The gender effect in risky asset holdings*

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Abstract

We study the relation between gender and stock holdings in Finland, a particularly gender equal country. We show that it is crucial to control for risk aversion using a measure of subjective risk-taking, rather than measures derived from abstract gambles. Controls related to financial knowledge and resources also explain the gender difference. The residual effect of the male gender on the conditional equity share, after all appropriate controls, is 3 percentage points and statistically significant. The effect on stock market participation on the other hand is close to zero or negative, so men contribute more to the nonparticipation puzzle conditional on covariates. The gender difference mainly works through women's higher risk aversion, which we find extends to finance professionals and wealthy private banking customers.

Keywords: risk preferences, portfolio choice, gender difference

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1. Introduction

Several studies find that women are less likely to participate in the stock market, and conditional on participation, take less risk (see e.g. Sundén and Surette, 1998; Barber and Odean, 2001; Dwyer, Gilkeson, and List, 2002; Agnew, Balduzzi, and Sundén, 2003). Compared to men, women are more risk-averse (e.g., Barsky et al., 1997; for reviews see Eckel and Grossman, 2008; Croson and Gneezy, 2009) and score lower in financial literacy tests (Chen and Volpe, 2002; Lusardi and Mitchell, 2008). Gender differences in portfolio holdings could thus be artifacts of imperfect controls for risk aversion or financial knowledge, and may vary between samples of different financial sophistication. Appropriate control variables would then eliminate the gender effect. On the other hand, it is possible that some gender difference remains, perhaps due to cultural or social norms.

In this paper we study the relation between gender and portfolio holdings in Finland, a country which ranks number 3 in the world in overall gender equality[1] and number two in economic literacy in a sample of 55 countries studied by Jappelli (2010). To the extent that a possible cultural gender effect depends on the level of gender equality in the society, we should be able to establish a lower limit for it in Finland, given appropriate data. This idea is motivated by the observation that the gender gap in mathematical test scores in school disappears in countries with a more gender-equal culture (Guiso et al., 2008).

To begin answering this question, we first validate our method of eliciting risk-preference utilizing investment seminars in different populations that are familiar with financial risk-taking.

[1] The Global Gender Gap Report 2010, World Economic Forum, Geneva, Switzerland 2010. The report covers 134 countries. The ranking for Finland was #2 at the time of our data collection in 2008.

We collect survey data on wealthy private banking investors (N=177), investment advisers and managers (N=81), as well as finance students (N=77). With a 97% response rate, the sample is practically free of nonresponse bias. We measure risk-taking on an eleven-point scale first in general matters, and then in various domains, including financial matters. We also use more traditional methods, such as inputing risk aversion from a certainty equivalent to a hypothetical lottery, which have been widely used in the economics literature (Barsky et al., 1997; Donkers, 2001; Guiso, Jappelli, and Pistaferri, 2002; Guiso and Paiella, 2006 and 2008; Nosic and Weber, 2010).

Our self-reported risk measures are based on the study by Dohmen et al. (2011) where the authors analyze a large panel survey data and also validate the self-reported risk measures by conducting a smaller sample field experiment. They show that the general risk question more accurately predicts behavior in many contexts, for example portfolio choice, compared to the standard lottery measure. The same risk attitude measure is thereafter used in several studies (for example, Bonin et al., 2007; Dohmen et al. 2010; Dohmen and Falk, 2011; Dohmen, Falk, Huffman, and Sunde, 2011).

We find that women are significantly less willing to take risk than men in almost all domains of risk also in populations familiar with financial risks. Factor analysis of risk-taking in the different domains suggest the existence of two distinct factors in the tendency to take risk: a ‘cool factor’ comprising general and financial risk attitudes, and a ‘hot factor’ comprising risk-taking in areas such as health, car driving, and sports. This result indicates that people who are more familiar with financial risks connect general risk taking especially with financial risk taking, and also separate financial risk taking from risk taking in other domains of life. Analyzing the relation between various risk measures and the subjects’ stock holdings, we find that the general and financial risk attitudes are very strong and robust predictors of portfolio choice. In

contrast, methods traditionally used by economists, such as the certainty equivalent of a lottery, do a poor job. In particular, they have no incremental explanatory power on actual financial risk-taking when risk attitude is controlled for.

Having validated the performance of a self-reported financial risk attitude as a predictor of risky asset holdings, we then turn to data on retail bank clients risk profiling reports. These reports are the result of financial advisors' client meetings in a large Finnish retail bank. The data offer several advantages. First, having 85,000 observations helps obtain precise estimates. Second, the data are more reliable than surveys in general as the data on investments comes directly from the bank's information system. Third, the customers have their own money at stake, and thus have incentives to carefully think about their risk attitude. The financial advisers have also been trained to emphasize the importance of correctly classifying their customers' risk attitude.

The retail bank risk profiling data also shows a robust effect of male gender on financial risk attitude. The effect size decreases by about 30% when investment knowledge is controlled for. Education increases the willingness to take risk, but does not affect the magnitude of the gender difference by much. After all controls, the gender effect on risk taking is of similar magnitude as having a college education.

After controlling for risk attitude, financial knowledge, wealth, and other relevant factors, the coefficient on a male dummy in a regression explaining risky asset holdings brings out the residual gender effect. The results show that conditional on participation, men invest 2.8 percentage points more of their wealth in the stock market, and this difference is statistically highly significant. The difference in these conditional risky shares is 5.4 percentage points in the raw data, so control variables capture about half of the original gender effect. The magnitude of the residual gender effect corresponds to an increase in the willingness to take risk of about 0.3

points on a 5-point financial risk attitude scale. Investment knowledge provides another point of comparison: the impact of male gender is about the same as that of a dummy variable indicating some investment experience compared to the omitted group of no experience. The gender residual is not reduced if we limit the sample to highly experienced or highly educated investors.

It thus appears that even in a gender-equal country such as Finland, some measure of a gender effect on the risky share remains. We find that the residual gender effect in risky share increases with age[2] while the difference in risk attitudes stays constant through the life cycle. Residual gender differences may be innate, or due to culture or social norms, as other effects should operate through the variables that we control for.

A different pattern nevertheless emerges when we look at the dichotomous stock market participation decision. The gender effect becomes insignificant when we control for risk attitude, financial knowledge and education. Furthermore, when we add income and wealth controls, the effect becomes significantly negative. It thus appears that the gender difference in stock market participation is completely explained by men having more favorable covariates on average, that is, higher wealth, lower risk aversion, and more investment knowledge.

In addition to the issue of gender and portfolio choice this paper also contributes to the literature on measuring risk aversion. Previous studies have used students subjects (e.g., Nosic and Weber, 2010), or respondents have been from the general population (e.g., Donkers, Melenberg, and van Soest, 2001; Dohmen et at., 2011), mostly without any special familiarity with financial risks. In contrast to these studies, our subjects have considerable experience with

[2] For example, for individuals under the age of 50, the impact on risky share is 1.9 percentage points, or about two thirds of its full sample value.

financial risks. A recent experimental study by Gong, Lei and Deng (2010) also uses real investors as subjects.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 presents results on risk attitude in different domains and studies gender differences. Section 4 investigates how the various risk measures are related to each other, as well as to risky asset holdings, and Section 5 estimates conditional gender differences in the best-performing risk measures as well as risky asset holdings. Section 6 concludes.

2. Data

A. Survey data

We collected information on risk attitudes from 81 investment advisors and managers, 77 finance students, and 177 private banking customers (from here on referred to as investors). Investment advisor and manager responses were collected during three different investment seminars in the fall of 2007. Investors filled the questionnaire during an investment meeting organized by a private banking unit of a commercial bank in November 2007. In both cases the subjects arrived on the scene without knowing of the survey. Participation was voluntary, and no rewards were offered. Finally, student responses were collected during a lecture of an investment management course at the Aalto School of Economics (formerly Helsinki School of Economics) in January 2008. The data thus includes altogether 337 responses, and with a 97% response rate, the sample is practically free of nonresponse bias.

The survey contained several questions on risk attitudes as well as on the respondent's background. Risk attitudes were measured on an 11-point scale in various domains (general, financial matters, career, car driving, sports/leisure, health, and trusting others), by a question

about respondents' willingness to invest in a hypothetical asset, and by a certainty equivalent question. All three groups answered the risk questions and the question about the hypothetical investment. The questionnaire filled by the investment advisors and managers did not include the certainty equivalent question. In addition, we asked the investors and the students to estimate their investment knowledge compared, first, to an investment advisor, and second, to their peers. The rating categories of the 5-point scale varied from "my knowledge in considerably worse" (1) to "my knowledge is considerably better" (5).

We also collected the responders' year of birth, gender and marital status, number of children, monthly income, education, profession, handedness, and height. Investors and students were also asked for the total value of their investment assets, and the amount allocated to stocks, directly or through mutual funds. We also asked for real estate wealth and outstanding debt. Panel A of Table 1 shows descriptive statistics on the survey respondents along the most important dimensions.

B. Bank clients' risk-preference profiles

We obtained a sample of risk-preference reports from a large commercial bank in Finland. The bank operates throughout Finland, and its client base is similar to overall population. These reports show the results of risk assessment discussions between a client and a financial adviser employed by the bank. The discussions took place between March 2007 and December 2008. We discard plans made by minors and corporations, and end up with 85,063 reports.

The risk-preference is determined by the following two questions:

I. How would you describe yourself as a saver / investor?

1. I want the invested capital to be safe and aim for small capital growth
2. I am ready to take only little risk and aim for steady capital growth

3. I am ready to take some risk and aim for good capital growth
4. I am ready to take risk and aim for good long term returns
5. I am ready to take considerable risk and aim for the best possible return in the long run

II. How do you react to fluctuations in the value of your savings or investments?

1. I do not accept such fluctuations under any circumstances.
2. I do not like volatility, but I accept that the value of my investments can temporarily decrease a little bit.
3. I understand that volatility is a part of investment and, therefore, I accept that the value of my investments can temporarily decrease to some extent.
4. I understand that volatility is a part of investment and, therefore, I accept that the value of my investments can fluctuate quite a lot.
5. I understand that volatility is a part of investment and, therefore, I accept even large fluctuations.

Both questions are rated on a 5-point scale, and the customers' risk profile is determined by the less risky answer of the two. The answers are checked for consistency so that they are not allowed to differ by more than one point. For example, if a client selects option 1 on the first question, acceptable answers to the second question are limited to options 1 or 2. In case the client answers inconsistently, the system displays an error message, and the financial adviser discusses the inconsistency with the client. Once the client selects feasible answers to both questions, she is assigned a risk rating from 1 (very risk averse) to 5 (willing to take substantial risk).

We obtain a number of useful client specific background variables: age and gender, education level, self-assessed investment knowledge on a 3-point scale (beginner, intermediate, advanced), as well as data related to income and wealth. We use 12-month average turnover in

the client's bank account, defined as the amount of transactions incoming to the client's accounts, less the amount of transactions made between the accounts. The vast majority of incoming transactions comprise salary, pension and government subsidies, so the turnover variable is a reasonable proxy for income. Descriptive statistics for this sample are shown in Panel B of Table 1.

3. Results on risk attitude

A. Basic results

The survey respondents rated their willingness to take risk, first in general, and then in six specific domains on an 11-point scale, from 0 (risk averse) to 10 (completely willing to take risk). On average, men rated their general willingness to take risk at significantly higher level than women (6.25 vs. 4.91; chi-square value 33.5, *p*-value < 0.01). The modal ratings are 7 for the men and 5 for women.[3] This is consistent with prior studies (Prince, 1993; Byrnes, Miller, and Schafer, 1999; Donkers, Melenberg, and van Soest, 2001; Eckel and Grossman, 2008). The importance of this result is that it shows that also women who are familiar with risk rate their general willingness to take risk at a lower level than men. We also find that investment advisors are more willing to take risk than investors (6.6 vs. 5.3, chi-square value 24.0, *p*-value < 0.01). The general willingness to take risk is negatively correlated with age, consistent with prior

[3] The distribution of women's ratings is more on the risk averse end of the scale than that of men's. The adjusted residual analysis tells that there were significantly more women who rated their willingness to take risk at level 2 or lower and more men who rated their willingness to take risk at level 7 or higher than the hypothesis of the independence of gender and rating would predict.

studies (Wallach and Kogan, 1961; McInish, 1982). The correlation coefficient is –0.18 (*p*-value < 0.01).

Figure 1 depicts the general risk attitude measure, as well as six domain specific risk attitude measures separately for men and women. There is a statistically significant (at 5% level) gender difference in risk attitudes, so that men are more willing to take risk, in financial matters, career issues, car driving, sports and leisure, and health. The only domain in which the difference is not significant is trusting others, although men are slightly more willing to take risks there as well. Figure 2 depicts gender differences adjusted for age and respondent type. Specifically, it shows the coefficient for the male dummy from a regression explaining each risk measure in turn, while including age, age squared, adviser dummy, and investor dummy as control variables. This adjustment does not alter the conclusions derived from the simple comparison of means, except that now the effect for trusting others is also significant, although only at the 10% level.

The different risk measures are all positively correlated with each other, as expected, and shown in Table 2. To better understand these correlations we run a factor analysis relating responses in the various domains of risk. Table 3 shows the results. Two factors that jointly explain 50% of the variation emerge from the data. The number of factors was determined based on a Scree plot, as well as a requirement that eigenvalues be greater than the mean eigenvalue. The first factor explains 43% of the variation and includes all other sub-domain specific questions, except financial matters. The most important variables here are willingness to take risk in health related matters and in car driving. The second factor comprise risk-taking generally and risk-taking in financial matters and explains the further 7% of the variation.

Dohmen et al. (2011) find that a single underlying trait determines willingness to take risks in the general population. Our results suggest that this does not hold in a population that is more familiar with financial risks. We find that our subjects connect general willingness to take risks

especially with financial risks, and also separate financial risk taking from risk taking in other domains of life. The same two factors emerge also when we run the analysis separately for men and women. Using scoring coefficients from the factor analysis we construct two new variables: 'hot factor' that is based on the first factor, and 'cool factor' that is based on the second factor. Figure 2 shows the adjusted gender differences in these factors, and in both cases women are statistically significantly more risk-averse.

We use two traditional measures of risk aversion. We first asked for the respondents' willingness to invest in a hypothetical asset. Respondents were asked to imagine they had won 100 thousand euros in a lottery. A reliable bank then offers them an investment that would, in two years, pay back twice the amount they have invested. However, with equal probability, the investor can loose half or the sum invested. The respondents were then asked how much of the 100 thousand they were willing to invest (0, 20, 40, 60, 80, 100 thousand euros).

The average investment was 38 thousand euros, and the modal investment was 40 thousand euros. This is in contrast to Dohmen et al. (2011), who study the same issue among the general population. The modal investment in their study was zero; over 60 percent of their respondents chose to invest nothing. Figure 1 shows the results by gender; the difference is not statistically significant.

The other traditional risk measure we use is the certainty equivalent of a lottery (see Nosic and Weber, 2010; Donkers, Melenberg, and van Soest, 2001). Respondents were asked to imagine a lottery in which they have a 50% chance to win 10,000 euros, and a 50% chance to get nothing. Then they had to choose either the lottery or x euros for sure. There were nine questions where the sure amount x ranged from 1,000 euros to 9,000 euros. The switching point, that is, the lowest sum of money for which a responder prefers the safe option over the lottery is the certainty equivalent.

The expected value of the lottery was 5,000 euros. According to this measure, slightly over half of the respondents, 57%, are risk averse, 36% are risk neutral and the rest, 7%, are risk loving. Figure 1 shows the results by gender (scaled for the graph by dividing the certainty equivalents by a factor of 1,000). On average women switched to the safe option at a lower level than men (3,977 vs. 4,231 euros) but the difference is not statistically significant.

Table 4 shows the correlations between these traditional risk measures as well as the general and financial risk attitudes, broken by subject gender and type. In most cases the correlations between the traditional measures and of the surveyed risk attitudes are low. The certainty equivalent measure correlates particularly weakly with the risk attitudes.

B. Predicting risk attitude

In this section we analyze the determinants of risk attitude. First, we take a brief look at the smaller sample survey data for this question. We have already discussed gender differences in these data based on the results reported in figures 1 and 2. In Table 5, we regress risk attitude on a full set of control variables. Across the different risk measures and specifications, men's risk attitude is 1.1 to 1.8 points higher on the 11-point scale, and the gender difference is always highly statistically significant. Of the control variables, investment knowledge increases risk attitude by about half of a point, and is highly statistically significant. Curiously, being a financial adviser increases risk attitude by 0.8 to 1.5 points, conditional on covariates. The magnitude of this effect is comparable to the gender effect. In unreported results we find that a significant gender effect exists also within the group of financial advisers. Age and wealth play no role in explaining risk attitudes. This could be due to the fact that all subjects have at least some financial expertise. The selected subject pool is also rather homogenous in education; more that 40% of the investment advisors and investors have a university degree.

Table 6 shows the results of a regression explaining the financial risk attitude of retail bank clients. Data is based on risk assessment reports generated from discussions between financial advisers and their clients in a Finnish commercial bank. The dependent variable is measured on a 5-point scale. Thus, as an alternative to OLS, and ordered logit model could be used. We have run these regressions using both methods, and the results are qualitatively the same. We choose to report the OLS specifications due the ease of interpreting the coefficients. Due to the large sample size the effects are very precisely estimated, and almost everything is statistically significant at the 1% level. We therefore emphasize economic magnitudes in interpreting the results.

The first column only includes age and gender as independent variables. The coefficient for the male dummy is 0.35. The second column adds two dummies for investment knowledge. The first dummy captures respondents that describe themselves as having some experience of financial markets, and the second dummy those who have extensive experience. The inclusion of these variables reduces the coefficient of the male dummy to 0.25. The gender effect remains at about a quarter of a point when further controls (education, income, and wealth) are included. These results show that while the gender effect is pervasive, it is clearly less important than the effect of knowledge. In the full specification (column 5), the magnitude of the gender effect is 60% of the effect of having some experience, and 26% of the effect of having extensive experience. The gender effect is roughly comparable to the effect of having a college degree (Education 4 –dummy), or a Master's degree (Education 5 –dummy)

Figure 3 depicts age profiles of the risk attitude scores. We limit the analysis to investors between ages 20 and 80 in order to have a sufficient number of observations. Risk-taking increases quite rapidly going from twenty-year-olds to thirty-year-olds. It then levels off, and starts to decline around the age of forty. Interestingly, the patterns are very similar for men and

women. The average difference is 0.38 points, and the greatest difference (0.53) occurs at age 34. As men reach the age of 47 their risk attitude declines to the level of twenty year olds. The corresponding age for women is 55. As the age increases, risk attitude further declines in an approximately linear fashion.

The gender-difference debate has traditionally been between the advocates of biological and social factors (see e.g. LaBorde Witt, 1994). Currently a broad agreement nevertheless exists on the joint influence of both biology and and culture on an individuals' behavior. The constant gender difference in Figure 3, however, speaks to the importance of biological origins of the gender difference in risk attitude. Women and men aged 65 have typically had quite different life experiences compared to 20-years-olds. Opportunities and social norms influencing women's choices have changed during the past 45 years. In our data the gender difference in risk attitudes is nevertheless similar among 65-years-olds and 20-years-olds. There has been increasing interest in biological factors affecting decision making. The evolution of such factors through the life cycle provides interesting new research topics (see Caldú and Dreher, 2007, and Mohr, Li and Heekeren, 2010 for reviews).

4. Validating the risk measures

In this section we investigate the explanatory power of the various risk measures on actual portfolio choice. We use two outcome variables: a binary variable indicating stock market participation and a continuous variable indicating the percentage of wealth allocated in stocks, conditional on investing in stocks (risky share). We have survey data on these outcome variables from wealthy private banking clients (henceforth called investors) and finance students.

Stock market participation rates in these groups are much higher than in the general population. Investors report owning some stocks in 72% of the cases, while the corresponding figure for finance students is 60% (Table 1, Panel A). Yet female investors and female finance students participate in the stock market less than their male counterparts do (investors 62% vs. 73%; students 46% vs. 67%). To investigate the impact of risk attitude, we run logit regressions explaining the zero-one decision of holding any stocks with one risk measure at a time, as well as control variables comprising respondent type dummy (1 for investors), male dummy, age and age squared, a variable indicating investment knowledge on a 5-point scale, a dummy variable for having university degree, income on a 6-point scale, and log wealth.

We find that general risk attitude, financial risk attitude, as well as the cool factor combining these two all individually strongly explain the participation decision. These risk measures are, however, too multicollinear to appear in the same regression together. We report the version employing the financial risk attitude in Table 7 as it has the greatest explanatory power. In the full specification reported in column 5, risk attitude and wealth are highly significantly positive, while none of the other variables are. The correlation between income and wealth is 0.52 (p-value < 0.01). Dropping income from the regression has a very small effect on the results: the coefficient of log wealth increases slightly.

Investor dummy is negative but not significant. This is due to investors' higher age and level of wealth compared to students. Without these controls the investor dummy is positive and significant. When we add traditional risk measures (results not reported) to the regression together with any of the risk attitude measures their effect is zero, or slightly negative. This provides clear evidence for the internal validity of the subjective risk attitude measures (general and financial), and against that of the traditional risk measures.

Table 8 shows the results of running an OLS regression explaining the risky share. The first three columns use either the general risk attitude, financial risk attitude, or the cool factor, one at a time, to explain the risky share. The two traditional measures, hypothetical investment and certainty equivalent, are also included. The incremental effect of the traditional measures is again essentially zero, while each of the risk attitude measures are highly significant.[4] The traditional measures remain insignificant also when a full set of control variables are included in the regression (results not reported).

Columns 4 through 6 drop the insignificant traditional measures and add the full menu of control variables, running the regressions again for each risk attitude measure in turn. Adding the controls slightly decreases the coefficients of all three risk attitude measures. For financial risk attitude and the cool factor also statistical significance drops somewhat, the *t*-values are now around 2. While the gender difference in the raw data is large (men 0.40, women 0.20), the coefficient of the male dummy in the regression is not significant. This suggests that the gender difference is captured by other variables, especially risk attitudes. Age and wealth have a negative effect on the risky share. The final rightmost column uses the financial risk attitude and drops some insignificant control variables in order to allow better comparison with the data on

[4] Adding the traditional variables into the regressions increases the *R*-squared only slightly and the increment in not significant in any of the regressions (*F*-tests, *p*-values > 0.9). In addition, we run separate regressions with one risk measure at a time. Dropping the traditional measures does not change the coefficients of the self-reported risk measures. When either the hypothetical investment or the certainty equivalent is the only explanatory variable, its coefficient is practically zero and not significant, and *R*-squared is close to zero.

retail bank clients that we analyze later.[5] This has very little effect on the most interesting variables, namely risk attitude and the male dummy.

Based on the analysis discussed here, as well as numerous unreported robustness checks, we conclude that self-reported general and financial risk attitudes are strongly associated with investment in risky assets. In contrast, traditional risk measures do a poor job, and have no incremental role when used together with risk attitude.

5. The gender effect in portfolio choice

The previous section shows that a simple financial risk attitude question dominates traditional risk measures based on abstract gambles. This gives us confidence for bringing in new data on retail bank clients' financial risk attitude and portfolio choice for analysis. In addition to a large sample size (85,000 profiles, over 60,000 without any missing items), this data has other benefits as well. It is very accurate for most items. The data on investments comes directly from the bank's information system. The setting of the interviews provides incentives for the customers to reflect on their risk attitude and to give accurate answers. The risk profile interviews are part of an investment consultation session that typically lasts about an hour. The bank's financial advisers are trained to emphasize the importance of correctly classifying their customers' risk aversion.

[5] Marital status and number of children were earlier included, motivated by Eckel and Grossman (2008) and more recently by Love (2010), and a dummy for tall individuals was earlier included, motivated by Dohmen et al., (2011). The dummy variable Tall takes value one when the respondent is taller than an average woman or an average man in Finland.

So far we have presented strong evidence that gender affects risk aversion, and that the effect is somewhat reduced when controlling for financial knowledge. From the analysis in Section 4 it is already clear that the risk attitude measures we employ in this paper strongly explain portfolio choice. In this section we focus on the question of gender effects in portfolio choice, namely stock market participation and risky share. We are especially interested in residual gender effects, that is, a possible remaining effect when controlling for financial risk attitude, as well as for sophistication and financial resources.

We start by looking at the behavior of students and wealthy private banking clients from our smaller survey sample. The stock market participation regressions, reported in Table 7, show that the effect of gender is statistically insignificant. Furthermore, it is practically zero once knowledge, education, and wealth are controlled for. In the full specification (column 5) the inclusion of wealth drives the expertise variable below zero, and the only significant effects are risk attitude and wealth. The analysis of risky share reported in Table 8 shows some indication of economically, but not statistically, significant gender effects. The male gender is associated with a 1-4 percentage points increase in the risky share, depending on which risk attitude measure is used.

We now turn to the analysis of the same questions using the large data set of retail bank clients. The stock market participation regression reported in Table 9 shows how the gender effect declines as additional controls are included. It is close to zero and insignificant in column 4 that adds the risk attitude. Column 5 adds income and wealth, which results in a strongly negative gender effect. Conditional on covariates, men contribute to the stock market nonparticipation puzzle to a greater extent than women do. Unreported analysis shows that the results are similar in subsamples of investors with advanced investment knowledge, or, alternatively, with college education.

Table 10 shows the results for the risky share. Male gender is associated with a 3.5 to 5.2 percentage points higher risky share if risk attitude is not controlled for. Columns 4 and 5 add risk attitude, and the residual gender effect is then estimated at 1.1 to 2.8 percentage points, remaining statistically highly significant. In the full specification (column 5), the residual gender effect of 2.8 percentage points corresponds to an increase of about a third of a point on the 5-point risk attitude scale. Unreported results show that coefficients are quite similar for men and women when estimated separately. We also split the sample into three roughly equal-sized age groups (ages 18-50, 51-64, and 65 and older), and find that the gender effect in risky share increases with age. It is 2.7 for the middle group, very close to the full sample value. The effect is 1.9 for the younger group, and 3.6 for the older. We also find that the residual gender effect does not disappear in subsamples of investors with advanced knowledge or college-level education. If anything, the effect is slightly larger.

As in the case of wealthy private banking clients and finance students (Table 8), the coefficient on wealth is negative, implying that wealthier investors do not increase their investment in stock at par with their wealth.[6] The coefficient on income is also negative, probably because of its relation to wealth. Curcuru et al. (2009) also obtain a negative coefficient on income, with a commensurate coefficient size. As a robustness check, we estimate the models dropping the income variable while retaining wealth, and obtain similar estimates for the key variables of interest.

[6] Unreported analysis shows that the negative sign for wealth disappears among investors with advanced investment knowledge.

6. Conclusions

In this paper we compare several measures of risk attitude using respondents that are familiar with financial risks. We find that a self-reported financial risk attitude (measured on an 11-point scale) is the strongest predictor of the proportion of wealth invested in stocks. Measures traditionally favored by economists, based on certainty equivalent or allocation to hypothetical investments, are dwarfed by the attitude variable. Factor analysis of risk attitudes in different domains suggests the existence of two distinct factors in the tendency to take risk. Previous research has found that a single factor captures risk attitudes in the general population. We also find that women are more risk-averse compared to men. This result is well established in the general population. Our contribution is to show that gender is still a strong predictor of risk taking in subjects with extensive personal and professional experience with financial matters.

We show that in addition to controlling for risk aversion using a measure of subjective risk-taking, control variables related to financial knowledge and resources are also important. Our investment knowledge measures are based on self-reported estimates of investment knowledge and experience. Future work could improve measuring this key variable by adding a quiz on financial literacy, or by collecting more detailed information on education.

We find that the residual gender effect on the conditional risky share—the effect of male gender on risky asset holdings after all appropriate controls—is about 3 percentage points, and statistically significant. The gender difference mainly works through women's higher risk aversion, which we find extends to finance professionals and wealthy private banking customers. The fact that Finland—the country from which our sample is derived from—is one of the most gender equal countries in the world suggests that we may have established a lower bound for the residual gender effect on risky share. The gender effect on the stock market participation

decision, on the other hand, is close to zero or negative. This implies that in a more gender-equal environment men could contribute more to the stock market nonparticipation puzzle, conditional on covariates.

We find an inverted U-shape in the willingness to take risks as a function of age (Figure 3). This finding is inconsistent with the standard lifecycle model which predicts a declining stock allocation as a function of age (Cocco, Gomes, and Maenhout, 2005). However, it may be consistent with young generations' greater uncertainty over future labor market income. Constantinides, Donaldson, and Mehra (2002) show that borrowing constraints can lead to a similar outcome even if the correlation between labor income and stock returns is very low. An inverted U-shape has also been suggested for the relation between age and time discounting (Read and Read, 2004). In their study, the middle-aged are the most patient, that is, they have lower discount rates compared to the young and the elderly. In our study the age pattern is almost identical for men and women, supporting the view that the gender effect in risk attitude is at least partially biological.

Our results also have implications for the financial services industry. There has been a trend in shifting the focus of investment advice from tactical asset allocation to strategic asset allocation, thus giving priority to risk preference rather than short-term expectations of asset class returns. Accurately estimating clients' risk aversion is therefore a central part of financial planning. To the extent that the clients do not have perfect knowledge of their own risk aversion, financial advice in this regard can be a source of value added, and possibly a source of competitive advantage for financial institutions. Regulation is also emphasizing the banks'

responsibility in this aspect.[7] It is useful for financial services firms to acknowledge that financial advisers may be more willing to take risk compared to the general population. This difference is not explained by age, income, or education. Self-selection into the financial industry based on other traits may play a part in explaining this finding.

[7] The 'Markets in Financial Instruments Directive' (MiFID) by the European Parliament is a prominent example. It requires financial advisers to elicit "the customers' preferences regarding risk taking, his risk profile and the purpose of the investment (§19:4)."

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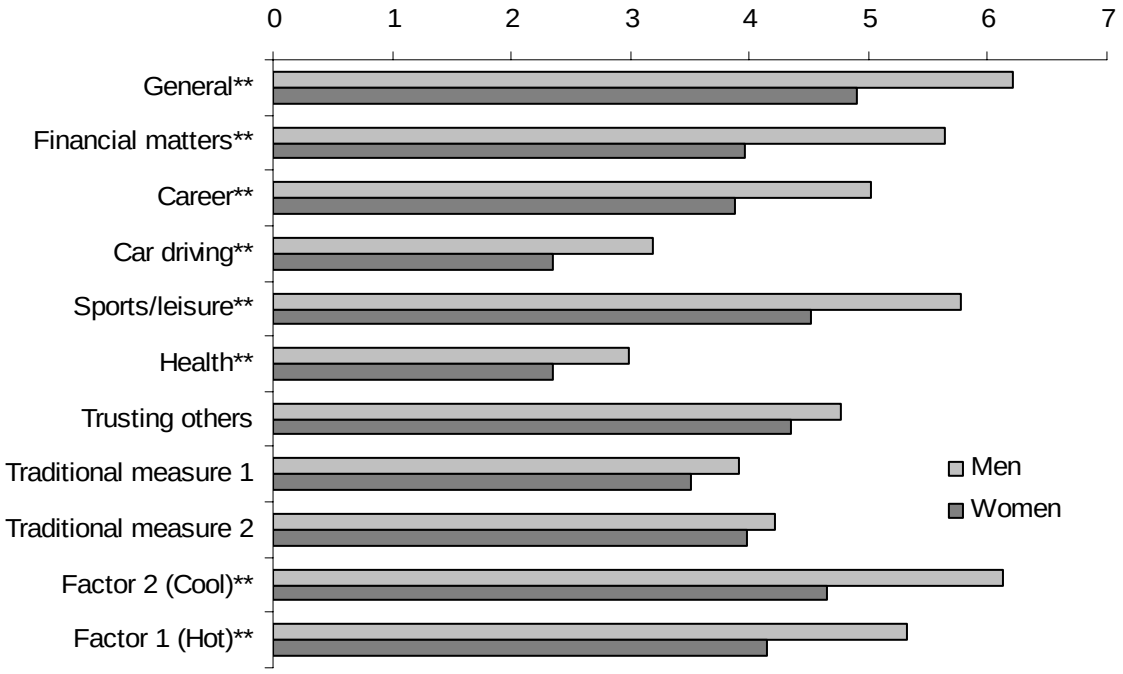

Figure 1. Gender differences in risk attitude. At the top, seven self-reported measures of risk attitude (general, financial matters, career, car driving, sports/leisure, health, and trusting others) measured on an 11-point scale where high values correspond to willingness to take more risk. Traditional measure 1 refers to a question concerning the amount of investment into a risky venture (original answers divided by 10) and traditional measure 2 to the certainty equivalent wealth from a 50-50 gamble of zero and 10,000 euros (original answers divided by 1,000). At the bottom, Factor 2 (Cool) and Factor 1 ('Hot') are the first two factors from a factor analysis (see Table 3) of all the self-reported risk measures. The data is based on a survey collected at investment seminars from wealthy private banking clients (labeled 'Investors', N=177), investment advisers (N=81), and finance students (N=77). The overall response rate is 97%. *, **, and *** represent significant gender differences at the 10%, 5% and 1% levels, respectively.

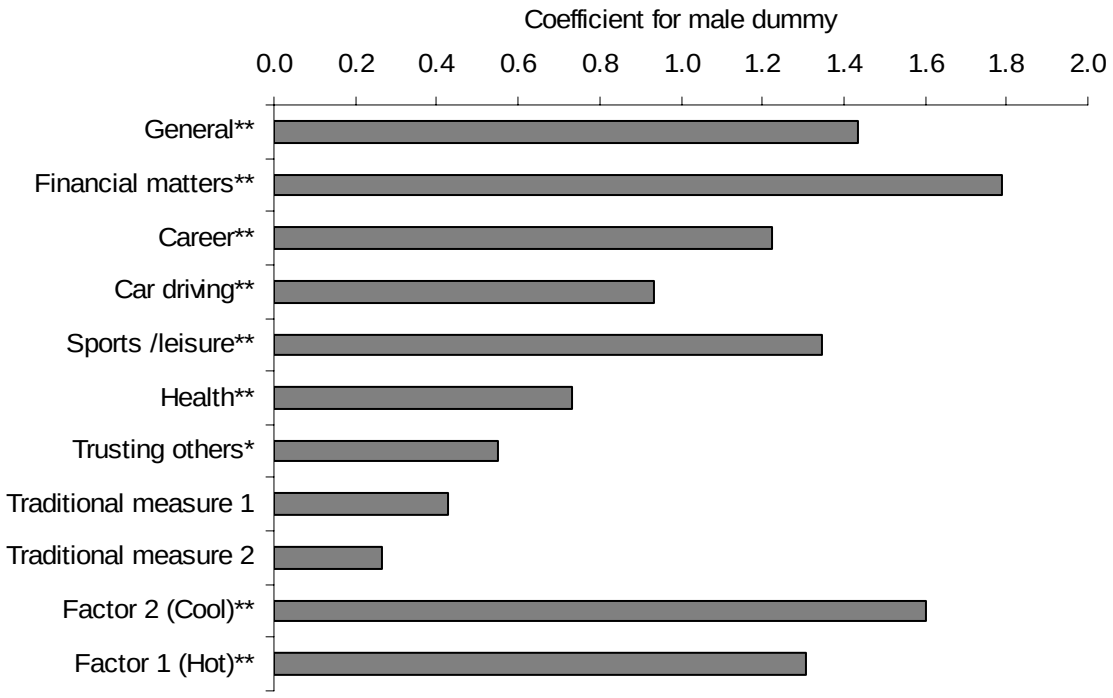

Figure 2. Age and type –corrected gender differences. The figure depicts coefficients for a male dummy from a regression explaining each risk measure (on the y-axis) in turn, controlling for age, age squared, adviser dummy, and investor dummy. At the top, seven self-reported measures on risk attitude (general, financial matters, career, car driving, sports/leisure, health, and trusting others), measured on an 11-point scale where high values correspond to willingness to take more risk. Traditional measure 1 refers to a question concerning the amount of investment into a risky venture (original answers divided by 10), and traditional masure 2 to certainty equivalent wealth from a 50-50 gamble of zero and 10,000 euros (original answers divided by 1,000). At the bottom, Factor 2 (Cool) and Factor 1 ('Hot') are the first two factors from a factor analysis (see Table 3) of all the self-reported risk measures. The data is based on a survey collected at investment seminars from wealthy private banking clients (labeled 'Investors', N=177), investment advisers (N=81), and finance students (N=77). The overall response rate is 97%. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

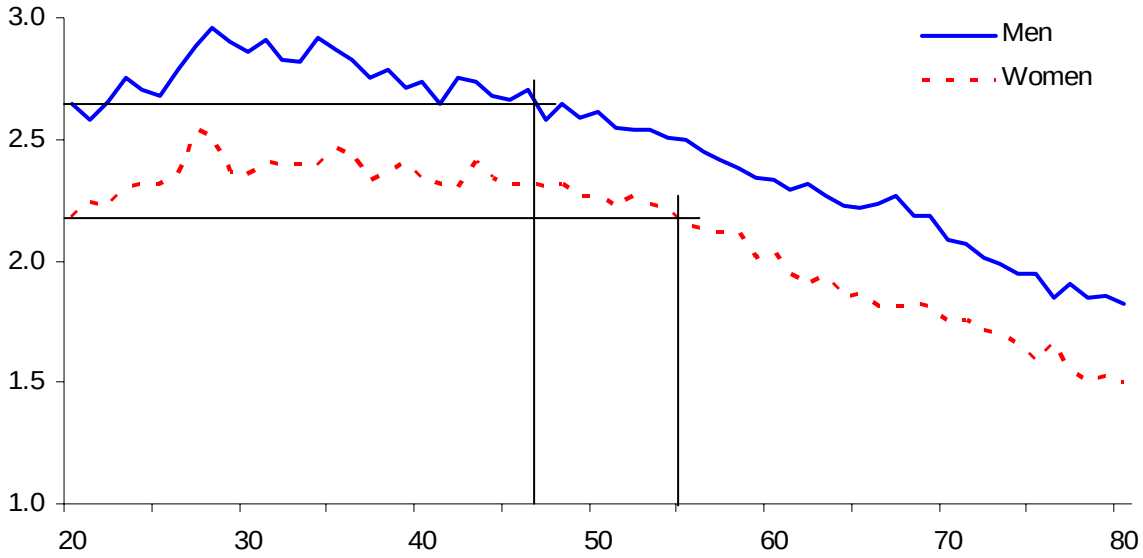

Figure 3. Bank clients' risk attitudes as a function of age. The vertical axis shows the average risk attitude score (5-point scale where high values correspond to willingness to take more risk) for investors with age given on the horizontal axis. The solid line represents men, and the dashed line represents women. The data are based on 85,063 reports of advisor-client discussions in a large Finnish retail bank.

Table 1

Descriptive statistics

Panel A reports summary statistics on a survey data collected at investment seminars from wealthy private banking clients (labeled 'Investors'), investment advisers and managers, and finance students. The overall response rate is 97%. Income is reported on a 6-point scale in which 1 stands for monthly income less than 1,000 euros, and 6 stands for monthly income greater than 5,000 euros. Panel B is based on data from reports of advisor-client discussions in a large Finnish retail bank.

Panel A. Investment seminar surveys

	Investment advisors	Investors	Students	Survey total
All subjects				
Number of observations	81	177	77	335
Age				
mean	37.8	58.1	24.2	45.3
std. dev.	9.4	14.1	3.6	18.2
median	36.0	60.0	23.0	44.0
Income / annual account turnover				
mean	4.1	4.3	1.7	3.6
std. dev.	1.1	1.1	1.0	1.8
median	4.0	4.0	1.0	4.0
Investment knowledge				
mean	-	2.5	2.7	2.5
std.dev.	-	1.2	1.0	1.3
median	-	2.0	2.5	2.0
Education				
university degree, %	43	45	17	38
Stock market participation, %	-	72	60	68
Risky share, %	-	26	55	34
Men				
Fraction, %	48	63	66	60
Age				
mean	37.8	58.1	24.2	45.3
std. dev.	9.4	14.1	3.6	18.2
median	36.0	60.0	23.0	44.0
Income / annual account turnover				
mean	4.1	4.3	1.7	3.6
std. dev.	1.1	1.1	1.0	1.8
median	4.0	4.0	1.0	4.0
Investment knowledge				
mean	-	2.7	2.8	2.8
std.dev.	-	1.2	0.9	1.1
median	-	3.0	3.0	3.0
Education				
university degree, %	43	45	17	38
Stock market participation, %	-	73	67	75
Risky share, %	-	30	66	40

Table 1 cont'd

	Investment advisors	Investors	Students	Survey total
Women				
Fraction, %	52	37	34	40
Age				
mean	37.8	58.1	24.2	45.3
std. dev.	9.4	14.1	3.6	18.2
median	36.0	60.0	23.0	44.0
Income / annual account turnover				
mean	4.1	4.3	1.7	3.6
std. dev.	1.1	1.1	1.0	1.8
median	4.0	4.0	1.0	4.0
Investment knowledge				
mean	-	2.0	2.4	2.1
std.dev.	-	1.1	1.1	1.1
median	-	2.0	2.0	2.0
Education				
university degree, %	43	45	17	38
Stock market participation, %	-	62	46	57
Risky share, %	-	19	24	20

Panel B. Risk assessment reports

	All	Men	Women
Number of observations	85 063	51%	49%
Age			
mean	55.4	54.6	56.3
std. dev.	16.2	16.4	16.0
median	58.0	57.0	59.0
Income / annual account turnover			
mean	48 400	60 330	36 073
std. dev.	149 700	164 174	131 852
median	25 900	31 722	21 658
Investment knowledge			
extensive experience	10%	13%	8%
some experience	51%	52%	50%
Education			
college degree, %	26.1	25.4	26.8
Stock market participation, %	46.4	50.3	42.4
Risky share, %	29.5	31.9	26.5

Table 2

Correlations between risk attitudes in different domains

The data is based on a survey collected at investment seminars from wealthy private banking clients (labeled 'Investors', N=177), investment advisers (N=81), and finance students (N=77). The overall response rate is 97%. All risk attitude questions use an 11-point scale, in which 0 stands for a 'not willing to take any risks', and 10 stands for 'completely willing to take risks'. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

	General	Car driving	Financial matters	Sports / leisure	Career	Health	Trusting other people
All subjects							
General	1.000						
Car driving	0.274***	1.000					
Financial matters	0.735***	0.339***	1.000				
Sports / leisure	0.414***	0.496***	0.465***	1.000			
Career	0.446***	0.428***	0.498***	0.561***	1.000		
Health	0.282***	0.497***	0.310***	0.395***	0.457***	1.000	
Trusting other people	0.292***	0.302***	0.359***	0.455***	0.434***	0.410***	1.000
Men							
General	1.000						
Car driving	0.206***	1.000					
Financial matters	0.715***	0.248***	1.000				
Sports / leisure	0.302***	0.460***	0.329***	1.000			
Career	0.405***	0.285***	0.404***	0.498***	1.000		
Health	0.212***	0.451***	0.235***	0.348***	0.321***	1.000	
Trusting other people	0.238***	0.204***	0.337***	0.382***	0.336***	0.360***	1.000
Women							
General	1.000						
Car driving	0.309***	1.000					
Financial matters	0.701***	0.383***	1.000				
Sports / leisure	0.460***	0.516***	0.538***	1.000			
Career	0.427***	0.562***	0.514***	0.596***	1.000		
Health	0.318***	0.534***	0.336***	0.419***	0.588***	1.000	
Trusting other people	0.335***	0.422***	0.375***	0.551***	0.530***	0.463***	1.000

Table 2. cont'd

	General	Car driving	Financial matters	Sports / leisure	Career	Health	Trusting other people
Investment advisors							
General	1.000						
Car driving	0.168	1.000					
Financial matters	0.575***	0.288***	1.000				
Sports / leisure	0.543***	0.468***	0.544***	1.000			
Career	0.408***	0.474***	0.427***	0.510***	1.000		
Health	0.231**	0.486***	0.281**	0.438***	0.449***	1.000	
Trusting other people	0.128	0.312***	0.232**	0.340***	0.304***	0.536***	1.000
Students							
General	1.000						
Car driving	0.311***	1.000					
Financial matters	0.755***	0.279**	1.000				
Sports / leisure	0.303***	0.253**	0.262**	1.000			
Career	0.530***	0.302***	0.465***	0.490***	1.000		
Health	0.276**	0.368***	0.239**	0.219*	0.336***	1.000	
Trusting other people	0.439***	0.106	0.487***	0.332***	0.395***	0.215*	1.000
Investors							
General	1.000						
Car driving	0.239***	1.000					
Financial matters	0.779***	0.337***	1.000				
Sports / leisure	0.364***	0.472***	0.474***	1.000			
Career	0.426***	0.419***	0.516***	0.574***	1.000		
Health	0.249***	0.542***	0.309***	0.398***	0.479***	1.000	
Trusting other people	0.234***	0.306***	0.319***	0.497***	0.467***	0.385***	1.000

Table 3

Factor analysis pattern matrix

Extraction method is principal axis factoring. Rotation method is promax with Kaiser normalization. The data is based on a survey collected at invstment seminars from wealthy private banking clients (labeled 'Investors', N=177), investment advisers (N=81), and finance students (N=77). The overall response rate is 97%. All risk attitude questions use an 11-point scale, in which 0 stands for a 'not willing to take any risks', and 10 stands for 'completely willing to take risks'. Table shows for each risk question the factor loadings that are greater than 0.4.

Risk domain	Factor 1 (' hot factor')	Factor 2 ('cool factor')
General		0.81
Car driving	0.64	
Financial matters		0.79
Sports / leisure	0.57	
Career	0.55	
Health	0.71	
Trusting other people	0.51	

Table 4

Correlations between main risk measures

The data is based on a survey collected at investment seminars from wealthy private banking clients (labeled 'Investors', N=177), investment advisers (N=81), and finance students (N=77). The overall response rate is 97%. Both risk attitude questions use an 11-point scale, in which 0 stands for a 'not willing to take any risks', and 10 stands for 'completely willing to take risks'. Trad. measure 1 shows answers to a question concerning the amount of investment into a risky venture, and Trad. measure 2 is the certainty equivalent wealth from a 50-50 gamble of zero and eur 10,000. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

	Risk, general	Risk, financial	Trad. measure 1	Trad. measure 2
All subjects				
Risk, general	1.000			
Risk, financial	0.735***	1.000		
Trad. measure 1	0.259***	0.271***	1.000	
Trad. measure 2	0.107	0.119*	0.251***	1.000
Men				
Risk, general	1.000			
Risk, financial	0.715***	1.000		
Trad. measure 1	0.282***	0.262***	1.000	
Trad. measure 2	0.153*	0.161*	0.284***	1.000
Women				
Risk, general	1.000			
Risk, financial	0.701***	1.000		
Trad. measure 1	0.185**	0.281***	1.000	
Trad. measure 2	-0.014	0.015	0.177	1.000

	Risk, general	Risk, financial	Trad. measure 1	Trad. measure 2
Investment advisors				
Risk, general	1.000			
Risk, financial	0.575***	1.000		
Trad. measure 1	0.252**	0.367**	1.000	
Trad. measure 2	-	-	-	-
Students				
Risk, general	1.000			
Risk, financial	0.755***	1.000		
Trad. measure 1	0.230**	0.237**	1.000	
Trad. measure 2	0.159	0.279**	0.229**	1.000
Investors				
Risk, general	1.000			
Risk, financial	0.779***	1.000		
Trad. measure 1	0.335***	0.297***	1.000	
Trad. measure 2	0.096	0.078	0.259***	1.000

Table 5

Determinants of subjective risk attitude; students, investors, and advisers

The dependent variable is one of three risk-attitude measures: General ('Gen.'), financial ('Fin.'), or a factor representing a combination of these two ('Cool f.', see Table 3). The models are OLS. The data is based on a survey collected at investment seminars from wealthy private banking clients (labeled 'Investors', N=177), investment advisers (N=81), and finance students (N=77). The overall response rate is 97%. All risk attitude questions use an 11-point scale, in which 0 stands for a 'not willing to take any risks', and 10 stands for 'completely willing to take risks'. Investor, Inv. advisor, Male, and Univ. degree are dummy variables. Investment knowledge is reported on a 5-point and income on a 6-point scale. t-values are reported below coefficients. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

Sample	Students, investors, advisers			Students and investors					
Dep. var.	Gen.	Fin.	Cool f.	Gen.	Fin.	Cool f.	Gen.	Fin.	Cool f.
Investor	0.36	0.16	0.12	0.18	0.15	0.12	-0.48	-0.26	-0.36
	0.82	0.33	0.30	0.35	0.27	0.26	-0.77	-0.38	-0.64
Inv. advisor	1.51***	0.80*	0.97***						
	3.99	1.94	2.80						
Male	1.35***	1.75***	1.56***	1.09***	1.73***	1.39***	0.77**	1.55***	1.15***
	6.01	7.17	7.50	3.96	5.86	5.51	2.38	4.42	3.89
Age	-0.02	0.02	0.01	-0.04	0.01	-0.02	-0.05	-0.01	-0.02
	-0.39	0.50	0.23	-0.77	0.17	-0.44	-0.76	-0.09	-0.35
Age squared	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-0.08	-1.07	-0.99	0.58	-0.62	-0.10	0.54	-0.16	0.01
Univ. degree	-0.29	0.20	0.01	-0.17	0.27	0.09	-0.05	0.51	0.22
	-1.28	0.82	0.06	-0.64	0.94	0.36	-0.18	1.57	0.79
Income	0.43	0.11	0.19	0.12	0.04	0.08	0.12	-0.07	0.02
	1.50	0.36	0.72	1.19	0.40	0.86	1.03	-0.52	0.20
Inv. knowledge				0.50***	0.43***	0.42***	0.51***	0.45***	0.46***
				4.44	3.55	4.07	4.10	3.30	4.02
Log wealth							0.19	0.13	0.09
							1.61	1.01	0.88
Intercept	6.59***	5.41***	6.35***	5.38***	4.45***	5.59***	3.64**	3.54**	4.56***
	7.69	5.80	8.01	5.11	3.92	5.75	2.45	2.19	3.28
R-squared	0.20	0.20	0.26	0.21	0.27	0.29	0.21	0.23	0.27
N	328	331	319	238	239	232	183	184	178

Table 6

Determinants of subjective risk attitude, retail bank clients

The dependent variable is financial risk attitude on a 5-point scale where high values correspond to willingness to take more risk. The models are OLS. The data are based on a sample of reports of advisor-client discussions in a large Finnish retail bank. Male is a dummy variable for the male gender. Investment knowledge 1 and 2 are dummies corresponding to some financial market experience, and extensive experience, respectively. Four education dummies (from 2 to 5) are based on having a high school diploma, vocational training, college degree, and a University Master's degree or higher. *t*-values are reported below coefficients. Standard errors are robust to heteroskedasticity. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

	1	2	3	4	5
Age	0.017***	-0.002**	-0.004***	-0.004***	0.000
	14.75	2.26	3.34	3.34	0.37
Age squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	30.9	17.54	12.01	12.01	12.44
Male	0.347***	0.251***	0.271***	0.271***	0.270***
	54.44	40.71	39.81	39.81	37.98
Inv. knowledge 1		0.443***	0.418***	0.418***	0.447***
		68.87	58.8	58.8	60.46
Inv. knowledge 2		1.013***	0.961***	0.961***	1.022***
		84.75	70.05	70.05	70.41
Education 2			0.189***	0.189***	0.205***
			10.11	10.11	10.7
Education 3			0.145***	0.145***	0.139***
			16.72	16.72	15.42
Education 4			0.321***	0.321***	0.315***
			24.95	24.95	23.71
Education 5			0.310***	0.310***	0.310***
			26.08	26.08	24.92
Log income					0.043***
					13.03
Log wealth					-0.054***
					20.36
Constant	2.197***	2.468***	2.250***	2.250***	2.112***
	75.13	86.94	66.57	66.57	60.72
Observations	85,063	82,412	66,795	66,795	62,405
R-squared	0.12	0.22	0.23	0.23	0.24

Table 7

Determinants of stock market participation, students and investors

The dependent variable takes the value of one if the respondent has invested in stocks, and zero otherwise. The models are Logit. The data is based on a survey collected at investment seminars from wealthy private banking clients (labeled 'Investors', N=177), investment advisers (N=81), and finance students (N=77). The overall response rate is 97%. All risk attitude questions use an 11-point scale, in which 0 stands for a 'not willing to take any risks', and 10 stands for 'completely willing to take risks'. Investor, Male, and University degree are dummy variables. Investment knowledge is reported on a 5-point and income on a 6-point scale. *z*-values are reported below coefficients. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

	1	2	3	4	5
Risk attitude, financial	0.27***	0.27***	0.26***	0.26***	0.52***
	3.50	3.28	3.20	3.14	3.86
Investor	-0.21	-0.08	-0.12	-0.24	-1.01
	-0.35	-0.14	-0.20	-0.38	-1.14
Male	0.28	0.12	0.15	0.03	0.02
	0.83	0.34	0.43	0.08	0.04
Age	0.14**	0.11*	0.10	0.06	-0.09
	2.21	1.69	1.49	0.87	-0.76
Age squared	0.00**	0.00	0.00	0.00	0.00
	-2.06	-1.43	-1.26	-0.71	0.73
Investment knowledge		0.08	0.06	0.04	-0.26
		0.52	0.41	0.28	-1.19
University degree			0.50	0.43	0.57
			1.45	1.22	1.10
Income				0.16	0.08
				1.30	0.40
Log wealth					0.57***
					3.06
Intercept	-3.45**	-3.18**	-2.99**	-2.53*	-4.62***
	-2.73	-2.39	-2.21	-1.82	-1.96
Pseudo R-squared	0.10	0.10	0.10	0.11	0.24
N	250	240	240	239	184

Table 8

Determinants of risky share, students and investors

The dependent variable is risky share, i.e., the proportion of total wealth that respondents hold in stocks, conditional on holding some stocks. The models are OLS. Investor, Male, Univ. degree, Married, Children, and Tall are dummy variables. Investment knowledge is reported on a 5-point and income on a 6-point scale. *t*-values are reported below coefficients. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

Risk attitude	General	Financial	Cool fact.	General	Financial	Cool fact.	Financial
Risk attitude	0.05**	0.05***	0.06***	0.04***	0.03*	0.04**	0.03*
	2.31	3.08	2.90	2.61	1.96	2.14	1.97
Hypothetical inv.	-0.00	-0.00	-0.00				
	-0.15	-0.24	-0.39				
Certainty equiv.	0.00	-0.01	-0.00				
	0.01	-0.26	-0.07				
Investor				0.05	0.04	0.05	
				0.36	0.34	0.39	
Male				0.03	0.02	0.01	0.04
				0.44	0.28	1.17	0.55
Age				-0.03**	-0.03**	-0.03**	-0.03**
				-1.98	-2.11	-2.11	-2.21
Age squared				0.00*	0.00*	0.00*	0.00*
				1.77	1.87	1.95	1.90
Inv. knowledge				-0.01	-0.00	-0.01	-0.00
				-0.43	-0.02	-0.21	-0.14
Univ. degree				0.03	0.02	0.02	0.01
				0.57	0.37	0.29	0.22
Income				0.02	0.02	0.02	0.02
				0.67	0.80	0.74	0.78
Married				0.00	-0.02	-0.01	
				0.03	-0.28	-0.17	
Children				0.02	0.05	0.04	
				0.21	0.56	0.44	
Tall				-0.08	-0.08	-0.07	
				-1.45	-1.44	-1.37	
Log wealth				-0.06**	-0.05**	-0.06**	-0.05**
				-2.39	-2.23	-2.40	-2.23
Intercept	0.08	0.10	0.01	1.56***	1.63***	1.61***	1.52***
	0.57	0.90	0.08	4.83	5.05	4.79	5.70
R-squared	0.04	0.07	0.06	0.36	0.35	0.36	0.33
N	147	148	142	151	152	147	152

Table 9

Determinants of stock market participation, retail bank clients

The dependent variable takes the value of one if the respondent has invested in stocks, and zero otherwise. The models are Logit. The data are based on a sample of reports of advisor-client discussions in a large Finnish retail bank. Male is a dummy variable for the male gender. Investment knowledge 1 and 2 are dummies corresponding to some financial market experience, and extensive experience, respectively. Four education dummies are based on (from 2 to 5) having a high school diploma, vocational training, college degree, and a University Master's degree or higher. t-values are reported below coefficients. Standard errors are robust to heteroskedasticity. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

	1	2	3	4	5
Risk attitude, financial				0.657***	0.751***
				59.08	62.07
Age	0.116***	0.084***	0.048***	0.093***	0.051***
	43.7	25.56	13.6	26.83	13.86
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***
	40.71	24.47	16.23	22.28	13.19
Male	0.351***	0.197***	0.082***	0.026	-0.118***
	25.03	11.49	4.44	1.47	6.07
Investment knowledge 1		1.424***	1.328***	1.238***	1.089***
		75.18	66.27	62.74	51.85
Investment knowledge 2		2.201***	1.965***	1.731***	1.378***
		66.1	55.11	50.15	36.63
Education 2		0.328***	0.309***	0.216***	0.168***
		6.88	6.2	4.32	3.22
Education 3		0.156***	0.185***	0.063***	0.089***
		6.98	7.83	2.77	3.64
Education 4		0.363***	0.384***	0.166***	0.167***
		11.33	11.31	4.97	4.7
Education 5		0.519***	0.455***	0.338***	0.242***
		17.1	14.11	10.71	7.14
Log income			0.016**		-0.017**
			1.98		1.98
Log wealth			0.348***		0.426***
			46.41		51.61
Intercept	-3.392***	-3.592***	-3.412***	-5.320***	-5.261***
	49.44	40.94	37.15	53.46	50.74
Observations	85,063	66,795	62,405	66,795	62,405

Table 10

Determinants of risky share, retail bank clients

The dependent variable is risky share, i.e., the proportion of total wealth held in stocks, conditional on holding some stock. The models are OLS. The data are based on a sample of reports of advisor-client discussions in a large Finnish retail bank. Investment knowledge 1 and 2 are dummies corresponding to some financial market experience, and extensive experience, respectively. Four education dummies are based on (from 2 to 5) having a high school diploma, vocational training, college degree, and a University Master's degree or higher. t-values are reported below coefficients. Standard errors are robust to heteroskedasticity. *, **, and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

	1	2	3	4	5
Risk attitude, financial				0.091***	0.087***
				54.45	50.63
Age	-0.002***	-0.004***	0.001	-0.003***	0.001*
	3.34	5.68	1.22	4.67	1.7
Age squared	0.00	0.000***	-0.000*	0.000***	0.00
	0.81	3.33	1.86	4.95	0.17
Male	0.052***	0.035***	0.052***	0.011***	0.028***
	19.55	12.32	17.57	4.01	9.86
Investment knowledge 1		0.049***	0.062***	0.017***	0.030***
		13.99	18.18	5.1	8.93
Investment knowledge 2		0.177***	0.217***	0.100***	0.137***
		34.76	41.13	19.75	26.1
Education 2		0.052***	0.059***	0.036***	0.042***
		6.02	6.75	4.39	5.04
Education 3		0.020***	0.018***	0.010***	0.009**
		5.67	5.04	2.78	2.48
Education 4		0.050***	0.048***	0.030***	0.030***
		9.27	8.94	5.8	5.73
Education 5		0.057***	0.066***	0.037***	0.046***
		11.65	13.23	7.94	9.78
Log income			-0.006***		-0.009***
			4.36		6.69
Log wealth			-0.041***		-0.035***
			26.99		23.58
Intercept	0.361***	0.313***	0.317***	0.075***	0.095***
	23.14	17.56	17.74	4.14	5.22
Observations	39,496	31,111	29,237	31,111	29,237
R-squared	0.02	0.07	0.11	0.16	0.19