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Culture’s invisible hand:

Exploring the relationship between national culture and household financial risk-taking.

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“The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.”

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Abstract

This research attempts to study why households differ in their level of financial risk taking and proposes a new answer to the equity premium puzzle. In doing so, this study identifies a link between national culture to household financial risk-taking separately from cross-country differences in institutions. Using ordinary least squares and probit regressions on data from the Household Financial Consumption Survey ranging from 2010-2017, comprising over 120 000 households from 15 EU countries, results show a significant effect of national culture on household financial risk-taking. Similar to existing research, individualism and masculinity are positively related to household financial risk-taking. Conversely, the positive effect of uncertainty avoidance and the negative effects of the indices for long-term orientation and indulgence are opposite to what existing literature finds. These contrasting effects can respectively be explained by ambiguity aversion, myopic loss aversion and a budget effect. However, additional research is needed to study the intricacies of the relationships between these effects and national culture. Additionally, results demonstrate the importance of controlling for institutional differences in future cross-cultural studies. Overall, this research shows that national culture can be an important determinant of the psychological costs related to taking financial risk. Subsequently, a potential answer to the equity premium puzzle could be that differences in national culture cause variation in equity market participation. Policymakers can exploit this relationship and improve financial risk-taking by taking national culture into consideration when designing solutions to promote financial risk-taking.

Introduction

Households differ substantially in their financial portfolios and subsequent financial risk-taking (Guiso et al., 2003). This is puzzling because standard economic portfolio theory predicts that all households should own at least some risky assets (Campbell, 2006). Despite the significant premium associated with investing in equity compared to safer assets, most households choose not to take financial risk. Equity market participation rates in countries like Germany, France and Italy are even smaller than 20%. Considering equity premium, non-participation in equity markets is often perceived as an investment mistake (Guiso et al., 2008). Recently, literature has started to explain which factors influence the observed heterogeneity in household portfolios and empirically examine the determinants of these portfolios (Cardak & Wilkins, 2009).

Several reasons have been suggested to explain why households choose not to engage in risky financial investments. Literature generally accepts that households experience some fixed entry or participation cost associated with equity market involvement. This cost exists separate from costs related to risk aversion (Haliassos & Bertaut, 1995). One way to interpret these costs is as psychological factors that make financial risk-taking uncomfortable for some households. The composition of these costs is ill understood and is a subject of ongoing research (Campbell, 2006).

Recent literature suggests that psychological differences result in heterogeneity of beliefs amongst investors. This heterogeneity of beliefs can explain why most investors choose not to invest in risky assets, separate from risk aversion (Campbell, 2006; Kahneman & Riepe, 1998; Shi & He, 2010; Shum & Faig, 2006). These psychological differences give rise to various biases such as overconfidence and optimism, both linked to investor appetite for risky assets (Giordani & Söderlind, 2006; Guiso et al., 2008; Hong et al., 2004; Puri & Robinson, 2007). The question arises as to which factors influence the psychological characteristics that lead to heterogeneity in financial risk-taking. It is often suggested that culture could significantly impact economic outcomes across countries, including financial risk-taking (Tabellini, 2010). In fact, empirical research from Breuer et al. (2014) shows that overconfidence and optimism differ for individuals across countries.

Economic literature has given little regard to the impact of culture on economic outcomes and often treated the subject as a black box (Williamson, 2000). However, recent studies have started to dive into this black box. Empirical research concludes that national culture has a

significant effect on corporate-level financial risk-taking (Ashraf et al., 2016; Díez-Esteban et al., 2019; Gaganis et al., 2019; Kreiser et al., 2010; Li et al., 2013; Mihet, 2013). Here, national culture has an effect on firm level risk-taking through its effect on managerial risk-taking (Ashraf et al., 2016; Gaganis et al., 2019; Li et al., 2013).

Whilst a large body of research has researched culture and its relation to corporate-level financial risk-taking, the impact of culture on household financial risk-taking has received little attention (Breuer & Salzmann, 2009; Gaganis et al., 2019; Mihet, 2013). Several studies have investigated cross-country differences in household financial decisions. However, these studies rarely focus on what drives differences in cross-country financial risk-taking (Breuer & Salzmann, 2009). In research from Breuer & Quinten (2009), national culture is shown to significantly impact the structure of household financial portfolios. The only study that links culture to household financial risk-taking is that of Breuer et al. (2014). Here, it is shown that culture has a significant and large impact on financial risk-taking. However, the study is unable to control for institutional differences nor does it study a representative sample.

The novel approach of this research is that this paper will study if culture affects financial risk-taking separate from differences in cross-country institutional, economic, and demographic factors. These differences will be from here on referred to as institutional differences. Culture shapes economic outcomes separately from formal institutions (Williamson, 2000). In fact, cross-country differences in institutional factors have a strong effect on risk-taking (Kreiser et al., 2010). A common mistake in cross-cultural empirical literature is that differences between countries are attributed to culture without controlling for institutional factors Sivakumar & Nakata (2001). While culture impacts household financial risk-taking, existing literature often does not control for cross-country differences in institutions. However, accounting for institutional differences is crucial to obtain unbiased estimates of the effect of culture. This research adds to existing literature by controlling for institutional differences and testing if culture influences financial risk-taking separately from institutional factors.

Moreover, this research will analyse a large and representative sample of real-world data on household financial decision-making. Prior research often relies from unrepresentative samples that are relatively small and oftentimes only comprise 2 countries. To find more accurate and generalizable results, this research studies a large sample encompassing over 120 000 households from 15 countries. When studying household financial risk-taking, empirical research often relies on elicited financial risk-taking instead of real-world financial risk-taking.

However, elicited financial risk-taking can differ from actual financial risk-taking (Shum & Faig, 2006). Research on household financial risk-taking is notoriously difficult because household behaviour is difficult to measure (Campbell, 2006). However, a causal link between national culture and economic outcomes can only be identified if the sample consists of real-world data (Breuer et al., 2014). Using the sample discussed above, the study further contributes to literature by researching real-world risk attitudes and portfolio structures in a non-experimental setting.

Additionally, this study seeks to contribute to literature by researching what drives the level of risk taken by households as measured by the share of risky assets in household portfolios. It is common for empirical literature that, once a sample is restricted to individuals who participate in the equity market, no household characteristics have a significant impact on the risky asset share of household portfolios (Malmendier & Nagel, 2011). This research attempts to find what factors drive financial risk-taking by households, learning more about the role of culture and suggesting areas for future research.

Understanding how national culture influences household investment behaviour can aid in explaining the reluctance of individuals to engage in risky financial investments. Additionally, this could provide offer new insights into the equity premium puzzle. A puzzle left unanswered for well over two decades. Furthermore, this research can help policymakers to better understand household financial decision-making and enable them to design more effective solutions to address household investment mistakes. Modern societies are ageing and can no longer afford their extensive welfare states and plans. Therefore, households need to accumulate assets independently to finance retirement (Bilias et al., 2011). Financial economists must advance their understanding of what drives equity market participation. to reduce equity market nonparticipation (Campbell, 2006). Policymakers can only address these investment mistakes if they understand which factors drive investment decisions (Barasinska et al., 2011). Ultimately, a better understanding of what drives financial risk-taking can enable society to forego investment mistakes and increase the overall level of financial wealth for all citizens. Therefore, this research will attempt to answer the following question:

What is the effect of national culture on financial risk-taking by households?

To answer this question, this research opts to define national culture in accordance with research from Hofstede (2011). Today, Hofstede's culture model is the most popular model to describe cultural conditions (Breuer & Quinten, 2009). Using these dimensions, this research empirically estimates three models that study elicited financial risk-taking, equity market participation and the ratio of risky assets in portfolios. Based on existing literature, it is expected that national culture has a significant effect on all three measures of financial risk-taking.

Results reveal a strong and significant link between household financial risk-taking and national culture, both with and without controlling for institutional differences. Specifically, higher levels of power distance, individualism, and masculinity, have a positive effect on financial risk-taking similar to what existing research finds for corporate-level risk-taking. Contrary to existing literature, higher levels of uncertainty avoidance and long-term orientation are associated with larger levels of financial risk-taking. A potential explanation for this is that results from existing research are biased because they do not control for institutional differences. Alternatively, the positive effect of uncertainty avoidance can be explained by the fact that uncertainty avoidance mitigates the effect of ambiguity aversion. The positive effect of long-term orientation can be explained by the fact that longer-term-oriented cultures face lower psychological costs related myopic loss aversion when engaging in financial risk taking. Finally, results demonstrate that indulgence has a negative effect on household financial risk-taking. A potential explanation is that indulgent cultures place a higher value on hedonic goods and subsequently have less money available for investing.

One of the main determinants of financial risk taking are the psychological costs investors face when taking financial risk (Campbell, 2006). Results from this research suggests that national culture directly influences these costs. In turn, presenting a potential answer to the equity premium puzzle. Policymakers should use this insight to design more effective solutions that promote financial risk-taking. Overall, this will boost total social welfare and equip society for the challenges ahead.

This paper is structured as follows: The second section of this paper reviews existing literature and forms hypotheses. The third section describes the data and methods used to test these hypotheses. The fourth section reports the results from the previously described tests. The fifth and sixth sections will conclude the research and discuss findings.

Literature review

Equity market participation puzzle

According to conventional economic theory all households should engage in at least some financial risk-taking (Cardak & Wilkins, 2009). This is based on the fact that risky assets offer a much larger return on equity than can be explained based on the difference in risk compared to relatively safer assets (Mehra & Prescott, 1985). This introduces a puzzling phenomenon otherwise known as the equity premium puzzle (Campbell & Cochrane, 1999). Here, the excess return of equity over risk-free assets is far greater than what can be explained by economic theory. Empirical evidence contradicts standard economic theory and shows that households differ substantially in the amount of financial risk they take (Campbell, 2006). In fact, most European households take little to no financial risk. For example, just 15-25% of households in the Netherlands, Italy, France, and Germany participate in the equity market (Guiso et al., 2003). Household risk tolerance heterogeneity can explain this difference in financial risk-taking. Literature shows that the probability of taking financial risk is increasing in the degree of risk tolerance (Barsky et al., 1997; Donkers & Van Soest, 1999; Puri & Robinson, 2007; Shum & Faig, 2006). However, the existence of a premium on equity suggests that all households should invest in risky assets (Campbell, 2006; Hurd et al., 2012; Mehra & Prescott, 1985). Consequently, non-participation in equity markets is regarded as an investment mistake (Guiso et al., 2008).

Entry or participation costs in equity markets

The question arises as to why individuals engage in an investment mistake of this type. Literature suggests that this limited participation can be explained by actual or perceived cost that discourages participation in the equity market (Haliassos & Bertaut, 1995). The exact nature of these costs is ill-understood and a matter of ongoing research (Campbell, 2006). One way to interpret these costs is as transaction costs (Haliassos & Bertaut, 1995). Another perspective is that these costs come in the form of psychological factors that make owning equity uncomfortable (Campbell, 2006). In fact, investor portfolio diversity can be attributed to psychological differences between investors (Shum & Faig, 2006). Because equity markets are highly complex, investors rely heavily on intuition shaped by psychological factors to make decisions (Kahneman & Riepe, 1998). Given that investors often rely on intuition, it can be that systematic errors in judgment or so-called biases influence investor decisions (Campbell, 2006). In other words, psychological differences may lead to heterogeneity of

beliefs among investors and introduce investment mistakes (Shi & He, 2010). The most well-known biases that influence investment decisions are overconfidence and optimism. The interplay of these two biases may lead individuals to over- or underestimate their knowledge and the risk of an asset (Giordani & Söderlind, 2006). Recent empirical literature supports the existence of individual-level psychological factors, or biases, that influence investment decisions. Research from Puri & Robinson (2007) concludes that optimistic people are more likely to participate in the equity market. Additionally, the level of trust an individual has towards others is a significant indicator of equity market participation (Guiso et al., 2008; Hong et al., 2004). Furthermore, sociability significantly predicts equity market participation (Georgarakos & Pasini, 2011). Additionally, individuals with a high need for achievement generally exhibit greater levels of risk-taking (Roberts, 1974).

The impact of national culture on risk-taking

Literature suggests that above discussed biases can be the product of the cultural environment where individuals grow up (Ashraf et al., 2016). In other words, national culture influences risk-taking by conditioning the how individuals make decisions. Additionally, cultural values are believed to cause considerable differences in risk aversion (Abdelrahim, 2021). For example, individuals from Asian countries are in general more overconfident than their American counterparts (Yates et al., 1996). Additionally, culture has an effect on probabilistic thinking and the subsequent notion regarding uncertainty and risk-taking (Phillips & Wright, 1977). Subsequent research from Wright & Phillips (1980) indicates how the impact of culture outweighs differences in institutional factors, illustrating the importance of culture in risk taking. Furthermore, cross-cultural differences in overconfidence are the results of culture-specific cognitive customs rather than discrimination (Yates et al., 1998).

Throughout the last decade, research has started to focus on the effect of national culture on financial decision-making, largely focusing on managerial and corporate outcomes (Kirkman et al., 2006). Literature agrees that national culture has a strong effect on corporate-level risk-taking (Kreiser et al., 2010). Furthermore, national culture has been found to have a large impact on the level of risk-taking by firms (Ashraf et al., 2016; Ashraf & Arshad, 2017; Kanagaretnam et al., 2011, 2014; Kreiser et al., 2010; Li et al., 2013; Mihet, 2013; Mourouzidou-Damtsa et al., 2019). One aspect on which culture has been found to affect corporate risk-taking is firm investment decisions (Shao et al., 2013). The effect of culture on risk-taking can be viewed as separate from legal constraints, insurance safety nets, or economic

development (Mihet, 2013). In research from Díez-Esteban et al. (2019) it is further identified that the effect of culture on corporate risk-taking is separate from the effect of religion on corporate risk-taking. In other words, literature shows how national culture impacts corporate risk-taking separately from differences in institutional differences. This effect exists for large as well as small/medium enterprises (Kreiser et al., 2010).

Existing research suggests that culture influences corporate risk-taking through its effect on managerial risk-taking (Ashraf et al., 2016; Gaganis et al., 2019; Li et al., 2013). If culture influences how managers make decisions, it is likely that culture impacts the way individuals and households make decisions in a similar fashion. Most research that studied the impact of culture on risk-taking has focussed on either corporate or managerial outcomes. However, there have been a handful of studies that researched the effect of national culture on individual level risk-taking. However, these studies have mostly focussed on limited samples and experimental settings. National culture has been shown to significantly impact buying behaviour as well as financial risk taking of consumers (Mandel, 2003). A clear limitation of the study is that it is unable to provide conclusive evidence on real-world behaviour, does not control for institutional differences and only examines two countries. Similarly, research from Hsee & Weber (1999) shows how individuals from China take significantly more risk when making investments compared to their American counterparts. This result is attributed to how collective each society is, e.g., how likely is it that society will provide financial help if an investment fails. Results from this research face a clear limitation in that it only examines respondents from two countries in an experimental setting. Therefore, it is difficult to generalize findings for other countries or real-world behaviour. Furthermore, national culture directly affects consumer financial decision-making through several dimensions of culture (Petersen et al., 2015). The study suggests that individuals often rely on long-term priorities when making financial decisions. In turn, these long-term priorities are formed by long-lasting personal experiences. National culture is considered one of these long-lasting personal experiences and distinguishes one group of people from another (Hofstede, 2001).

Beyond financial decision-making, literature shows that national culture can have a significant effect on the structure of household financial portfolios (Breuer & Salzmann, 2009). Research from Gaganis et al. (2020) demonstrates how culture impacts the amount of debt per household. Research from Breuer et al. (2014) further concludes that psychological factors rooted in national culture significantly impact household financial risk-taking separate from risk aversion. The study has clear limitations in that it only uses data from a small number of

economics students from Singapore and Germany which might not be representative of actual households. This limits the credibility of results and makes it difficult to generalize findings to other countries or real-world behaviour. Additionally, the research does not adequately control for differences in institutional factors that might affect household financial consumption.

National culture and institutional differences

To study the effect of culture on investment behaviour it is important to comprehend the concept of culture. For this research, national culture will be used as means to measure information about the psychology of investors. Studying the effect of cultural values and their subsequent effect on beliefs offers a way to identify a causal link of culture to economic behaviour (Guiso et al., 2008). Research from Hofstede (2011) defines national culture as the unique combination of six dimensions. The dimensions he identifies in his work are as follows: Power distance index, Individualism versus collectivism, masculinity versus femininity, uncertainty avoidance index, long-term orientation versus short-term orientation and indulgence versus restraint. Today, Hofstede's culture model is one of the most popular models to describe culture in economic literature (Breuer & Quinten, 2009). Hofstede's cultural dimensions are often used particularly often in literature because of its clarity and parsimony (Kirkman et al., 2006). In some cases, culture can actually better predict outcomes than individual differences such as personality traits (Taras et al., 2010). It is especially interesting to study the effect of culture on economic outcomes because culture has a large effect on human decision making separate from institutional factors (Williamson, 2000). To estimate this effect, it is crucial to control for institutional factors. However, cross-cultural studies often attribute a difference between two countries to differences in cultural values, without controlling for institutional factors (Sivakumar & Nakata, 2001). Without mediation tests, differences between countries cannot be attributed to differences in cultural values (Kirkman et al., 2006). Therefore, research should control for economic, institutional, and demographic differences between countries (Chui et al., 2010). The following section will discuss institutional factors controlled for in this research.

Previous studies show that equity market participation is positively related to income and negatively related to expected inflation (Hong et al., 2004). Consequently, it is important to control for both variables. It is further suggested that efficient equity markets may reduce the cost of information through the firm specific information that efficient equity prices reveal (Adjasi & Yartey, 2007). Better-developed equity markets thus better facilitate the flow of

information and reduces trading costs (Chui et al., 2010). As mentioned previously, trading costs are one an important reason that determines if an individual participates in equity markets. Additionally, Research shows how a strong bank sector development impacts equity market participation (Yartey, 2008). Thus, research should control for equity market and bank sector development. Furthermore, previous literature suggests how demographic variables can explain equity market participation. Here, the dependency ratio is identified as the most important among these variables (Chui et al., 2010). Lastly, literature suggests that religious people buy less equity (Al Awadhi, 2021; Blau, 2018). Countries differ in their religion mix. Therefore, it is important to control for religion when studying the effect of national culture.

Power distance

Societies characterized by high power distance show a hierarchical structure with power concentrated amongst leaders (Hofstede, 2001). This means that the majority of society, non-leaders, do not have the freedom or autonomy to make risky decisions (Thompson et al., 2017). The same research argues that high power distance cultures promote conservatism whereas low power distance cultures are optimistic and actively seek to make themselves better off. Additionally, power distance has a negative effect on firm level risk taking (Shane, 1993). This research further finds how high-power distance cultures emphasize that individuals should be obedient to those in a position of power over them. Additionally, power distance has a negative effect on how proactive a culture behaves (Chui et al., 2010). Recent empirical literature studying the effect of power distance on a firm-level has consistently found a negative effect of power distance on firm risk-taking (Ashraf et al., 2016; Gaganis et al., 2019, 2020; Kreiser et al., 2010). collectively, these arguments could be an explanation for why households choose not to engage in risky financial behaviour. For individuals in more power distant cultures, it might be more uncomfortable to engage in financial risk-taking compared to less power-distant cultures. Engaging in financial risk taking entails deviating from the social norm. Hence this type of investing is expected to bear higher psychological costs for individuals in these cultures. Subsequently reducing household financial risk taking. This research therefore arrives at the following hypothesis:

H1: Power distance has a negative effect on household financial risk-taking.

Individualism versus collectivism

In individualistic cultures people are expected to look after themselves and individual achievements are valued more than collective achievements (Hofstede, 2001). Additionally, managers from individualistic cultures are more likely to break rules and engage in risky strategies (Morris et al., 1993). The study further concludes how these managers are more autonomous and have a larger tendency to engage in risky behaviour. Empirical research conducted by Shao et al. (2013) builds on this and finds that higher levels of individualism results in more investments in long-term risky assets rather than short-term safe assets. Furthermore, in more individualistic societies decisions are more likely to be driven by overconfidence and self-attribution (Chui et al., 2010). The research further concludes that equity markets in these societies have a higher amount of volatility and trading volume. This indicates that individualistic societies are more active in equity markets and engage in a higher level of financial risk-taking, likely driven by optimism and overconfidence. Empirical research further demonstrates that individualism has a positive effect on risk-taking within firms (Ashraf et al., 2016; Gaganis et al., 2019, 2020; Kwok & Tadesse, 2006; Li et al., 2013). Expanding on this, research from Breuer et al. (2014) concludes that individualism has a positive effect on financial risk-taking by households. The combination of these arguments indicates how households are more likely to engage in risky financial behaviour because individualistic societies are subject to higher levels of overconfidence and optimism. This likely reduces the psychological costs of taking financial risk and make equity market participation more attractive. This research therefore proposes the following hypothesis:

H2: Individualism has a positive effect on household financial risk-taking.

Masculinity versus femininity

A country that scores high on the masculinity index has gender roles that are clearly separate. In these cultures men are expected to be assertive, tough, and focussed on material success whilst women are expected to be modest, tender and concerned with the quality of life. Conversely, feminine societies have overlapping gender roles and both men and women are expected to show feminine characteristics (Hofstede, 1980). Women invest much less than men (Charness & Gneezy, 2011). Consequently, most household investing is assumed to be done by men. Therefore, it is expected that masculine societies pursue risky choices to increase financial wealth and show off (Ashraf et al., 2016). On a firm-level, research from

McGrath et al. (1992) shows that masculinity is positively related to risk-taking. Similarly, Hofstede (1980) identifies masculine societies are more prone to the overconfidence bias, have a larger need for achievement and are less risk averse. Both overconfidence and the need for achievement have a positive effect on risk-taking (Roberts, 1974). Consequently, individuals from feminine cultures might be subject to higher psychological costs when taking financial risk because they perceive the choice as riskier than people from masculine cultures. This research therefore proposes the following hypothesis:

H3: Masculinity has a positive effect on household financial risk-taking.

Uncertainty avoidance index

Literature generally accepts that uncertainty avoidance strongly impacts risk-taking (Hofstede, 1980). Cultures that demonstrate high uncertainty avoidance prefer official rules and do not like ambiguity. On the contrary, high uncertainty avoidance cultures often feel safe and enjoyable in ambiguous situations (Hofstede, 2001). Risk-taking generally creates high levels of outcome uncertainty. Individuals from cultures with a low uncertainty avoidance index will therefore typically display a greater willingness to take risk than those from cultures with a high uncertainty avoidance index (Hofstede, 2001). Additionally, individuals from cultures with low uncertainty avoidance have a higher need for achievement and subsequently take more risk (Hofstede, 1980; Kreiser et al., 2010). Furthermore, empirical results show that the uncertainty avoidance has a negative effect on risk-taking (Ashraf et al., 2016; Gaganis et al., 2019; Kreiser et al., 2010; K. Li et al., 2013). Accordingly, it could be that individuals in high uncertainty avoidance countries face higher entry or participation costs in equity markets, simply because the uncertainty regarding the future of financial markets entails a higher cost for them. In turn, increasing the cost in terms of psychological factors people have when taking financial risk or participating in the equity market. This research therefore proposes the following hypothesis:

H4: Uncertainty avoidance has a negative effect on household financial risk-taking.

Long-term versus short-term orientation

Long-term orientation refers to the extent to which a culture is oriented towards future-oriented rewards (Hofstede, 2001). Long-term-oriented cultures are more risk averse because

they are more cautious about risky decision-making. On the contrary, short-term-oriented societies take more risk because they care more about short-term face-saving, credibility, reputation and satisfying social obligations (Hofstede, 2011). In research from Naldi et al. (2007) it is concluded that longer-term oriented firms engage less in risk-taking behaviour. Additionally, research from Lumpkin et al. (2010) shows that long term orientation is negatively related to risk-taking. Furthermore, societies that display high levels of long-term orientation generally have higher levels of risk aversion (Abdelrahim, 2021; Park & Lemaire, 2011). Additionally, higher levels of risk aversion can indicate how longer-term-oriented households face larger psychological costs when making risky financial decisions. The combination of these arguments indicate that long-term orientation can deter households from taking financial risk. This research therefore proposes the following hypothesis:

H5: Long-term orientation has a positive effect on household financial risk-taking.

Indulgence versus restraint

Indulgence measures the extent to which cultures control impulsive behaviour (Hofstede & Minkov, 2010). Societies that have high levels of indulgence are inclined to be confident, optimistic and show more acceptance towards deviating from the norm (Hofstede, 2011). In turn, optimistic investors who have high levels of trust are more likely to accept risky investments like equity (Guiso, 2012). Additionally, more trustful people tend to take more financial risk within equity markets (Ashraf et al., 2016). Indulgent societies tend to be oriented toward the short-term and are more comfortable with impulsive spending (Gupta et al., 2018). These types of societies place a higher value hedonic behaviour. Consequently, individuals are subject to lower psychological costs of taking risk (Littrell, 2008). This reduces outcome volatility and the expected value of losses, two important factors in determining risk averseness (Wiseman & Gomez-Mejia, 1998). Additionally, these types of cultures often discount losses that are the result of risky decisions less than their restrictive counterparts (Alipour & Yaprak, 2022). Combined, this indicates how individuals from more indulgent societies are more likely to engage in financial risk taking as they are subject to lower psychological costs of taking financial risk. This research therefore proposes the following hypothesis:

H6: Indulgence has a positive effect on household financial risk-taking.

Methods & data

The goal of this research is to investigate the relationship between household financial risk-taking and national culture. The definitions and sources for all the variables used can be found in table 1. This section will discuss the methodology for the empirical part of this research. The key variables for this research are measures of risk-taking from household microdata collected by the European Central Bank in the Household Consumer Finance Survey, or HCFS, from 2010-2017 further described below. This research will study three measures of household financial risk-taking in the form of elicited household financial risk-taking, household publicly traded equity ownership and the percentage of liquid assets invested in publicly traded equity.

The main explanatory variable for this research is national culture in the form of six cultural dimensions as defined by Hofstede (2011). These six dimensions are referred to as follows: *pdi*: Power distance index, *ivc*: Individualism versus collectivism, *mvf*: masculinity versus femininity, *uci*: uncertainty avoidance index, *lvs*: long-term orientation versus short-term orientation and *ivr*: indulgence versus restraint. In research from Hofstede (2011) a unique formula is identified for each of these indices that provides numerical values ranging roughly from 0-100. The so-called value survey model can be used to calculate a score for each of the dimensions listed above for each of the cultures that were included in the experiment. In research from Hofstede (2011), a database is constructed using the abovementioned survey. The database contains cultural dimensions for all countries in the HCFS except for Cyprus. This database is useful to compare cultural dimensions of countries over a longer period as differences between cultures are assumed to be constant over time (Beugelsdijk et al., 2015)

The HCFS survey is conducted by the European central bank for the 2010, 2014 and 2017 waves. In total, the dataset for the three waves consists of 244,480 households and 613,819 Individuals. The first wave contains data for a subset of 15 European countries, namely: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Italy, Luxembourg, Malta, The Netherlands, Portugal, Slovakia, Slovenia and Spain. When only considering these countries, the dataset consists of 204716 households and 510475 people. Only individuals that were present in one of the waves are included in the sample. A small number of respondents are therefore dropped as they participated in one or more waves. The participants that were present in more than one wave are randomly allocated to one of the waves they were present

in and dropped from the other observations. The data can thus be regarded as cross-sectional. The final sample used for each of the empirical analyses performed differs. The first two analyses study the entire sample consisting of 122 648 and 133 785 households respectively. There is a small difference in the sample sizes because elicited financial risk-taking is not measured for all households in all waves. The final analysis only studies those households that participate in the equity market. Further summary statistics are provided under Table 2.

To address item non-response, the HCFS data provides multiply imputed values. Missing values are estimated conditional upon observed variables. For each missing value, five different values are estimated to account for imputation uncertainty. The final value is taken as the multiply imputed value of the estimated variables for cases of non-response. The households in the sample have an unequal probability of being selected to partake in the survey. To account for this, this analysis uses a cross-sectional weighting variable that considers both external and internal data such as the probability of selection, coverage issues, unit non-response and an adjustment of weights to external data. The weighting technique used is in line with standard techniques identified in research from Eurostat (2011) and United Nations Statistics Division (2005).

The dataset contains data on the household and personal level that measure demographic characteristics, household characteristics such as household size, motivation to enter household and if any household member uses the internet, financial consumption, and financial wealth. As control variables this research proposes the use of several characteristics of the household reference person, the reference person identified in the survey is not necessarily the household head but instead the person to which the rest of the household is referred to in the survey. Ideally, these characteristics would have been included for the financially knowledgeable person, FKP, of the household instead of the reference person. Unfortunately, the HCFS only includes data on who is the FKP for wave 3 of the survey. Analysis shows that 90% of reference persons are also the FKP of their household. This research therefore assumes that the FKP is the reference person for waves 1 and 2. Only households where the reference person is also the FKP are included in the sample for wave 3. The effect of national culture is likely different for individuals born in a country other than their country of residence. To accurately measure the effect of national culture on risk-taking this research opts to only include households where the reference person or FKP has the nationality of the country of residence.

Household financial risk-taking

The first measure for household financial risk-taking this research will study is household elicited willingness to take financial risk. HCFS respondents indicate the level of financial risk taken by selecting one of the following options: (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 risk expecting to earn average returns; (4) Not willing to take any financial risk. Here, a higher number indicates lower risk-taking. Important to note is that respondents might not be able to accurately indicate the level of risk they have taken or the beliefs they had at the time of investment. Therefore, this research only considers responses made by the reference person of a household as this individual is assumed to be the financially knowledgeable person. It should be noted that this measure is not risk tolerance in the Arrow-Pratt sense, which is distinct from beliefs. But rather an indicative measure that combines both expectations and risk-taking. Additionally, it is difficult to interpret responses in a cardinal sense because respondents might differ in how they interpret the above options such as “average” or “substantial” (Malmendier & Nagel, 2011). Furthermore, survey answers may differ from real-world risky choices by households. However, elicited financial risk taking is suitable to predict actual allocation to risky assets (Shum & Faig, 2006). Previous literature has often used elicited financial risk-taking to study actual household financial risk-taking and agrees that the measure is suitable for an analysis of this type (Breuer et al., 2014; Cardak & Wilkins, 2009; Gaganis et al., 2019; Jianakoplos & Bernasek, 2006; Malmendier & Nagel, 2011). To ameliorate the possibility of a difference between self-reported risk-taking and actual risky asset allocation this study will research both elicited risk tolerance as well as direct measures of asset allocation.

The second measure for household financial risk-taking is a binary variable that indicates if a household owns publicly traded equity. Here, 0 indicates no equity holdings and 1 indicates that the household owns publicly traded equity. Literature generally accepts that publicly traded equity is a risky asset (Dimmock & Kouwenberg, 2010; Gollier, 2002; Heaton & Lucas, 2000; Malmendier & Nagel, 2011; Shum & Faig, 2006). In turn, owning publicly traded equity can thus be regarded as taking financial risk. Studying the relationship between equity market participation and national culture can allow this research to understand if national culture impacts equity market participation. This measure is unable to distinguish between the size of risk taken by households. Households with a small percentage of total

financial assets invested in publicly traded equity holdings will be classified as taking the same risk as a household with a larger percentage of total financial assets invested in publicly traded equity. To ameliorate this risk this study will also research the share of liquid assets invested in equity.

The final measure for household financial risk-taking is the percentage of liquid assets invested in equities. Contrary to the previous measure, the sample for this test only includes households that own publicly traded equity. In doing so, the measure controls for the fixed cost that households face for participating in the equity market. This analysis is suitable to test if national culture influences the size of risk people take when investing. The measure for the percentage of liquid assets invested in equity is constructed using the HCFS data by dividing household equity holdings over household net liquid assets. Net liquid assets here are defined as the sum of liquid financial assets minus non-collateralised debt. Financial assets here include equity, bonds, cash, and short-term instruments.

Each of the above-discussed measures for household financial risk-taking are impacted by the state of the economy and financial uncertainty. Uncertainty about macroeconomic outcomes can predict household financial risk taking (Ben-David et al., 2018). The countries included in the sample likely differ in economic states and subsequent uncertainty about outcomes. For example, the economic states of Greece and Italy in 2015 were vastly different to the economic states of The Netherlands and Germany. To account for the difference in the macro-economic state over time, this research uses a sample that includes three survey waves ranging from 2010-2017 and controls for GDP per capita, consistent with research from (Chui et al., 2010). Additionally, a dummy variable for the survey wave will be used as a control variable to capture unique events or a difference in economic state not measured by other variables. The dummy variables for year should control for all aggregate time effects, including variation in average risk tolerance (Malmendier & Nagel, 2011). Year dummies are only used when not controlling for institutional differences.

As a control variable for income, total household income is used. All income, wealth and asset holdings variables are indexed to December 2015 euros using the harmonised index of consumer prices, or HICP. HICP values are used on a country level to account for country-specific differences in inflation rates. In line with research from (Malmendier & Nagel, 2011), variables for both asset holdings and liabilities will be used as this better captures the

effect of financial wealth. Controls for assets are important because literature shows that equity market participation is increasing in assets (Vissing-Jorgensen, 2003). Economic theory predicts that house ownership has a strong effect on financial risk-taking (Chetty et al., 2017). Therefore, this research will control for home ownership in the empirical analyses. In their research, The HCFS includes a variable that measures the tenure status of the main residence. Only full ownership of main residence is considered as house ownership in the analysis of this research.

Table 1, definitions and sources of variables

Variable	Description
Elicited risk-taking	Elicited financial risk-taking on a 1-4 scale with 4 being the least risky <i>Source: HCFS, European central bank</i>
Equity ownership	Binary variable indicating if a household owns any publicly traded equity <i>Source: HCFS, European central bank</i>
Equity as % of liquid assets	Ratio of household equity assets to total liquid assets <i>Source: HCFS, european central bank</i>
Cultural indices	Cultural indices that proxy for six different cultural dimensions <i>Source: Hofstede (2011)</i>
GDP per capita	GDP per capita in constant 2015 euro's <i>Source: world development indicators, World Bank</i>
Expected inflation rate	Average inflation rate of the previous 5 years. Calculated using HICP <i>Source: HICP, European central bank</i>
Bank sector development	The ratio of the total deposit money bank assets and gross domestic product. <i>Source: Beck, Demirguc-Kunt, and Levine (2003).</i>
Equity market development	The ratio of equity market capitalization to gross domestic product. <i>Source: Beck, Demirguc-Kunt, and Levine (2003).</i>
Dependency ratio	Ratio of working to non-working age population <i>Source: world development indicators, World Bank</i>
House ownership	A binary variable indicating if the household owns its main residence <i>Source: HCFS, European central bank</i>
Employment income	Numerical value of total household employment income in euro's

	<i>Source: HCFS, European central bank</i>
Demographic variables	Education, age, gender, marital status, and labour status of the household reference person <i>Source: HCFS, European central bank</i>
Financial wealth	Assets and liabilities of the total household <i>Source: HCFS, European central bank</i>
Religion	The percentage of the population with Protestant, Catholic or Muslim beliefs <i>Source: La Porta, Lopez-De-Silanes, Shleifer, and Vishny (1999).</i>

Empirical analysis elicited risk tolerance

This research starts by studying the effect of national culture on elicited financial risk-taking as reported by the financially knowledgeable person of the household. Elicited risk-taking as measured by the HCFS has 4 distinct outcomes, where a larger outcome indicates a lower level of risk-taking. Elicited household financial risk-taking will be referred to as y_{it} in the following section. The data here is presented as ordinal-level data. Therefore, an ordinary least squares model, OLS, provides an appropriate framework to test for the relationship between y_{it} and national culture. By using a model similar to the empirical model used in research from Breuer et al. (2014) and Breuer & Quinten (2009), this study can provide estimates for the effect that each of the dimensions of national culture has on y_{it} . By using OLS, this research allows for facile comparability with existing research. Additionally, the general acceptance of OLS in literature improves reliability of results. Furthermore, OLS enables this research to quantitatively examine the effect of culture on elicited financial risk-taking. This allows for an effective assessment of the effect of cultural factors on risk-taking in households. Results are straightforward with estimates representing the change in elicited risk-taking associated with a 1 unit increase for each variable respectively. Furthermore, an OLS model allows this research to control for institutional factors and other control variables that are expected to influence risk-taking. In doing so, this research can estimate a more accurate and robust effect of culture. In conclusion, an OLS regression can allow this research to effectively explore the effect of culture on elicited financial risk-taking. Therefore, this research estimates the following model.

$$y_{it} = \beta_0 + \beta_1 * pdi + \beta_2 * ivc + \beta_3 * mvf + \beta_4 * uci + \beta_5 * lvs + \beta_6 * ivr + \gamma * x_{it} + u_{it}$$

Here x_{it} is a vector of control variables that includes controls on both the household and individual level as well as control variables for institutional, economic, and demographic differences. Control variables on the household level here are as follows $\ln(\text{employment income})$, $\ln(\text{assets})$, $\ln(\text{debt})$, house ownership and the year the survey was conducted. Control variables on the personal level are: highest level of education, age, gender, marital status and labour status. Control variables for institutional differences are: GDP per capita, Expected inflation rate, Bank sector development, Equity market development, dependency ratio and religion. These factors are suggested in literature as potential factors influencing household financial risk-taking (Chui et al., 2010). By including data from several waves and introducing the variable year as a control variable the idiosyncratic shock is likely uncorrelated with national culture. Finally, the control variables on the household and personal level are suitable to ensure that the heterogenous part of the error term is uncorrelated with national culture. Results from the Hausman test are significant at the five percent level, the null hypothesis that the model is exogenous can therefore be rejected and this research assumes that the above specified is endogenous.

Empirical analysis of equity ownership

The second measure for household financial risk-taking this research studies is a binary variable that measures if a household holds any type of equity. The variable, referred to as y_{it} takes on a value of 1 if the household owns any publicly traded equity and 0 otherwise. This research studies the effect of national culture on the probability that a household engages in risky financial behaviour. To estimate the size of this effect, a probit regression model is employed. The probit model is well suited for this analysis because it can model the conditional probability of equity market participation based on culture and other control variables. By employing a probit maximum likelihood model, this research can quantitatively estimate the impact of culture on the probability of participating in the equity market. A probit regression model is suitable for this analysis because all dimensions for national culture except IDV display patterns consistent with normal distribution, as can be seen in figures 1-6 in the appendix. Based on the Shapiro-Wilk test, there is insufficient evidence to reject the null hypothesis of normal distribution for each of the dimensions except IDV. Therefore, it is reasonable to assume that the dimensions for national culture are normally distributed. A probit model assumes normally distributed dependent variables. Consequently, this type of model is suitable to study the effect of national culture on equity market

participation. Additionally, the non-linearity of the probit model is well suited to study the binary variable of equity market participation. Moreover, the model can control for institutional and other variables that influence equity market participation. This enables the model to isolate the effect of culture. This research proposes the following probit model to estimate the impact of national culture on the probability of equity market participation.

$$P(y_{it} = 1 | pdi, ivc, mvf, uci, lvs, ivr, x_{it}) \\ = \Phi(\alpha + \beta_1 * pdi + \beta_2 * ivc + \beta_3 * mvf + \beta_4 * uci + \beta_5 * lvs + \beta_6 * ivr + \gamma * x_{it})$$

Here, $\Phi(\cdot)$ denotes the cumulative standard normal distribution function and x_{it} is a vector of control variables that includes controls on both the household, and individual and country level like those described for the analysis of elicited household financial risk-taking.

Empirical analysis risky assets

The third and final measure this research tests is the proportion of risky assets in a household financial portfolio. Measured by the percentage of liquid assets invested in publicly traded equity, referred to as y_{it} . The dependent variable here is available as ratio data. Analysis of the data shows that the amount of liquid assets and the amount of public equity owned are highly correlated with each other. This is rationalized by the fact that even if the proportion of money invested in risky assets stays constant, an increase in the total amount invested leads to an increase in money invested in risky assets. Total wealth is an important determinant of investments in risky equity (Cardak & Wilkins, 2009; Malmendier & Nagel, 2011). To ameliorate this concern, this research opts to use the ratio of risky assets invested as a proportion of total assets. This allows the model to better capture the effect of culture on how risky a portfolio is. OLS is well equipped for this type of analysis as it can estimate the linear relationship between culture and the ratio of risky assets. Additionally, an ordinary least squares regression can estimate the sign and magnitude of the effect of culture on the ratio of risky assets whilst controlling for institutional and other variables. Therefore, this research proposes the following ordinary least squares model.

$$y_{it} = \beta_0 + \beta_1 * pdi + \beta_2 * ivc + \beta_3 * mvf + \beta_4 * uci + \beta_5 * lvs + \beta_6 * ivr + \gamma * x_{it} + u_{it}$$

Like the previous models, x_{it} here is a vector that includes control variables on both the household, individual and country level. The control variables on a personal and country

level are the same as for the previous two models. An ordinary least squares model is suitable to test the hypotheses here because it can be assumed that the error term is uncorrelated with national culture. By including data from several waves and introducing the variable year as a control variable it is likely that the idiosyncratic shock is uncorrelated with national culture. Finally, the control variables are suitable to ensure that the heterogenous part of the error term is uncorrelated with national culture. Results from the Hausman test are significant at the five per cent level. Thus, the null hypothesis that the model is exogenous can be rejected and this research assumes that the above specified is endogenous.

Summary statistics

Table 2, Summary statistics.

Variable	<i>N</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>Summary statistics on a household level</i>					
Total liquid assets	137,625.00	59,012.23	704,603.60	-963.36	163,000,000.00
Total gross income	137,494.00	48,905.43	71,312.24	0.00	5,600,677.00
Total assets	137,495.00	400,384.60	1,984,038.00	0.00	375,000,000.00
Total liabilities	60,775.00	79,036.05	168,259.50	0.00	15,400,000.00
Value of shares	20,180.00	92,329.65	1,078,226.00	0.00	138,000,000.00
Value of bonds	137,625.00	3,225.33	68,814.47	0.00	14,600,000.00
House ownership	145,224.00	0.71	0.45	0.00	1.00
Number of children	145,224.00	0.55	0.95	0.00	13.00
<i>Summary statistics on reference person level</i>					
Age	142,547.00	54.61	16.66	15.00	85.00
Gender	145,224.00	1.46	0.50	1.00	2.00
Employment	145,198.00	4.74	3.58	1.00	13.00
Power distance	145,224.00	50.60	19.65	11.00	104.00
Individualism	145,224.00	59.64	16.33	27.00	80.00
Masculinity	145,224.00	48.28	22.83	14.00	110.00
Uncertainty avoidance	145,224.00	76.60	17.66	51.00	112.00
Long-term orientation	145,224.00	55.16	17.09	28.00	83.00
Indulgence vs restraint	145,224.00	45.28	12.82	16.00	68.00

Note: The first part of this table provides descriptive statistics on the household level. The bottom part of this table reports descriptive statistics for variables on a personal level for the reference person of each household

Results

This research studies the influence of culture on household financial risk-taking through three different analyses of both elicited and real-world financial risk-taking. The analyses study the elicited financial risk-taking, equity market participation and the ratio of liquid assets invested in equity. In the subsequent section, results of the analyses will be described. Afterwards, several robustness checks as well as an aggregate perspective for the hypotheses will be discussed. Results of the full empirical models can be seen in table 3 in the appendix. Results for the probability of equity market participation are presented as marginal effects.

Elicited risk tolerance

This research starts by relating national culture to elicited financial risk-taking. Elicited financial risk-taking here has 4 distinct outcomes ranging from 1-4 where a higher number indicates a lower level of risk-taking. To empirically estimate the relationship between national culture and elicited risk-taking, this research estimates an ordinary least squares regression. Results for variables of interest can be found in table 4, full regression results can be found in table 5 of the appendix. Important to note is that coefficients derived from the analysis should not be interpreted as absolute levels of risk-taking but rather indicating the magnitude and sign of the effects on elicited risk-taking.

Results indicate that national culture has a significant and large effect on elicited financial risk-taking by households. Estimated coefficients for national culture dimensions are significant for all dimensions both with and without controls for institutional differences. Interestingly, the effect of national culture increases when controls for institutional differences are used. The sign of the estimated effects remains constant, regardless of institutional controls. This suggests that the estimates for national culture in model 1 partly capture the effect of cross-country differences in institutions. In turn, this difference in institutions has a significant effect on household financial risk-taking. This is confirmed by the regression results which show that all institutional factors except for GDP per capita have a strong effect on household elicited financial risk-taking. To put into context, a one standard deviation increase in the proportion of people who are protestant *ceteris paribus* has a negative effect of 0.8 or 22% of the mean on household-elicited financial risk-taking. Such an increase is enough to drop close to a full level in financial risk-taking. Going from 2 to 2.8 for example, would move a respondent from (2) Take above average financial risks expecting to

earn above average returns closer to (3) Take average financial risk expecting to earn average returns. Thus, institutional differences have a large effect on household financial risk-taking.

Results further indicate a positive relationship between power distance and elicited financial risk-taking both with and without using controls for institutional differences. When controlling for institutional differences, a coefficient of 0.0082035 that is significant at the one percent level is estimated. To put in context, the maximum difference in power distance for countries in the sample is 104 points. At that level, power distance could *ceteris paribus* account for a difference of 0.85 in elicited financial risk-taking. This difference is in turn enough to jump a full level in financial risk-taking indicating large economic significance. Additionally, results show that individualism has a positive effect on elicited financial risk-taking both with and without institutional controls. In other words, more individualistic societies report higher levels of elicited financial risk-taking. The model with controls for institutional differences estimates a coefficient of -0.0187181, significant at the one percent level, for the individualism index. To contextualize, the largest difference in individualism for countries used in this sample is 53 points. *Ceteris paribus*, this difference could explain close to a full point of elicited financial risk-taking, indicating large economic significance. Similarly, results show that more masculine cultures take more financial risk both with and without controlling for institutional differences. The model estimates a coefficient of -0.0141129, significant at the one percent level, for the masculinity index. The largest difference in masculinity for countries used in this sample is 96 points. Potentially making households jump up to 1.35 points in financial risk-taking, *ceteris paribus*.

Furthermore, results indicate that uncertainty avoidance has a positive effect on financial risk taking, an effect opposite to the hypothesized effect of the uncertainty avoidance index. The model estimates a coefficient of -0.0220415, significant at the one percent level, for the uncertainty avoidance index. The maximum difference between countries in the sample is 61 points on the uncertainty avoidance index. *Ceteris paribus* that would indicate an increase in elicited financial risk-taking of 1 full point, indicating large economic significance.

Continuing, results indicate how the long-term orientation index has a negative effect on financial risk taking. This result is opposite to the hypothesized effect of short-term orientation. The model estimates a coefficient of 0.0163728, significant at the one per cent level, for the long-term orientation index. The maximum difference between countries in the sample is 55 points on the uncertainty avoidance index. *Ceteris paribus* that would indicate an increase in elicited financial risk-taking of 0.9 points for elicited financial risk-taking.

Finally, results indicate contrary to the hypothesized effect more indulgent societies take less financial risk. The model estimates a coefficient of 0.0250565 significant at the one percent level for the indulgence index. The maximum difference between countries in the sample is 52 points on the indulgence index. *Ceteris paribus*, that would indicate an increase in elicited financial risk-taking of 1.3 points in elicited financial risk-taking.

Concluding, results for the empirical analysis of elicited financial risk-taking show a large statistical and economically significant impact of national culture on household financial risk-taking. Additionally, results show that cross-country institutional differences have a large effect on household financial risk-taking separate from differences in cultural values.

Equity market participation

The second analysis performed in this research relates equity market participation to national culture. To empirically capture the relationship between national culture and equity market participation, a maximum likelihood probit model is estimated. Results for variables of interest can be found in table 4, full regression results can be found in table 5 of the appendix. A positive coefficient can be interpreted as having a positive effect on the probability of participating in the equity market. Similar to the first analysis, results show a large and significant effect of national culture on household financial risk-taking both with and without controls for national culture. The estimated effect of national culture changes sign for all dimensions when controlling for institutional differences. This indicates that the effects estimated in the first model contain part of the effect of cross-country institutional differences. This sign reversal indicates that institutional differences influence financial risk-taking. The analysis shows a large and significant effect for faith, GDP per capita and the dependency ratio. A one standard deviation difference in the percentage of the population that is protestant *ceteris paribus* leads to a reduction of 8.6 percentage points or 60% of the mean probability of equity market participation on the probability that a household participates in the equity market. This demonstrates that cross-country institutional differences have a large effect on financial risk-taking by households. Thus, it is important to account for these differences to estimate an unbiased effect of culture. Consequently, the following section will focus on the results of the second model with controls for institutional differences.

Results indicate that power distance has a positive effect on equity market participation with an estimated coefficient of -0.000463, significant at the one percent level, when not

controlling for institutional differences. However, when accounting for institutional differences the estimated effect becomes positive and insignificant. This can indicate that the estimated effect in the first model was due to differences in institutions rather than culture. Additionally, results indicate that individualism has a significantly positive effect on equity market participation with an estimated coefficient of 0.0041872. A one standard deviation difference in individualism only leads to less than a 1/1000 percentage point difference in the probability of participating in the equity market. However, the maximum difference in individualism between countries in the sample is 52 points. A 52-point increase in individualism would lead to a 22-percentage point increase in the probability of a household participating in the equity market, *ceteris paribus*. Thus, the effect is economically significant. Furthermore, results show that masculinity has a positive and significant effect on equity market participation with an estimated coefficient of 0.0032942. Here too, a one standard deviation difference in individualism leads to less than 1/1000 percentage point difference in the probability of participating in the equity market. However, maximum difference in masculinity between countries in the sample is 96 points. *Ceteris paribus*, the 96-point increase in individualism would lead to a 31-percentage point increase in the probability of a household participating in the equity market demonstrating economic significance. Uncertainty avoidance also has a positive and significant effect on equity market participation with an estimated coefficient of 0.0066802. Once again, a one standard deviation difference in uncertainty avoidance only leads to less than a 1/1000 percentage point difference in the probability of participating in the equity market. However, the effect is economically significant. The largest difference for the uncertainty avoidance index is 61 points. *Ceteris paribus*, a 61-point increase in uncertainty avoidance would lead to a 40-percentage point increase in the probability of a household participating in the equity market. The long-term orientation index is estimated to have a significant and negative effect an estimated coefficient of -0.0022422. Similar to the dimensions discussed above, a one standard deviation difference in uncertainty avoidance only leads to less than 1/1000 percentage point difference in the probability of participating in the equity market. However, the maximum difference in long term orientation for countries in this sample is 55 points. An increase of 55 points would, *ceteris paribus*, entail a 12-percentage point increase in the probability of equity market participation. This demonstrates economic significance. Finally, indulgence is estimated to have a significant and negative effect under this model with an estimated coefficient of -0.0042457. A one standard deviation difference in uncertainty avoidance only leads to less than a 1/1000 percentage point difference in the

probability of participating in the equity market. However, the 52-point difference on the indulgence index found for countries in this sample demonstrates economic significance. An increase of this size can, *ceteris paribus* be attributable a 22-percentage point decrease in the probability of a household participating in the equity market.

Concluding, empirical analysis of equity market participation show a large statistical and economically significant impact of national culture on household financial risk-taking.

Risky asset ratio

The final analysis of this research studies the effect of national culture on the amount of risk households take by relating national culture to the share of risky assets in total household liquid assets. To empirically capture the relationship between national culture and the ratio of risky assets, an ordinary least squares model is estimated. Results for variables of interest can be found under Table 4, full regression results can be found in table 3 of the appendix.

Without controls for institutional differences, this research finds a negative and significant effect for power distance with an estimated coefficient of -0.0018882. Here, a 1 unit increase in power distance indicates an approximate 0.2 percentage point increase in the ratio of risky assets. However, the relationship between power distance and the ratio of risky assets becomes positive and insignificant when controlling for institutional differences. This indicates that the estimated effect of national culture could instead be due to cross-country differences in institutions. This conclusion is strengthened by the fact that the sign of the estimated effects changes for four of the six cultural dimensions when controlling for institutional differences.

Beyond power distance, this research does not find any significant effects on the ratio of risky assets except for age and having 6 compared to no children. Interestingly, the R^2 of the final model is close to zero. This indicates that the variation in the ratio of liquid assets invested in stocks is largely due to factors not considered in this analysis. This is in line with empirical literature that finds that it is hard to find any household characteristics that have a significant impact on the risky asset share of household portfolios (Malmendier & Nagel, 2011).

Table 4, regression results for elicited financial risk taking, equity market participation and the ratio of liquid assets.

Variables	<i>Elicited risk-taking</i>		<i>Equity market participation</i>		<i>Ratio of risky assets</i>	
	I	II	I	II	I	II
Power distance	0.003857*** 0.0001677	0.0082035*** 0.0007948	0.0004916*** 0.0001047	-0.000463 0.0003776	-0.0018882* 0.0009815	0.0085153 0.0055772
Individualism	-0.005552*** 0.0002901	-0.0187181*** 0.0032153	-0.0003208*** 0.0001236	0.0041872*** 0.0014246	-0.0001881 0.0017733	0.0105786 0.052721
Masculinity	-0.0058714*** 0.0001991	-0.0141129*** 0.0018023	-0.0020904*** 0.0001003	0.0032942*** 0.0007804	0.0023266 0.0024421	-0.007686 0.015481
Uncertainty avoidance	-0.000593*** 0.0002214	-0.0220415*** 0.0027113	-0.0017983*** 0.0001157	0.0066802*** 0.0012518	0.005508 0.0050478	-0.0316123 0.0194548
Long-term orientation	0.0059025*** 0.0003468	0.0163728*** 0.0015377	0.0007056*** 0.0001402	-0.0022422*** 0.0006936	-0.0035277 0.0028047	-0.0006526 0.0243837
Indulgence	0.0067873*** 0.0003207	0.0250565*** 0.0023961	0.0008394*** 0.0001331	-0.0042457*** 0.001089	0.0012874 0.0015485	0.0237836 0.0212823
Income controls	Yes	Yes	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	No	Yes	No	Yes	No
Institutional controls	No	Yes	No	Yes	No	Yes
# Obs.	122648	122648	133,785	133,785	19,922	19,922
R ²	0.1447	0.1503	0.2202	0.2219	0.0004	0.0004

Methodological variations and robustness checks

The robustness of results is tested with several variations in methodology. The following section provides a brief overview of the robustness checks used to validate results. Results of robustness checks can be found in the appendix. The tests will only focus on elicited risk-taking and equity market participation as this research has been unable to find any significant variables studying the ratio of risky to liquid assets.

To estimate the effect of national culture this research uses cultural dimensions as defined by (Hofstede, 2011). Although these dimensions are universally perceived in literature as effective measures to empirically study the effect of national culture. It could be that the

estimated effect of national culture is due to a fault in the dimensions. In research from (Schwartz, 2008) an alternative measure to national culture is constructed. Because these dimensions are different from those used in this research, a direct comparison cannot be made. However, these different cultural values can be used to test if culture significantly affects financial risk-taking under a different measure of culture. Results of the test can be found in Table 6 of the appendix. These results indicate that culture has a significant effect on financial risk-taking. However, only one of the new cultural dimensions has a significant effect on equity market participation after controlling for institutional differences. Results further show that estimates of the effect of national culture change in size and sign after controlling for institutional differences. This confirms how research should account for these differences when attempting to estimate an effect of national culture. Future research is needed to decide what is the most efficient way to measure national culture.

It could be that outliers influence the estimated cultural effects. To test this, a robustness check was performed where the wealthiest and least wealthy 10% of respondents for each country respectively are dropped from the sample. Wealth here is defined as net wealth. After removing outliers, the same empirical tests as discussed under the methodology section were performed, results can be seen in Table 7 of the appendix. Estimated effects for the model without the wealthiest and least wealthy 10% of the population do not provide any indication that estimated effects are biased by outliers. Estimated effects do not change significantly after excluding outliers, strengthening the notion that the sample is representative.

Additionally, it is generally accepted that age has a significant impact on the probability of participating in the equity market and subsequent financial risk-taking. Therefore, the empirical analysis controls for age as a continuous variable. However, it could be that age has a non-linear effect on risk-taking. In that case, a dummy variable for age cohort better captures the effect of age on risk-taking. To test this, a robustness check is performed where age is used as a binary variable indicating the age cohort that a respondent belongs to. Results for this regression can be found in Table 8 of the appendix. Both with and without using age groups as dummy variables, national culture is shown to have a significant impact on financial risk-taking. For elicited financial risk-taking, results show little change when using dummies for age groups instead of using age as a continuous variable. However, point estimates for equity market participation change after including age dummies. For all dimensions of culture, the estimated effect becomes much stronger. In fact, estimated effects of culture become over seven times larger for all cultural dimensions. Estimates for the effect of belonging to an age category are insignificant for elicited risk-taking but are significant for

equity market participation. This could indicate that real-world choices are non-linearly affected by age, but elicited choices are not. A potential explanation is that experienced results are an important driver of equity market participation (Malmendier & Nagel, 2011). This would indicate a non-linear relationship between age and financial risk-taking as age groups differ in the results they experienced. Thus, future research should control for age using age cohort dummies. Further research is needed to identify if there is a difference between the effect of age on elicited and real-world financial risk-taking.

As a final test for robustness, wealth is controlled for using liquid assets instead of total assets. The relation between liquid assets and financial risk-taking is likely stronger than the relation between total assets and risk-taking as stock market participation is increasing in liquid assets (Vissing-Jorgensen, 2003). Results are reported in table 9 of the appendix. These results show that the sign and significance of point estimates change very little after controlling for liquid assets instead of total assets, strengthening robustness of results.

Aggregate perspective on hypotheses

This research examines the effect of national culture on household financial risk-taking by studying three separate measures for household financial risk-taking. Each provides a unique perspective on the six hypotheses formulated for the effect associated with the dimensions of national culture. Table 5 shows an overview of the sign of effects estimated in each of the models discussed above as well as their significance level. Results discussed above demonstrate how cross-country institutional differences have a large and significant effect on financial risk-taking and how part of that effect is captured by national culture before controlling for these differences. The subsequent part will therefore focus on the results for models with controls for institutional differences. Unfortunately, no significant effects were found when studying the ratio of liquid assets invested in risky assets. Nevertheless, this is in line with previous research and should not change the conclusion regarding the hypothesized effect. Consequently, the subsequent section will focus on the results for elicited financial risk-taking and equity market participation.

The hypothesized effect of power distance is negative. Based on the analysis of elicited financial risk-taking this hypothesis cannot be rejected. Additionally, power distance shows large economic significance for this analysis. Although the analysis for equity market participation also estimates a negative effect of power distance, this effect is not significant.

Therefore, this research shows that power distance has a large and significant negative effect on elicited financial risk-taking but no significant effect on real-world financial risk-taking. In aggregate, this demonstrates a negative effect of power distance on financial risk-taking. Further research is needed to confirm if the effect is different for elicited and real-world risk-taking.

The hypothesized effect of individualism is positive. Based on the results of the empirical analysis for elicited financial risk-taking and equity market participation this hypothesis cannot be rejected. Both analyses reveal a large statistically and economically significant effect. In aggregate, individualism is shown to have a positive effect on household financial risk-taking.

The hypothesized effect of masculinity is positive. Results from the empirical analysis for elicited financial risk-taking and equity market participation do not provide sufficient evidence to reject this hypothesis. Both analyses show a large statistically and economically significant effect of masculinity on financial risk-taking. In aggregate, masculinity is shown to be associated with larger levels of financial risk-taking.

The hypothesized effect of uncertainty avoidance is negative. However, empirical results from the analyses for elicited financial risk-taking and equity market participation show a large and significant positive effect of uncertainty avoidance on household financial risk-taking. These results provide sufficient evidence to reject hypothesis 4. The estimated effect is particularly interesting as it is opposite to the estimated effects of uncertainty avoidance found in previous literature (Ashraf et al., 2016; Gaganis et al., 2019; Kreiser et al., 2010; Li et al., 2013). Further research is needed to confirm if uncertainty avoidance indeed positively impacts household financial risk-taking.

The hypothesized effect of long-term orientation is negative. In other words, more short-term-oriented societies are hypothesized to take more financial risk. Based on the empirical analysis of elicited financial risk-taking and equity market participation, this hypothesis cannot be rejected. Both models estimate a large statistical and economically significant effect which indicates that higher levels of the long-term orientation index are associated with lower levels of household financial risk-taking.

The final hypothesis is regarding the indulgence versus restraint index. Here, the hypothesized effect is positive. In other words, more indulgent societies are expected to take higher levels of financial risk. However, results indicate that the indulgence versus restraint index has a significantly negative effect on household financial risk-taking, both in terms of

elicited and real-world financial risk-taking. Thus, hypothesis 6 should be rejected. In aggregate, this research finds that more indulgent cultures take less financial risk.

Concluding, the results of this research indicate a large statistically and economically significant effect of national culture on household financial risk-taking as measured by elicited financial risk-taking and equity market participation. Estimated effects for individualism, masculinity and long-term orientation are in line with hypothesized effects. Uncertainty avoidance and indulgence versus restraint indices have an effect opposite to the hypothesised value. Power distance has a significant effect on elicited financial risk-taking. However, results do not show a significant effect on real-world financial risk-taking.

Table 5, signs of estimated coefficients for elicited financial risk-taking, equity market participation and the percentage of liquid assets invested in equity

Independent variables	Hypothesized effect	<i>Elicited financial risk-taking</i>		<i>Equity market participation</i>		<i>% of liquid assets in equity</i>	
		I	II	I	II	I	II
		Power distance	<i>Negative</i>	-.***	-.***	+.***	-
Individualism	<i>Positive</i>	+.***	+.***	-.***	+.***	-	+
Masculinity	<i>Positive</i>	+.***	+.***	-.***	+.***	+	-
Uncertainty avoidance	<i>Negative</i>	+.***	+.***	-.***	+.***	+	-
Long-term orientation	<i>Positive</i>	-.***	-.***	+.***	-.***	-	-
Indulgence	<i>Positive</i>	-.***	-.***	+.***	-.***	+	+
Income controls		Yes	Yes	Yes	Yes	Yes	Yes
Household characteristics		Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	No	Yes	No	Yes	No
Institutional controls		No	Yes	No	Yes	No	Yes
# Obs.		122648	122648	133,785	133,785	19,922	19,922
R ²		0.1447	0.1503	0.2202	0.2219	0.0004	0.0004

Discussion

Empirical research suggests that only a small fraction of households invest in risky financial assets, commonly regarded as an investment mistake (Guiso et al., 2008). To prevent these mistakes, a better understanding of the factors driving financial risk-taking is needed (Campbell, 2006). This research adds to existing literature by studying the effect of national culture on household financial risk-taking, building on previous studies that research the effect of culture on firm financial risk-taking. Results of this study contribute to a better understanding of what drives financial risk-taking as well as a potential answer to the equity premium puzzle. Policymakers can leverage these insights to design solutions that improve household financial risk-taking. The contribution of this research is threefold. This research is amongst the first to separate the effect of culture from institutional differences whilst studying a large and representative sample. Additionally, this research contributes by studying the effect of national culture on real-world financial risk-taking.

Interpretation of results

Results demonstrate that national culture significantly affects household financial risk-taking, as measured by elicited financial risk-taking and equity market participation. Specifically, results indicate that individualism, masculinity, uncertainty avoidance, long-term orientation and indulgence have a significant effect on household financial risk-taking. Of these effects, power distance, individualism and masculinity align with hypothesized effects. A possible interpretation is that cultural heterogeneity can cause a difference in the psychological costs that individuals face upon taking financial risk. Prior research acknowledges that these psychological costs are key in explaining limited financial risk-taking and the equity premium puzzle (Campbell, 2006). Therefore, results suggest that cultural differences can be linked to the level of financial risk households choose to take. Put differently, part of the equity premium puzzle can be explained by cross-country differences in culture. Consequently, policymakers seeking to promote financial risk-taking should consider national culture. Based on this research, solutions that attempt to increase individualism, masculinity and uncertainty avoidance or reduce indulgence and long-term orientation have the potential to improve household financial risk-taking. To provide further insight, the following section will discuss the effects found for each of these dimensions.

Results show that power distance has a negative effect on elicited risk-taking, similar to the effect shown in existing firm-level research. However, power distance does not significantly impact equity market participation. Existing literature suggests that elicited risk-taking may differ from actual risk-taking (Malmendier & Nagel, 2011). Therefore, it could be that power distance influences an individual's beliefs rather than his actual choices. Further research is needed to understand why power distance does not influence real-world financial risk-taking. Continuing, results confirm that more individualistic and more masculine cultures exhibit higher levels of financial risk-taking, in line with existing research demonstrating the positive effect of these dimensions on firm-level risk-taking (Ashraf et al., 2016; Gaganis et al., 2019; Kwok & Tadesse, 2006; Li et al., 2013; McGrath et al., 1992; Meier-Pesti & Penz, 2008). Moreover, results confirm the positive relationship between individualism and financial risk-taking found in research from Breuer et al. (2014). A possible interpretation is that more masculine and individualistic societies are face smaller psychological costs when engaging risky financial behaviour.

Contrary to existing literature, results indicate that uncertainty avoidance has a positive effect on financial risk-taking. However, the effect of uncertainty avoidance on equity market participation only becomes positive after controlling for institutional differences. This could indicate that the negative effect found in existing literature is instead due to cross-country differences in institutions. This suggests that uncertainty avoidance may not contribute to the psychological costs associated with equity market participation. A possible explanation could be that uncertainty avoidance has been found to moderate the effect of ambiguity avoidance in equity markets (Tang & Zhou, 2022). Theoretical models predict that equity market participation is lower if ambiguity of equity markets is higher (Antoniou et al., 2015). If uncertainty avoidance indeed moderates the effect of ambiguity aversion, it should thus have a positive effect on equity market participation. Further research is needed to confirm if this relationship holds in real-world scenarios and when controlling for all cultural dimensions. Furthermore, existing literature indicates that more short-term oriented firms take higher levels of risk (Abdelrahim, 2021; Lumpkin et al., 2010; Naldi et al., 2007; Park & Lemaire, 2011). Conversely, results show that more short-term-oriented cultures exhibit lower levels of financial risk-taking. For equity market participation, this effect only becomes negative after controlling for institutional differences, suggesting how the effects shown in prior research may be driven by institutional differences. A possible explanation for the negative effect of long-term orientation can be found in myopic loss aversion. This occurs when investors are too focussed on the short-term and react too negatively to short-term losses (Benartzi &

Thaler, 1995). Longer-term oriented societies care less about short-term losses. Thus, they could be less affected by myopic loss aversion and in turn take more financial risk. Future research is needed to understand the relationship between myopic loss aversion and culture. Finally, results show that higher levels of indulgence are associated with lower levels of financial risk-taking. This is contrary to existing literature which finds that higher levels of indulgence are often associated with higher levels of risk-taking (Alipour & Yaprak, 2022; Littrell, 2008). A possible explanation for this is that indulgent cultures highly value short-term hedonic behaviour and engage in more impulsive spending (Gupta et al., 2018; Littrell, 2008). If indulgent cultures spend more on short-term hedonic enjoyment, they will always have less money to invest in equity. Future research is needed to confirm if a budget effect of this type influences household financial risk-taking.

Limitations

Like all research, this study faces some limitations. Although the sample has great internal validity, it is challenging to extrapolate results to undeveloped economies. To improve generalizability, developed economies should be included in future research. Another limitation is the exclusive use of cultural dimensions as defined in research from Hofstede (2011), while alternative models exist. Robustness tests further indicate how the effect of culture can differ based on the chosen model for culture. Future research is needed to find what model is best suited to test the effect of culture on financial risk-taking. Additionally, robustness tests show that the effect of age on financial risk-taking is likely non-linear, warranting the use of age cohort dummy variables instead of a continuous variable. Another key limitation of this research is the limited explanatory power of the empirical models. Explanatory power for the model used to study the ratio of risky assets is particularly limited, explaining less than 1% of variation. This is in line with existing research where it is common that models have limited explanatory power when only studying equity market participants (Malmendier & Nagel, 2011). To overcome this, future research could study the ratio of risky assets in an experimental design where the entire population participates in the equity market. Alternatively, limited explanatory power can be explained by the fact that all equity is classified as risky equity. However, research shows that there are risky and less risky types of equity (Campbell, 1996). Hence, labelling all equity as risky can pose a limitation to the methodology of this research. Another reason could be that this study is unable to control for historic returns on household portfolios, suggested by literature as key in

explaining why households differ in portfolio diversity (Malmendier & Nagel, 2011; Sivakumar & Nakata, 2001). This methodological limitation can explain part of why model for the ratio of liquid assets has limited explanatory power. An argument could be made that empirical models for elicited financial risk-taking and equity market participation also have limited explanatory power with r-squared values of 0.15 and 0.22 respectively. However, the explanatory power of these models is similar or larger than values found in prior research. For example, in research from Malmendier & Nagel (2011) an r-squared of 0.1 is reported and in research from (Breuer et al., 2014) an r-squared of 0.06 is reported when studying elicited financial risk-taking. The increase of this research compared to abovementioned studies can be attributed to the inclusion of culture as a driver of financial risk-taking as well as the ability to control for institutional differences. Finally, explanatory power of the model studying equity market participation is significantly larger compared to research from Breuer & Salzmann (2009), who report a r-squared of 0.10. Concluding, explanatory power is relatively low. However, it yields a significant increase over existing literature.

Recommendations

Results show that institutional differences have a significant effect on financial behaviour and that not controlling for these differences biases the estimated effect of culture. Future cross-country research on financial behaviour should therefore always control for these differences. This research further demonstrates that the effect of culture on elicited risk-taking can differ from its effect on real-world financial risk-taking. Therefore, future research should attempt to study real-world behaviour instead of elicited behaviour to provide more accurate insights. Contrary to existing literature, this research finds a positive effect of uncertainty avoidance on financial risk-taking. This could be due to how uncertainty avoidance mitigates the effect of ambiguity avoidance. However, further research is needed to understand the relationship between these two variables. Another area that needs further research is the link between myopic loss aversion and long-term orientation. Myopic loss aversion can explain why results show that contrary to prior research, longer-term-oriented societies take less financial risk. To date, no research has been conducted on the link between myopic loss aversion and long-term orientation. Future research is thus invited to further study this topic. Finally, the negative effect of indulgence on financial risk-taking can potentially be explained by a budget effect. Here, households take less financial risk simply because they intent to spend a larger proportion of their earnings on hedonic goods. Further research is needed to confirm the existence of such a budget effect.

Conclusion

This research concludes that national culture has a significant effect on household financial risk-taking. The relation between national culture and financial risk-taking is studied using elicited financial risk-taking, equity market participation and the ratio of risky assets in portfolios. Using a sample comprising over 120 000 households from 15 EU countries, results indicate that national culture significantly impacts elicited financial risk-taking and equity market participation. Specifically, financial risk taking is increasing in individualism, masculinity, and uncertainty avoidance. Additionally, more short-term oriented or indulgent cultures take less financial risk. Estimated effects are economically significant. For example, individualism can *ceteris paribus* explain a 53-percentage point difference in the probability of participating in the equity market between countries in this sample.

Similar to prior studies on firm-level risk-taking, results demonstrate a positive effect of individualism and masculinity on financial risk-taking. Contrary to existing literature, results show that uncertainty avoidance has a positive effect and long-term orientation as well as indulgence have negative effects on financial risk-taking. A possible explanation is that effects found in previous literature are due to variations in institutions instead of culture. Future research should thus always control for institutions. Alternatively, results can be explained by the effect of ambiguity aversion on uncertainty avoidance, the effect of myopic loss aversion on long-term orientation and a budget effect. Future research is needed to better understand the intricacies of these relationships. To improve generalizability, future research is further invited to replicate this study using a larger sample and develop more accurate methods to measure the level of risk households are willing to take.

In conclusion, findings from this research show how national culture can explain why households differ in financial risk-taking. National culture is linked to the psychological costs related to taking financial risk. Consequently, a potential answer to the equity premium puzzle is that differences in national culture cause differences in equity market participation. Therefore, policymakers seeking to improve financial risk-taking and overcome the equity premium puzzle should consider cultural factors in their solutions. Specifically, they should design solutions that increase individualism, masculinity and uncertainty avoidance or reduce indulgence and long-term orientation. In doing so, they can exploit the significant impact that national culture has on household financial risk taking.

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Appendix

Figure 1, histogram of pdi

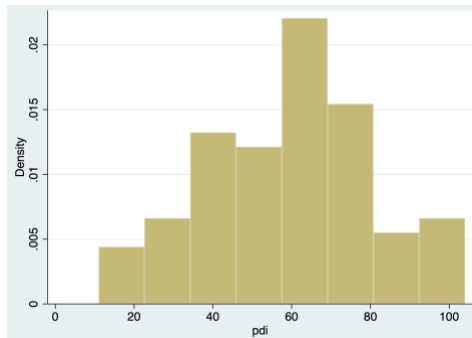


Figure 2, histogram of IDV

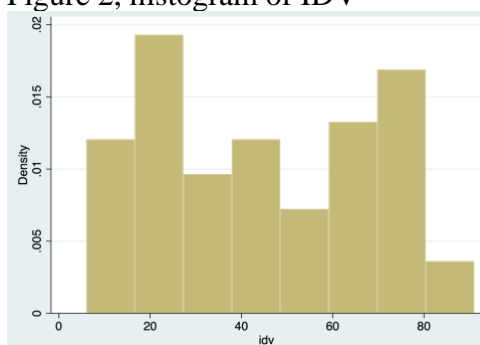


Figure 3, histogram of MAS

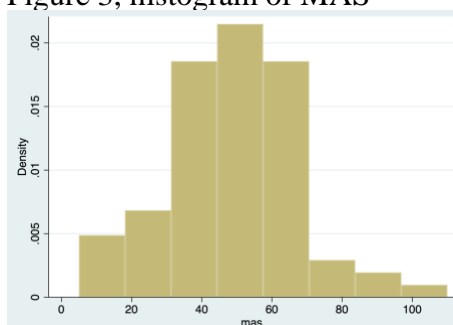


Figure 4, histogram of UAI

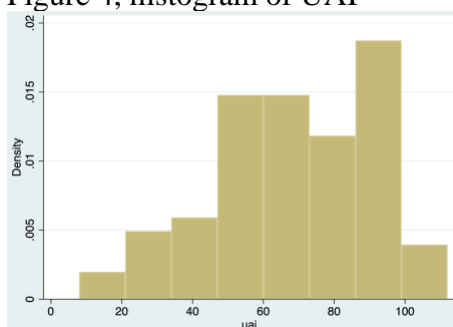


Figure 5, histogram of ITOWVS

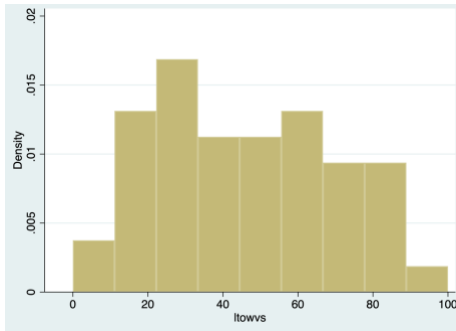


Figure 6, histogram of IDV

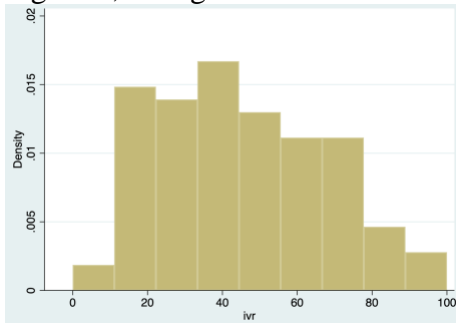


Table 3: Regression results for elicited financial risk-taking, stock market participation and the percentage of liquid assets invested in stocks

Independent variables	<i>Elicited financial risk-taking</i>		<i>Stock market participation</i>		<i>% of liquid assets in stocks</i>	
	I	II	I	II	I	II
<i>PDI</i>	0.003857 ***	0.008203 5***	0.000491 6***	-0.000463	0.00188 82*	0.008515 3
	0.000167 7	0.000794 8	0.000104 7	0.000377 6	0.00098 15	0.005577 2
	-	-	-	-	-	-
<i>IDV</i>	0.005552 ***	0.018718 1***	0.000320 8***	0.004187 2***	0.00018 81	0.010578 6
	0.000290 1	0.003215 3	0.000123 6	0.001424 6	0.00177 33	0.052721
	-	-	-	-	-	-
<i>MAS</i>	0.005871 4***	0.014112 9***	0.002090 4***	0.003294 2***	0.00232 66	- 0.007686
	0.000199 1	0.001802 3	0.000100 3	0.000780 4	0.00244 21	0.015481
	-	-	-	-	-	-
<i>UAI</i>	0.000593 ***	0.022041 5***	0.001798 3***	0.006680 2***	0.00550 8	0.031612 3
	0.000221 4	0.002711 3	0.000115 7	0.001251 8	0.00504 78	0.019454 8
	-	-	-	-	-	-
<i>ITOWVS</i>	0.005902 5***	0.016372 8***	0.000705 6***	0.002242 2***	0.00352 77	0.000652 6
	-	-	-	-	-	-

	0.000346 8	0.001537 7	0.000140 2	0.000693 6	0.00280 47	0.024383 7
				-		
<i>IVR</i>	0.006787 3***	0.025056 5***	0.000839 4***	0.004245 7***	0.00128 74	0.023783 6
	0.000320 7	0.002396 1	0.000133 1	0.001089	0.00154 85	0.021282 3
	-	-			-	-
<i>Male</i>	0.117907 ***	0.119307 9***	0.020956 2***	0.020241 6***	0.05124 21	0.042409 2
	0.007463 3	0.007470 7	0.003224 4	0.003219 7	0.08723 76	0.080961 2
<i>Age</i>	0.004164 5***	0.004259 1***	0.000526 4***	0.000489 5***	0.00365 34*	0.003573 7*
	0.000414 6	0.000414 6	0.000185 1	0.000184 7	0.00190 1	0.001978 4
	-	-			-	-
<i>ln(income)</i>	0.037009 3***	0.039181 3***	0.024707 9***	0.024325 8***	0.03134 84	0.031594 5
	0.005308	0.005356 9	0.004102 8	0.004096 3	0.02975 01	0.029385 7
	-	-				
<i>ln(assets)</i>	0.047022 5***	0.047995 ***	0.050668 5***	0.050861 1***	0.01659 26	0.018307 6
	0.003216 9	0.003240 4	0.002021 5	0.001979 5	0.01767 67	0.017419 2
			-	-	-	
<i>ln(debt)</i>	0.002401 6***	0.001346	0.001414 9***	0.001574 2***	0.00029 57	0.000006 48
	0.000847 7	0.000854 1	0.000319 5	0.000323 5	0.00526 09	0.005140 6
			-	-		
<i>House ownership</i>	0.093594 9***	0.106488 7***	0.063813 2***	0.061843 1***	0.00828 88	0.004284 4
	0.01112	0.011261 6	0.005687 1	0.005658	0.05225 51	0.053641 2
			-	-	-	-
<i>Married</i>	0.048898 1***	0.052277 6***	0.021417 3***	0.021154 5***	0.04216 82	0.043484 5
	0.011430 6	0.011442 6	0.005341 5	0.005317	0.03998 75	0.040299 6
			-	-		
<i>Legal union</i>	0.048512 **	0.069353 7***	0.020529 4**	0.018284 1**	0.08579 94	0.090401 5
	0.021995 5	0.022182 5	0.008357 1	0.008502 1	0.08364 24	0.087049 8
			-	-	-	-
<i>Widowed</i>	0.030349 7**	0.037496 4***	0.026037 1***	0.025906 9***	0.01848 37	0.012411 6

	0.014013 3	0.014034 1	0.007942 6	0.007905 2	0.04533 81	0.045544 8
<i>Divorced</i>	0.029278 1**	0.028789 4**	0.024467 5***	0.024493 3***	0.06124 5	0.06311
		0.014194 6	0.006298 6	0.006267 4	0.05862 47	0.059040 1
<i>Lower secondary education</i>	- 0.040100 9***	- 0.014628 9	- 0.016694 2***	- 0.018015 7***	- 0.31763 47	- 0.310185 7
	0.010576 5	0.010635 6	0.003992 4	0.004024 1	0.35507 07	0.349305 3
<i>Upper secondary education</i>	- 0.078276 ***	- 0.060624 9***	- 0.041058 4***	- 0.041894 7***	- 0.13871 53	- 0.138670 2
	0.009705 7	0.009744 8	0.003670 8	0.003696 4	0.10666 6	0.105063 2
<i>Tertiary/BSc/MSc/PHD</i>	- 0.180522 9***	- 0.161785 1***	- 0.070494 9***	- 0.070884 7***	- 0.19020 37	- 0.189297 3
	0.011886 6	0.011969 6	0.004442 1	0.004441 1	0.14108 8	0.139536 7
<i>Self-employed with employees</i>	- 0.115196 3***	- 0.114110 6***	- 0.023042 3***	- 0.022235 2***	- 0.04283 19	- 0.044567
	0.025770 1	0.025799 6	0.007858 9	0.007874 5	0.14404 38	0.1408
<i>Self-employed without employees</i>	- 0.094170 1***	- 0.090322 9***	- 0.024909 6***	- 0.024791 5***	- 0.10621 02	- 0.100129 2
	0.019988 1	0.019976 9	0.004877 9	0.004865 6	0.11613 74	0.114245 3
<i>Unpaid family worker</i>	- 0.015268 9	- 0.011792 8	- 0.041457 4**	- 0.040216 1**	- 0.43354 94	- 0.247081
	0.083209 2	0.084201 2	0.019303 1	0.019890 1	0.46688 23	0.268781 7
<i>On leave and planning to return</i>	- 0.038238 1	- 0.041904 7	- 0.009590 7	- 0.010407 4	- 0.04970 4	- 0.036915 3
	0.039163 4	0.039125 2	0.020524 1	0.020508 2	0.09943 73	0.104608 8
<i>Unemployed</i>	- 0.003284 8	- 0.001828 3	- 0.010011 3	- 0.009226 9	- 0.14260 46	- 0.140145 8
	0.015993 7	0.016002 6	0.010234 9	0.010130 9	0.11411 54	0.111544 3

	-	-				
<i>Student/ unpaid intern</i>	0.155714 ***	0.148670 2***	0.078657 7**	0.078426 4**	0.36036 07	0.352467 5
	0.038710 8	0.039004 9	0.031014 4	0.030643 2	0.24394 12	0.237056 5
<i>Retiree</i>	0.035133 ***	0.031742 7***	0.002367 9	0.003109 3	0.00943 44	0.008182 1
	0.012065 8	0.012070 7	0.005219 7	0.005213 9	0.09306 78	0.093087 8
			-	-		
<i>Disabled</i>	0.065072 **	0.075689 9***	0.018714 6	0.018332 2	0.22954 63	0.225136 6
	0.027426 1	0.027662 1	0.018351 2	0.018386	0.19419	0.194199 7
	-	-	-	-		
<i>Military or social service</i>	0.164106 7	0.166627 5	0.048134 2**	0.048561 3**	0.68492 84	0.674010 2
	0.152307 3	0.162848 2	0.022791 1	0.022606 7	0.64774 06	0.647475 6
	-	-	-	-		
<i>Fulfilling domestic tasks</i>	0.013852 1	0.004746 9	0.023655 9***	0.021947 5***	0.10875 63	0.109943 7
	0.016504 4	0.016493	0.007297 1	0.007397 5	0.14646 12	0.144408 7
	-	-	-	-		
<i>Other not working for pay</i>	0.000820 2	0.008050 3	0.020780 1*	0.019160 4*	0.11759 21	0.083545 7
	0.019476 9	0.019528 2	0.010976 5	0.011092	0.12420 45	0.108644 2
					-	-
<i>1 child</i>	0.008054 6	0.007548 9	0.003064	0.003706	0.01380 05	0.016623 2
	0.011238 7	0.011242 1	0.004572 5	0.004581 5	0.05946 29	0.058920 1
					-	-
<i>2 children</i>	0.021932 6*	0.023858 2**	0.008921 2*	0.009707 8**	0.04099 29	0.044236 6
	0.012119 5	0.012119 3	0.004748 8	0.004758 7	0.04425 87	0.045387 7
	-	-	-	-	-	-
<i>3 children</i>	0.012376 7	0.007606 9	0.013252 **	0.012056 7*	1.23894 6	- 1.234786
	0.022323 8	0.022217 2	0.006408 1	0.006477 9	1.13153 4	1.125429
			-	-	-	-
<i>4 children</i>	0.030682 2	0.029836 1	0.019834 8*	0.018989 5*	0.01598 66	0.023219 9
	0.040152 6	0.039990 6	0.011044 1	0.011123 3	0.20927 3	0.208821 4

<i>5 children</i>	0.057578	0.059611	0.003917	0.007026	0.26297	0.269962
	9	4	4	4	57	2
<i>6 children</i>	0.060072		0.023248	0.023551	0.28930	0.289772
	4	0.060175	8	4	58	3
	0.141367	0.132218	0.068989	0.067805	0.17432	0.187175
	**	2*	6	7	64	2**
	0.070023	0.101369	0.102752	0.13872	0.093594	
	0.066364	9	9	4	43	1
		-	-			
<i>7 children</i>	0.296060	0.297728	0.048419	0.048950	0.49043	
	8*	4*	1**	1***	61	0.488941
	0.166732	0.165884	0.019020	0.018835	0.64687	0.667081
	5	3	7	9	19	6
			-	-		
<i>8 children</i>	0.451408	0.435623	0.082201	0.082079	1.66034	1.653572
	2***	4***	4***	3***	6*	*
	0.060392	0.053619	0.004913	0.004874	0.96599	0.993395
	4	2	5	6	34	5
	-	-	-	-	-	-
<i>9 children</i>	0.050861	0.016463	0.007371		0.03015	0.053807
	8	7	8	-0.01027	71	5
	0.140612	0.139773	0.040841		0.14938	0.134451
	2	7	1	0.039137	76	1
			-	-		
<i>10 or more children</i>	0.186546	0.233282	0.069018	0.069147	0.84519	0.821271
	2	6	7***	9***	68	4
	0.213023	0.221274	0.013032	0.012779	0.79206	0.797224
	1	4	7	2	11	7
	-		-			
<i>2010</i>	0.015894		0.017040		0.95743	
	8		9***		51	
			0.005854		0.92795	
	0.016375		7		59	
<i>2013</i>	0.137993		0.000950		0.88585	
	2***		1		88	
	0.017116		0.009089		0.88047	
	6		3		83	
			-			
<i>2014</i>	0.137223		0.029094		1.06536	
	7***		2***		5	
	0.016159		0.004896		0.95604	
	6		8		78	
			-			
<i>2016</i>	0.171699		0.046154		1.21089	
	***		9***		5	
	0.021357		0.007438		0.93988	
	1		5		62	

2017	0.103755 7***	- 0.033055 1***	1.05227 7
	0.016402 1	0.005053 5	0.95117 96
2018	0.036802 2**	- 0.064686 ***	1.02134 8
	0.018305 7	- 0.064686 ***	0.72484 75
% protestant	2.594056 ***	- 0.644354 3***	0.477318
	0.309034 3	0.134110 4	4.322909
% catholic	2.60228* **	- 0.648147 7***	0.502292 9
	0.309425 3	0.134373 8	4.309312
% muslin	2.597197 ***	- 0.624168 1***	0.192591 9
	0.318466	0.137162 4	4.710252
% other faith	2.602179 ***	- 0.649612 6***	0.507290 2
	0.309349	0.134344 9	4.303618
Bank sector development	0.003770 3***	0.000029 6	0.001256 3
	0.000374 8	0.000211 4	0.002099 3
Stock market development	- 0.003195 7***	- 0.000272	- 0.003322 2
	0.000429 4	0.000192 3	0.003782 8
GDP per capita	- 0.074886 8	- 0.057334 5**	- 0.000023 1
	0.079279 7	0.028996 3	0.000039 6
Dependency ratio	0.049885 5***	- 0.005394 5***	- 0.156703 8

		0.005068 7	0.001218 4	0.118236 1
<i>Expected inflation</i>		5.411032 ***	0.366301 1	32.43736
		0.812099 7	0.484364 4	26.82156
<i>Constant</i>		-	-	-
	4.144658 ***	255.5826 ***	1.17413 7	53.09567
	0.061846 4	31.34895	1.40164 2	427.1581

*Notes: The table shows coefficient estimates for three different models at the household level with national culture dimensions as the main explanatory variables. The three models are specified as follows: model 1 is an ordinary least squares regression with elicited financial risk-taking as dependent variable, model two shows the marginal effects of a probit regression with a binary variable for stock market participation as dependent variable, model three is an ordinary least squares regression with the % of liquid assets invested in stocks as dependent variable. For each model, the first column reports results without controls for institutional differences and the second column reports results with institutional differences controlled for. *** indicates the coefficient is different from 0 at the 1% level, ** indicates the coefficient is different from 0 at the 5% level and * indicates that the coefficient is different from 0 at the 10% level. Standard errors are given below the estimated coefficients.*

Table 6: regression results using Schwarz cultural values

Independent variables	<i>Elicited financial risk-taking</i>		<i>Stock market participation</i>	
	I	II	I	II
<i>Harmony</i>	-0.39***	-0.38***	0.0893254**	-0.0209922
	0.0386002	0.148036	0.0172173	0.0493505
<i>Embeddedness</i>	-0.01	-3.19***	0.0703406**	-0.0302404
	0.0410681	0.3052933	0.0180234	0.0891793
<i>Hierarchy</i>	0.293***	0.486***	-0.0034992	-0.040304*
	0.0193242	0.1075555	0.0081446	0.0223638
<i>Mastery</i>	-0.00	-4.36***	0.2630752**	-0.0192107
	0.0344233	0.5625295	0.0167639	0.1315696
<i>Aff auton</i>	0.156***	-0.59***	0.1155144**	-0.0197683
	0.0224464	0.0789752	0.0099698	0.0371061
<i>Intel auton</i>	-0.27***	-0.72***	-	-0.020106
	0.0291979	0.0732187	0.107033***	0.0122675
				0.04362

<i>Male</i>	-0.11***	-0.11***	0.0209346**	0.0220122**
	0.0074784	0.0074846	0.0032278	0.0034084
<i>Age</i>	0.004***	0.004***	0.0005644**	0.0005573**
	0.0004149	0.0004154	0.0001859	0.0002016
<i>ln(income)</i>	-0.04***	-0.03***	0.0252789**	0.0233818**
	0.0053553	0.005366	0.0041439	0.0044266
<i>ln(assets)</i>	-0.04***	-0.04***	0.0504421**	0.0533402**
	0.003233	0.0032532	0.0020242	0.0021626
<i>ln(debt)</i>	0.002***	0.001	0.0011828**	0.0016053**
	0.0008476	0.000856	0.0003205	0.0003483
<i>House ownership</i>	0.106***	0.109***	0.0612342**	0.0650377**
	0.0112805	0.0113052	0.0057014	0.0061046
<i>Married</i>	0.050***	0.051***	0.0229879**	0.0218472**
	0.0114292	0.01147	0.0053631	0.0057276
<i>Legal union</i>	0.089***	0.067***	0.0244843**	-0.0177165*
	0.0220252	0.0222762	0.0082317	0.0091112
<i>Widowed</i>	0.033**	0.036***	0.0269303**	0.0266885**
	0.0140246	0.0140628	0.0079877	0.0086
<i>Divorced</i>	0.027*	0.029**	0.0250545**	0.0260965**
	0.0142071	0.0142337	0.0063407	0.0067151
<i>Lower secondary education</i>	-0.03***	-0.01	0.0188655**	0.0171333**
	0.0106533	0.0106538	0.004108	0.0044407
<i>Upper secondary education</i>	-0.08***	-0.05***	0.0386484**	0.0413051**
	0.0096145	0.0097536	0.0036917	0.0040622
<i>Tertiary/BSc/MSc/PHD</i>	-0.17***	-0.15***	0.0696762**	0.0741301**
	0.0119833	0.0119868	0.0045106	0.0048562

<i>Self-employed with employees</i>	-0.11***	-0.11***	0.0230186** *	0.0233941** *
	0.0258045	0.0258034	0.0078927	0.0083714
<i>Self-employed without employees</i>	-0.09***	-0.09***	0.026004***	0.0266552** *
	0.0199774	0.0200062	0.004851	0.0051054
<i>Unpaid family worker</i>	-0.01	-0.01	0.0424614**	0.0427064**
	0.0832273	0.0846852	0.0185879	0.0206091
<i>On leave and planning to return</i>	0.043	0.040	0.0084544	0.0112467
	0.0390981	0.0391852	0.0203206	0.0215966
<i>Unemployed</i>	0.004	-0.00	-0.0074506	-0.0107351
	0.0160198	0.0160225	0.0103975	0.0104822
<i>Student/ unpaid intern</i>	-0.14***	-0.14***	0.0888799** *	0.0784891**
	0.0389263	0.0390285	0.0314992	0.0315728
<i>Retiree</i>	0.029**	0.031***	0.0018279	0.0015377
	0.0120888	0.0120866	0.0052108	0.0056193
<i>Disabled</i>	0.085***	0.082***	-0.011978	-
	0.0276787	0.027813	0.0189602	-
<i>Military or social service</i>	-0.15	-0.16	-0.0409079	-
	0.161569	0.1689409	0.0287109	-
<i>Fulfilling domestic tasks</i>	-0.01	-0.00	0.0244953** *	-
	0.0165016	0.016511	0.0072185	-
<i>Other not working for pay</i>	-0.00	0.016	0.0221476**	-
	0.0194833	0.0195327	0.0108122	-
<i>1 child</i>	0.011	0.007	0.0032293	0.0049586
	0.0112536	0.0112646	0.0045816	0.0049575
<i>2 children</i>	0.024**	0.024**	0.0083661*	0.011742**
	0.0121404	0.0121435	0.0047464	0.0051399
<i>3 children</i>	-0.00	-0.00	0.0128257**	-0.0107339
	0.0223595	0.0222746	0.0064085	0.0071365
<i>4 children</i>	0.037	0.030	-0.0192961*	-0.0165946
	0.0401245	0.0399249	0.0110254	0.0124607
<i>5 children</i>	0.067	0.059	0.00695	0.0066405
	0.0625485	0.0601439	0.0231864	0.0275155
<i>6 children</i>	0.141**	0.140**	0.0806216	0.0775278

	0.0686771	0.0682107	0.1001084	0.1149806
<i>7 children</i>	0.328*	0.314*	-0.0350882	-
	0.1686157	0.1701883	0.0240849	-
			-	
			0.0817142**	
<i>8 children</i>	0.464***	0.436***	*	-
	0.0514625	0.0520734	0.0055261	-
<i>9 children</i>	0.004	-0.01	0.0307687	-
	0.1627483	0.1477443	0.0558611	-
			-	
			0.0593875**	
<i>10 or more children</i>	0.282	0.255	*	-
	0.2104313	0.2325539	0.0186304	-
			-	
			0.0489263**	
<i>2010</i>	0.012	-	*	-
	0.0189284	-	0.0060962	-
			0.0549957**	
<i>2013</i>	0.137***	-	*	-
	0.0182874	-	0.0123812	-
			-	
			0.0633396**	
<i>2014</i>	0.133***	-	*	-
	0.0170597	-	0.0050641	-
			-	
			0.0796821**	
<i>2016</i>	0.202***	-	*	-
	0.0232138	-	0.0076247	-
			-	
			0.0662709**	
<i>2017</i>	0.097***	-	*	-
	0.0174581	-	0.0050561	-
			-	
			0.0845864**	
<i>2018</i>	0.032*	-	*	-
			-	
			0.0845864**	
	0.0185356	-	*	-
<i>% protestant</i>	-	-0.03***	-	-0.000338
	-	0.0059309	-	0.0111738
<i>% catholic</i>	-	-0.01***	-	-0.0018029
	-	0.003145	-	0.0115515
<i>% muslin</i>	-	-0.51***	-	0.0257453*
	-	0.1088758	-	0.0139206
<i>% other faith</i>	-	-	-	-0.0023475

	-	-	-	0.0121743
<i>Bank sector development</i>	-	0.001***	-	0.0004781*
	-	0.000336	-	0.0002449
<i>Stock market development</i>	-	-0.00*	-	0.0000738
	-	0.0003639	-	0.0001829
<i>GDP per capita</i>	-	-1.01***	-	-0.0143876
	-	0.0869454	-	0.020685
				-
				0.0026475**
<i>Dependency ratio</i>	-	0.062***	-	*
	-	0.0056192	-	0.0010048
<i>Expected inflation</i>	-	3.217***	-	0.0054081
	-	0.6566531	-	0.341627
<i>Constant</i>	6.293***	49.07***	-	-
	0.4479036	4.767527	-	-

*Notes: The table shows coefficient estimates for three different models at the household level with national culture dimensions as the main explanatory variables. The three models are specified as follows: model 1 is an ordinary least squares regression with elicited financial risk-taking as dependent variable, model two shows the marginal effects of a probit regression with a binary variable for stock market participation as dependent variable, model three is an ordinary least squares regression with the % of liquid assets invested in stocks as dependent variable. For each model, the first column reports results without controls for institutional differences and the second column reports results with institutional differences controlled for. *** indicates the coefficient is different from 0 at the 1% level, ** indicates the coefficient is different from 0 at the 5% level and * indicates that the coefficient is different from 0 at the 10% level. Standard errors are given below the estimated coefficients.*

Table 7: Regression results for elicited financial risk-taking, stock market participation and the percentage of liquid assets invested in stocks excluding 10% highest and lowest net wealth households

Independent variables	<i>Elicited financial risk-taking</i>		<i>Stock market participation</i>	
	I	II	I	II
<i>PDI</i>	0.0039133***	0.0084963***	0.0036272***	-0.0022928
	0.0001932	0.0009165	0.0010574	0.0036392
<i>IDV</i>	-0.0052811***	-0.0210099***	-0.0025236**	0.0316359**
	0.0003535	0.0036869	0.0012005	0.0138739
<i>MAS</i>	-0.005825***	-0.0152473***	-0.0149736***	0.0224033***
	0.0002356	0.0020803	0.0008855	0.0073041
<i>UAI</i>	-0.0005358**	-0.0243865***	-0.0138896***	0.0455382***
	0.0002573	0.0031338	0.0011464	0.0117028
<i>ITOWVS</i>	0.005939***	0.0175714***	0.0051431***	-0.0146572**
	0.0004178	0.0017764	0.0012882	0.0066633
<i>IVR</i>	0.0068342***	0.0265229***	0.0063963***	-0.0271274***
	0.0003712	0.0027756	0.0012917	0.0102215

<i>Male</i>	-0.1097913***	-0.1123686***	0.1568985***	0.1521662***
	0.0087133	0.0087154	0.0308792	0.0309121
<i>Age</i>	0.0045816***	0.0046332***	0.0034464**	0.0032117*
	0.0004913	0.0004921	0.0017239	0.0017248
<i>ln(income)</i>	-0.0200052***	-0.021718***	0.1503838***	0.1496174***
	0.006524	0.0065652	0.0409282	0.0411101
<i>ln(assets)</i>	-0.0831414***	-0.083597***	0.444606***	0.4502715***
	0.0057772	0.0058428	0.0243229	0.0244543
<i>ln(debt)</i>	0.0046856***	0.0035159***	-0.009247***	-0.010261***
	0.0010356	0.0010441	0.0030752	0.0031135
<i>House ownership</i>	0.1289388***	0.144573***	-0.5322179***	-0.5253481***
	0.0128844	0.0130654	0.0418985	0.042142
<i>Married</i>	0.0609579***	0.0627845***	-0.1845815***	-0.1841683***
	0.0137197	0.0137245	0.0448675	0.0448048
<i>Legal union</i>	0.0656774***	0.0777988***	-0.1153081	-0.1063824
	0.0234956	0.0236374	0.0734353	0.0739574
<i>Widowed</i>	0.0417714**	0.0474923***	-0.2526309***	-0.2524217***
	0.0163863	0.0163996	0.0744727	0.0744352
<i>Divorced</i>	0.0500657***	0.0489043***	-0.1505516***	-0.1509902***
	0.0167808	0.0168013	0.0539118	0.0538574
<i>Lower secondary education</i>	-0.0284451**	-0.0021113	0.2006239***	0.2114823***
	0.0120491	0.0121226	0.0550425	0.0556507
<i>Upper secondary education</i>	-0.0822942***	-0.0642052***	0.3958124***	0.4018169***
	0.0111092	0.0111512	0.049338	0.0502811
<i>Tertiary/BSc/MSc/PHD</i>	-0.1640417***	-0.1450828***	0.6208705***	0.6243695***
	0.0139784	0.014062	0.0523437	0.0531796
<i>Self-employed with employees</i>	-0.0826109**	-0.0802808**	-0.1135945	-0.110267
	0.0366705	0.0364766	0.1339944	0.1332891
<i>Self-employed without employees</i>	-0.0764887***	-0.0713755***	-0.191153***	-0.1911855***
	0.0249995	0.0249734	0.0616675	0.0617447
<i>Unpaid family worker</i>	0.0537555	0.0576662	-0.2959951	-0.2858106
	0.0795473	0.0797713	0.3533981	0.3601269
<i>On leave and planning to return</i>	0.029868	0.033985	0.1460346	0.1490977
	0.0502073	0.0501063	0.1637653	0.1634063
<i>Unemployed</i>	0.0207069	0.0257181	-0.1292241	-0.1263342
	0.0206293	0.0206056	0.104957	0.104106
<i>Student/unpaid intern</i>	-0.1549747***	-0.146234***	0.5271978***	0.5306778***

	0.0541978	0.054851	0.1748619	0.1744966
<i>Retiree</i>	0.048039***	0.0462734***	0.0148368	0.0201247
	0.0139557	0.0139619	0.0478954	0.0479141
<i>Disabled</i>	0.1151781***	0.125955***	-0.396552***	-0.3940799***
	0.0295382	0.0294399	0.0945701	0.0958615
<i>Military or social service</i>	-0.1917262	-0.2036964	-0.7833087**	-0.7927746**
	0.1700248	0.1771358	0.3414552	0.3437897
<i>Fulfilling domestic tasks</i>	0.008078	0.0207113	-0.2149683***	-0.1964825**
	0.0190233	0.0189814	0.0764628	0.0766861
<i>Other not working for pay</i>	0.0037976	0.0165846	-0.1991839	-0.1900887
	0.0259752	0.0261282	0.1231305	0.1228582
<i>1 child</i>	0.0132396	0.0135459	0.0207415	0.0248231
	0.0134481	0.013447	0.0424779	0.0425435
<i>2 children</i>	0.0200803	0.0222332	0.0662064	0.0705828*
	0.0140468	0.0140393	0.0422597	0.0422611
<i>3 children</i>	0.0288707	0.0341106	-0.177564**	-0.1692119**
	0.0252654	0.0251851	0.0688357	0.0692669
<i>4 children</i>	0.0612814	0.0601081	-0.2863104**	-0.283981**
	0.0521328	0.0516111	0.1319902	0.1330875
<i>5 children</i>	0.1497754**	0.1546345***	-0.0579607	-0.0391431
	0.0620301	0.0578869	0.2142042	0.2150902
<i>6 children</i>	0.1052663	0.0881518	0.5588234	0.5675455
	0.0762544	0.0766583	0.6345157	0.6411529
<i>7 children</i>	-0.127018	-0.1225074	-0.4852451	-0.4993974
	0.2020627	0.1982329	0.3462354	0.3459216
<i>8 children</i>	0.488449***	0.4592572***	-1.58244***	-1.599242***
	0.0422695	0.0438258	0.4433204	0.4464332
<i>9 children</i>	0.1002473	0.1426017	-0.1528837	-0.1717758
	0.116248	0.1095125	0.4022337	0.400549
<i>10 or more children</i>	0.2012454	0.2555527	-1.362691***	-1.372808***
	0.2213025	0.2294664	0.4964965	0.4970089
<i>2010</i>	-0.0534577***		-0.1147045**	
	0.0168708		0.0447	
<i>2013</i>	0.1113996***		-0.0155371	
	0.0177934		0.0705693	
<i>2014</i>	0.1059905***		-0.1726513***	
	0.0165115		0.0366178	
<i>2016</i>	0.1403522***		-0.3726561***	
	0.0228599		0.0743236	

2017	0.0799755***		-0.2305206***	
	0.0169177		0.03941	
2018	0.005365		-0.480957*	
	0.0188832		-0.480957*	
% protestant		2.873422***		-4.738663***
		0.356582		1.259782
% catholic		2.88281***		-4.765639***
		0.3570504		1.262032
% muslin		2.876741***		-4.601899***
		0.3671719		1.292975
% other faith		2.882749***		-4.775554***
		0.3569656		1.261475
Bank sector development		0.0035686***		0.0015865
		0.000434		0.0020777
Stock market development		-0.0030129***		0.0003604
		0.0004926		0.0018447
GDP per capita		-0.0567997		-0.45095
		0.0908901		0.285842
Dependency ratio		0.0542887***		-0.0373419***
		0.0058598		0.011468
Expected inflation		6.62578***		-3.395846
		0.9161612		5.008707
Constant	4.324095***	-283.5304***	-6.945691***	468.6336***
	0.0807085	36.16583	0.3847193	127.8272

*Notes: The table shows coefficient estimates for three different models at the household level with national culture dimensions as the main explanatory variables. The three models are specified as follows: model 1 is an ordinary least squares regression with elicited financial risk-taking as dependent variable, model two shows the marginal effects of a probit regression with a binary variable for stock market participation as dependent variable, model three is an ordinary least squares regression with the % of liquid assets invested in stocks as dependent variable. For each model, the first column reports results without controls for institutional differences and the second column reports results with institutional differences controlled for. *** indicates the coefficient is different from 0 at the 1% level, ** indicates the coefficient is different from 0 at the 5% level and * indicates that the coefficient is different from 0 at the 10% level. Standard errors are given below the estimated coefficients.*

Table 8: Regression with age cohort dummies

Independent variables	<i>Elicited financial risk-taking</i>		<i>Stock market participation</i>	
	I	II	I	II
<i>PDI</i>	0.0038624***	0.0081821***	0.0038693***	-0.0031335
	0.0001678	0.0007954	0.0008437	0.0029847

	-	-	-	
<i>IDV</i>	0.0055592***	0.0186265***	0.0025398***	0.0310954***
	0.0002902	0.0032157	0.0009754	0.0113204
	-	-	-	
<i>MAS</i>	0.0058659***	0.0140334***	0.0166855***	0.02487***
	0.0001994	0.0018038	0.0007328	0.0061421
	-	-	-	
<i>UAI</i>	0.0005779***	0.0219417***	0.0144511***	0.0512095***
	0.0002218	0.0027145	0.0009146	0.0098239
	-	-	-	
<i>ITOWVS</i>	0.0059147***	0.0163183***	0.005611***	0.0168074***
	0.0003468	0.0015392	0.0010746	0.0055163
	-	-	-	
<i>IVR</i>	0.0067779***	0.0249552***	0.0066781***	0.0321777***
	0.000321	0.0023993	0.0010815	0.0085693
	-	-	-	
<i>Male</i>	0.1176182***	0.1189869***	0.169846***	0.1643952***
	0.0074609	0.0074686	0.0263354	0.0263396
<i>Age 20-30</i>	-0.017479	-0.0156113	0.7666659***	0.7666659***
<i>Age 20-30</i>	0.0638292	0.0641002	0.1342359	0.1342359
<i>Age 30-40</i>	0.0220029	0.0264815	0.7987152***	0.7987152***
<i>Age 30-40</i>	0.0651682	0.0654689	0.1409096	0.1409096
<i>Age 40-50</i>	0.0665795	0.0704079	0.8778704***	0.8778704***
<i>Age 40-50</i>	0.0650134	0.065305	0.1400991	0.1400991
<i>Age 50-60</i>	0.0848047	0.0891063	0.888476***	0.888476***
<i>Age 50-60</i>	0.0652101	0.0655048	0.140795	0.140795
<i>Age 60-70</i>	0.1438521**	0.1492211**	0.875782***	0.875782***
<i>Age 60-70</i>	0.0661749	0.0664628	0.1459178	0.1459178
<i>Age 70-80</i>	0.1892373***	0.1958353***	0.8840848***	0.8840848***
<i>Age 70-80</i>	0.0666877	0.0669768	0.1506768	0.1506768
<i>Age 80-90</i>	0.2210634***	0.2289575***	0.8872402***	0.8872402***
<i>Age 80-90</i>	0.0670365	0.0673235	0.1587535	0.1587535
	-	-	-	
<i>ln(income)</i>	0.0364515***	0.0385913***	0.1965008***	0.1935507***
	0.0053137	0.0053635	0.0328454	0.0328846
	-	-	-	
<i>ln(assets)</i>	0.0467724***	0.0477258***	0.4015749***	0.4038811***
	0.00321	0.0032329	0.0151474	0.0151572
	-	-	-	
<i>ln(debt)</i>	0.0023383***	0.0012731	0.0118799***	0.0131595***
	0.000849	0.0008554	0.002539	0.0025763
	-	-	-	
<i>House ownership</i>	0.0948375***	0.1078147***	0.4524604***	0.4411023***
	0.0111182	0.0112584	0.0359329	0.0361915
	-	-	-	
<i>Married</i>	0.0538194***	0.0574736***	0.1615313***	0.1600642***

	0.0115119	0.0115255	0.0383979	0.0383601
<i>Legal union</i>	0.0501182**	0.0708783***	-0.1510642**	-0.1328199**
	0.0220225	0.0222113	0.0656806	0.0661563
			-	-
<i>Widowed</i>	0.035102**	0.0424037***	0.1790094***	0.1787131***
	0.013816	0.0138387	0.0627063	0.0626315
			-	-
<i>Divorced</i>	0.0360839**	0.0359971**	0.1884233***	0.1898925***
	0.0144348	0.0144602	0.0486328	0.04862
<i>Lower secondary education</i>	-			
	0.0391826***	-0.0136538	0.1897327***	0.2050974***
	0.0106177	0.0106732	0.0468916	0.0473801
<i>Upper secondary education</i>	-	-		
	0.0785577***	0.0609548***	0.3958368***	0.4068479***
	0.0096103	0.0096458	0.041573	0.0423566
	-			
<i>Tertiary/BSc/MSc/PHD</i>	0.1811075***	-0.162507***	0.6025513***	0.610751***
	0.0117851	0.0118691	0.0432914	0.0441011
<i>Self-employed with employees</i>	-	-	-	-
	0.1143152***	0.1131171***	0.1963416***	-0.1896166**
	0.0257841	0.0258118	0.0745452	0.0745065
<i>Self-employed without employees</i>	-			
	0.0928463***	-0.088965***	0.2115989***	0.2114572***
	0.0199186	0.0199071	0.0461933	0.0463481
<i>Unpaid family worker</i>	-0.0159974	-0.0125282	-0.3775919	-0.3645011
	0.0819396	0.0829601	0.2340694	0.2383224
<i>On leave and planning to return</i>				
	0.0373826	0.0409056	0.0755408	0.0817876
	0.0389619	0.0389165	0.1490496	0.1488275
<i>Unemployed</i>	-0.0015638	-0.00000212	-0.0770246	-0.0711784
	0.01605	0.0160603	0.0862386	0.0851609
	-	-		
<i>Student/ unpaid intern</i>	0.1716585***	0.1641414***	0.5929112***	0.5937136***
	0.042519	0.042901	0.1685722	0.1672781
<i>Retiree</i>	0.0313405**	0.0280474**	0.084676*	0.0933701**
	0.0133968	0.0133936	0.0449249	0.0450669
<i>Disabled</i>	0.0682801**	0.0792249***	-0.1534508	-0.1519962
	0.0275526	0.0277906	0.1674455	0.1681885
<i>Military or social service</i>				
	-0.1665245	-0.1684857	-0.2375221	-0.2473367
	0.1548591	0.1652268	0.4021729	0.4052574
			-	
<i>Fulfilling domestic tasks</i>	-0.0132341	-0.0040626	0.1893318***	-0.1734903**
	0.0166115	0.0165989	0.0692419	0.0694907
<i>Other not working for pay</i>				
	-0.0002606	0.0087787	-0.1459498	-0.1314395

	0.01964	0.0196857	0.1023724	0.1024728
<i>1 child</i>	0.0054232	0.0046816	0.016791	0.0215652
	0.0114879	0.0114893	0.0359873	0.0360694
<i>2 children</i>	0.0159001	0.0173417	0.0582233	0.0641609*
	0.0129658	0.0129655	0.0376164	0.0376683
<i>3 children</i>	-0.0189501	-0.0146712	-0.1223783**	-0.1125182*
	0.0227194	0.0226188	0.0581265	0.0583943
<i>4 children</i>	0.0235766	0.0221008	-0.1820367*	-0.1747069
	0.040493	0.0403064	0.1070623	0.1073073
<i>5 children</i>	0.0527931	0.0541508	0.0414074	0.0634719
	0.06012	0.0602249	0.1797728	0.178657
<i>6 children</i>	0.1352407**	0.1255563*	0.4457114	0.4393817
	0.0677758	0.0713289	0.5337678	0.5455053
<i>7 children</i>	0.2961982*	0.2978114*	-0.4597754*	-0.4727643*
	0.166879	0.1660965	0.2762956	0.2792005
<i>8 children</i>	0.4388256***	0.4230898***	-1.523486***	-1.532596***
	0.0625429	0.0557495	0.4041701	0.4116443
<i>9 children</i>	-0.052055	-0.0184553	-0.0482816	-0.0760769
	0.1352443	0.1345674	0.3482169	0.3441524
<i>10 or more children</i>	0.1640812	0.2102671	-0.8703862**	-0.8796144**
	0.2103291	0.2190054	0.3638703	0.3628376
			-	
<i>2010</i>	-0.0159443		0.1250247***	
	0.0163829		0.0391321	
<i>2013</i>	0.138075***		-0.0010854	
	0.0171173		0.0581392	
<i>2014</i>	0.1370477***		-0.213351***	
	0.0161567		0.0324699	
			-	
<i>2016</i>	0.1721976***		0.3561357***	
	0.0213499		0.0600233	
<i>2017</i>	0.1042865***		-0.24527***	
	0.0164085		0.0340747	
			-	
<i>2018</i>	0.0377946**		0.5451982***	
	0.0183147		0.1925403	
<i>% protestant</i>		2.580045***		-4.898371***
		0.3092085		1.057835
<i>% catholic</i>		2.588267***		-4.928285***
		0.3096011		1.059831
<i>% muslin</i>		2.582718***		-4.732275***
		0.3186172		1.082935
<i>% other faith</i>		2.588174***		-4.939999***
		0.3095254		1.059503

<i>Bank sector development</i>		0.0037472***		0.0002807
		0.0003747		0.0016691
<i>Stock market development</i>		-		
		0.0031676***		0.0019531
<i>GDP per capita</i>		0.0004296		0.0015177
		-0.0772774		-0.408807*
<i>Dependency ratio</i>		0.0792595		0.2309243
		-		-
<i>Expected inflation</i>		0.0499702***		0.0421444***
		0.0050739		0.0096093
<i>Constant</i>		5.384033***		-2.559953
		0.8133364		3.856511
<i>Constant</i>	4.261977***	-254.0479***	-7.544083***	483.7993***
	0.0866792	31.36682	0.2949682	107.269

*Notes: The table shows coefficient estimates for two different models at the household level with national culture dimensions as the main explanatory variables. The two models are specified as follows: model 1 is an ordinary least squares regression with elicited financial risk-taking as dependent variable, model two shows the marginal effects of a probit regression with a binary variable for stock market participation as dependent variable. For each model, the first column reports results without controls for institutional differences and the second column reports results with institutional differences controlled for. *** indicates the coefficient is different from 0 at the 1% level, ** indicates the coefficient is different from 0 at the 5% level and * indicates that the coefficient is different from 0 at the 10% level. Standard errors are given below the estimated coefficients.*

Table 9: Regression results using liquid assets instead of total assets

Independent variables	<i>Elicited financial risk-taking</i>		<i>Stock market participation</i>	
	I	II	I	II
<i>PDI</i>	0.0032769***	0.0080702***	0.0070293***	-0.0034412
	0.0001761	0.0008194	0.000823	0.0031764
<i>IDV</i>	-	-	-	-
	0.0052638***	0.0181381***	0.0038748***	0.0427209***
<i>MAS</i>	0.0003044	0.0032422	0.0010585	0.0124436
	-	-	-	-
<i>UAI</i>	0.0057113***	0.0137529***	0.0171876***	0.027747***
	0.000207	0.0018306	0.0007747	0.006529
<i>ITOWVS</i>	-	-	-	-
	-0.0003697	0.0221917***	0.0153828***	0.0551074***
<i>IVR</i>	0.0002259	0.0027996	0.0009621	0.0104551
	0.0057381***	0.0164395***	0.0044045***	0.0236007***
<i>IVR</i>	0.0003554	0.0015693	0.001105	0.0059156
	-	-	-	-
<i>IVR</i>	0.0066593***	0.0259537***	0.0041646***	0.0418535***
	0.000329	0.0024919	0.0011111	0.0090104

	-	-		
<i>Male</i>	0.1168888***	0.1184432***	0.1481696***	0.1467151***
	0.0076772	0.0076855	0.0271047	0.0271346
<i>Age</i>	0.003907***	0.0040032***	0.0047629***	0.0046388***
	0.0004246	0.0004253	0.0014737	0.0014748
	-	-		
<i>ln(income)</i>	0.0431389***	0.0437482***	0.1497036***	0.1498181***
	0.0054543	0.0054853	0.030409	0.0305244
	-	-		
<i>ln(assets)</i>	0.0363939***	-0.038677***	0.3852748***	0.3873964***
	0.0021018	0.0021269	0.0108057	0.0108899
<i>ln(debt)</i>	-0.0003845	-0.0017474*	0.017231***	0.0170726***
	0.0008853	0.0008944	0.0027342	0.0027658
<i>House ownership</i>	0.0078771	0.0206032**	-0.0024259	0.0082448
	0.0083716	0.0084952	0.0328154	0.0330918
			-	-
<i>Married</i>	0.043841***	0.0468128***	0.1103007***	0.1091742***
	0.0117556	0.0117709	0.039806	0.0398137
<i>Legal union</i>	0.0551987**	0.0767748***	-0.1653863**	-0.1663243**
	0.0223107	0.0224783	0.0730548	0.073973
			-	-
<i>Widowed</i>	0.0274903*	0.0347979**	0.1838836***	0.1822593***
	0.0144379	0.0144557	0.0641603	0.0642285
<i>Divorced</i>	0.0232717	0.021615	-0.0941977*	-0.0893136*
	0.0145671	0.0146064	0.0481788	0.0481947
	-	-		
<i>Lower secondary education</i>	0.0405367***	-0.0123493	0.1729546***	0.1773112***
	0.0108728	0.010936	0.0488441	0.0491617
	-	-		
<i>Upper secondary education</i>	0.0791639***	-0.057172***	0.3768905***	0.3701547***
	0.0098297	0.0098917	0.0444001	0.0449397
	-	-		
<i>Tertiary/BSc/MSc/PHD</i>	0.1771458***	0.1532354***	0.5144641***	0.5097355***
	0.0118724	0.0119779	0.0462114	0.04675
<i>Self-employed with employees</i>	-	-		
	0.1396601***	0.1384873***	-0.0042699	-0.0005427
	0.0264151	0.0264466	0.0741507	0.0739805
<i>Self-employed without employees</i>	-	-		
	0.1000277***	0.0961189***	-0.06291	-0.0685158
	0.0200469	0.0200573	0.0473838	0.0475743
<i>Unpaid family worker</i>	-0.0771178	-0.066637	-0.0652452	-0.0700156
	0.0902	0.093558	0.2431901	0.2407456
<i>On leave and planning to return</i>				
	0.0342998	0.0371474	0.0432447	0.0554099

	0.0403529	0.0403355	0.1447273	0.1441018
<i>Unemployed</i>	-0.0201573	-0.0211016	-0.0070668	-0.0049156
	0.0170341	0.0170253	0.089091	0.0886851
	-	-		
<i>Student/ unpaid intern</i>	0.1377334***	0.1296288***	0.3603057**	0.3619746**
	0.0394454	0.0396977	0.1441011	0.1439064
<i>Retiree</i>	0.0449015***	0.0421632***	-0.0047864	-0.0043433
	0.0124214	0.0124205	0.0409559	0.0409856
<i>Disabled</i>	0.0805183***	0.0876518***	-0.1498507	-0.1323943
	0.0283236	0.028652	0.1588404	0.1582824
<i>Military or social service</i>	-0.1631039	-0.1669548	-0.242108	-0.2328093
	0.1673328	0.179623	0.2279911	0.2326169
<i>Fulfilling domestic tasks</i>	-0.0151767	-0.0062686	-0.0904418	-0.0853845
	0.01749	0.0174758	0.0704655	0.0704284
<i>Other not working for pay</i>	0.0120588	0.0205348	-0.1061993	-0.1061093
	0.0200751	0.0201744	0.1001914	0.1001518
<i>1 child</i>	0.0080209	0.0074239	0.052565	0.0532619
	0.0115081	0.0115206	0.0378537	0.0379478
<i>2 children</i>	0.0245656**	0.0263174**	0.1145316***	0.1139931***
	0.0124692	0.0124701	0.0379449	0.037977
<i>3 children</i>	-0.0051504	-0.0009947	-0.018633	-0.0145349
	0.0229653	0.0228912	0.0628361	0.0632832
<i>4 children</i>	0.041635	0.0397872	-0.1092577	-0.1083575
	0.0403623	0.0402593	0.1168827	0.1171213
<i>5 children</i>	0.0446501	0.0447475	0.1341952	0.1516146
	0.0601175	0.0600666	0.1730992	0.1752291
<i>6 children</i>	0.0783548	0.053439	0.5125286	0.5250192
	0.0736129	0.0739314	0.4977005	0.5014064
<i>7 children</i>	0.2740984	0.2673963	-0.2167913	-0.2006457
	0.1813905	0.1796277	0.3088819	0.3117554
<i>8 children</i>	0.4385503***	0.4210952***	-1.315681***	-1.325126***
	0.0756497	0.0681186	0.3917872	0.3980768
<i>9 children</i>	0.0189846	0.0451981	0.34447	0.3427145
	0.1011284	0.0983973	0.4859563	0.4829351
<i>10 or more children</i>	0.1448893	0.1815115	-0.3683874	-0.3582918
	0.2225546	0.2318406	0.3478154	0.3502278
			-	
<i>2010</i>	0.009617		0.1413814***	
	0.0186793		0.0429297	
			-	
<i>2013</i>	0.1647245***		0.2062102***	
	0.0194504		0.0619557	

2014	0.1621376*** 0.0186238		-0.241014*** 0.0358686	
2016	0.2159552*** 0.0236434		- 0.4085196*** 0.0648093	
2017	0.1283341*** 0.0186531		0.2949097*** 0.0370922	
2018	0.008923 0.0204387		-0.3604479 -0.3604479	
% protestant		2.670617*** 0.3139839		-6.700588*** 1.126689
% catholic		2.679208*** 0.3144205		-6.730508*** 1.12874
% muslim		2.664511*** 0.3229931		-6.564375*** 1.155993
% other faith		2.678687*** 0.3143566		-6.736939*** 1.128275
Bank sector development		0.0039689*** 0.0003968		-0.0002782 0.0017661
Stock market development		- 0.0032463*** 0.0004422		0.002998* 0.0015904
GDP per capita		-0.098798 0.0794731		-0.5741612** 0.2571675
Dependency ratio		0.0545026*** 0.0052608		0.0520998*** 0.0099933
Expected inflation		6.273968*** 0.8511186		-4.410968 4.538068
Constant	4.052546*** 0.0642277	-263.3383*** 31.84083	-5.539952*** 0.2833733	667.385*** 114.3104

*Notes: The table shows coefficient estimates for three different models at the household level with national culture dimensions as the main explanatory variables. The three models are specified as follows: model 1 is an ordinary least squares regression with elicited financial risk-taking as dependent variable, model two shows the marginal effects of a probit regression with a binary variable for stock market participation as dependent variable, model three is an ordinary least squares regression with the % of liquid assets invested in stocks as dependent variable. For each model, the first column reports results without controls for institutional differences and the second column reports results with institutional differences controlled for. *** indicates the coefficient is different from 0 at the 1% level, ** indicates the coefficient is different from 0 at the 5% level and * indicates that the coefficient is different from 0 at the 10% level. Standard errors are given below the estimated coefficients.*

A, Robustness checks

Table 4 shows the regression results of an ordinary least squares model and probit maximum likelihood model similar to those described as model 1 and 2 in the methodology section. The only difference is that now, culture is defined in accordance to research from Schwartz (2008) instead of research from Hofstede (2011). Luxemburg and Malta are no longer part of the sample in this test as research from Schwartz (2008) does not estimate cultural values for these countries. Additionally, the variable for faith other than protestant, catholic and Muslim is dropped from institutional controls as it is found to be perfectly colinear with other institutional controls. Households with more than 7 children are now coded under the same variable as the model was otherwise unable to estimate coefficients. Finally, the regression for stock market participation dropped employment types 9-12 due to insufficient sizes of the number of individuals belonging to these groups.