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Risk Attitudes and Investment Decisions across European Countries – Are Women More *Conservative* Investors than Men?*

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Abstract

This study questions the popular stereotype that women are more risk averse than men in their financial investment decisions. The analysis is based on micro-level data from large-scale surveys of private households in five European countries. In our analysis of investment decisions, we directly account for individuals' self-perceived willingness to take financial risks. The empirical evidence we provide only weakly supports the gender differences argument. We find that women are less likely to invest in risky financial assets. However, when the probability of investing is controlled for, males and females are found to allocate equal shares of their wealth to risky assets.

Keywords: gender, risk aversion, financial behavior
JEL Classification: G11, J16

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1 Introduction

It is commonly believed that men are more willing to take financial risks than their female counterparts. In fact, numerous empirical studies provide evidence of systematic differences in financial risk-taking between men and women (e.g., Bajtelsmit et al. (1996), Dwyer et al. (2002), Hartog et al. (2002), Fellner & Maciejovsky (2007), Agnew et al. (2008), Borghans et al. (2009)). Nevertheless, we think that the existing evidence does not suffice to generally tar women as conservative investors.

First of all, there are studies that question the prevailing belief and provide evidence that gender has no effect on individuals' investment decisions (e.g., Johnson & Powell (1994), Schubert et al. (1999), Keller & Siegrist (2006) and Booth & Nolen (2009)). Furthermore, most evidence supporting the gender stereotype is based on the US data. Yet, given cross-country differences in macroeconomic conditions, institutional settings and social policies results obtained for one country should not be automatically generalized for the rest of the world. Recent literature suggests that even cross-country differences in social norms play a significant role in determining individuals' economic behavior (Carroll et al. (1994), Fernández & Fogli (2006) and Giuliano (2007)). Hence, the analysis of financial behavior requires evidence from different countries. However, there are presently only few empirical studies investigating the investment decisions of males and females outside the US. For instance, Palsson (1996) uses survey data on Swedish households, while Perrin (2008) employs survey data on Swiss households.

Secondly, there is still no consensus in the literature regarding the determinants of gender differences in financial behavior. One hypothesis is that females make more conservative investment decisions because they are by nature more risk averse than males. This conjecture is supported by a range of studies that look at individual specific attitudes towards risk taking (Jianakoplos & Bernasek (1998), Donkers & van Soest (1999), Hartog et al. (2002), Dohmen et al. (2006) and Perrin (2008)). These studies find that being a man is positively correlated with willingness to take risks in financial matters. A direct test of the hypothesis is however hardly possible since it requires two sets of information: the actual investment behavior of individuals and their risk attitudes. The later set of information is rarely available. Instead one can use individuals' self-assessment of their willingness to take financial risks and to combine it with their real life investment decisions. As shown by Wärneryd (1996) and Dohmen et al. (2006), self-declared attitudes towards risk-taking

reflect the true risk preferences of individuals and, therefore, present reliable instruments in this instance.

Finding out whether differences in risk attitudes predetermine the investment behavior of the two gender groups, is important for practical reasons. If these differences are in fact as significant as it is commonly believed, there is clearly a need for policy interventions for at least two reasons. The first reason is related to the gender wealth gap. All things being equal, if women systematically follow very conservative investment strategies during their lives, they are more likely to accumulate lower retirement wealth than their male counterparts. Importance of the issue raises especially in the light of recent trend towards private pension plans. The second reason is related to the role of private households' as suppliers of financial assets for enterprizes. Through participation in stock markets, private households provide firms with financial capital, which is one of the main factors of production. If a large group of private households for some reasons abstains from participation in markets of risky financial assets, it has obvious negative effects for individual firms and thus for the overall economy. It is therefore crucial to investigate whether gender differences in financial behavior have sizable effects and, if so, what determines these differences. After all, any policy interventions aimed at fostering investment can be more effectively designed if there is a clear understanding of the underlying causes of the differences.

The aim of the present study is to investigate investment behavior of males and females in five European countries: Austria, Cyprus, Germany, Italy and the Netherlands. Specifically, we consider two aspects of investment behavior. Firstly, we ask whether, all things equal, men and women have the same probability of investing in risky financial assets. Secondly, for individuals who own risky assets, we analyze differences in the shares of wealth invested by men and women in these assets. Furthermore, we ask whether differences in investment behavior can be explained by gender-specific differences in risk attitudes. In other words, the aim is to test the hypothesis that female investors are take less risks than their male counterparts because they are by nature more risk averse than men.

Our analysis is based on microeconomic data drawn from national surveys of private households. The data allow us to control for a wide range of individual-specific characteristics that may be relevant for investment decisions. Most importantly, we can directly control for individuals' attitudes towards risk-taking, because our data contain

information on respondents' self-assented willingness to take financial risks. Moreover, the cross-country nature of the data allows us to see whether behavioral patterns are common for all five countries despite differences in institutional settings, social policies, and other country specific factors.

The results of the analysis show that women are indeed less likely to hold risky financial assets than their male counterparts. However, conditional on ownership, both gender groups seem to invest an equal share of their wealth to these assets, ceteris paribus. Furthermore, our results show that gender differences in portfolio choices cannot be attributed to differences in risk tolerance between the two groups. Even when we control for individual attitudes towards risk-taking, we find statistically significant differences between men and women in the probability of investing in stocks and in the portfolio shares of held stocks. Hence, the hypothesis that females take more conservative investment decisions because they are inherently more risk averse than males cannot be confirmed by the data.

The remainder of the paper is organized as follows. In the next section, we review the existing literature on gender differences in financial risk-taking. In Section 3, we formulate our working hypotheses and describe how the hypotheses are tested. The data employed to test the hypotheses are described in Section 4. In Section 5, we analyze the effects of gender on the probability of holding risky assets and on the share of wealth allocated to these assets. In Section 6, we examine whether gender effects disappear when individual risk attitudes are controlled for. The last section concludes.

2 What does the literature say about the influence of gender on investment decisions?

The investigation of the relationship between investment decisions and investors' socioeconomic and demographic characteristics receives considerable attention in academic literature. Gollier (2002) predicts that under the assumption of a frictionless market, investors' wealth, age, investment horizon, human capital, and even family composition play a role for portfolio choice and, thus, should be introduced into the models of portfolio decision. Furthermore, Guiso et al. (2003) argue that in imperfect markets, investors' individual-specific factors play an important role; especially important are factors that are

negatively correlated with participation costs. For example, better educated individuals incur lower information costs which are a part of participation costs.

Still, there is no consensus regarding the role of gender for investment behavior. Some studies predict that, ceteris paribus, there are no differences between men and women in financial-decision making. Johnson & Powell (1994) explore differences in the decisions taken by individuals with managerial education. They find that males and females in this subpopulation display similar risk propensity. Although this finding cannot be generalized to the total population, it may indicate that educational background plays an important role in offsetting gender differences in risk taking. In a more general context, based on the Panel Study of Income Dynamics, Haliassos & Bertaut (1995) find that sex has no effect on an investor's decision to hold stocks. Also the results of a recent study by Keller & Siegrist (2006) based on a representative survey of private households in Switzerland show that females have the same willingness to invest in stocks as males.

Nonetheless, the above mentioned literature is significantly outnumbered by studies claiming that gender matters. For instance, it is argued that female investors are less willing to hold risky assets and, conditional on decision to hold them, invest a smaller share of their wealth into these assets than their male counterparts. One of the early studies representing this view is conducted by Hinz et al. (1996). Using data on investment decisions of 500 participants of a defined contribution plan in the USA, they find that men are more likely to hold risky assets than women and that the percentage of wealth invested by men in these assets is higher than that invested by women. Similar evidence is provided by Barsky et al. (1997), who show that males invest a higher fraction of their financial wealth in stocks, while women prefer safer assets such as Treasury bills and saving accounts. Bajtelsmit et al. (1996) investigate what factors influence the percentage of wealth invested in risky assets in a defined contribution plan in 1989 in the USA. They too find that women are relatively more risk averse than men. The results of the study may be, however, biased by the fact that it is not known whether the individuals themselves or their employers made the allocation decision. Jianakoplos & Bernasek (1998) test gender differences in investment behavior using a large data set drawn from the Survey of Consumer Finances (CFS) 1989. The analysis reveals that single women are relatively more risk averse than single men or married couples.

Numerous experimental studies are consonant with literature that builds upon survey data. Powell & Ansic (1997), for instance, find that men have a significantly higher

preference for risk than women: males prefer "riskier" investment strategies in order to achieve the highest gains, while women select "safer" strategies that allow them avoiding the worst possible losses. Olsen & Cox (2001), who investigate the gender differences for professionally trained investors, find that women weigh risk attributes, such as possibility of loss and uncertainty, more heavily than men. Female investors also tend to emphasize risk reduction more than their male colleagues. Consonant with these findings, Dwyer et al. (2002) and Niessen & Ruenzi (2007) show that, for managers of US mutual funds, gender differences are significant even when educational background and work experience are comparable. Finally, Fellner & Maciejovsky (2007) find that women prefer less volatile investments and exhibit lower market activity, e.g. they submit fewer offers and engage less often in trades.

As an explanation for gender differences in observed investment behavior, it is commonly suggested that females are by nature more risk averse than males. This conjecture is supported by a number of studies that investigate the differences between the two gender groups with respect to individual specific attitudes towards risk taking. Jianakoplos & Bernasek (1998) analyze data on respondents' self-assessed tolerance towards investment risk and find that women perceive themselves as less inclined to risk-taking than men. Also Donkers & van Soest (1999), who use a survey of Dutch households containing questions on perceived risk aversion, find that being a women significantly increases the degree of risk aversion. Similar evidence is found in experimental lotteries by Hartog et al. (2002), who deduce individuals' Arrow-Pratt measure of risk aversion. Two more recent studies provide evidence on gender differences in individual risk preferences based on large surveys of private households. One of the studies is conducted by Dohmen et al. (2006) who use data of the German Socioeconomic Panel (SOEP), another is done by Perrin (2008), who survey a large sample of Swiss households. Both studies find that being a man is positively correlated with the willingness to take risks in financial matters.

Although abundant, the existing evidence is insufficient to confirm that gender matters for investment decisions. First of all, almost all existing studies of observed financial behavior rely on US data. There are only few studies that use survey data from other countries.[1] Yet, given cross-country differences in institutional settings, social policies and macroeconomic conditions, results obtained for one country should not be automatically generalized for the rest of the world. Therefore, it is necessarily to look at the

[1] Palsson (1996) use 1985 survey data on Swedish households, and Perrin (2008) employs survey data on Swiss households.

micro-level data from different countries. Secondly, even when researchers control for all relevant socioeconomic characteristics and still find a significant effect of gender on the financial behavior, they cannot always directly test whether this effect can be attributed to an inherent tendency of females to be more risk averse than males. A direct analysis of the link between risk attitudes and investment decisions is rarely possible because either information on actual investment behavior or on risk attitudes is unavailable. Our conjecture is that introduction of a control variable capturing individual risk preferences along with other socioeconomic variables in one model may render the effect of gender insignificant. Haliassos & Bertaut (1995), who explicitly account for the level of risk aversion in their model of portfolio choice, find no effect of gender on the decision to hold stocks. Therefore, in order to obtain a true picture of gender differences in investment behavior, it is necessary to account for individual risk attitudes.

To sum, the existing literature on individual risk preferences argues that women are more risk averse than men. However, empirical studies that look at the actual investment behavior of individuals provide conflicting evidence in this respect. This might indicate that gender differences in financial behavior could not be solely attributed to the 'innate' differences in risk attitudes. There might be other factors responsible for why women are more conservative in making financial decisions in comparison to their male counterparts.

3 Research hypotheses and test methodology

As shown in the previous section, there is no consensus in the literature regarding the effect of gender on investment behavior. In the this study, we investigate whether the assumed gender differences in risk attitudes are responsible for different investment patterns observed in the general population. To answer this question we proceed in the following way. Firstly, we examine whether sex has a significant effect on investment decisions when we explicitly control for investors' financial wealth, income, age, education and a range of other socioeconomic variables, except for individual attitudes towards financial risk. [2] Under this specification, we expect to find a significant effect of sex. Then, in the second step, we extend the model by including individual willingness to take finan-

[2]In our choice of control variables, we follow the existing empirical literature on household financial behavior. See, e.g. Haliassos & Bertaut (1995) and Guiso et al. (2003).

cial risks as an additional explanatory variable. In this case, we expect to find no gender effects because we control for all potential sources of gender differences in investment behavior.

In our tests, we consider two aspects of investment decisions: participation and allocation. Participation decision is the decision to hold or not to hold risky financial assets. Allocation decision refers to the fraction of disposable financial wealth invested in risky financial assets. Respectively, we set up four hypotheses regarding the effects of gender on investment behavior.

Hypothesis 1a: Ceteris paribus, women are less likely to invest in risky financial assets than men.

The participation decision is modeled in the following manner. Denote U_r a the individual utility of holding risky assets and U_s as the utility of not holding risky assets. An investor decides to hold risky financial assets if $U_r - U_s > 0$. Neither utility is observable, but both are assumed to be functions of investors' socioeconomic and demographic characteristics:

$$U_s - U_r = \alpha + \beta_1 Male + \gamma_1 x_1 + e,$$

where $Male$ is a binary variable equal to 1 if the decision maker is male, and 0 if female; x_1 is a vector of control variables and e captures the unobserved factors. Then, if we define an indicator variable Y equal to 1 if an individual owns risky assets and 0 otherwise, the probability of this choice conditional on the investor's observed characteristics is:

$$Pr[Y = 1] = \alpha + \beta_1 Male + \gamma_1 x_1 + e. \quad (1)$$

We estimate the effects of explanatory variables by fitting empirical data to equation (1) and performing a probit regression.[3] Hypothesis 1a will be confirmed, if we find a statistically significant positive coefficient on the variable $Male$.

Hypothesis 1b: All things being equal, women allocate a smaller share of their financial wealth to risky assets than men, conditional on the probability of investing in these assets.

To test this hypothesis, we estimate the effects of gender on allocation decision. The investors' allocation decision is modeled based on the predictions of Haliassos & Bertaut

[3]We do not address the issue of potential endogeneity of the explanatory variables.

(1995). The researchers show that, in frictionless markets and in absence of transaction costs, a utility maximizing investor should always be willing to invest a positive amount of wealth in a risky asset when risky assets offer a higher expected return than risk-free assets. In the presence of participation costs, however, not all investors will be able to participate in the market of risky financial assets. More precisely, an investor will not participate in the market if utility gained from owning risky financial assets is smaller than the incurred participation costs.[4]

Because of the non-random sorting of individuals into participants and non-participants, we have to deal with a sample selection problem. Under these circumstances, a conventional linear regression model estimated by ordinary least squares is not a suitable tool for the analysis. Instead, we estimate the effect of gender on the share allocated to risky assets using Heckmans' two-stage estimation procedure.[5] The selection mechanism is modeled in the following manner. Let the equation that determines the sample selection have the form

$$Pr[Y = 1] = \alpha + \beta_1 Male + \gamma_1 x_1 + e,$$

where x_1 is a set of control variables that affect the probability of participation in the market of risky financial assets, $Pr[Y = 1]$. This probability is estimated using a probit regression model. The equation describing the fraction of wealth invested in risky assets, y^*, is given by

$$y^* = \beta_2 Male + \gamma_2 x_2 + u,$$

where y^* is a latent variable observed only if $Pr[Y = 1] > 0$ and x_2 is a set of control variables affecting the allocation decision. Then the model that describes the fraction

[4]Under participation costs, we understand all fixed and variable costs associated with market entrance and transactions as well as information costs incurred by individuals while selecting and managing their financial portfolios.

[5]A popular strategy among the existing studies that look at the determinants of the fraction of wealth invested in risky financial assets is to use a Tobit regression model in order to deal with the lower bound (zeros) and the upper bound (ones) of the distribution of the wealth fraction, e.g. Jianakoplos & Bernasek (1998), Bernasek & Shwiff (2001) or Perrin (2008). However, according to Maddala (1991), the Tobit regression model is not appropriate for situations were the dependent variable is bounded between 0 and 1 by definition. There is no way a fraction of a wealth can be negative or higher than 1. Furthermore, the Tobit model does not allow to correct for sample selection bias. Therefore, we do not apply Tobit in our study.

of wealth observed in our sample – denoted as y – has the form

$$y|Pr[Y=1]>0 = \beta_2 Male + \gamma_2 x_2 + \rho_{ue}\sigma_u\lambda + u, \tag{2}$$

where ρ_{ue} is the coefficient of correlation between u and e; σ_u is the standard deviation of u; and λ is the inverse Mill's ratio estimated from the first stage probit regression. Hypothesis 1b will be confirmed if the estimate of β_2 in equation (2) is positive and statistically significantly different from zero, which means that being a man has a positive effect on the fraction of wealth invested in risky financial assets.

Hypothesis 2a: Conditional on individual willingness to take financial risks, men and women invest in risky financial assets with equal probability.

To test this hypothesis we re-estimate model (1) by including an additional variable that captures the individuals' willingness to take financial risks. The model describing the participation decision is thus

$$Pr[Y=1] = \alpha + \delta_1 Male + \nu_1 \, Risk\,Tolerance + \mu_1 x_1 + e, \tag{3}$$

where $Risk\,Tolerance$ is a set of dummy-variables capturing the level of individual willingness to take financial risk. If gender differences in risk attitudes are in fact responsible for discrepancies in investment choices, it should render the effects of the gender variable insignificant. Otherwise, we can conclude that the observed differences in ivestment decisions are driven by other factors.

Hypothesis 2b: Conditional on willingness to take financial risks, men and women invest equal shares of their financial portfolios in risky assets.

This hypothesis is tested by estimating the model of allocation decision where individual willingness to take financial risks is explicitly controlled for. Similar to the test of Hypothesis 1b, we conduct the Heckman's two-stage procedure to estimate the effects of gender on allocation decision:

$$y|Pr[Y=1]>0 = \delta_2 Male + \nu_2 RiskTolerance + \mu_2 x_2 + \rho_{ue}\sigma_u\lambda + u, \tag{4}$$

The hypothesis 2b will be confirmed if the coefficient on the gender variable becomes insignificant once we control for risk attitudes. Otherwise, the hypothesis will be rejected.

4 Data and definitions

To test our hypotheses, we employ cross-sectional data on private households from five European countries: Austria, Cyprus, Germany, Italy and the Netherlands. The data are assembled from several sources. German and Dutch data are drawn directly from the countries' national surveys: the German Socioeconomic Panel (SOEP) and the DNB Household Survey. Data for the other three countries are drawn from the Luxembourg Wealth Study (LWS) database. The year when each survey was conducted and the number of households covered are reported in Table 1.

Cypriot, German, and Dutch data are characterized by relatively high non-response rates to the question about financial asset holdings. In Cyprus, 20 percent of the respondents do not report whether they hold any risky assets or how much is invested. In the German data, information on the value of financial assets is missing in about 25 percent of observations. In the Dutch survey, about 20 percent of respondents do not provide any information on their holdings of risky financial assets. In each case, we examine which factors affect the probability of non-response to the question by estimating a probit regression model. The dependent variable in this model is an indicator variable equal to 1 if ownership status is reported and equal to 0 if nothing is reported. Explanatory variables include sex, age, income, ownership of safe financial assets like savings deposits, ownership of real estate, employment status, education, and family structure. The model is estimated for each country separately. The results obtained for Cyprus show that the only factor influencing the probability of non-response is the households' income: the probability of non-response increases with income. Thus, our data set for Cyprus under-samples the high-income households, because any observation that has missing data on ownership of risky assets is excluded from the analysis. The results for the Netherlands reveal that the likelihood of non-response is higher for self-employed individuals and owners of real estate. Income is found to have no influence on response. In effect, our Dutch data set under-samples the self-employed and owners of real property. For Germany, we found a positive relationship between the probability of non-response and households' income. Hence, similarly to Cyprus, we under-sample high-income households. The following analysis is conducted only with data where information on ownership of risky financial assets is not missing.[6]

[6]Observations with missing values in other variables that are important for the analysis are also excluded from the data.

Dealing with household-level data rises an important question about who makes investment decisions in multi-person households. Ideally, one should identify who is the primary (or dominant) decision-maker in a household as is done by Bernasek & Shwiff (2001). However, due to the specifics of our data, we are only able to identify who is the household head in a given household. The definition of household head varies across surveys; Table 2 summaries survey specific definitions. The German and the Dutch data additionally allow to identify whether the household head is the main decision-maker in financial matters. For the other three countries, we assume that the household head is the decision maker. We also assume that investment decisions in a multi-person household are made by its head. Respectively, all demographic information used in the analysis refers to the household heads. Information on wealth and income is aggregated at household level. Descriptive statistics of the variables by country are found in Tables 4 through 8.

Another question that emerges is what asset holdings should be considered as risky? First of all, we should emphasize that this study focuses only on financial assets. Furthermore, the information collected in the national surveys allows us to differentiate among five asset classes: savings deposits, life insurance policies, bonds, stocks and investment funds.[7] If one considers volatility of returns as the main source of risk, then only the last two asset types should be referred to as risky assets. Thus, our definition of risky assets comprises directly held stocks and investment funds. The later are included in the definition because an increasing number of households own stocks through investment funds and ignoring these indirect holdings may lead to an underestimation of total stock holdings. On the other hand, risk content of mutual funds can vary significantly depending on the mix of asset types in a fund. For this reason, we also employ a second definition of risky assets that includes only directly held stocks.

In the following chapters, we analyze two aspects of investment behavior: 1) participation, i.e. whether a household owns risky financial assets and 2) allocation, i.e. what portfolio share is invested in these assets.

[7] German survey does not differentiate between direct and indirect stockholding.

5 Analysis of participation and allocation decisions

5.1 Descriptive analysis

We start by comparing the participation of males and females in the market of risky financial assets. Figure 1 shows the fraction of male and female owners of risky assets according to country. Apparently, there are well pronounced differences between the two gender groups in all five countries. In particular, the highest difference is observed in Cyprus - the fraction of male owners is by 15 percent higher than the fraction of female owners; the lowest difference is found in the Netherlands - the fraction of males is higher by 5 percent than the fraction of females. As far as the direct ownership of stocks is concerned, the gender gap in participation is also substantial. The largest difference is observed in Cyprus (15 percent) and the smallest in Italy (6 percent).[8] Thus, the figures on participation rates are in line with the popular belief that women are less willing to bear investment risks.

To learn more about the participation patters of males and females, we take a closer look at participation rates among different wealth and age groups. Figure 2 plots participation rates among males and females over wealth quartiles. Remarkably, the participation patterns are similar in all five countries. While the males' profile of participation is located slightly above the females' profile, wealth seems to have similar effects for both gender groups. At low levels of wealth only a small fraction of households decides to invest in risky assets, probably because of participation costs. The fraction increases as wealth grows, however, at a different rate: the highest growth is observed at the upper quartile of wealth, while at the 2nd and 3rd quartile the fraction grows less rapidly. As for the ownership of risky assets over the life-cycle, the participation profiles of males and females exhibit a common hump-shaped form; however, at any given age group, females are less likely to invest in these assets than males (see Figure 3). Young households, either with a male or a female household head, are less likely to acquire risky financial assets than older households because of fixed costs and borrowing constraints. As households become older and their income and wealth increases, they become more likely to invest in risky assets. Finally, later in life, the participation rate falls as income decreases and retirement wealth is being gradually consumed. Overall, the wealth and age patterns ob-

[8] In the German data, ownership of stocks cannot be disentangled from other risky assets.

served in our data are consistent with investment behavior of households documented in existing empirical research (see Guiso et al. (2002)).

Now, we compare the two gender groups with respect to the share of financial wealth allocated to risky assets. Figure 4 shows the average share of risky assets conditional on the ownership of these assets. The shares are calculated separately for each gender group and country.[9] Female owners of risky assets seem to allocate an equal or even a slightly higher fraction of their financial wealth into risky assets than male owners. Only in the Netherlands, the average share held by men is higher than the share invested by women. A similar pattern is observed for shares invested in directly held stocks. The figures are somewhat surprising because most previous studies document that women usually invest lower shares of their financial portfolios into risky assets than males (e.g. Bajtelsmit et al. (1996), Barsky et al. (1997) and Jianakoplos & Bernasek (1998)).

The influence of wealth on allocation decision is mixed. As Figure 5 shows, the average share invested in risky assets by males and females is highest at the 1st wealth quartile. Then it decreases rapidly at the 2nd quartile and, finally, at the 3rd and 4th wealth quartiles it starts to increase again. In all countries, except for the Netherlands, the average share held by females conditional on wealth is either very close to the share held by males or even higher. Only in the Netherlands, females seem to hold a lower fraction of risky assets in their portfolios then males. Also the distributions of shares by age plotted in Figure 6 do not allow to conclude that women hold lower shares of risky assets over the life cycle than males. Overall, the descriptive evidence suggests that variation in wealth and age has little explanatory power for the differences in allocation decisions between male and female investors.

5.2 Effects of gender on the probability of holding risky assets

In this section we test Hypothesis 1a by estimating the effects of gender on the probability of holding risky assets by means of regression analysis. For this purpose, we estimate equation (1) by performing a probit regression.[10] The dependent variable in this specification is a dummy-variable equal to 1 if a household owns risky assets and 0 otherwise. Effects of gender are captured by the dummy-variable *Male* equal to 1 if the decision-

[9] For Germany, information on the invested shares is unavailable.

[10] We also estimated the equation using a logit regression model. The log-likelihood for the probit model is however higher than for the logit model in all five countries, favoring the probit model.

maker is a man, and 0 if a female. We control for income, financial wealth, age, education, employment, marital status, number of children, and ownership of real estate. To allow for nonlinearities in the effects of wealth and age, we use a set of wealth-quartile dummies and a set of age-bracket dummies. The base category for wealth is the first wealth quartile; the base category for age is the youngest group of individuals below the age 30. The regression equation is estimated separately for each country.

Estimation results are found in Table 9. The effects are calculated at sample mean values for continuous variables and at zero for dummy-variables. The coefficients on the gender dummy-variable *Male* are positive in all three countries suggesting that the probability of investing in risky financial assets is higher for males than for their female counterparts. However, in three countries – Austria, Cyprus, and Italy – the coefficients are significantly different from zero. Ceteris paribus, males are by about 7 percent more likely to hold risky assets than females in Austria and Cyprus. In Italy, the predicted difference in probabilities is about 2 percent. In Germany and the Netherlands the gender of household heads seems to have no significant effect on the participation decision.

The predicted relationship is generally in line with the common belief and in that sense does not present any novel evidence. Yet, there is another aspect of the obtained results that deserves some more consideration. In Austria, Cyprus, and Italy, we are not able to control whether a household head or his/her spouse is also the decision maker. This data deficiency should bias our results towards finding no significant differences between males and females. Yet, we do find them in these countries, while there is *no* evidence for differences in Germany and the Netherlands – the two countries where survey data allows the most accurate identification of the decision maker within a household. How can this puzzling result be explained? The survey specific definitions of a "household head" in Austria, Cyprus, and Italy is such that in most couples, the male partner will be inevitably identified as a "head", since income generated by a male would normally account for a larger part of a household income. As a result, the percentage of female household heads is higher among single-person households and the percentage of male household heads is higher among married couples. Indeed, a look into the descriptive statistics in Tables 4 through 8 reveals that the proportion of single females in Austria, Cyprus, and Italy is more than three times higher than the proportion of single males, while in the German and Dutch samples the number of single females is only twice as high as the number of single males. Hence, the Austrian, Cypriot, and Italian samples of

female-headed households are over-represented by single women who are known to be more reluctant to take financial risks than single males or females in married couples.[11]

On the other hand, the insignificant effects of gender found for Germany and the Netherlands, may be a result of our broad definition of risky financial assets. As mentioned before, the definition includes both the direct stockholding and shares of investment funds. The risk content of the later can be less risky than assumed and that is why women may have been found equally willing to invest in such assets. It would be useful to estimate the effect of gender on the probability of direct stockholding. Therefore, we estimate model (1) once again but now the dependent variable is a dummy equal to 1 if a household owns directly held stocks and 0 otherwise.[12] The estimation results are reported in Table 10. The estimated parameters on the variable *Male* suggest that in all considered countries men are more likely to hold stocks than women, holding other variables constant at their means. Hence, the results are sensitive to the definition of risky assets. This becomes especially clear in the case of the Netherlands where gender of the decision-maker has a significant effect on the probability of holding stocks, but not on the probability of holding stocks and investment funds. The magnitude of the estimates is however moderate: the difference in predicted probabilities between males and females ranges from 1 percent in Italy to 7 percent in Cyprus.

To summarize, Hypothesis 1a can be confirmed only in cases where the decision maker could not be accurately identified or when the definition of risky assets is narrowed to directly held stocks. However, even in those cases, where the effects of gender are found to be statistically significant, the magnitude of the estimated coefficients suggests that the influence of household heads' gender on the probability of owning risky assets is weaker than suggested by the figures obtained from the descriptive analysis in the preceding section. Variation in socioeconomic factors and, especially in household wealth and income, seems to explain a great deal of differences in the decision to participate in the markets of risky financial assets.

[11] Jianakoplos & Bernasek (1998) show that, of all household types, single women are the most risk averse. In particular, the fraction of wealth invested into risky assets by single women increases less than the fraction invested by single men or married women as household wealth increases. Single women also exhibit higher relative risk aversion than other groups over most periods of the life cycle. Moreover, in contrast to single men and married couples, single women reduce the portion of risky assets in their portfolios as the number of children increases.

[12] This specification cannot be estimated with German data, because in this survey, ownership of stocks cannot be disentangled from other risky assets.

5.3 Effects of gender on the share of wealth allocated to risky assets

In this section, we test Hypothesis 1b by estimating the effects of gender on the share allocated to risky assets using the Heckman's two-stage estimation procedure. Our first-stage selection equation includes the same variables that were used in the probit regression for participation decision. The choice of variables for the selection equation is in line with other empirical studies implementing the Heckman's two-stage approach when analyzing shares of risky assets (see e.g. Guiso et al. (2003)). In the main equation, we include a natural logarithm of wealth instead of the dummies for wealth quartiles. The results of the estimation are documented in Table 11.

The main finding of the estimation is that gender seems to have very little effect on the allocation decision: in all four countries, the estimated coefficients on the variable *Male* are not significantly different from zero. Even when we focus on the shares of directly held stocks, we find a limited effect of gender on allocation decision (see Table 12). Marginal effects of the variable *Male* appear to be significant only in Italy and the Netherlands, however, at low levels of significance. Hence, Hypothesis 1b cannot be confirmed at least at high levels of statistical significance.

In conclusion, the findings of the conducted regression analysis show that, when the main socioeconomic factors are taken into account, differences between male and female investors with respect to allocation decisions are insignificant especially when we consider the joint share of stocks and mutual funds in the households financial portfolios. Some weak evidence of differences is found when we limit our analysis to the share of wealth allocated to directly held stocks. In contrast, gender differences in participation are strongly significant even when we control for a range of socioeconomic characteristics. Therefore, since the discrepancies cannot be explained by the objectively observed factors, they might be attributable to the subjective attitudes towards financial risks. We investigate this conjecture in the following sections of the paper.

6 The role of individual attitudes towards financial risk

6.1 Measuring risk tolerance

Each of the national surveys used in this analysis collects information about respondents' attitudes towards risk taking in financial matters. In particular, respondents are asked to asses their own willingness to take financial risks. The exact formulation of the question and the scales on which the strength of the willingness is measured differ across surveys. Table 13 documents the respective questions asked in the national surveys. German SOEP applies the most detailed 11-point scale to measure the individuals' willingness to take risks in financial matters. In the Netherlands, a 7-point scale is applied. Finally, the Austrian, Cypriot, and Italian surveys use the least detailed 4-point scale.[13] The validity of the survey based measures of risk tolerance is examined in laboratory experiments and it is shown that they have a strong explanatory power for actual risk taking behavior (see e.g. Dohmen et al. (2006) and Wärneryd (1996)).

To control for individual willingness to take financial risks in our regression analysis, we generate a set of dummy-variables, *RiskTolerance j*, where *j* indicates which alternative was selected by a respondent when answering the survey question about risk attitude. Table 14 describes the generated dummy-variables. For example, for Austria, we

[13]While processing the data, we discovered that the Dutch and Italian data sets are characterized by high non-response rates to the question regarding the willingness to take financial risk. For our analysis, non-responses mean that all observations with missing data have to be excluded from the data set, which leads to a significant reduction of the data set. The non-response rate in the Dutch data set is 27 percent. In order to see whether the decision to report risk attitude is influenced by some observed factors, we fit the data to a probit regression model. The dependent variable in this model is an indicator variable equal to 1 if risk attitude is reported and equal to 0 if risk attitude is missing. Explanatory variables include sex, age, income, wealth, employment status, education, family structure and an indicator variable equal to 1 if risky assets are owned and equal to 0 otherwise. Our results show that the probability of non-response is negatively related to income and wealth, while availability of risky assets does not have any effect on the decision to report risk attitude. Probably, households with zero or small asset holdings are confronted less frequently with investment decisions in their every day lives and are thus unable to asses their attitudes towards risk-taking in a hypothetical setting or merely regard this question as not relevant for them. In the Italian data set, the rate of non-response is very high: about 65 percent of respondents skipped the question. The results of a probit regression suggest that the probability of non-response decreases with income, wealth, and for those who are employed. Remarkably, all those who did not answer the question about risk attitude, do not hold any risky assets. Thus, conducting an analysis with a sub-set of individuals who provide information on their risk attitudes may lead to an overestimation of the probability of ownership of risky assets. We should keep this in mind when analyzing the influence of risk attitudes on investment decisions. In the other three countries – Austria, Cyprus and Germany – the non-response rate is less than 1 percent of a sample.

generate four dummy-variables: *RiskTolerance*1 equal to 1 if the respondent chooses the first alternative and 0 otherwise, *RiskTolerance*2 if the second alternative was selected and 0 otherwise, *RiskTolerance*3 if the third alternative was selected and 0 otherwise, *RiskTolerance*4 if the fourth alternative was selected and 0 otherwise. In the same way we generate the four dummy variables capturing the level of risk tolerance for Cyprus and Italy. The German and the Dutch data require special treatment because respondents in the respective surveys were asked to asses their risk attitude on a more detailed ordinal scale. Therefore, we can generate eleven dummy-variables for the German data set and seven dummy-variables for the Dutch data set. However, taking into account that only a small number of respondents in both surveys choose the alternatives at the upper end of the scale, introducing all 11 or 7 dummies into a regression is not viable. Instead, we merge some of the alternatives so that the number of groups is reduced to four. Table 14 shows which alternatives were merged together in the case of Germany and which in the case of the Netherlands.

Figure 7 presents the distribution of males and females by the four groups depending on the willingness to take financial risk. In all countries, females clearly outnumber males in the group with the lowest risk tolerance. At higher levels of risk tolerance, the proportion of males exceeds the proportion of females, although the differences are not substantial. The coefficient of correlation between the variable *Male* and the categorical variable *Risk Tolerance* is positive and statistically significant in all five countries. The coefficient amounts to 0.07 for Austria, 0.06 for Cyprus, 0.15 for Germany, 0.12 for Italy, and 0.14 for the Netherlands. The figures suggest that males tend to be more risk seeking than women. An important question that emerges is whether this correlation can explain why women are less likely to hold risky assets than men even when they are equally wealthy.

6.2 Effects of gender on the probability of holding risky assets when risk attitude is controlled for

In this section, we test Hypothesis 2a, which states that conditional on individual willingness to take financial risks, men and women invest in risky financial assets with equal probability. Firstly, we focus on the estimation of equation (3) where the dependent variable is an indicator variable equal to 1 if a household owns risky assets and 0 otherwise. The results of the estimation are found in Table 15.

The coefficients on the dummy-variables *RiskTolerance2*, *RiskTolerance3* and *RiskTolerance4* should be interpreted in relation to the base category, *RiskTolerance1*, which denotes the lowest risk tolerance. For example, a positive coefficient on *RiskTolerance4* means that a person with this level of risk tolerance is more likely to invest in risky assets as compared to an individual with the lowest level of risk tolerance. The estimated coefficients on all risk tolerance dummies in our model have a positive sign. Moreover the magnitude of the coefficients increases as dummy-variables indicate higher levels of risk tolerance. This relationship is plausible since the probability of investing in risky assets is expected to increase with risk tolerance. With respect to Germany and the Netherlands, the result is also important because it shows that our transformation of the original measure of risk attitude did not cause any biases. Nevertheless, to be on the safe side we also estimate a model were the original survey measures are included, i.e. eleven dummy-variables for Germany and seven dummy-variables for the Netherlands. However, the results remain unchanged. The only difference is that dummies for the higher levels of risk tolerance become insignificant.

Turning to the main variable of interest, the dummy-variable *Male*, the obtained results are interesting from several perspectives. In Austria, the coefficient of *Male* remains statistically significant although the magnitude is lower in comparison to the results obtained after the estimation of model (1). Hence, although there is some positive correlation between being male and being risk tolerant, it does not completely explain the differences in the probability of holding risky assets by males and females. In Cyprus, the gender effect is statistically insignificant. However, this effect was already weakly significant when we did not control for risk attitudes. Thus, the results obtained for Cyprus also show that the contribution of risk tolerance dummies to the explanation of gender differences is quite low. On contrast, in Italy the effect of gender increases in magnitude after we control for risk tolerance. This result, however, might be driven by the sample bias resulting from the high non-response rate to the risk attitude question described in the previous section. Finally, the most striking results are found for Germany and the Netherlands. Here, conditional on individual risk tolerance, the coefficients on the variable *Male* become negative. The negative sign suggests that males with the same risk tolerance as their female counterparts are less likely to invest in risky assets. It seems that women underestimate their willingness to take risks, since their actual behavior appears to be more risk-tolerant than what is expected from the stated risk tolerance. This conjecture, however, has not been studied in the literature yet. Guiso & Paiella (2005) is the only study we are aware

off that finds a negative effect of being male on the probability of investing in risky assets when risk attitudes are taken into account. The authors, however, do not discuss the potential reasons for this finding. So, we leave this issue for future research.

Finally, we estimate the effects of gender and risk attitudes on the probability of investing in directly held stocks. Here too, we fit the data to a probit regression model. The estimation results are reported in Table16. As we have seen from the estimation of model (1), gender has significant effects on the probability of stockholding when risk attitudes are not taken into account. Now, as we include risk tolerance dummies into the regression equation, the effects of gender seem to get weaker in all countries except for Italy. Eventually, the coefficients on *Male* in Cyprus and the Netherlands become statistically insignificant now. Thus, gender differences in the likelihood of investing in risky assets can be in part attributed to differences in risk tolerance. The explanatory power of the effects should not, however, be overestimated.

6.3 Effects of gender on the conditional share of risky assets when risk attitude is controlled for

Now we conduct a test of the hypothesis that, conditional on willingness to take financial risks, men and women invest equal shares of their financial portfolios in risky assets. To test this hypothesis, we estimate the effects of gender on the portfolio shares invested in risky assets when risk tolerance is accounted for. Tables 17 and 18 document the results of estimation of model (4) for risky assets and for directly held stocks respectively.

In previous sections, when we estimated the effects of gender on the invested shares without controlling for risk attitudes, we found no significant effect of gender on the share of total risky assets and some weak, but statistically significant, effect of gender on the share of directly held stocks in Italy and the Netherlands. Estimation of the effects when risk attitudes are also taken into account, does not change these results. In particular, coefficients on the variable *Male* remain insignificant in the regressions estimated for Austria and Cyprus; for Italy, the effect of gender becomes insignificant. In contrast, the Dutch data still predict a positive significant effect of being male on the portfolio share of directly held stocks.

Overall, the analysis of the influence of risk tolerance on the portfolio share of risky financial assets lends only weak support for our hypothesis. Eventually, subjective measures of risk tolerance do not fully explain the differences between men and women in allocation decisions. The determinants of gender differences in portfolio choices is more complex than is commonly suggested.

7 Summary and conclusions

In this paper we question the popular stereotype that women are more risk averse in financial matters than men. While studying the behavior of the two gender groups, we advance the analysis of observed behavior by including subjective information on risk attitudes into our model of investment choice. Specifically, we link the actual investment decisions of individuals with their self-reported willingness to take financial risks.

The results of our analysis provide only partial evidence of gender differences. In particular, we find that women are less likely to hold risky assets than males, ceteris paribus. This relationship gets stronger when we focus on the ownership of directly held stocks. With respect to allocation decision, however, the results of the regression analysis show that males and females invest equal shares of their wealth to risky financial assets, ceteris paribus. Nevertheless, there is some weak evidence that males hold higher shares of directly held stocks than their female counterparts.

Even when we control for individual attitudes towards risk-taking, we find statistically significant differences between men and women in the probability of investing in stocks and in the portfolio shares of held stocks. This finding shows that gender differences in portfolio choices cannot be attributed to differences in risk tolerance between the two groups. Therefore, the hypothesis that females take more conservative investment decisions because they are by nature more risk averse than males cannot be confirmed by the data. Other factors which cannot be taken into account in our model may play a role, such differences in human capital, duration of work life, knowledge of financial markets, or even trust in financial institutions.

The findings do not differ very much among the countries. Most of the observed cross-country variation comes from the specifical designs of the respective national surveys and

their sample structures. Apart from that, investment patterns of males and females seem to be quite similar in all five European countries.

All in all, the results of the study speak against the simplistic approach when sex is used as a proxy for risk aversion. Our findings also show that financial advice should be provided in accordance with individual risk preferences of individuals rather than to be based on the stereotypical believes about behavior of a "typical" man or woman.

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Appendix

Table 1: Sources of microeconomic data employed in the study

	Austria	**Cyprus**	**Germany**	**Italy**	**Netherlands**
Survey	LWS	LWS	SOEP	LWS	DNB Household Survey
Year of survey	2004	2002	2004	2004	2004
N of households surveyed	2,556	895	11,796	8,012	2,048

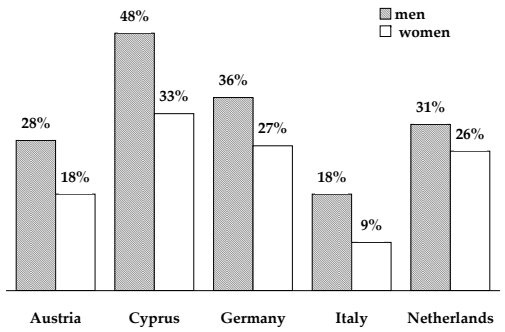
Table 2: Definitions of household head

Country	Definition of household head
Austria	A self-declared household head or a household member with the most accurate knowledge about the household finances
Cyprus	Economically dominant member or primary economic unit of a household
Germany	Person who knows best about the general conditions under which the household functions and is primarily responsible for the management of the household money
Italy	Person primarily responsible for the household budget
Netherlands	Person who declares him-/herself as a household head and has the highest influence on financial decisions of the household

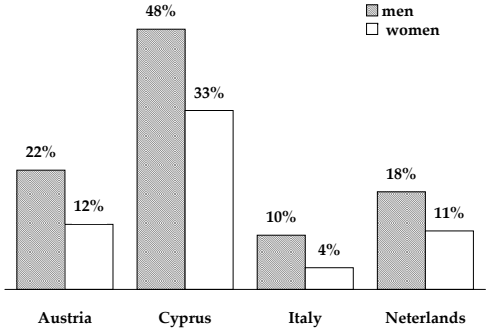
Table 3: Definition of variables used in the analysis

Variable	Definition
Risky Assets	Dummy variable equal to 1 if a household owns risky financial assets and 0 otherwise. Risky financial assets include shares of national and foreign companies held directly or through investment funds.
Share	Fraction of a household's portfolio allocated to risky financial assets.
Stocks	Dummy variable equal to 1 if a household owns directly held stocks and 0 otherwise.
Stocks Share	Fraction of a household's portfolio allocated to directly held stocks.
Income	Household's net annual income in Euros.
Financial Wealth	Household's total financial wealth. It takes into account holdings in saving deposits, bonds, stocks and mutual funds.
Real Property	Dummy variable equal to 1 if the household owns residential real estate and 0 otherwise.
Employed	Dummy variable equal to 1 if the household head has a full- or part-time job and 0 otherwise.
Self-Employed	Dummy variable equal to 1 if the household head is self-employed.
Retired	Dummy variable equal to 1 if the household head is retired.
University	Dummy variable equal to 1 if the household head has a university degree and 0 otherwise.
$N_{children}$	Number of children under 18 in a household.
Age	Age of a household head; a continuous variable.
Male	Dummy variable equal to 1 if the household head is male, 0 if female
Single	Dummy variable equal to 1 if the household head is a single person, 0 otherwise.

Figure 1: Fraction of male and female owners of risky assets



a) Total risky financial assets



b) Directly held stocks

Table 4: Descriptive statistics by gender, Austria

	Males N = 1,640 (64%)			Females N = 916 (36%)		
Variable	Mean	Median	St.Dev.	Mean	Median	St.Dev.
Risky Assets	0.28	0.00	0.45	0.18	0.00	0.38
Stocks	0.22	0.00	0.41	0.12	0.00	0.33
Savings	0.97	1.00	0.17	0.93	1.00	0.25
Real Property	1.00	1.00	0.00	1.00	1.00	0.00
Income	33,966	32,550	13,680	25,256	22,050	13,023
Financial Wealth	56,865	23,150	120,098	29,575	12,837	53,171
Age	52.56	52.00	14.11	50.90	50.00	15.58
Employed	0.55	1.00	0.50	0.37	0.00	0.48
Self-Employed	0.08	0.00	0.27	0.05	0.00	0.23
Retired	0.39	0.00	0.49	0.30	0.00	0.46
University	0.39	0.00	0.49	0.43	0.00	0.50
$N_{children}$	0.50	0.00	0.92	0.40	0.00	0.84
Single	0.21	0.00	0.41	0.69	1.00	0.46

Table 5: Descriptive statistics by gender, Cyprus

	Males N = 438 (62%)			Females N = 265 (38%)		
Variable	Mean	Median	St.Dev.	Mean	Median	St.Dev.
Risky Assets	0.48	0.00	0.50	0.33	0.00	0.47
Stocks	0.48	0.00	0.50	0.33	0.00	0.47
Savings	0.61	1.00	0.49	0.53	1.00	0.50
Real Property	0.69	1.00	0.46	0.58	1.00	0.37
Income	23,541	16,000	93,867	14,277	10,500	17,936
Financial Wealth	34,639	6,200	25,0587	6,897	2,035	13,286
Age	50.90	50.00	13.93	45.70	44.00	14.85
Employed	0.74	1.00	0.43	0.69	1.00	0.46
Self-Employed	0.24	0.00	0.43	0.19	0.00	0.39
Retired	0.22	0.00	0.41	0.07	0.00	0.26
University	0.33	0.00	0.48	0.34	0.00	0.48
$N_{children}$	0.90	0.00	1.15	0.89	0.00	1.14
Single	0.06	0.00	0.23	0.20	0.00	0.40

Table 6: Descriptive statistics by gender, Germany

	Males N = 4,858 (59%)			Females N = 3,335 (41%)		
Variable	Mean	Median	St.Dev.	Mean	Median	St.Dev.
Risky Assets	0.36	0.00	0.48	0.27	0.00	0.44
Stocks	-	-	-	-	-	-
Savings	0.72	1.00	0.44	0.67	1.00	0.45
Real Property	0.41	0.00	0.49	0.54	1.00	0.50
Income	37,860	31,826	36,326	24,042	18,891	18,573
Financial Wealth	24,211	0	101,210	10,704	0	37,423
Age	52.03	51.00	14.98	49.97	47.00	18.23
Employed	0.54	1.00	0.50	0.45	0.00	0.50
Self-Employed	0.08	0.00	0.27	0.04	0.00	0.20
Retired	0.27	0.00	0.44	0.28	0.00	0.45
University	0.24	0.00	0.43	0.16	0.00	0.38
$N_{children}$	0.44	0.00	0.86	0.42	0.00	0.80
Single	0.35	0.00	0.48	0.67	1.00	0.46

Table 7: Descriptive statistics by gender, Italy

	Males N = 4,885 (61%)			Females N = 3,123 (39%)		
Variable	Mean	Median	St.Dev.	Mean	Median	St.Dev.
Risky Assets	0.18	0.00	0.38	0.09	0.00	0.29
Stocks	0.10	0.00	0.30	0.04	0.00	0.19
Savings	0.80	1.00	0.40	0.72	1.00	0.45
Real Property	0.72	1.00	0.45	0.67	1.00	0.47
Income	27,359	21,770	28,191	19,845	15,624	15,856
Financial Wealth	25,404	8,000	72,627	15,728	5,000	55,711
Age	56.14	56.00	14.81	57.89	58.00	17.12
Employed	0.52	1.00	0.50	0.31	0.00	0.46
Self-Employed	0.14	0.00	0.35	0.05	0.00	0.22
Retired	0.45	0.00	0.50	0.44	0.00	0.50
University	0.10	0.00	0.29	0.07	0.00	0.26
$N_{children}$	0.41	0.00	0.77	0.32	0.00	0.70
Single	0.19	0.00	0.40	0.62	1.00	0.49

Table 8: Descriptive statistics by gender, Netherlands

	Males N = 1,117 (78%)			Females N = 304 (22%)		
Variable	Mean	Median	St.Dev.	Mean	Median	St.Dev.
Risky Assets	0.30	0.00	0.46	0.25	0.00	0.43
Stocks	0.18	0.00	0.39	0.11	0.00	0.30
Savings	0.87	1.00	0.33	0.80	1.00	0.40
Real Property	0.73	1.00	0.45	0.53	1.00	0.50
Income	38,574	35,778	20,477	30,278	28,809	18,418
Financial Wealth	32,323	12,025	69,393	23,581	8,510	42,688
Age	52.92	52.00	14.35	47.72	47.00	14.69
Employed	0.64	1.00	0.48	0.68	1.00	0.47
Self-Employed	0.03	0.00	0.18	0.03	0.00	0.17
Retired	0.27	0.00	0.44	0.11	0.00	0.31
University	0.41	0.00	0.49	0.51	1.00	0.50
$N_{children}$	0.65	0.00	1.05	0.31	0.00	0.77
Single	0.44	0.00	0.50	0.89	1.00	0.32

Figure 2: Participation rate, by wealth

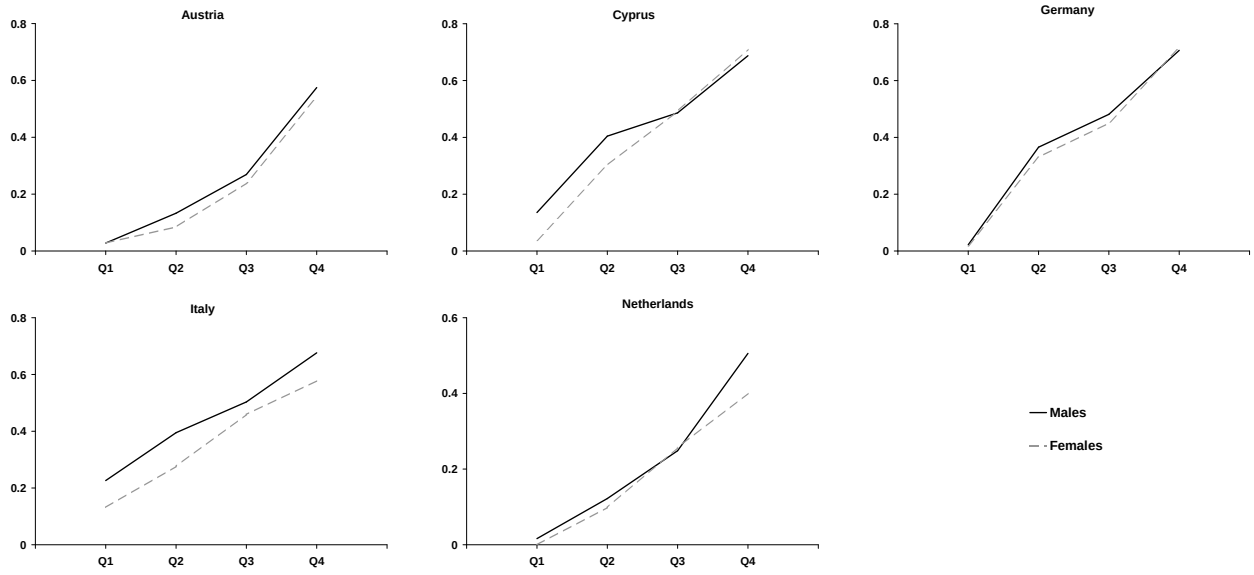


Figure 3: Participation rate, by age

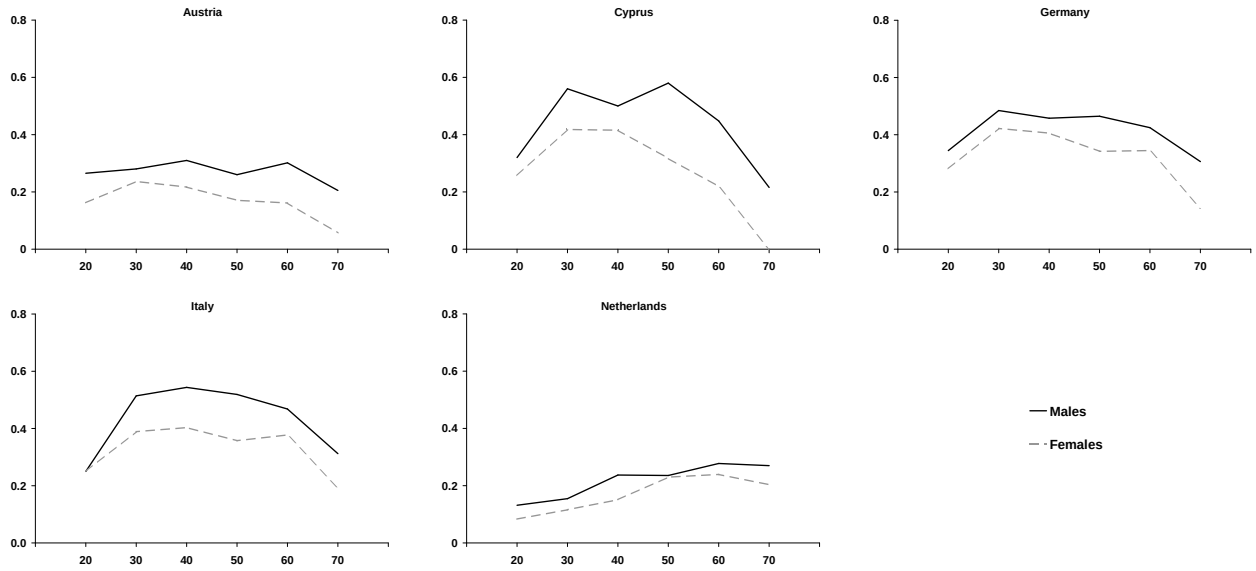
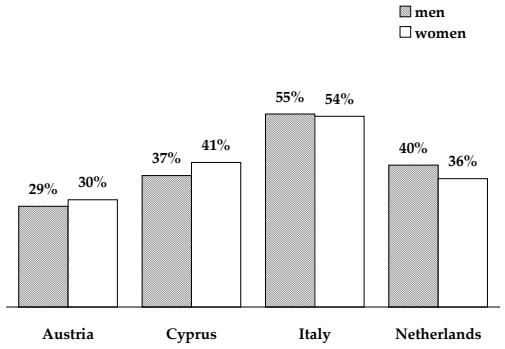
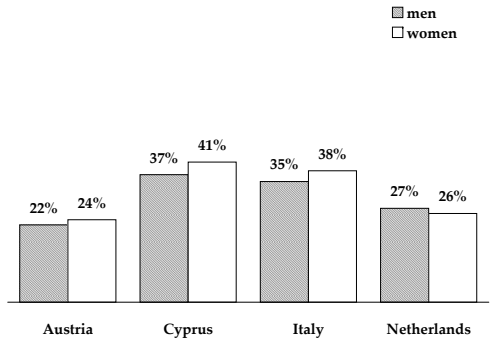


Figure 4: Share of financial wealth invested in risky assets (conditional on ownership)



a) Total risky financial assets



b) Directly held stocks

Figure 5: Share of financial wealth invested in risky assets, by wealth

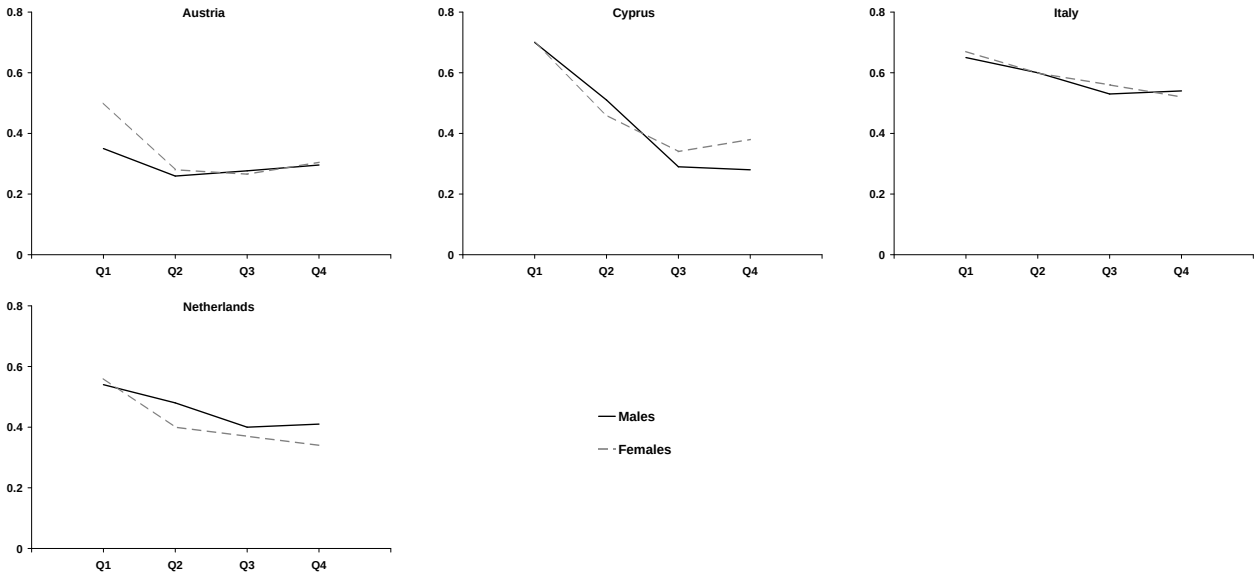


Figure 6: Share of financial wealth invested in risky assets, by age

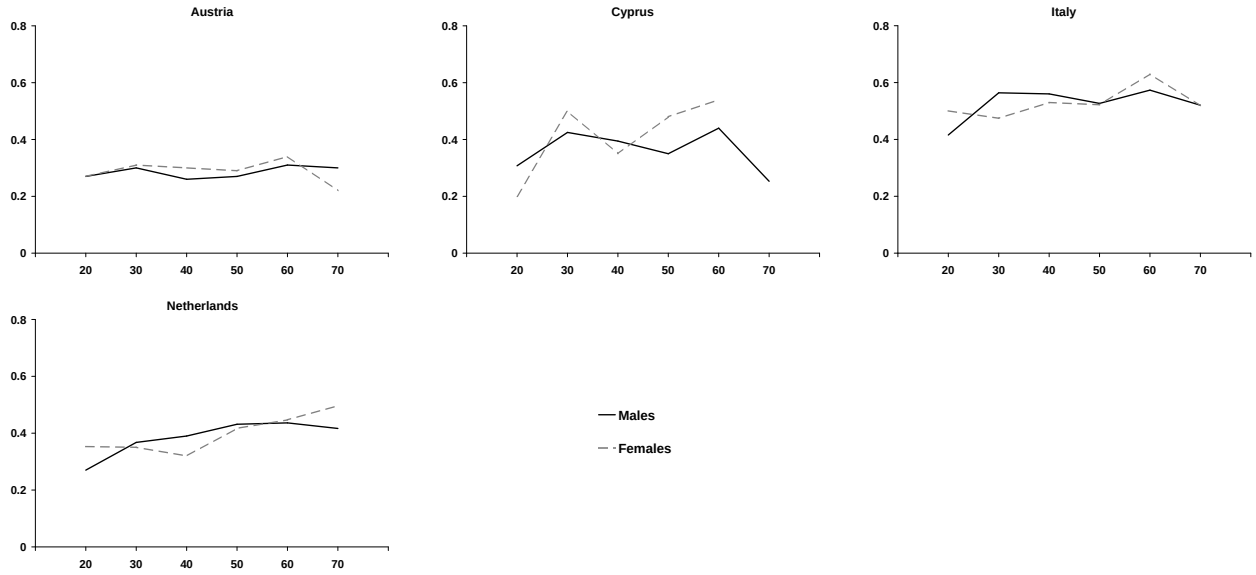


Table 9: Probability of investing in risky financial assets

This table summarizes the results of estimation of model (1) by means of a probit regression. The dependent variable is a binary variable equal to 1 if *risky financial assets* are held and 0 otherwise. The upper part of the table reports marginal effects of the explanatory variables on the probability of holding risky financial assets. The effects are predicted at mean values of the explanatory variables. *, ** and *** correspond to 10%, 5% and 1% significance levels respectively. $\Pr(Y = 1|Male = 0)$ denotes the predicted probability that a female owns risky assets. The predicted value is calculated at mean values of the explanatory variables.

	Austria	Cyprus	Germany	Italy	Netherlands
Male	0.069***	0.074*	0.004	0.018***	0.025
	(0.019)	(0.044)	(0.012)	(0.005)	(0.033)
ln(Income)	0.138***	0.018*	0.172***	0.029***	0.034
	(0.024)	(0.009)	(0.012)	(0.005)	(0.021)
2nd wealth quartile	0.199***	0.400***	0.172***	0.115***	0.065
	(0.040)	(0.061)	(0.019)	(0.034)	(0.041)
3rd wealth quartile	0.386***	0.447***	0.322***	0.353***	0.256***
	(0.041)	(0.060)	(0.018)	(0.050)	(0.043)
4th wealth quartile	0.647***	0.580***	0.513***	0.603***	0.508***
	(0.035)	(0.052)	(0.017)	(0.047)	(0.041)
Real Property	0.073***	0.048	-0.067***	0.012**	0.044
	(0.020)	(0.046)	(0.012)	(0.005)	(0.028)
Employed	-0.061**	0.108	-0.012	0.014	-0.121***
	(0.027)	(0.086)	(0.017)	(0.009)	(0.046)
Self-Employed	0.002	0.025	-0.084***	-0.008	0.072
	(0.031)	(0.051)	(0.018)	(0.005)	(0.069)
Retired	-0.020	0.141	-0.044*	0.006	-0.102**
	(0.034)	(0.121)	(0.024)	(0.010)	(0.047)
University	0.078***	0.178***	0.089***	0.036***	0.104***
	(0.017)	(0.045)	(0.014)	(0.010)	(0.026)
Age 30-39	-0.053	0.134	-0.043**	0.061*	0.027
	(0.032)	(0.087)	(0.021)	(0.033)	(0.067)
Age 40-49	-0.122***	0.125	-0.121***	0.052*	-0.006
	(0.027)	(0.083)	(0.019)	(0.029)	(0.066)
Age 50-59	-0.165***	0.173**	-0.152***	0.039	-0.030
	(0.020)	(0.087)	(0.018)	(0.026)	(0.063)
Age 60-69	-0.145***	0.105	-0.182***	0.041	-0.047
	(0.029)	(0.114)	(0.021)	(0.028)	(0.070)
Age ≥ 70	-0.171***	-0.120	-0.246***	0.016	0.039
	(0.018)	(0.120)	(0.017)	(0.023)	(0.089)
Single	0.092***	-0.173**	0.012	0.006	-0.008
	(0.025)	(0.068)	(0.014)	(0.005)	(0.028)
Num. of children	-0.005	0.024	-0.028***	0.002	0.022
	(0.010)	(0.022)	(0.008)	(0.003)	(0.014)
$\Pr(Y = 1\|Male = 0)$	0.160	0.375	0.272	0.043	0.244
$\Pr(\chi^2)$	0.000	0.000	0.000	0.000	0.000
Log-Likelihood	-1020.96	-367.36	-3967.04	-2197.81	-717.79
Pseudo-R^2	0.278	0.232	0.234	0.342	0.169
Number of obs.	2,556	703	8,193	8,008	1,421

Table 10: Probability of investing in directly held stocks

This table summarizes the results of estimation of model (1) by means of a probit regression. The dependent variable is a binary variable equal to 1 if *directly held stocks* are owned and 0 otherwise. The upper part of the table reports marginal effects of the explanatory variables on the probability of holding stocks. The effects are predicted at mean values of the explanatory variables. *, ** and *** correspond to 10%, 5% and 1% significance levels respectively. $\Pr(Y = 1|Male = 0)$ denotes the predicted probability that a female owns stocks. The predicted value is calculated at mean values of the explanatory variables.

	Austria	Cyprus	Italy	Netherlands
Male	0.048***	0.070*	0.011***	0.041**
	(0.015)	(0.042)	(0.003)	(0.020)
ln(Income)	0.094***	0.020**	0.017***	0.015
	(0.019)	(0.009)	(0.003)	(0.013)
2nd wealth quartile	0.135***	0.399***	0.056**	0.091**
	(0.038)	(0.061)	(0.024)	(0.036)
3rd wealth quartile	0.270***	0.441***	0.164***	0.147***
	(0.041)	(0.060)	(0.045)	(0.041)
4th wealth quartile	0.541***	0.576***	0.313***	0.375***
	(0.042)	(0.052)	(0.059)	(0.055)
Real Property	0.045***	0.043	0.004*	0.032**
	(0.016)	(0.046)	(0.002)	(0.016)
Employed	-0.027	0.109	0.003	-0.115***
	(0.022)	(0.086)	(0.005)	(0.034)
Self-Employed	0.000	0.018	-0.003	0.032
	(0.024)	(0.051)	(0.003)	(0.043)
Retired	0.014	0.132	0.001	-0.064***
	(0.027)	(0.121)	(0.005)	(0.020)
University	0.048***	0.180***	0.017***	0.045***
	(0.014)	(0.044)	(0.006)	(0.016)
Age 30-39	-0.049**	0.135	0.050*	0.013
	(0.024)	(0.087)	(0.030)	(0.041)
Age 40-49	-0.088***	0.127	0.044*	0.004
	(0.021)	(0.083)	(0.026)	(0.040)
Age 50-59	-0.103***	0.169*	0.034	-0.012
	(0.017)	(0.087)	(0.022)	(0.036)
Age 60-69	-0.106***	0.102	0.034	-0.025
	(0.022)	(0.114)	(0.023)	(0.036)
Age ≥ 70	-0.120***	-0.104	0.027	-0.003
	(0.013)	(0.122)	(0.019)	(0.046)
Single	0.046**	-0.168**	0.003	-0.011
	(0.020)	(0.068)	(0.003)	(0.015)
Num. of children	-0.009	0.025	0.003**	0.013*
	(0.008)	(0.022)	(0.002)	(0.008)
$\Pr(Y = 1\|Male = 0)$	0.106	0.372	0.015	0.077
$\Pr(\chi^2)$	0.000	0.000	0.000	0.000
Log-Likelihood	-897.05	-367.71	-1506.51	-497.10
Pseudo-R^2	0.258	0.230	0.287	0.186
Number of obs.	2,556	703	8,008	1,421

Table 11: Conditional portfolio share invested in risky assets

This table summarizes the results of estimation of model (2) by means of the Heckman's two-step procedure. The dependent variable is the portfolio share invested in *risky financial assets*. The upper part of the table reports the estimated coefficients on the explanatory variables in the main (second stage) equation. The coefficients are predicted at mean values of the explanatory variables. The specification of the first stage selection equation corresponds to the probit regression for the participation decision and includes the following variables: logarithm of income, number of children, dummies for sex, education, employment, family status, age groups, and wealth quartiles. In the present table we report only the estimates on wealth quartile dummies which serve as selection equation instruments. *, ** and *** correspond to 10%, 5% and 1% significance levels respectively.

	Austria	Cyprus	Italy	Netherlands
Male	0.001	0.042	0.027	0.058
	(0.022)	(0.053)	(0.020)	(0.040)
ln(Income)	0.022	0.020*	-0.017	0.005
	(0.030)	(0.012)	(0.017)	(0.027)
ln(Wealth)	0.034**	-0.035	0.035***	0.048**
	(0.014)	(0.023)	(0.012)	(0.025)
Real Property	0.023	0.095*	-0.003	0.106***
	(0.019)	(0.053)	(0.022)	(0.038)
Employed	-0.015	0.216	0.043	-0.039
	(0.028)	(0.134)	(0.037)	(0.056)
Self-Employed	0.040	0.094*	0.006	0.028
	(0.030)	(0.054)	(0.023)	(0.083)
Retired	0.012	0.338**	-0.036	-0.027
	(0.037)	(0.166)	(0.038)	(0.067)
University	0.014	0.216***	-0.008	0.063*
	(0.018)	(0.058)	(0.021)	(0.035)
Age 30-39	0.026	0.289***	0.137*	0.048
	(0.040)	(0.103)	(0.079)	(0.089)
Age 40-49	-0.027	0.236**	0.147*	0.106
	(0.040)	(0.099)	(0.079)	(0.091)
Age 50-59	-0.069	0.248**	0.154**	0.078
	(0.045)	(0.103)	(0.078)	(0.091)
Age 60-69	-0.033	0.210	0.257***	0.078
	(0.049)	(0.135)	(0.081)	(0.101)
Age ≥ 70	-0.078	-0.048	0.161**	0.082
	(0.059)	(0.170)	(0.082)	(0.111)
Single	0.035	-0.122	0.043**	0.067*
	(0.024)	(0.127)	(0.021)	(0.035)
Num. of children	-0.026**	0.027	0.022*	0.001
	(0.011)	(0.025)	(0.013)	(0.017)
Constant	-0.361	-0.459	0.034	-0.547
	(0.390)	(0.433)	(0.260)	(0.451)
Selection Equation Instruments				
2nd wealth quartile	0.701***	1.051***	0.879***	0.704***
	(0.132)	(0.171)	(0.227)	(0.154)
3rd wealth quartile	1.263***	1.185***	1.804***	1.317***
	(0.130)	(0.171)	(0.220)	(0.150)
4th wealth quartile	2.073***	1.618***	2.674***	2.063***
	(0.134)	(0.177)	(0.220)	(0.154)
λ	0.073**	0.393***	0.101***	0.151**
	(0.037)	(0.133)	(0.031)	(0.071)
ρ	0.366	0.909	0.378	0.507
σ	0.200	0.433	0.268	0.298
Number of obs.	2,556	703	8,008	1,383
N. of censored obs.	1,937	407	6,832	1,000

Table 12: Conditional portfolio share invested in directly held stocks

This table summarizes the results of estimation of model (2) by means of the Heckman's two-step procedure. The dependent variable is the portfolio share invested in *directly held stocks*. The upper part of the table reports the estimated coefficients on the explanatory variables in the main (second stage) equation. The coefficients are predicted at mean values of the explanatory variables. The specification of the first stage selection equation corresponds to the probit regression for the participation decision and includes the following variables: logarithm of income, number of children, dummies for sex, education, employment, family status, age groups, and wealth quartiles. In the present table we report only the estimates on wealth quartile dummies which serve as selection equation instruments. *, ** and *** correspond to 10%, 5% and 1% significance levels respectively.

	Austria	Cyprus	Italy	Netherlands
Male	0.000	0.039	0.045**	0.096*
	(0.020)	(0.053)	(0.020)	(0.057)
ln(Income)	0.026	0.024**	0.059***	0.000
	(0.026)	(0.012)	(0.016)	(0.039)
ln(Wealth)	0.013	-0.038	0.003	0.014
	(0.012)	(0.023)	(0.012)	(0.026)
Real Property	0.011	0.092*	0.032	0.170***
	(0.017)	(0.053)	(0.021)	(0.052)
Employed	0.028	0.215	0.011	-0.089
	(0.025)	(0.133)	(0.036)	(0.075)
Self-Employed	0.003	0.091*	0.004	-0.113
	(0.027)	(0.054)	(0.023)	(0.112)
Retired	0.084**	0.333**	-0.014	-0.038
	(0.033)	(0.166)	(0.037)	(0.080)
University	-0.007	0.216***	0.034*	0.043
	(0.016)	(0.057)	(0.020)	(0.042)
Age 30-39	-0.009	0.285***	0.122	-0.099
	(0.036)	(0.103)	(0.077)	(0.124)
Age 40-49	-0.028	0.231**	0.122	-0.161
	(0.036)	(0.098)	(0.077)	(0.127)
Age 50-59	-0.029	0.245**	0.100	-0.159
	(0.040)	(0.103)	(0.076)	(0.127)
Age 60-69	-0.031	0.202	0.155**	-0.188
	(0.044)	(0.135)	(0.079)	(0.139)
Age ≥ 70	-0.060	-0.032	0.115	-0.141
	(0.053)	(0.169)	(0.079)	(0.145)
Single	0.024	-0.115	0.014	0.042
	(0.022)	(0.127)	(0.020)	(0.045)
Num. of children	-0.012	0.029	0.031**	0.003
	(0.010)	(0.025)	(0.012)	(0.021)
Constant	-0.285	-0.462	-0.793***	-0.136
	(0.348)	(0.432)	(0.253)	(0.576)
Selection Equation Instruments				
2nd wealth quartile	0.701***	1.051***	0.879***	0.625***
	(0.132)	(0.171)	(0.227)	(0.192)
3rd wealth quartile	1.263***	1.185***	1.804***	0.888***
	(0.130)	(0.171)	(0.220)	(0.187)
4th wealth quartile	2.073***	1.618***	2.674***	1.743***
	(0.134)	(0.177)	(0.220)	(0.186)
λ	0.024	0.390***	0.116***	0.160**
	(0.033)	(0.133)	(0.030)	(0.080)
ρ	0.140	0.906	0.438	0.576
σ	0.174	0.431	0.265	0.278
Number of obs.	2,556	703	8,008	1,383
N. of censored obs.	1,937	407	6,832	1,174

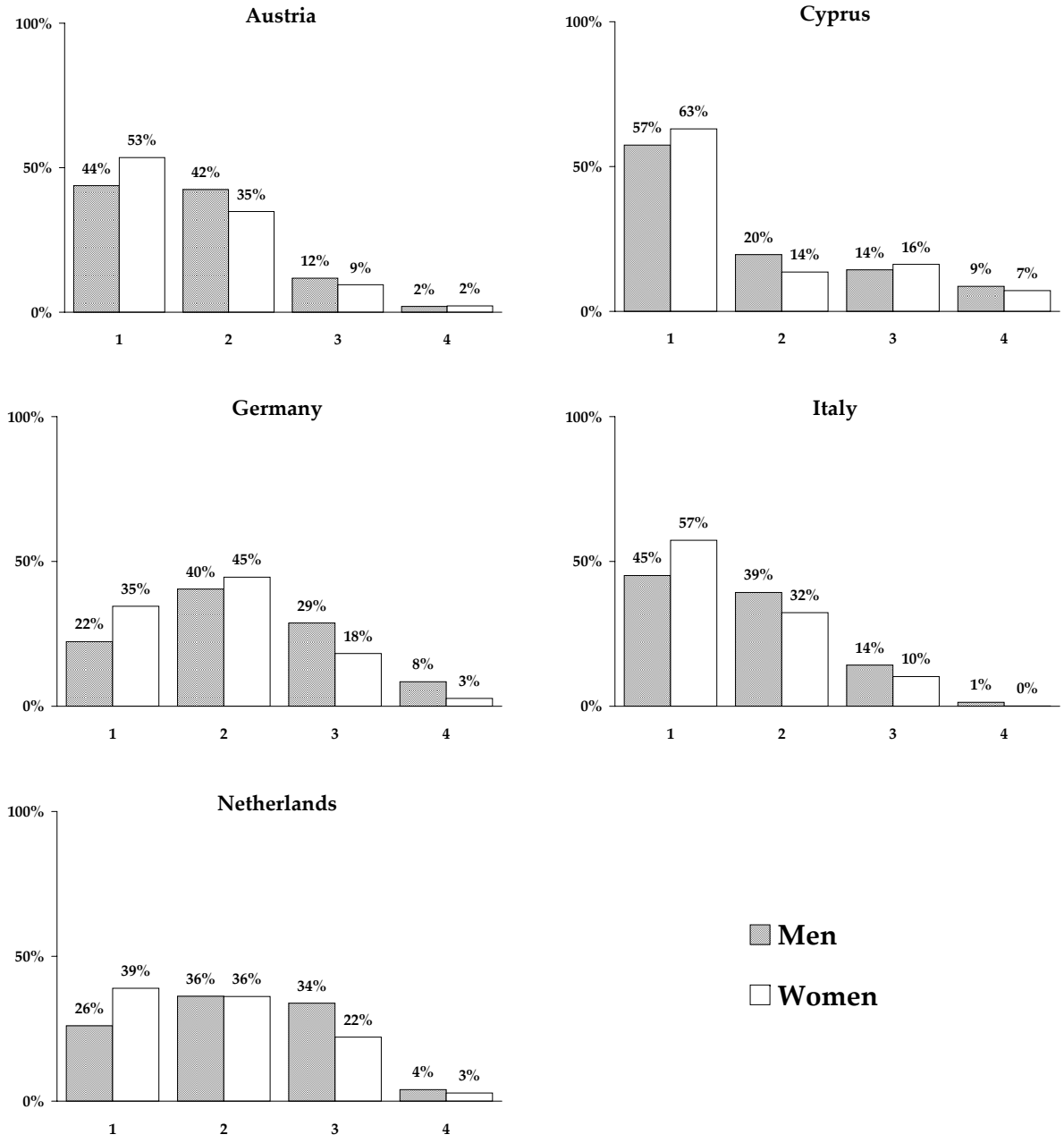
Table 13: Survey questions about the attitude towards financial risks

Country	Survey question
Austria	"*For savings I prefer secure investment instruments and avoid risk*" 1=completely applicable; 2=rather applicable; 3=rather not applicable; 4=completely inapplicable.
Cyprus	"*Which of the statements comes closest to the amount of financial risk that you are willing to take when you save or make investments?*" 1=not willing to take any financial risks; 2=take average financial risks expecting to earn average returns; 3=take above average financial risks expecting to earn above average returns; 4=take substantial financial risks expecting to earn substantial returns.
Germany	*How would you rate your willingness to take risks in financial matters on the scale from 0 "risk averse" to 10 "fully prepared to take risks"*
Italy	"*Which of the statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?*" 1=low returns, without any risk of losing your capital; 2=a reasonable return, with a good degree of security for your invested capital; 3=a good return, with reasonable security for your invested capital; 4=very high returns, regardless of a high risk of losing part of your capital.
Netherlands	*Please indicate on a scale from 1 to 7 to what extent you agree with the "I am prepared to take the risk to lose money, when there is also a chance to gain money", where 1 indicates 'totally disagree' and 7 indicates 'totally agree'.*

Table 14: Construction of the variables capturing the willingness to take financial risks

Country	Selected alternative	Generated variable	Description
Austria, Cyprus and Italy	1	RiskTolerance1	equal to 1 if alternative "1" is selected and 0 otherwise
	2	RiskTolerance2	equal to 1 if alternative "2" is selected and 0 otherwise
	3	RiskTolerance3	equal to 1 if alternative "3" is selected and 0 otherwise
	4	RiskTolerance4	equal to 1 if alternative "4" is selected and 0 otherwise
Germany	0	RiskTolerance1	equal to 1 if alternative "0" is selected and 0 otherwise
	1 to 3	RiskTolerance2	equal to 1 if alternatives "1" or "3" are selected and 0 otherwise
	4 to 6	RiskTolerance3	equal to 1 if an alternative from "4" to "6" is selected and 0 otherwise
	7 to 10	RiskTolerance4	equal to 1 if an alternative from "7" to "10" is selected and 0 otherwise
Netherlands	1	RiskTolerance1	equal to 1 if alternative "0" is selected and 0 otherwise
	2 or 3	RiskTolerance2	equal to 1 if alternative "2" or "3" is selected and 0 otherwise
	4 or 5	RiskTolerance3	equal to 1 if alternative "4" or "5" is selected and 0 otherwise
	6 or 7	RiskTolerance4	equal to 1 if alternative "6" or "7" are selected and 0 otherwise

Figure 7: Distribution of individuals by the stated willingness to take financial risks



Note: Each histogram shows for a given country the distribution of males and females by the stated willingness to take financial risks. The strength of the willingness is measured on an ordinal scale where "1" correspond to the lowest risk tolerance and "4" to the highest risk tolerance

Table 15: Probability of investing in risky assets conditional on risk tolerance

This table summarizes the results of estimation of model (3) by means of a probit regression. The dependent variable is a binary variable equal to 1 if *risky financial assets* are held and 0 otherwise. The upper part of the table reports marginal effects of the explanatory variables on the probability of holding risky financial assets. The effects are predicted at mean values of the explanatory variables. *, ** and *** correspond to 10%, 5% and 1% significance levels respectively. *RiskTolerance1* is a dummy variable indicating the lowest level of risk tolerance; this is the base category and is excluded from the regression equation. $\Pr(Y = 1|RiskTolerance1 = 1, Male = 0)$ denotes the predicted probability that a female with the lowest willingness to take financial risks owns risky assets. The predicted probability is calculated at mean values of the explanatory variables.

	Austria	Cyprus	Germany	Italy	Netherlands
Male	0.047**	0.067	-0.027**	0.083***	-0.022
	(0.019)	(0.045)	(0.012)	(0.024)	(0.043)
RiskTolerance2	0.116***	0.138**	0.126***	0.236***	0.155***
	(0.018)	(0.059)	(0.016)	(0.022)	(0.047)
RiskTolerance3	0.410***	0.078	0.232***	0.296***	0.351***
	(0.039)	(0.062)	(0.019)	(0.030)	(0.048)
RiskTolerance4	0.272***	0.100	0.383***	0.534***	0.430***
	(0.079)	(0.077)	(0.027)	(0.051)	(0.082)
ln(Income)	0.124***	0.020**	0.168***	0.108***	0.084**
	(0.023)	(0.010)	(0.012)	(0.021)	(0.038)
2nd wealth quartile	0.242***	0.396***	0.181***	0.283**	0.106*
	(0.044)	(0.062)	(0.020)	(0.135)	(0.059)
3rd wealth quartile	0.437***	0.443***	0.309***	0.454***	0.291***
	(0.043)	(0.061)	(0.018)	(0.117)	(0.057)
4th wealth quartile	0.666***	0.556***	0.491***	0.551***	0.553***
	(0.037)	(0.054)	(0.018)	(0.091)	(0.049)
Real Property	0.058***	0.049	-0.065***	0.030	0.011
	(0.020)	(0.046)	(0.012)	(0.027)	(0.037)
Employed	-0.066**	0.100	-0.021	0.033	-0.171***
	(0.026)	(0.088)	(0.018)	(0.046)	(0.060)
Self-Employed	-0.026	0.022	-0.094***	-0.020	0.020
	(0.027)	(0.052)	(0.018)	(0.033)	(0.098)
Retired	-0.020	0.145	-0.056**	-0.023	-0.085
	(0.031)	(0.122)	(0.025)	(0.049)	(0.061)
University	0.076***	0.176***	0.077***	0.140***	0.107***
	(0.017)	(0.045)	(0.014)	(0.032)	(0.035)
Age 30-39	-0.024	0.175**	-0.038*	0.158	0.085
	(0.036)	(0.087)	(0.022)	(0.099)	(0.104)
Age 40-49	-0.092***	0.154*	-0.110***	0.143	0.062
	(0.028)	(0.084)	(0.021)	(0.097)	(0.102)
Age 50-59	-0.130***	0.219**	-0.137***	0.124	0.002
	(0.023)	(0.088)	(0.020)	(0.096)	(0.097)
Age 60-69	-0.099***	0.160	-0.151***	0.147	-0.024
	(0.033)	(0.116)	(0.024)	(0.101)	(0.107)
Age ≥ 70	-0.138***	-0.047	-0.222***	0.051	0.109
	(0.022)	(0.134)	(0.021)	(0.101)	(0.131)
Single	0.080***	-0.177***	0.002	0.044	-0.009
	(0.025)	(0.066)	(0.014)	(0.027)	(0.036)
Num. of children	-0.001	0.023	-0.029***	-0.004	0.036**
	(0.010)	(0.023)	(0.008)	(0.017)	(0.018)
$\Pr(Y = 1\|RiskTolerance1 = 1, Male = 0)$	0.150	0.371	0.288	0.392	0.292
$\Pr(\chi^2)$	0.000	0.000	0.000	0.000	0.000
Log-Likelihood	-949.86	-361.66	-3825.42	-1545.38	-491.44
Pseudo-R^2	0.329	0.238	0.256	0.190	0.249
Number of obs.	2,556	698	8,120	2,806	1,039

Table 16: Probability of investing in stocks conditional on risk tolerance

This table summarizes the results of estimation of model (3) by means of a probit regression. The dependent variable is a binary variable equal to 1 if a household owns *directly held stocks* and 0 otherwise. The upper part of the table reports marginal effects of the explanatory variables on the probability of holding stocks. The effects are predicted at mean values of the explanatory variables. *, ** and *** correspond to 10%, 5% and 1% significance levels respectively. *RiskTolerance1* is a dummy variable indicating the lowest level of risk tolerance; this is the base category and is excluded from the regression equation. $\Pr(Y = 1|RiskTolerance1 = 1, Male = 0)$ denotes the predicted probability that a female with the lowest willingness to take financial risks owns stocks. The predicted probability is calculated at mean values of the explanatory variables.

	Austria	Cyprus	Italy	Netherlands
Male	0.030**	0.063	0.074***	0.215
	(0.015)	(0.045)	(0.017)	(0.150)
RiskTolerance2	0.090***	0.141**	0.129***	0.298**
	(0.015)	(0.058)	(0.018)	(0.151)
RiskTolerance3	0.267***	0.079	0.277***	0.875***
	(0.037)	(0.062)	(0.031)	(0.144)
RiskTolerance4	0.301***	0.080	0.556***	1.166***
	(0.074)	(0.078)	(0.097)	(0.253)
ln(Income)	0.081***	0.022**	0.102***	0.179
	(0.018)	(0.010)	(0.015)	(0.117)
2nd wealth quartile	0.161***	0.395***	0.269**	0.034
	(0.040)	(0.062)	(0.135)	(0.187)
3rd wealth quartile	0.297***	0.437***	0.299***	0.222
	(0.043)	(0.061)	(0.115)	(0.174)
4th wealth quartile	0.541***	0.554***	0.293***	1.138***
	(0.043)	(0.055)	(0.071)	(0.170)
Real Property	0.033**	0.044	0.013	0.283**
	(0.015)	(0.046)	(0.019)	(0.125)
Employed	-0.026	0.100	0.003	-0.665***
	(0.021)	(0.088)	(0.035)	(0.189)
Self-Employed	-0.016	0.016	-0.021	0.058
	(0.021)	(0.052)	(0.021)	(0.298)
Retired	0.015	0.136	-0.010	-0.283
	(0.026)	(0.122)	(0.037)	(0.216)
University	0.046***	0.176***	0.082***	0.268**
	(0.014)	(0.045)	(0.025)	(0.112)
Age 30-39	-0.034	0.176**	0.133	0.212
	(0.026)	(0.087)	(0.100)	(0.349)
Age 40-49	-0.068***	0.155*	0.136	0.270
	(0.022)	(0.084)	(0.096)	(0.343)
Age 50-59	-0.077***	0.213**	0.113	0.234
	(0.019)	(0.088)	(0.090)	(0.342)
Age 60-69	-0.074***	0.155	0.113	0.047
	(0.024)	(0.116)	(0.095)	(0.383)
Age ≥ 70	-0.097***	-0.033	0.100	0.221
	(0.016)	(0.135)	(0.093)	(0.415)
Single	0.034*	-0.172***	0.026	0.004
	(0.019)	(0.066)	(0.020)	(0.114)
Num. of children	-0.005	0.024	0.019	0.120**
	(0.008)	(0.022)	(0.012)	(0.055)
$\Pr(Y = 1\|RiskTolerance1 = 1, Male = 0)$	0.098	0.369	0.163	0.097
$\Pr(\chi^2)$	0.000	0.000	0.000	0.000
Log-Likelihood	-847.13	-362.00	-1194.24	-381.68
Pseudo-R^2	0.299	0.236	0.174	0.237
Number of obs.	2,556	698	2,806	1,039

Table 17: Portfolio share invested in risky assets conditional on risk tolerance

This table summarizes the results of estimation of model (2) by means of the Heckman's two-step procedure. The dependent variable is the portfolio share invested in *risky financial assets*. The upper part of the table reports the estimated coefficients on the explanatory variables in the main equation. The coefficients are predicted at mean values of the explanatory variables. Coefficients on the risk tolerance dummies are to be interpreted in relation to the base category *RiskTolerance1* denoting the lowest level of risk tolerance. The specification of the first stage selection equation corresponds to the probit regression for the participation decision and includes the following variables: dummies for sex, risk tolerance, education, employment, family status, age groups, and wealth quartiles, logarithm of income and number of children. In the present table we report only the estimates on wealth quartile dummies which serve as selection equation instruments. *, ** and *** correspond to 10%, 5% and 1% significance levels respectively.

	Austria	Cyprus	Italy	Netherlands
Male	-0.021	0.027	0.033	0.065
	(0.022)	(0.053)	(0.022)	(0.045)
RiskTolerance2	0.071***	0.143**	0.076**	0.001
	(0.023)	(0.065)	(0.032)	(0.055)
RiskTolerance3	0.146***	0.114*	0.123***	0.045
	(0.035)	(0.066)	(0.039)	(0.066)
RiskTolerance4	0.229***	0.268***	0.335***	0.017
	(0.051)	(0.083)	(0.079)	(0.091)
ln(Income)	0.018	0.020*	-0.009	-0.029
	(0.029)	(0.012)	(0.019)	(0.042)
ln(Wealth)	0.025**	-0.046**	0.028**	0.046*
	(0.013)	(0.023)	(0.011)	(0.025)
Real Property	0.012	0.080	-0.006	0.118***
	(0.019)	(0.053)	(0.023)	(0.041)
Employed	-0.017	0.207	0.046	0.023
	(0.028)	(0.131)	(0.039)	(0.067)
Self-Employed	0.026	0.077	-0.002	0.027
	(0.030)	(0.054)	(0.024)	(0.104)
Retired	0.015	0.330**	-0.040	0.007
	(0.036)	(0.164)	(0.040)	(0.069)
University	0.015	0.232***	0.005	0.053
	(0.018)	(0.058)	(0.024)	(0.036)
Age 30-39	0.035	0.320***	0.138*	0.061
	(0.039)	(0.107)	(0.083)	(0.106)
Age 40-49	-0.011	0.268***	0.148*	0.140
	(0.039)	(0.102)	(0.082)	(0.106)
Age 50-59	-0.040	0.293***	0.156*	0.130
	(0.043)	(0.109)	(0.082)	(0.107)
Age 60-69	0.005	0.271**	0.264***	0.134
	(0.048)	(0.138)	(0.085)	(0.119)
Age ≥ 70	-0.031	0.063	0.156*	0.151
	(0.056)	(0.170)	(0.084)	(0.126)
Single	0.024	-0.157	0.050**	0.068*
	(0.024)	(0.126)	(0.022)	(0.039)
Num. of children	-0.021**	0.021	0.018	0.009
	(0.011)	(0.025)	(0.013)	(0.018)
Constant	-0.300	-0.452	-0.088	-0.236
	(0.375)	(0.440)	(0.325)	(0.593)
Selection Equation Instruments				
2nd wealth quartile	0.858***	1.039***	0.724**	1.045***
	(0.139)	(0.171)	(0.361)	(0.222)
3rd wealth quartile	1.442***	1.174***	1.209***	1.644***
	(0.138)	(0.172)	(0.352)	(0.218)
4th wealth quartile	2.172***	1.534***	1.641***	2.453***
	(0.141)	(0.180)	(0.352)	(0.223)
λ	0.077**	0.398***	0.186***	0.097
	(0.036)	(0.132)	(0.063)	(0.075)
ρ	0.392	0.924	0.640	0.349
σ	0.197	0.431	0.290	0.279
Number of obs.	2,556	698	2,806	1,012
N. of censored obs.	1,937	406	1,630	703

Table 18: Portfolio share invested in stocks conditional on risk tolerance

This table summarizes the results of estimation of model (2) by means of the Heckman's two-step procedure. The dependent variable is the portfolio share invested in *directly held stocks*. The upper part of the table reports the estimated coefficients on the explanatory variables in the main equation. The coefficients are predicted at mean values of the explanatory variables. Coefficients on the risk tolerance dummies are to be interpreted in relation to the base category *RiskTolerance1* denoting the lowest level of risk tolerance. The specification of the first stage selection equation corresponds to the probit regression for the participation decision and includes the following variables: dummies for sex, risk tolerance, education, employment, family status, age groups, and wealth quartiles, logarithm of income and number of children. In the present table we report only the estimates on wealth quartile dummies which serve as selection equation instruments. *, ** and *** correspond to 10%, 5% and 1% significance levels respectively.

	Austria	Cyprus	Italy	Netherlands
Male	-0.015	0.023	0.084	0.125**
	(0.022)	(0.052)	(0.053)	(0.062)
RiskTolerance2	0.034	0.149**	0.209***	-0.083
	(0.024)	(0.065)	(0.070)	(0.063)
RiskTolerance3	0.061*	0.118*	0.396***	0.025
	(0.034)	(0.065)	(0.108)	(0.071)
RiskTolerance4	0.142***	0.264***	0.776***	0.001
	(0.049)	(0.082)	(0.184)	(0.100)
ln(Income)	0.031	0.024**	0.104*	0.014
	(0.028)	(0.012)	(0.053)	(0.044)
ln(Wealth)	-0.005	-0.049**	-0.018	0.031
	(0.012)	(0.023)	(0.017)	(0.026)
Real Property	0.014	0.078	0.040	0.144***
	(0.018)	(0.053)	(0.041)	(0.055)
Employed	0.027	0.201	0.020	-0.079
	(0.027)	(0.131)	(0.071)	(0.082)
Self-Employed	0.001	0.076	-0.019	0.005
	(0.030)	(0.054)	(0.046)	(0.127)
Retired	0.079**	0.319*	-0.031	0.029
	(0.037)	(0.163)	(0.076)	(0.075)
University	-0.006	0.228***	0.072	0.025
	(0.017)	(0.057)	(0.049)	(0.041)
Age 30-39	0.009	0.315***	0.140	-0.112
	(0.041)	(0.106)	(0.170)	(0.147)
Age 40-49	-0.012	0.262***	0.144	-0.146
	(0.040)	(0.101)	(0.168)	(0.147)
Age 50-59	-0.030	0.290***	0.117	-0.152
	(0.042)	(0.108)	(0.166)	(0.147)
Age 60-69	0.007	0.264*	0.231	-0.183
	(0.048)	(0.137)	(0.171)	(0.160)
Age $\geq$ 70	-0.009	0.084	0.143	-0.171
	(0.057)	(0.169)	(0.170)	(0.163)
Single	0.044*	-0.149	0.042	0.047
	(0.023)	(0.125)	(0.041)	(0.046)
Num. of children	-0.011	0.023	0.043*	0.020
	(0.011)	(0.025)	(0.025)	(0.021)
Constant	-0.153	-0.445	-1.611*	-0.457
	(0.378)	(0.441)	(0.957)	(0.618)
Selection Equation Instruments				
2nd wealth quartile	0.740***	1.037***	0.847	0.969***
	(0.158)	(0.171)	(0.541)	(0.295)
3rd wealth quartile	1.215***	1.158***	1.022*	1.235***
	(0.154)	(0.172)	(0.531)	(0.289)
4th wealth quartile	1.982***	1.525***	1.314**	2.199***
	(0.155)	(0.180)	(0.531)	(0.288)
λ	0.047	0.389***	0.476***	0.135*
	(0.036)	(0.131)	(0.151)	(0.074)
ρ	0.283	0.914	1.000	0.541
σ	0.166	0.426	0.476	0.249
Number of obs.	2,556	698	2,806	1,012
N. of censored obs.	2,093	408	2,214	838