country dummy: France | -1.2422 | 0.4895 | ** | 0.7616 | 0.5002 | | 1.2555 | 0.4322 | *** | 1.3730 | 0.3039 | *** |
| Country dummy: Denmark | 0.4262 | 0.4312 | | 2.1014 | 0.4770 | *** | 0.0139 | 0.4243 | | 0.6180 | 0.3059 | ** |
| Country dummy: Switzerland | 0.3579 | 0.4449 | | 0.8199 | 0.5043 | | 0.5048 | 0.4395 | | -0.3332 | 0.3389 | |
| Country dummy: Belgium | 0.4738 | 0.4362 | | 1.6714 | 0.4893 | *** | 1.3374 | 0.4229 | *** | 0.9047 | 0.3072 | *** |
| Country dummy: Czech Republic | 0.7597 | 0.5283 | | 1.8740 | 0.5753 | *** | 1.3875 | 0.4816 | *** | 2.3670 | 0.3158 | *** |
| Country dummy: Poland | 0.7640 | 0.6852 | | -0.2559 | 0.7235 | | -1.9263 | 0.8261 | ** | 0.0000 | (omitted) | |
| Log-likelihood | -5,428 | | | -8,511 | | | -6,647 | | | -3,747 | | |
| Observations | 9,997 | | | 9,997 | | | 9,997 | | | 9,119 | | |

**Notes:** Logarithmic values of the dependent variables have been taken in order to normalize them. Standard errors bonds, stocks and mutual funds are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table 12**
Estimation results on the amounts of financial assets held conditional on ownership using a two-part model and a sub-sample including last-born individuals only.

| | Log bonds | | | Log stocks | | | Log mutual funds | | | Log IRA's | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | |
| Number of siblings | -0.0120 | 0.0376 | | 0.0411 | 0.0395 | | -0.0406 | 0.0429 | | -0.0535 | 0.0388 | |
| Age | 0.0257 | 0.0108 | ** | 0.0089 | 0.0121 | | -0.0236 | 0.0134 | * | -0.0468 | 0.1390 | *** |
| Gender | -0.2724 | 0.1472 | * | -0.0262 | -0.1617 | | 0.0249 | 0.1731 | | -0.1284 | 0.1557 | |
| Couple | 0.1390 | 0.1798 | | 0.0309 | 0.1986 | | -0.0546 | 0.2044 | | 1.4377 | 0.3099 | *** |
| Having children | 0.0625 | 0.2370 | | 0.3953 | 0.2670 | | -0.0469 | 0.2765 | | 0.1344 | 0.3582 | |
| Not working | 0.1670 | 0.1928 | | 0.0593 | 0.2153 | | -0.1149 | 0.2280 | | -0.3022 | 0.1980 | |
| Post-secondary education | 0.0637 | 0.1651 | | -0.0859 | 0.1793 | | 0.3342 | 0.1830 | * | -0.0107 | 0.1635 | |
| Probability of leaving an inheritance above 50,000 euro | -0.0028 | 0.0019 | | 0.0081 | 0.0023 | *** | 0.0045 | 0.0025 | * | 0.0035 | 0.0023 | |
| Self-reported health good | 0.0716 | 0.1698 | | 0.2683 | 0.1919 | | 0.3034 | 0.2072 | | 0.0141 | 0.1849 | |
| Good numeracy | 0.0445 | 0.1715 | | 0.3403 | 0.1748 | * | 0.0772 | 0.1918 | | 0.0996 | 0.1696 | |
| Childhood socioeconomic status | 0.0074 | 0.2101 | | 0.2246 | 0.2330 | | -0.2629 | 0.2578 | | -0.5273 | 0.2456 | ** |
| Was better than average at math in school when ten years old | 0.2867 | 0.1540 | * | 0.3078 | 0.1741 | * | -0.0638 | 0.1866 | | 0.1403 | 0.1666 | |
| Was better than average in language in school when ten years old | 0.0735 | 0.1533 | | -0.2467 | 0.1746 | | 0.3590 | 0.1852 | * | 0.0450 | 0.1645 | |
| War baby | 0.1287 | 0.1638 | | -0.0669 | 0.1791 | | 0.2736 | 0.1895 | | -0.0906 | 0.1823 | |
| Depression baby | 0.5148 | 0.2437 | ** | -0.4796 | 0.3245 | | 0.2402 | 0.3708 | | -0.3512 | 0.6012 | |
| Gross household income ('000s euros) | 0.0673 | 0.1020 | | 0.2923 | 0.1186 | ** | 0.1268 | 0.1267 | | -0.0811 | 0.1072 | |
| Gross financial assets ('000s euros) | 0.6787 | 0.0610 | *** | 0.7741 | 0.0614 | *** | 0.8403 | 0.0743 | *** | 0.5456 | 0.0705 | *** |
| Real assets ('000s euros) | 0.0766 | 0.0440 | * | 0.0462 | 0.0489 | | -0.0969 | 00507 | * | 0.0172 | 0.0575 | |
| Country dummy: Austria | 0.3612 | 0.7626 | | 0.9546 | 0.9571 | | -0.2164 | 0.9509 | | 1.5028 | 0.9339 | |
| Country dummy: Germany | 0.9657 | 0.6144 | | 0.4649 | 0.7850 | | 1.6958 | 0.7924 | ** | 0.1197 | 0.8421 | |
| Country dummy: Sweden | -0.0017 | 0.6143 | | 1.8223 | 0.7207 | ** | 2.4206 | 0.7670 | *** | 1.7886 | 0.6944 | ** |
| Country dummy: Netherlands | -0.5279 | 0.6335 | | 0.6702 | 0.7263 | | 0.8181 | 0.7789 | | -0.4232 | 0.8480 | |
| Country dummy: Italy | 1.9091 | 0.5810 | *** | 0.3249 | 0.7818 | | 0.7842 | 0.8406 | | 0.0000 | (omitted) | |
| Country dummy: France | -1.0616 | 0.6915 | | 0.7204 | 0.7513 | | 1.5959 | 0.7953 | ** | 2.2820 | 0.6837 | *** |
| Country dummy: Denmark | 0.5764 | 0.5964 | | 1.8055 | 0.7131 | ** | 0.1665 | 0.7828 | | 1.4066 | 0.6890 | ** |
| Country dummy: Switzerland | 0.3029 | 0.6236 | | 0.5652 | 0.7504 | | 0.6915 | 0.7966 | | 0.4277 | 0.7359 | |
| Country dummy: Belgium | 0.5312 | 0.6050 | | 1.4326 | 0.7304 | * | 1.6229 | 0.7717 | ** | 1.8171 | 0.6879 | *** |
| Country dummy: Czech Republic | 0.1304 | 0.9443 | | -0.4057 | 1.2387 | | 1.1860 | 0.9954 | | 3.0417 | 0.7128 | *** |
| Country dummy: Poland | -1.0258 | 0.8660 | | -0.6377 | 0.8980 | | 0.0000 | (omitted) | | 0.0000 | (omitted) | |
| Log-likelihood | -1,835 | | | -2,918 | | | -2,159 | | | -1,157 | | |
| Observations | 3,793 | | | 3,793 | | | 3,411 | | | 2,991 | | |

**Notes:** Logarithmic values of the dependent variables have been taken in order to normalize them. Standard errors bonds, stocks and mutual funds are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

## 5. Discussion

Using longitudinal data of the Survey of Health, Ageing and Retirement in Europe this paper set out to clarify the relationship between birth order and financial risk preferences and corresponding financial market participation in older age. Previous literature on the effects of birth order on financial risk preferences and corresponding financial market participation suggests later-born individuals to be significantly more financial risk tolerant compared to first-born individuals (see, e.g., Gilliam and Chatterjee, 2011; Morgan, 2009). Morgan (2009) argues first-born individuals to have lower personal discount rates and to be more long-term oriented compared to their later-born counterparts. Therefore, first-born individuals are more willing to wait to receive a higher payout and hence are more likely to prefer passive investment strategies with less risky financial assets.

Aforementioned literature on the effects of birth order on an individual's financial risk preferences and corresponding financial market participation bases its analyzes and conclusions on relatively small, United States oriented, samples. However, based on recent research (see, e.g., Christelis *et al*., 2010) and *Figure 1* to *Figure 6*, significant heterogeneity exists in the rate of financial market participation across countries, making conclusions based on individuals from the United States only less relevant. Therefore, methodologically, this paper contributes to the household finance literature by using an extensive longitudinal data set covering 10,435 individuals aged 50 and over from 12 European countries. In contrast to the findings by the aforementioned papers, the analysis of this paper reveals that, except for the ownership of individual retirement accounts, birth order does not have a significant effect on an individual's financial risk preferences and corresponding financial market participation. In addition, to the best of the author's knowledge, this paper is the first to analyze the relationship between birth order and the amounts invested in each of the four financial assets *conditional* on ownership, finding birth order to only have a significant effect on the amount of individual retirement accounts held.

According to Christelis *et al*. (2008), further understanding the limited financial market participation might be of interest from a policy point of view, since European pension reforms are likely to increase an individual's reliance on financial market participation, especially in the form of individual retirement accounts and stocks. In the context of this reasoning, the finding of this paper that birth order is not a potential answer to the puzzle of why so many households do not participate in the financial market, except for the case of individual retirement accounts, becomes even more relevant.

Several points are identified where additional research could add value. First, a shortcoming of the performed analysis might be that, in the case of two partners participating in SHARE, the information on financial asset ownership[6] and general household finances has been aggregated over the couple. By doing so, variables at the individual level (e.g., birth order, education and cognitive abilities) are regressed on variables at the household level. This might also explain the fact that this paper only finds a significant relationship between birth order and the holding probability of an individual retirement account and the amount held in such an account. Therefore, further research could focus on solely investigating individuals who are either single or the ones taking all the financial decisions in the household. Second, as mentioned before, little or no relationship is found between the financial decision-making of an individual and its financial risk preferences derived my means of a survey (see, e.g., Warneryd, 1996; Zaleskiewicz, 2001). Given this information, the data on an individual's willingness to take at least some financial risk might not be accurate in predicting an individual's financial market participation. In addition, in the context of the data set used in this paper, a possible explanation for the missing relationship between the financial decision-making of an individual and its self-assessed financial risk aversion might be the financial crisis of 2007-2008, also known as the global financial crisis. The data on an individual's self-assessed financial risk aversion is subtracted from the second wave of SHARE, which was conducted in 2006, whereas the data on an individual's financial asset ownership is subtracted from the fourth wave of SHARE, which was conducted in 2010. The financial markets experienced turbulent times between these two data collection moments, possibly affecting an individual's willingness to participate in these markets. Lastly, one might wonder whether the respondent's recollections about life events that took place many years back are reliable and are interpretations are consistent across countries. In the case of SHARELIFE data, Havari and Mazzona (2011) argue that this data is of reasonable good quality and that these variables are not likely to suffer from recall bias.

## 6. Conclusion

This paper set out to clarify the relationship between birth order and an individual's financial risk preferences and corresponding financial market participation in older age. The latter is defined as decisions concerning the ownership of four financial assets: bonds, directly held stocks, mutual funds and individual retirement accounts. The results indicate that birth

[6] This is the case for information on stock, mutual fund and bond ownership. Information on the ownership of individual retirement accounts is reported at the individual level.

order does not have a significant effect on portfolio choices and the willingness to take at least some financial risk, except for the holding probabilities and amounts held of individual retirement accounts. Analyzing the full sample, being a later-born individual is found to decrease the holding probability of individual retirement accounts with 1.19 percentage points. Correspondingly, the estimation results on the amounts of financial assets held *conditional* on ownership using a two-part model indicate that being a later-born individual decreases the amount of individual retirement accounts held by 217.99 percentage points. Focusing on the sub-sample consisting of last-born individuals only, the number of siblings an individual has does not appear to have any significant effect on the holding probabilities of the financial assets, the amounts held *conditional* on ownership or the willingness to take at least some financial risk.

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# 8. Appendix

**Table A1**
Overview variables including description
Variables equivalent to the SHARE codebook for Wave 1 to 5. The SHARE codebook can be consulted for further information on the questions asked to gather the variable information.

| Mnemonic | SHARE code | Variable description |
|---|---|---|
| *Dependent variables* | | |
| New_has_bonds | as062_ | *Aggregated variable (by using hhid4) indicating whether an individual and/or his/her partner has bonds* |
| New_has_stocks | as063_ | *Aggregated variable (by using hhid4) indicating whether an individual and/or his/her partner has stocks* |
| New_has_mutual_funds | as064_ | *Aggregated variable (by using hhid4) indicating whether an individual and/or his/her partner has mutual funds* |
| New_has_iras | as020_ | *Aggregated variable (by using hhid4) indicating whether an individual and/or his/her partner has individual retirement accounts (IRA's)* |
| Bonds | - | *Dummy variable, 1 if an individual or his/her partner has bonds (new_has_bonds4=1)* |
| Stocks | - | *Dummy variable, 1 if an individual or his/her partner has stocks (new_has_stocks=1)* |
| Mutual_funds | - | *Dummy variable, 1 if an individual or his/her partner has mutual funds (new_has_mutual_funds=1)* |
| IRAs | - | *Dummy variable, 1 if an individual or his/her partner has individual retirement accounts (IRAs) (new_has_iras=1)* |
| Has_risky_financial_assets | - | *Dummy variable, 1 if an individual or his/her partner holds either stocks, mutual funds or has IRA (bonds=1, stocks=1 and/or mutual_funds=1)* |
| Willing_to_take_financial_risk | as068_ | *Dummy variable, 1 if individual is willing to take at least some financial risk (as068_=1, 2 or 3)* |
| Log_new_amount_of_bonds | as007e | *Natural logarithm of the amount of bonds held conditional on ownership* |
| Log_new_amount_of_stocks | as011e | *Natural logarithm of the amount of stocks held conditional on ownership* |
| Log_new_amount_of_mutual_funds | as017e | *Natural logarithm of the amount of mutual funds held conditional on ownership* |
| Log_new_amount_of_iras | as021e | *Natural logarithm of the amount of IRA's held conditional on ownership* |
| *Independent variables* | | |
| Later_born_child | dn035_w1, dn035_w2, dn035_w4 | *Dummy variable, 1 if an individual is not the oldest (dn035_=2 or dn035_=3)* |
| Last_born_child | dn035_w1, dn035_w2, dn035_w4 | *Dummy variable, 1 if an individual is the youngest (dn035_=3)* |
| Number_of_siblings | dn036_w1, dn036_w2, dn036_w4, dn037_w1, dn037_w2, dn037_w4 | *Total number of brothers and sisters* |
| Austria | country | *Dummy variable, 1 if an individual lives in Austria (country=11)* |
| Germany | country | *Dummy variable, 1 if an individual lives in Germany (country=12)* |
| Sweden | country | *Dummy variable, 1 if an individual lives in Sweden (country=13)* |
| Netherlands | country | *Dummy variable, 1 if an individual lives in Netherlands (country=14)* |

| | | |
|---|---|---|
| Spain | country | *Dummy variable, 1 if an individual lives in Spain (country=15)* |
| Italy | country | *Dummy variable, 1 if an individual lives in Italy (country=16)* |
| France | country | *Dummy variable, 1 if an individual lives in France (country=17)* |
| Denmark | country | *Dummy variable, 1 if an individual lives in Denmark (country=18)* |
| Switzerland | country | *Dummy variable, 1 if an individual lives in Switzerland (country=20)* |
| Belgium | country | *Dummy variable, 1 if an individual lives in Belgium (country=23)* |
| Czech Republic | country | *Dummy variable, 1 if an individual lives in Czech Republic (country=28)* |
| Poland | country | *Dummy variable, 1 if an individual lives in Poland (country=29)* |
| Age | age | *Age of the individual* |
| Gender | gender | *Dummy variable, 1 if individual is male (gender=1)* |
| Couple | mstat | *Dummy variable, 1 if individual is in a couple (mstat =1, 2 or 3)* |
| Having_children | nchild | *Dummy variable, 1 if individual has children (nchild > 0)* |
| Not_working | cjs | *Dummy variable, 1 if individual indicates that he/she is not-working due to retirement, unemployment or otherwise non participation in the labor force (cjs=1,3 or 4)* |
| Post_secondary_education | isced | *Individual has taken post-secondary education (isced=4, 5 or 6)* |
| Inheritance | ex003_ | *The probability of leaving an inheritance of at least 50,000 euros* |
| Self_reported_health_good | sphus | *Dummy variable, 1 if individual reported his/her own health as excellent, very good or good (sphus=1, 2 or 3)* |
| Good_numeracy | numeracy | *Dummy variable, 1 if individual scored good at numeracy test (numeracy=5)* |
| Childhood_ses | | |
| Better_mathematically | sl_cs010_ | *Dummy variable, 1 if individual was better than average at math in school when ten years old (sl_cs010_=1 or 2)* |
| Better_language | sl_cs010a_ | *Dummy variable, 1 if individual was better than average in language in school when ten years old (sl_cs010a_=1 or 2)* |
| War_baby | yrbirth | *Dummy variable, 1 if individual was born between 1939-1947* |
| Depression_baby | yrbirth | *Dummy variable, 1 if individual was born between 1924-1930* |
| Hyperbolic_total_hh_income | thinc | *Inverse hyperbolic sine transformation of the total household income in '000 euros* |
| Hyperbolic_gross_fin_assets | hgfass | *Inverse hyperbolic sine transformation of the total household gross financial assets in '000 euros* |
| Hyperbolic_real_fin_assets | hrass | *Inverse hyperbolic sine transformation of the total household real financial assets in '000 euros* |

**Table A2**
Summary statistics dependent variables per country

| | Austria | Germany | Sweden | Netherlands | Spain | Italy | France | Denmark | Switzerland | Belgium | Czech Republic | Poland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Holding bonds | 0.0509 | 0.1434 | 0.1357 | 0.0396 | 0.0155 | 0.1664 | 0.0320 | 0.1653 | 0.1907 | 0.1134 | 0.0205 | 0.0056 |
| Log bonds | 11.8482 | 15.1542 | 10.9242 | 15.3812 | 18.6769 | 16.9084 | 16.6319 | 12.9391 | 15.9200 | 18.9655 | 17.1774 | 9.6829 |
| Holding stocks | 0.0697 | 0.1298 | 0.4347 | 0.1452 | 0.0284 | 0.0507 | 0.1335 | 0.3964 | 0.2429 | 0.1995 | 0.0437 | 0.0111 |
| Log stocks | 15.0340 | 13.9609 | 11.6532 | 13.0732 | 16.0337 | 17.2648 | 14.1034 | 11.0889 | 14.5159 | 18.2081 | 16.3683 | 10.8296 |
| Holding mutual funds | 0.0509 | 0.1639 | 0.3430 | 0.0995 | 0.0206 | 0.0507 | 0.1325 | 0.1315 | 0.1907 | 0.1673 | 0.0450 | 0.0033 |
| Log mutual funds | 10.7189 | 14.9208 | 11.8113 | 13.6246 | 14.6557 | 17.3584 | 17.9121 | 11.6728 | 14.8117 | 18.2628 | 15.3005 | 8.5077 |
| Holding IRA's | 0.0161 | 0.0150 | 0.1281 | 0.0132 | 0.0168 | 0.0036 | 0.1278 | 0.1225 | 0.0650 | 0.0998 | 0.1473 | 0.0000 |
| Log IRA's | 20.0234 | 14.7667 | 14.0864 | 19.8658 | 14.3853 | 21.9759 | 17.2074 | 13.7314 | 16.0499 | 19.0020 | 12.7094 | - |
| Risky asset holding | 0.1126 | 0.2459 | 0.6457 | 0.2102 | 0.0542 | 0.0899 | 0.2857 | 0.5070 | 0.3644 | 0.3347 | 0.2033 | 0.0145 |
| Willingness to take at least some financial risk | 0.1796 | 0.3033 | 0.4271 | 0.2650 | 0.0826 | 0.1486 | 0.2284 | 0.4502 | 0.3319 | 0.3081 | 0.3342 | 0.0958 |
| Observations | 373 | 732 | 796 | 985 | 775 | 1,124 | 1,064 | 1,004 | 708 | 1,243 | 733 | 898 |

**Notes:** Table depicts the descriptive statistics of the dependent variables per country. All logarithmic values are conditional on ownership. Variable descriptions can be found in *Table A1*.

**Table A3**
Summary statistics independent variables per country

| | Austria | Germany | Sweden | Netherlands | Spain | Italy | France | Denmark | Switzerland | Belgium | Czech Republic | Poland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Later-born child | 0.6461 | 0.6325 | 0.6193 | 0.6985 | 0.6994 | 0.6886 | 0.6814 | 0.6723 | 0.6285 | 0.6693 | 0.6139 | 0.7082 |
| Last-born child | 0.3619 | 0.3265 | 0.3141 | 0.4751 | 0.4323 | 0.3835 | 0.3741 | 0.3546 | 0.3983 | 0.4119 | 0.2442 | 0.4399 |
| Number of siblings | 2.2145 | 1.9809 | 2.1985 | 3.3350 | 2.6361 | 2.6512 | 2.7030 | 2.2251 | 2.6427 | 2.6066 | 1.6371 | 2.5468 |
| Age | 70.7587 | 68.6120 | 70.5038 | 68.0995 | 70.9703 | 69.4751 | 69.4972 | 68.5956 | 68.6554 | 69.3307 | 67.8445 | 68.1281 |
| Gender | 0.3914 | 0.4877 | 0.4812 | 0.4477 | 0.4129 | 0.4733 | 0.4211 | 0.4851 | 0.4280 | 0.4899 | 0.3356 | 0.4165 |
| Couple | 0.4826 | 0.7131 | 0.6658 | 0.6995 | 0.6800 | 0.7269 | 0.5526 | 0.5777 | 0.5819 | 0.6122 | 0.5880 | 0.6626 |
| Having children | 0.8445 | 0.9044 | 0.9259 | 0.8944 | 0.8645 | 0.8950 | 0.8816 | 0.8944 | 0.8234 | 0.8721 | 0.9577 | 0.9443 |
| Not working | 0.7855 | 0.7036 | 0.7286 | 0.5959 | 0.5316 | 0.6744 | 0.7331 | 0.6404 | 0.5593 | 0.6935 | 0.8049 | 0.8285 |
| Post-secondary education | 0.2386 | 0.3620 | 0.3593 | 0.2497 | 0.0748 | 0.0819 | 0.2321 | 0.3934 | 0.2938 | 0.2792 | 0.1432 | 0.1192 |
| Probability of leaving an inheritance above 50,000 euro (%) | 47.2507 | 58.4743 | 61.5287 | 49.3674 | 41.5007 | 61.4135 | 61.3150 | 61.5624 | 54.3921 | 69.5403 | 69.9665 | 45.7571 |
| Self-reported health good | 0.6649 | 0.5792 | 0.6721 | 0.6853 | 0.4723 | 0.5445 | 0.5949 | 0.7639 | 0.8206 | 0.7088 | 0.5866 | 0.4165 |
| Good numeracy | 0.2064 | 0.2514 | 0.3216 | 0.3543 | 0.0297 | 0.0916 | 0.1457 | 0.3207 | 0.2811 | 0.1730 | 0.2074 | 0.0857 |
| Childhood socioeconomic status | 0.6684 | 0.7721 | 0.7711 | 0.7901 | 0.5998 | 0.5231 | 0.8133 | 0.9003 | 0.8822 | 0.9426 | 0.5206 | 0.3752 |
| Was better than average at math in school when ten years old | 0.3190 | 0.3620 | 0.4598 | 0.3898 | 0.2439 | 0.3256 | 0.3261 | 0.4492 | 0.3912 | 0.4200 | 0.3465 | 0.3085 |
| Was better than average in language in school when ten years old | 0.3727 | 0.3989 | 0.4548 | 0.3431 | 0.2039 | 0.2794 | 0.3919 | 0.4522 | 0.4294 | 0.4513 | 0.3943 | 0.3096 |
| War baby | 0.3673 | 0.3279 | 0.3807 | 0.3462 | 0.2581 | 0.3434 | 0.2782 | 0.3118 | 0.3051 | 0.2792 | 0.3711 | 0.2762 |
| Depression baby | 0.1260 | 0.0861 | 0.1106 | 0.0843 | 0.1445 | 0.0827 | 0.1297 | 0.1145 | 0.1102 | 0.1231 | 0.0682 | 0.0935 |
| Gross household income (‘000s euros) | 3.8207 | 3.8398 | 4.1914 | 4.1124 | 3.2283 | 3.5927 | 3.9639 | 4.2135 | 4.7413 | 4.1895 | 2.6972 | 2.3235 |
| Gross financial assets (‘000s euros) | 2.4696 | 3.2629 | 4.2898 | 3.3494 | 1.9073 | 2.4798 | 3.5606 | 4.1398 | 4.4886 | 3.8757 | 1.7823 | 1.9010 |
| Real assets (‘000s euros) | 3.7808 | 4.3050 | 4.9851 | 4.4652 | 5.3215 | 5.2199 | 5.0726 | 4.9003 | 4.5273 | 5.1713 | 3.8105 | 3.1410 |
| Observations | 373 | 732 | 796 | 985 | 775 | 1,124 | 1,064 | 1,004 | 708 | 1,243 | 733 | 898 |

**Notes:** Table depicts the descriptive statistics of the independent variables per country. For the gross household income, gross financial assets and real assets an inverse hyperbolic sine transformation has been applied. Variable descriptions can be found in *Table A1*.

**Table A4**
Estimation results bonds, stocks and mutual funds using a logistic regression.

| Variable | Bonds | | | Stocks | | | Mutual Funds | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Error | | Coef. | Std. Error | | Coef. | Std. Error | |
| Later-born child | 0.0462 | 0.0822 | | 0.1087 | 0.0700 | | 0.0059 | 0.0751 | |
| Number of siblings | -0.0350 | 0.0224 | | 0.0039 | 0.0182 | | -0.0552 | 0.0217 | ** |
| Age | 0.0222 | 0.0060 | *** | 0.0066 | 0.0050 | | -0.0186 | 0.0055 | *** |
| Gender | -0.1919 | 0.0836 | ** | 0.1158 | 0.0701 | * | 0.0813 | 0.0754 | |
| Couple | 0.0002 | 0.1013 | | 0.0798 | 0.0821 | | -0.1477 | 0.0902 | |
| Having children | 0.0382 | 0.1289 | | -0.0981 | 0.1092 | | -0.0724 | 0.1180 | |
| Not working | 0.2489 | 0.1068 | ** | 0.0020 | 0.0882 | | 0.1748 | 0.0947 | * |
| Post-secondary education | 0.1025 | 0.0914 | | 0.0698 | 0.0755 | | 0.1614 | 0.0808 | ** |
| Probability of leaving an inheritance above 50,000 euro | -0.0006 | 0.0011 | | 0.0043 | 0.0009 | *** | 0.0026 | 0.0010 | ** |
| Self-reported health good | 0.2744 | 0.0961 | *** | 0.1197 | 0.0783 | | 0.3060 | 0.0895 | *** |
| Good numeracy | 0.0154 | 0.0947 | | 0.2041 | 0.0764 | *** | -0.0530 | 0.0845 | |
| Childhood socioeconomic status | -0.0774 | 0.0964 | | 0.1075 | 0.0798 | | -0.0665 | 0.1080 | |
| Was better than average at math in school when ten years old | 0.1033 | 0.0854 | | 0.1768 | 0.0732 | ** | 0.1492 | 0.0796 | * |
| Was better than average in language in school when ten years old | 0.1377 | 0.0851 | | -0.1272 | 0.0737 | * | 0.1424 | 0.0792 | * |
| War baby | 0.0330 | 0.0881 | | 0.0505 | 0.0755 | | 0.1673 | 0.0807 | ** |
| Depression baby | 0.1392 | 0.1564 | | -0.2139 | 0.1392 | | 0.0504 | 0.1609 | |
| Gross household income (‘000s euros) | 0.0933 | 0.0545 | * | 0.1961 | 0.0478 | *** | 0.1138 | 0.0504 | ** |
| Gross financial assets (‘000s euros) | 0.7746 | 0.0340 | *** | 0.6063 | 0.0257 | *** | 0.6907 | 0.0292 | *** |
| Real assets (‘000s euros) | 0.0433 | 0.0237 | * | 0.0473 | 0.0203 | ** | -0.0290 | 0.0207 | |
| Country dummy: Austria | 0.9616 | 0.4189 | ** | 0.7274 | 0.3198 | ** | 0.3854 | 0.3622 | |
| Country dummy: Germany | 1.5195 | 0.3592 | *** | 0.7528 | 0.2745 | *** | 1.2135 | 0.2949 | *** |
| Country dummy: Sweden | 0.7899 | 0.3613 | ** | 2.1672 | 0.2608 | *** | 1.8259 | 0.2876 | *** |
| Country dummy: Netherlands | -0.0226 | 0.3788 | | 0.8670 | 0.2670 | *** | 0.6303 | 0.2964 | ** |
| Country dummy: Italy | 2.3852 | 0.3456 | *** | 0.2063 | 0.2798 | | 0.4281 | 0.3035 | |
| Country dummy: France | -0.8076 | 0.3985 | ** | 0.6015 | 0.2710 | ** | 0.7245 | 0.2927 | ** |
| Country dummy: Denmark | 1.1036 | 0.3554 | *** | 1.9803 | 0.2619 | *** | 0.3135 | 0.2940 | |
| Country dummy: Switzerland | 0.8316 | 0.3654 | ** | 0.7089 | 0.2789 | ** | 0.4379 | 0.3025 | |
| Country dummy: Belgium | 0.6493 | 0.3558 | * | 0.8477 | 0.2642 | *** | 0.7699 | 0.2875 | *** |
| Country dummy: Czech Republic | 0.8906 | 0.4324 | ** | 0.9861 | 0.3102 | *** | 0.9952 | 0.3272 | *** |
| Country dummy: Poland | 0.0228 | 0.5638 | | 0.0401 | 0.4030 | | -1.1852 | 0.6386 | * |
| Constant (Spain) | -8.9429 | 0.6121 | *** | -7.3118 | 0.4711 | *** | -5.1368 | 0.5134 | *** |
| | | | | | | | | | |
| Pseudo $R^2$ | 0.2658 | | | 0.3060 | | | 0.2644 | | |
| Log-likelihood | -2,285 | | | -3,099 | | | -2,700 | | |
| Observations | 9,997 | | | 9,997 | | | 9,997 | | |

**Notes:** Standard errors are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table A5**
Estimation results all risky financial assets, bonds and willingness to take at least some financial risk using a logistic regression.

| Variable | Individual Retirement Accounts | | | All Risky Financial Assets | | | Willingness to take at least some financial risk | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Error | | Coef. | Std. Error | | Coef. | Std. Error | |
| Later-born child | -0.2379 | 0.0987 | ** | 0.0122 | 0.0635 | | 0.0452 | 0.0538 | |
| Number of siblings | 0.0016 | 0.0285 | | -0.0223 | 0.0171 | | -0.0023 | 0.0143 | |
| Age | -0.0641 | 0.0091 | *** | -0.0116 | 0.0045 | ** | -0.0307 | 0.0040 | *** |
| Gender | 0.1956 | 0.1001 | * | 0.1002 | 0.0637 | | 0.5386 | 0.0537 | *** |
| Couple | 2.0314 | 0.1911 | *** | 0.2632 | 0.0751 | *** | -0.0164 | 0.0629 | |
| Having children | 0.3682 | 0.2136 | * | -0.0666 | 0.1039 | | -0.1013 | 0.0850 | |
| Not working | -0.2305 | 0.1256 | * | -0.0431 | 0.0796 | | 0.0381 | 0.0675 | |
| Post-secondary education | -0.0266 | 0.1074 | | 0.0981 | 0.0704 | | 0.3601 | 0.0594 | *** |
| Probability of leaving an inheritance above 50,000 euro | -0.0007 | 0.0014 | | 0.0036 | 0.0008 | *** | 0.0031 | 0.0007 | *** |
| Self-reported health good | -0.0065 | 0.1212 | | 0.1503 | 0.0690 | ** | 0.1269 | 0.0581 | ** |
| Good numeracy | 0.0329 | 0.1077 | | 0.1023 | 0.0726 | | 0.2853 | 0.0608 | *** |
| Childhood socioeconomic status | -0.2444 | 0.1407 | * | 0.0003 | 0.0811 | | 0.1292 | 0.0658 | * |
| Was better than average at math in school when ten years old | 0.1076 | 0.1066 | | 0.1766 | 0.0676 | *** | 0.1393 | 0.0572 | ** |
| Was better than average in language in school when ten years old | 0.0029 | 0.1059 | | -0.0264 | 0.0669 | | 0.0917 | 0.0575 | |
| War baby | -0.2914 | 0.1157 | ** | 0.0329 | 0.0683 | | 0.0056 | 0.0576 | |
| Depression baby | -0.0786 | 0.3414 | | -0.1748 | 0.1310 | | 0.0140 | 0.1164 | |
| Gross household income (‘000s euros) | 0.1916 | 0.0696 | *** | 0.2048 | 0.0438 | *** | 0.1581 | 0.0351 | *** |
| Gross financial assets (‘000s euros) | 0.6573 | 0.0425 | *** | 0.7577 | 0.0240 | *** | 0.2264 | 0.0169 | *** |
| Real assets (‘000s euros) | 0.0639 | 0.0363 | * | 0.0288 | 0.0174 | * | 0.0524 | 0.0146 | *** |
| Country dummy: Austria | -0.3230 | 0.5651 | | 0.5017 | 0.2565 | * | 0.6124 | 0.2067 | *** |
| Country dummy: Germany | -1.1945 | 0.4443 | *** | 0.7998 | 0.2103 | *** | 0.9336 | 0.1712 | *** |
| Country dummy: Sweden | 0.9956 | 0.3379 | *** | 2.4759 | 0.2055 | *** | 1.2528 | 0.1679 | *** |
| Country dummy: Netherlands | -1.6084 | 0.4432 | *** | 0.4694 | 0.2074 | ** | 0.6893 | 0.1676 | *** |
| Country dummy: Italy | -2.0439 | 0.5947 | *** | 0.0346 | 0.2131 | | 0.3510 | 0.1690 | ** |
| Country dummy: France | 1.3947 | 0.3335 | *** | 0.8992 | 0.2039 | *** | 0.4975 | 0.1685 | *** |
| Country dummy: Denmark | 0.7469 | 0.3369 | ** | 1.7207 | 0.2034 | *** | 1.2835 | 0.1649 | *** |
| Country dummy: Switzerland | -0.6166 | 0.3751 | | 0.4190 | 0.2207 | * | 0.6711 | 0.1791 | *** |
| Country dummy: Belgium | 0.6089 | 0.3381 | * | 0.8412 | 0.2012 | *** | 0.7304 | 0.1637 | *** |
| Country dummy: Czech Republic | 3.1170 | 0.3504 | *** | 2.1723 | 0.2137 | *** | 1.8619 | 0.1732 | *** |
| Country dummy: Poland | 0.0000 | (omitted) | | -0.3604 | 0.3366 | | 0.4341 | 0.1911 | ** |
| Constant (Spain) | -4.5309 | 0.7759 | *** | -5.6845 | 0.4135 | *** | -2.2549 | 0.3398 | *** |
| | | | | | | | | | |
| Pseudo $R^2$ | 0.3518 | | | 0.3756 | | | 0.1717 | | |
| Log-likelihood | -1,537 | | | -3,607 | | | -4,828 | | |
| Observations | 9,997 | | | 9,997 | | | 9,997 | | |

**Notes:** Standard errors all risky financial assets are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table A6**
Estimation results bonds, stocks and mutual funds using a logistic regression and a sub-sample including last-born individuals only.

| Variable | Bonds | | | Stocks | | | Mutual Funds | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Error | | Coef. | Std. Error | | Coef. | Std. Error | |
| Number of siblings | -0.0363 | 0.0353 | | 0.0176 | 0.0276 | | -0.0205 | 0.0316 | |
| Age | 0.0233 | 0.0098 | ** | 0.0003 | 0.0085 | | -0.0231 | 0.0099 | ** |
| Gender | -0.1808 | 0.1444 | | 0.1755 | 0.1175 | | 0.1059 | 0.1314 | |
| Couple | 0.1879 | 0.1763 | | 0.1790 | 0.1411 | | -0.1556 | 0.1555 | |
| Having children | 0.0923 | 0.2319 | | -0.2744 | 0.1918 | | 0.0818 | 0.2073 | |
| Not working | 0.2120 | 0.1825 | | 0.1994 | 0.1534 | | -0.0083 | 0.1707 | |
| Post-secondary education | 0.0219 | 0.1569 | | -0.0385 | 0.1312 | | 0.3528 | 0.1415 | ** |
| Probability of leaving an inheritance above 50,000 euro | -0.0033 | 0.0019 | * | 0.0048 | 0.0016 | *** | 0.0024 | 0.0018 | |
| Self-reported health good | 0.2662 | 0.1641 | | 0.2751 | 0.1357 | ** | 0.2987 | 0.1543 | * |
| Good numeracy | 0.0083 | 0.1691 | | 0.3688 | 0.1301 | *** | 0.1160 | 0.1475 | |
| Childhood socioeconomic status | -0.1554 | 0.1937 | | 0.0570 | 0.1662 | | -0.2173 | 0.1882 | |
| Was better than average at math in school when ten years old | 0.2646 | 0.1460 | * | 0.1562 | 0.1265 | | -0.0991 | 0.1408 | |
| Was better than average in language in school when ten years old | 0.0738 | 0.1475 | | -0.1356 | 0.1263 | | 0.3037 | 0.1402 | ** |
| War baby | 0.0085 | 0.1552 | | -0.0929 | 0.1297 | | 0.1950 | 0.1432 | |
| Depression baby | 0.4539 | 0.2311 | * | -0.3604 | 0.2301 | | 0.0250 | 0.2776 | |
| Gross household income (‘000s euros) | 0.0402 | 0.0989 | | 0.2010 | 0.0829 | ** | 0.1322 | 0.0912 | |
| Gross financial assets (‘000s euros) | 0.7157 | 0.0556 | *** | 0.5870 | 0.0420 | *** | 0.6838 | 0.0511 | *** |
| Real assets (‘000s euros) | 0.1091 | 0.0406 | *** | 0.0469 | 0.0354 | | -0.0715 | 0.0372 | * |
| Country dummy: Austria | 1.1402 | 0.7499 | | 0.6407 | 0.5773 | | 0.2790 | 0.7278 | |
| Country dummy: Germany | 1.7300 | 0.6198 | *** | 0.6106 | 0.5036 | | 1.5427 | 0.5685 | *** |
| Country dummy: Sweden | 1.1138 | 0.6262 | * | 2.1508 | 0.4712 | *** | 2.3672 | 0.5547 | *** |
| Country dummy: Netherlands | 0.2292 | 0.6328 | | 1.0124 | 0.4684 | ** | 0.8343 | 0.5586 | |
| Country dummy: Italy | 2.5574 | 0.5826 | *** | 0.2814 | 0.4899 | | 0.4044 | 0.5822 | |
| Country dummy: France | -0.5251 | 0.6867 | | 0.7509 | 0.4813 | | 0.9425 | 0.5613 | * |
| Country dummy: Denmark | 1.6017 | 0.6067 | *** | 2.1882 | 0.4685 | *** | 0.4606 | 0.5695 | |
| Country dummy: Switzerland | 1.0543 | 0.6284 | * | 0.9229 | 0.4926 | * | 0.6375 | 0.5759 | |
| Country dummy: Belgium | 0.9331 | 0.6032 | | 1.0410 | 0.4688 | ** | 1.0358 | 0.5506 | * |
| Country dummy: Czech Republic | 0.6226 | 0.9399 | | 0.1003 | 0.7193 | | 0.3090 | 0.7724 | |
| Country dummy: Poland | 0.0234 | 0.9132 | | 0.3161 | 0.6421 | | 0.0000 | (omitted) | |
| Constant (Spain) | -9.1209 | 1.0666 | *** | -7.0486 | 0.8275 | *** | -5.0022 | 0.9874 | *** |
| | | | | | | | | | |
| Pseudo $R^2$ | 0.2673 | | | 0.3179 | | | 0.2675 | | |
| Log-likelihood | -795 | | | -1,083 | | | -887 | | |
| Observations | 3,793 | | | 3,793 | | | 3,411 | | |

**Notes:** Standard errors are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table A7**
Estimation results individual retirement accounts, all risky financial assets and willingness to take at least some financial risk using a logistic regression and a sub-sample including last-born individuals only.

| Variable | Individual Retirement Accounts | | | All Risky Financial Assets | | | Willingness to take at least some financial risk | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Error | | Coef. | Std. Error | | Coef. | Std. Error | |
| Number of siblings | -0.0497 | 0.0459 | | -0.0086 | 0.0256 | | 0.0086 | 0.0217 | |
| Age | -0.0596 | 0.0157 | *** | -0.0143 | 0.0078 | * | -0.0204 | 0.0065 | *** |
| Gender | 0.1042 | 0.1803 | | 0.1257 | 0.1074 | | 0.5425 | 0.0900 | *** |
| Couple | 1.9309 | 0.3388 | *** | 0.3161 | 0.1280 | ** | -0.0663 | 0.1051 | |
| Having children | 0.4887 | 0.4168 | | -0.2078 | 0.1776 | | -0.2321 | 0.1415 | |
| Not working | -0.3467 | 0.2279 | | -0.0406 | 0.1375 | | 0.0223 | 0.1130 | |
| Post-secondary education | 0.0466 | 0.1936 | | 0.1012 | 0.1233 | | 0.4996 | 0.1008 | *** |
| Probability of leaving an inheritance above 50,000 euro | 0.0042 | 0.0026 | | 0.0055 | 0.0014 | *** | 0.0024 | 0.0012 | ** |
| Self-reported health good | -0.1484 | 0.2166 | | 0.2044 | 0.1187 | * | 0.1398 | 0.0979 | |
| Good numeracy | -0.0645 | 0.1980 | | 0.1858 | 0.1264 | | 0.3709 | 0.1051 | *** |
| Childhood socioeconomic status | -0.5289 | 0.2899 | * | -0.0769 | 0.1531 | | 0.2278 | 0.1337 | * |
| Was better than average at math in school when ten years old | 0.2575 | 0.1968 | | 0.1777 | 0.1174 | | 0.0537 | 0.0982 | |
| Was better than average in language in school when ten years old | -0.0295 | 0.1945 | | -0.0816 | 0.1166 | | 0.0066 | 0.0992 | |
| War baby | -0.2414 | 0.2100 | | -0.0290 | 0.1159 | | 0.0653 | 0.0971 | |
| Depression baby | -0.6899 | 0.6711 | | -0.2919 | 0.2122 | | -0.1299 | 0.1872 | |
| Gross household income (‘000s euros) | 0.2066 | 0.1253 | * | 0.2270 | 0.0764 | *** | 0.1555 | 0.0595 | *** |
| Gross financial assets (‘000s euros) | 0.6486 | 0.0761 | *** | 0.7394 | 0.0398 | *** | 0.2131 | 0.0279 | *** |
| Real assets (‘000s euros) | 0.0027 | 0.0640 | | -0.0073 | 0.0309 | | 0.0768 | 0.0247 | *** |
| Country dummy: Austria | 0.9866 | 1.0364 | | 0.6398 | 0.4871 | | 1.0441 | 0.3544 | *** |
| Country dummy: Germany | -0.5965 | 0.9479 | | 1.0067 | 0.4122 | ** | 1.1723 | 0.3019 | *** |
| Country dummy: Sweden | 1.7234 | 0.7747 | | 2.9282 | 0.4029 | *** | 1.5278 | 0.2978 | *** |
| Country dummy: Netherlands | -1.3320 | 0.9443 | | 0.8106 | 0.3926 | ** | 1.0584 | 0.2823 | *** |
| Country dummy: Italy | 0.0000 | (omitted) | | 0.1097 | 0.4057 | | 0.5227 | 0.2970 | * |
| Country dummy: France | 2.3280 | 0.7582 | | 1.2384 | 0.3961 | *** | 0.7925 | 0.2923 | *** |
| Country dummy: Denmark | 1.4737 | 0.7697 | | 2.1153 | 0.3940 | *** | 1.5229 | 0.2881 | *** |
| Country dummy: Switzerland | -0.1317 | 0.8289 | | 0.7180 | 0.4179 | * | 1.0620 | 0.3058 | *** |
| Country dummy: Belgium | 1.3321 | 0.7645 | | 1.1803 | 0.3881 | *** | 0.9501 | 0.2826 | *** |
| Country dummy: Czech Republic | 3.6963 | 0.7985 | | 2.1448 | 0.4363 | *** | 2.2409 | 0.3163 | *** |
| Country dummy: Poland | 0.0000 | (omitted) | | -0.1694 | 0.5938 | | 0.9243 | 0.3191 | *** |
| Constant (Spain) | -5.2689 | 1.4772 | | -5.6925 | 0.7474 | *** | -3.1959 | 0.5826 | *** |
| | | | | | | | | | |
| Pseudo $R^2$ | 0.3568 | | | 0.3927 | | | 0.1778 | | |
| Log-likelihood | -479 | | | -1,251 | | | -1,730 | | |
| Observations | 2,991 | | | 3,793 | | | 3,793 | | |

**Notes:** Standard errors all risky financial assets are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table A8**
Estimation results on the amounts of financial assets held conditional on ownership using a two-part model.

| | Log bonds | | | Log stocks | | | Log mutual funds | | | Log IRA's | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Error | | Coef. | Std. Error | | Coef. | Std. Error | | Coef. | Std. Error | |
| Later-born child | -0.0679 | 0.5025 | | -0.1104 | 0.3536 | | 0.2463 | 0.3927 | | -0.4740 | 0.5738 | |
| Number of siblings | -0.1259 | 0.1567 | | 0.0074 | 0.0996 | | -0.0712 | 0.1234 | | 0.0172 | 0.1652 | |
| Age | 0.0337 | 0.0399 | | 0.0815 | 0.0281 | *** | 0.0512 | 0.0347 | | 0.0786 | 0.0604 | |
| Gender | -1.4374 | 0.4972 | *** | -1.9117 | 0.3520 | *** | -1.7954 | 0.4093 | *** | -0.9616 | 0.6040 | |
| Couple | -0.3395 | 0.6017 | | 0.0552 | 0.4235 | | 0.7795 | 0.4772 | | 2.0798 | 1.3087 | |
| Having children | -1.2152 | 0.7709 | | -0.5515 | 0.5519 | | -1.3936 | 0.6376 | ** | -2.0840 | 1.3276 | |
| Not working | 0.1189 | 0.6500 | | -0.9228 | 0.4532 | ** | -0.1573 | 0.5520 | | -2.4182 | 0.7594 | *** |
| Post-secondary education | -0.0592 | 0.5310 | | -0.6015 | 0.3553 | * | -0.6637 | 0.4081 | | -1.0695 | 0.6300 | * |
| Probability of leaving an inheritance above 50,000 euro | 0.0029 | 0.0069 | | 0.0068 | 0.0050 | | 0.0062 | 0.0060 | | 0.0080 | 0.0086 | |
| Self-reported health good | -0.2076 | 0.6025 | | -0.5883 | 0.4243 | | 0.3240 | 0.5082 | | 0.7948 | 0.7333 | |
| Good numeracy | 0.0777 | 0.5338 | | 0.0448 | 0.3508 | | 0.0010 | 0.4307 | | 0.9920 | 0.6325 | |
| Childhood socioeconomic status | 0.8728 | 0.6717 | | 1.0932 | 0.4571 | ** | 0.4748 | 0.4005 | | -0.5327 | 0.8247 | |
| Was better than average at math in school when ten years old | 0.2637 | 0.5331 | | 0.2836 | 0.3524 | | 0.0533 | 0.4227 | | -1.1009 | 0.6409 | * |
| Was better than average in language in school when ten years old | 0.2964 | 0.5278 | | 0.1771 | 0.3596 | | 0.1222 | 0.4191 | | 0.3957 | 0.6400 | |
| War baby | 0.1819 | 0.5356 | | -0.1206 | 0.3743 | | -0.4320 | 0.4462 | | 0.1344 | 0.7086 | |
| Depression baby | 0.2014 | 0.9576 | | -0.6412 | 0.7832 | | 0.0673 | 0.9110 | | 0.3647 | 2.3447 | |
| Gross household income ('000s euros) | 0.3466 | 0.3752 | | 0.0547 | 0.2752 | | -0.0494 | 0.3173 | | -0.8192 | 0.4096 | ** |
| Gross financial assets ('000s euros) | 0.5052 | 0.2428 | ** | 0.6605 | 0.1535 | *** | 0.5006 | 0.2058 | ** | 0.2889 | 0.2904 | |
| Real assets ('000s euros) | 0.1895 | 0.1447 | | -0.0149 | 0.1020 | | -0.0573 | 0.1283 | | 0.3331 | 0.2387 | |
| Country dummy: Austria | -8.0619 | 2.8351 | *** | 1.4879 | 2.5217 | | -3.2672 | 2.1539 | | 6.3840 | 3.8282 | * |
| Country dummy: Germany | -5.1166 | 2.5694 | ** | 0.0127 | 2.1370 | | 0.6236 | 2.0150 | | 1.6715 | 3.0335 | |
| Country dummy: Sweden | -9.2815 | 2.5236 | *** | -2.7997 | 2.0253 | | -2.5721 | 1.9163 | | 0.9296 | 2.2106 | |
| Country dummy: Netherlands | -5.1791 | 2.7561 | * | -1.3287 | 2.0732 | | -0.5427 | 2.0471 | | 6.5885 | 3.0100 | ** |
| Country dummy: Italy | -2.6046 | 2.5295 | | 3.3721 | 2.2559 | | 3.4641 | 2.1696 | | 9.4526 | 4.0937 | ** |
| Country dummy: France | -4.4459 | 2.8783 | | -0.2273 | 2.1112 | | 3.1574 | 2.0407 | | 4.0923 | 2.1877 | * |
| Country dummy: Denmark | -7.4739 | 2.5153 | *** | -3.2203 | 2.0164 | | -3.0406 | 1.9281 | | 0.5745 | 2.2137 | |
| Country dummy: Switzerland | -5.2404 | 2.5975 | ** | -0.7406 | 2.0850 | | -0.2059 | 2.0246 | | 1.9681 | 2.4510 | |
| Country dummy: Belgium | -2.0195 | 2.5756 | | 3.3206 | 2.0685 | | 3.3826 | 1.9866 | * | 5.9981 | 2.1970 | *** |
| Country dummy: Czech Republic | -1.6000 | 3.1086 | | 3.4350 | 2.4361 | | 1.5317 | 2.2794 | | -0.5316 | 2.3056 | |
| Country dummy: Poland | -8.3910 | 3.9497 | ** | -1.8824 | 2.9642 | | -4.1033 | 2.3640 | * | 0.0000 | (omitted) | |
| Constant (Spain) | 13.9177 | 4.0724 | *** | 6.5716 | 3.1491 | ** | 9.9683 | 3.2679 | *** | 9.8254 | 5.0468 | * |
| | | | | | | | | | | | | |
| $R^2$ | 0.1478 | | | 0.1611 | | | 0.1619 | | | 0.1412 | | |
| Observations | 938 | | | 1,642 | | | 1,201 | | | 661 | | |

**Notes:** Standard errors log amount of bonds, stocks and mutual funds are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table A9**
Estimation results on the amounts of financial assets held conditional on ownership using a two-part model and a sub-sample including last-born individuals only.

| | Log bonds | | | Log stocks | | | Log mutual funds | | | Log IRA's | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Error | | Coef. | Std. Error | | Coef. | Std. Error | | Coef. | Std. Error | |
| Number of siblings | 0.2474 | 0.2454 | | 0.1387 | 0.1547 | | -0.1491 | 0.1975 | | -0.2464 | 0.2747 | |
| Age | 0.0583 | 0.0751 | | 0.0579 | 0.0474 | | 0.0273 | 0.0614 | | -0.0425 | 0.1145 | |
| Gender | -1.3296 | 0.8370 | | -1.5677 | 0.5890 | *** | -0.8538 | 0.7359 | | -3.0095 | 1.1922 | ** |
| Couple | -0.3532 | 1.0340 | | -1.6270 | 0.7533 | ** | 1.0964 | 0.8716 | | 0.1988 | 2.6490 | |
| Having children | -0.2424 | 1.3735 | | -0.5033 | 0.9763 | | -1.2394 | 1.2181 | | -3.3147 | 2.7315 | |
| Not working | -0.2759 | 1.2350 | | -1.1776 | 0.8104 | | -0.9235 | 1.0035 | | -0.6815 | 1.5322 | |
| Post-secondary education | 0.5298 | 1.0414 | | -0.2767 | 0.6268 | | -0.6412 | 0.7387 | | -0.6607 | 1.1707 | |
| Probability of leaving an inheritance above 50,000 euro | 0.0023 | 0.0117 | | 0.0169 | 0.0087 | * | 0.0150 | 0.0113 | | 0.0059 | 0.0173 | |
| Self-reported health good | -2.0090 | 1.0399 | * | -0.3627 | 0.7342 | | -0.3629 | 0.9334 | | 1.8117 | 1.3736 | |
| Good numeracy | 0.4469 | 0.9679 | | -0.6170 | 0.5998 | | -0.4975 | 0.7726 | | 2.1568 | 1.2652 | * |
| Childhood socioeconomic status | 1.7649 | 1.4322 | | 1.0696 | 0.8703 | | -0.1063 | 1.2217 | | -2.0121 | 1.7563 | |
| Was better than average at math in school when ten years old | 0.5973 | 0.9669 | | 0.8475 | 0.6197 | | 0.4438 | 0.8035 | | -0.7269 | 1.2083 | |
| Was better than average in language in school when ten years old | 0.0890 | 0.9337 | | -0.5968 | 0.6320 | | 0.0739 | 0.7874 | | 0.9787 | 1.1822 | |
| War baby | 1.4582 | 1.0420 | | 0.2830 | 0.6449 | | 0.4246 | 0.8046 | | 1.2814 | 1.4263 | |
| Depression baby | 1.3029 | 1.5436 | | -0.3935 | 1.2218 | | 1.8530 | 1.6355 | | 2.3110 | 5.0057 | |
| Gross household income ('000s euros) | 0.3772 | 0.6082 | | 0.3874 | 0.4573 | | -0.2259 | 0.6218 | | -1.0443 | 0.8150 | |
| Gross financial assets ('000s euros) | 0.4524 | 0.4140 | | 0.5929 | 0.2596 | ** | 0.4463 | 0.3920 | | 0.9858 | 0.5943 | * |
| Real assets ('000s euros) | -0.2540 | 0.3027 | | -0.0585 | 0.1767 | | -0.1256 | 0.2313 | | 0.2226 | 0.4811 | |
| Country dummy: Austria | -7.9501 | 4.4065 | * | 1.3902 | 4.5901 | | -4.7216 | 3.9109 | | 11.3649 | 7.7236 | |
| Country dummy: Germany | -7.0347 | 3.2387 | ** | -1.6885 | 3.5144 | | -0.7470 | 3.8705 | | 8.2057 | 6.9292 | |
| Country dummy: Sweden | -12.0354 | 3.1095 | *** | -4.6957 | 3.2097 | | -2.7372 | 3.7231 | | 7.5875 | 5.5577 | |
| Country dummy: Netherlands | -8.8289 | 3.3838 | *** | -3.4808 | 3.2397 | | -1.2713 | 3.8102 | | 8.1995 | 7.1971 | |
| Country dummy: Italy | -4.5999 | 3.1817 | | -0.0286 | 3.6015 | | 2.7828 | 4.4137 | | 0.0000 | (omitted) | |
| Country dummy: France | -7.1184 | 3.7392 | * | -1.0691 | 3.3643 | | 4.4527 | 3.9654 | | 8.2830 | 5.4541 | |
| Country dummy: Denmark | -10.3383 | 3.0804 | *** | -5.1068 | 3.1665 | | -3.2030 | 3.7252 | | 4.6862 | 5.5722 | |
| Country dummy: Switzerland | -7.7264 | 3.2676 | ** | -3.4827 | 3.2695 | | -0.3903 | 3.8343 | | 7.6956 | 6.0091 | |
| Country dummy: Belgium | -3.6695 | 3.2710 | | 1.4560 | 3.2578 | | 3.7448 | 3.7780 | | 12.2371 | 5.4993 | ** |
| Country dummy: Czech Republic | -5.1455 | 5.1781 | | -3.5420 | 6.1568 | | 7.2713 | 3.8688 | | 4.6258 | 5.6130 | |
| Country dummy: Poland | -12.6049 | 3.3606 | *** | -6.8237 | 3.3542 | ** | 0.0000 | (omitted) | | 0.0000 | (omitted) | |
| Constant (Spain) | 14.8094 | 6.7135 | ** | 8.6612 | 5.3450 | | 13.1567 | 6.0001 | * | 13.4689 | 10.2979 | |
| | | | | | | | | | | | | |
| $R^2$ | 0.1907 | | | 0.1701 | | | 0.1858 | | | 0.2000 | | |
| Observations | 315 | | | 560 | | | 389 | | | 204 | | |

**Notes:** Standard errors log amount of bonds, stocks and mutual funds are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table A10**

Marginal effects of censored tobit regression on the log amount of bonds, stocks, mutual funds and individual retirement accounts unconditional on ownership.

| | Log bonds | | | Log stocks | | | Log mutual funds | | | Log IRA's | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | |
| Later-born child | 0.4519 | 0.9542 | | 0.8206 | 0.6247 | | -0.1023 | 0.8018 | | -2.9158 | 1.1345 | ** |
| Number of siblings | -0.4799 | 0.2615 | * | 0.0181 | 0.1661 | | -0.5734 | 0.2298 | ** | 0.0951 | 0.3197 | |
| Age | 0.2504 | 0.0695 | *** | 0.0739 | 0.0456 | | -0.1926 | 0.0602 | *** | -0.7384 | 0.1039 | *** |
| Gender | -2.4251 | 0.9656 | ** | 0.2659 | 0.6228 | | 0.4556 | 0.8059 | | 2.2968 | 1.1544 | ** |
| Couple | -0.3252 | 1.1603 | | 0.9676 | 0.7340 | | -1.0679 | 0.9604 | | 22.4529 | 2.0093 | *** |
| Having children | -0.0392 | 1.4932 | | -1.3009 | 0.9971 | | -1.5126 | 1.2827 | | 3.5773 | 2.3360 | |
| Not working | 2.7235 | 1.2387 | ** | -0.2388 | 0.7929 | | 1.9515 | 1.0366 | * | -3.6031 | 1.4427 | ** |
| Post-secondary education | 1.3757 | 1.0571 | | 0.5557 | 0.6742 | | 1.4858 | 0.8675 | * | -0.9075 | 1.2437 | |
| Probability of leaving an inheritance above 50,000 euro | -0.0061 | 0.0125 | | 0.0388 | 0.0084 | *** | 0.0307 | 0.0111 | *** | -0.0113 | 0.0160 | |
| Self-reported health good | 2.7860 | 1.1039 | ** | 1.0125 | 0.7050 | | 3.1186 | 0.9397 | *** | 0.1812 | 1.3687 | |
| Good numeracy | 0.2507 | 1.0952 | | 1.6464 | 0.6692 | ** | -0.3523 | 0.9062 | | 0.6476 | 1.2543 | |
| Childhood socioeconomic status | -0.7000 | 1.1372 | | 1.3044 | 0.7116 | * | -0.1089 | 1.1244 | | -2.3324 | 1.5804 | |
| Was better than average at math in school when ten years old | 1.3779 | 1.0055 | | 1.4325 | 0.6508 | ** | 1.7570 | 0.8517 | ** | 0.4775 | 1.2325 | |
| Was better than average in language in school when ten years old | 1.6063 | 0.9932 | | -0.7891 | 0.6552 | | 1.5955 | 0.8403 | * | 0.4968 | 1.2243 | |
| War baby | 0.2246 | 1.0134 | | 0.2677 | 0.6712 | | 1.5052 | 0.8638 | * | -3.1262 | 1.3206 | ** |
| Depression baby | 1.6256 | 1.7925 | | -1.9431 | 1.2792 | | 0.6360 | 1.7425 | | 1.4674 | 3.4717 | |
| Gross household income ('000s euros) | 1.3533 | 0.6193 | ** | 1.8483 | 0.4498 | *** | 1.1627 | 0.5471 | ** | 2.0538 | 0.7874 | *** |
| Gross financial assets ('000s euros) | 8.9457 | 0.3608 | *** | 5.7765 | 0.2263 | *** | 7.6378 | 0.2964 | *** | 7.4883 | 0.5148 | *** |
| Real assets ('000s euros) | 0.6420 | 0.2671 | ** | 0.3727 | 0.1816 | ** | -0.3486 | 0.2318 | | 0.7982 | 0.3994 | ** |
| Country dummy: Austria | 7.3726 | 4.3677 | * | 6.7696 | 2.8184 | ** | 2.2409 | 3.5797 | | -0.6772 | 5.6826 | |
| Country dummy: Germany | 14.8937 | 3.7153 | *** | 6.9104 | 2.3569 | *** | 12.7055 | 2.9148 | *** | -11.2735 | 4.5656 | ** |
| Country dummy: Sweden | 5.9449 | 3.7407 | | 18.1437 | 2.1970 | *** | 17.8816 | 2.8080 | *** | 11.7728 | 3.7000 | *** |
| Country dummy: Netherlands | -2.6010 | 3.9765 | | 7.6193 | 2.2819 | *** | 6.0546 | 2.9465 | ** | -15.2536 | 4.4653 | *** |
| Country dummy: Italy | 25.1163 | 3.5302 | *** | 2.7795 | 2.4210 | | 4.4382 | 3.0085 | | -18.6374 | 5.4833 | *** |
| Country dummy: France | -11.0177 | 4.1498 | *** | 5.7646 | 2.3193 | ** | 8.3611 | 2.9267 | *** | 18.0499 | 3.6449 | *** |
| Country dummy: Denmark | 9.7352 | 3.6735 | *** | 16.5780 | 2.1963 | *** | 1.7515 | 2.8887 | | 8.7716 | 3.6824 | ** |
| Country dummy: Switzerland | 7.2351 | 3.8172 | * | 6.7505 | 2.3808 | *** | 4.2027 | 3.0217 | | -6.4512 | 4.1044 | |
| Country dummy: Belgium | 6.0676 | 3.6901 | | 9.6159 | 2.2699 | *** | 8.7734 | 2.8516 | *** | 9.3888 | 3.6606 | ** |
| Country dummy: Czech Republic | 9.0105 | 4.4452 | ** | 9.9951 | 2.6670 | *** | 10.0155 | 3.2422 | *** | 35.8699 | 3.9564 | *** |
| Country dummy: Poland | 1.4516 | 5.0551 | | 2.1209 | 3.0477 | | -7.8206 | 4.8929 | | -107.6671 | 0.0000 | *** |
| | | | | | | | | | | | | |
| Pseudo $R^2$ | 0.1302 | | | 0.1315 | | | 0.1240 | | | 0.1868 | | |
| Log-likelihood | -5,688 | | | -8,898 | | | -7,007 | | | -3,953 | | |
| Observations | 9,997 | | | 9,997 | | | 9,997 | | | 9,997 | | |

**Notes:** Standard errors log amounts of bonds, stocks and mutual funds are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.

**Table A11**
Marginal effects of censored tobit regression on the log amount of bonds, stocks, mutual funds and individual retirement accounts unconditional on ownership and using a sub-sample including last-born individuals only.

| | Log bonds | | | Log stocks | | | Log mutual funds | | | Log IRA's | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | | M.E. | Std. Error | |
| Number of siblings | -0.4551 | 0.4073 | | 0.1937 | 0.2427 | | -0.2096 | 0.3384 | | -0.7077 | 0.5244 | |
| Age | 0.2603 | 0.1148 | ** | 0.0181 | 0.0745 | | -0.2412 | 0.1057 | ** | -0.7784 | 0.1842 | *** |
| Gender | -1.9483 | 1.6176 | | 1.1014 | 1.0213 | | 1.1943 | 1.3928 | | 1.0058 | 2.1023 | |
| Couple | 1.4036 | 1.9396 | | 0.7612 | 1.2499 | | -0.8092 | 1.6709 | | 21.0417 | 3.5737 | *** |
| Having children | 0.6719 | 2.5878 | | -2.8031 | 1.7007 | * | 0.1593 | 2.2871 | | 5.7603 | 4.6090 | |
| Not working | 2.1202 | 2.0926 | | 1.1318 | 1.3330 | | -0.7426 | 1.8421 | | -3.8963 | 2.6550 | |
| Post-secondary education | 0.3330 | 1.8279 | | -0.0839 | 1.1420 | | 3.6755 | 1.5350 | ** | 0.4981 | 2.2442 | |
| Probability of leaving an inheritance above 50,000 euro | -0.0279 | 0.0205 | | 0.0491 | 0.0139 | *** | 0.0345 | 0.0200 | * | 0.0480 | 0.0298 | |
| Self-reported health good | 1.8927 | 1.8300 | | 2.3389 | 1.1839 | ** | 2.9994 | 1.6011 | * | -1.1301 | 2.4550 | |
| Good numeracy | 0.5201 | 1.9462 | | 2.6518 | 1.1124 | ** | 1.3369 | 1.5807 | | -0.3499 | 2.3214 | |
| Childhood socioeconomic status | -1.4985 | 2.3711 | | 0.7022 | 1.5095 | | -1.7433 | 2.0713 | | -7.4867 | 3.3811 | ** |
| Was better than average at math in school when ten years old | 3.3444 | 1.6842 | ** | 1.4210 | 1.1051 | | -0.2629 | 1.5032 | | 1.9147 | 2.2745 | |
| Was better than average in language in school when ten years old | 1.1815 | 1.6862 | | -1.1845 | 1.0892 | | 3.1781 | 1.4720 | ** | -0.1534 | 2.2534 | |
| War baby | 0.3542 | 1.7594 | | -0.7011 | 1.1074 | | 2.3332 | 1.5067 | | -2.6098 | 2.4232 | |
| Depression baby | 5.2070 | 2.6412 | ** | -3.4526 | 2.0834 | * | 0.7693 | 2.9689 | | -4.6368 | 6.7157 | |
| Gross household income ('000s euros) | 0.8004 | 1.1153 | | 2.1314 | 0.7478 | *** | 1.2293 | 0.9658 | | 2.3841 | 1.4451 | * |
| Gross financial assets ('000s euros) | 8.0927 | 0.5917 | *** | 5.4395 | 0.3607 | *** | 7.4807 | 0.5408 | *** | 7.8555 | 0.9583 | *** |
| Real assets ('000s euros) | 1.2328 | 0.4598 | *** | 0.2851 | 0.3098 | | -0.9232 | 0.4204 | ** | -0.0510 | 0.7128 | |
| Country dummy: Austria | 9.4423 | 7.4047 | | 4.7210 | 4.9369 | | 0.9159 | 6.7164 | | 13.3242 | 10.3202 | |
| Country dummy: Germany | 16.7997 | 6.1574 | *** | 4.5682 | 4.1413 | | 15.3674 | 5.2160 | *** | -5.3042 | 9.3921 | |
| Country dummy: Sweden | 9.0904 | 6.1654 | | 16.5833 | 3.7721 | *** | 23.2336 | 5.0407 | *** | 19.9311 | 8.0011 | ** |
| Country dummy: Netherlands | -0.0848 | 6.3092 | | 7.7062 | 3.7820 | ** | 7.8241 | 5.1295 | | -12.5371 | 9.1103 | |
| Country dummy: Italy | 25.9657 | 5.5829 | *** | 1.5306 | 3.9625 | | 3.3724 | 5.3716 | | -120.2120 | . | |
| Country dummy: France | -8.4314 | 6.8386 | | 6.1579 | 3.9381 | | 10.9400 | 5.2682 | ** | 26.6444 | 7.8428 | *** |
| Country dummy: Denmark | 14.0358 | 5.9398 | ** | 16.7088 | 3.7241 | *** | 3.2549 | 5.1872 | | 16.1540 | 7.9224 | ** |
| Country dummy: Switzerland | 8.9522 | 6.2700 | | 6.7775 | 4.0073 | * | 6.1075 | 5.3246 | | -1.4889 | 8.5443 | |
| Country dummy: Belgium | 8.6269 | 5.9523 | | 9.9618 | 3.8094 | *** | 11.3531 | 5.0518 | ** | 16.7198 | 7.8097 | ** |
| Country dummy: Czech Republic | 6.3972 | 8.9895 | | 0.0692 | 5.4416 | | 3.2366 | 7.1698 | | 41.8797 | 8.5305 | *** |
| Country dummy: Poland | 0.4285 | 7.9274 | | 3.0857 | 4.7305 | | -95.0970 | . | | -103.7870 | . | |
| | | | | | | | | | | | | |
| Pseudo $R^2$ | 0.1323 | | | 0.1414 | | | 0.1399 | | | 0.2083 | | |
| Log-likelihood | -1,931 | | | -3,042 | | | -2,284 | | | -1,225 | | |
| Observations | 3,793 | | | 3,793 | | | 3,793 | | | 3,793 | | |

**Notes:** Standard errors log amounts of bonds, stocks and mutual funds are clustered at the household level. Variable descriptions can be found in *Table A1*. ***, **, * denote significance at 1%, 5% and 10%, respectively.