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The impact of financial literacy and financial interest on risk tolerance

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ABSTRACT

We investigate and compare the effects of financial literacy and financial interest on risk tolerance, evaluating not only at the means, but also the whole distribution. We use a unique sample of 12,156 Swedish bank customers combining bank-register data with survey data. Results show that both financial literacy and financial interest are associated with higher risk tolerance. They further show that the impact of financial interest is significantly higher than the impact of financial literacy. Differences are also observed across the distribution. Quantile regressions show that financial interest has its greatest association at the medium-to-high range of risk tolerance, whereas financial literacy shows its greatest association at the lower range of risk tolerance. Findings contribute to the literature on risk tolerance, specifically pointing to the relevance of the noncognitive trait; interest, to individuals' risk tolerance.

1. Introduction

Financial-risk tolerance is commonly defined as the maximum amount of variability in return that someone is willing to accept when making a financial decision. Because financial risk plays a role in almost every important economic decision, understanding individuals' tolerance toward risk links to the goal of understanding economic behavior. This paper investigates and compares the effects of financial literacy and financial interest on individuals' risk tolerance.

Previous research has found various factors to explain risk tolerance. Included in this body of research are studies of how socioeconomic factors such as age, income, and education affect risk tolerance (Bucciol et al., 2017; Dohmen et al., 2011; Grable, 2000). Further, a large number of studies investigate the relationship between gender and risk tolerance, concluding that men are more risk tolerant than women (Charness and Gneezy, 2012; Croson and Gneezy, 2009; Dreber et al., 2011; Dreber and Hoffman, 2007; Eckel and Grossman, 2008; Gysler et al., 2002).[2] Other researchers find that genetic variation is an important source of individual heterogeneity in financial risk-taking (Cesarini et al., 2008). Conlin et al. (2015) conclude that personality traits affect whether individuals invest is risky assets (stocks).

The literature also suggests cognitive explanations for risk-tolerance heterogeneity: Differences in risk tolerance could be due to differences in familiarity and understanding of the very nature of financial risk (Sung and Hanna, 1996). In general, things with which an individual is familiar and choice alternatives that fall in the individual's domain of competence will tend to be less risky. People prefer choices about which they can feel expert and competent (Heath and Tversky, 1991). Others argue that understanding the nature of the risk concept decreases negative emotional reactions toward risk (cf. Croson and Gneezy, 2009; Loewenstein et al., 2001; Slovic, 1987). In accordance, substantial evidence avers that *financially literate* individuals exhibit a more risk-tolerant behavior and invest in risky assets to a larger extent than individuals with lower financial literacy (e.g., Bannier and Neubert, 2016; Dimmock et al., 2016; Van Rooij et al., 2011). Financially literate individuals also hold more financial assets in general (Feng et al., 2019). Considering the benefits of such behaviors, much effort has been put into improving consumers' financial literacy, such as through work and high school programs. However, it is unclear whether educational programs actually affect risk-taking and financial behavior. Hung and Yoong (2013), for example, find that unsolicited advice has no effect on investment behavior, whereas individuals who actively solicit advice ultimately change behavior, in spite of relatively low financial literacy. Their findings show that building financial literacy can affect outcomes, but also that other (in their study unobserved) factors, such as inherent motivation, could be highly

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[2] However, evidence exists that for lower risk-tolerance levels, the gender difference is insignificant (Säve-Söderbergh, 2012).

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relevant. Such motivational factors "do not appear to be perfectly correlated with financial literacy" (p. 18).

Deci and Ryan (1991) suggest that "intrinsically motivated behaviors are those the person undertakes out of *interest*" (p. 241 italics as in the original). From this perspective, interest and intrinsic motivation are synonymous. Although knowledge of financial issues, that is, financial literacy, is a cognitive construct, interest is motivational. In the education literature, researchers discuss two forms of interest: *Situational interest* is best understood as temporary interest associated with increased attention in a specific situation; *Individual interest,* in contrast, reflects a long-term involvement in some activity or subject (e.g., Renninger, 2000; Hidi, 1990; Schiefele, 1991). Furthermore, individual interest, or motivation, appears to be stable and long lasting toward certain domains (Von Culin et al., 2014). Individual interest means a person values and likes a topic and looks for more information about it (Schiefele, 1991). We use the term *financial interest* to describe a motivational state where the individual is interested in economic issues and financial markets. Thus, financial interest is here defined as an individual rather than a situational interest.

The association between financial literacy on financial risk taking (i.e., stock market participation) has received considerable attention from researchers and policymakers. Specifically in the education literature, researchers give increased attention to noncognitive traits. Consistency of interest combined with perseverance of effort significantly accounts for variances in success outcomes (Duckworth et al., 2007). Research on the effects of interest is still very scarce in the financial-literacy and behavioral-economics literature. Notable exceptions include early exploratory studies by Gunnarsson and Wahlund (1997) and Wärneryd (1999), who find that differences in the extent to which individuals express an interest in financial matters, that is, to what extent households have an interest and endeavor to acquire information about market developments and new forms of saving, correlates with differences in saving behavior. These studies conclude that financial interest appears to be the greatest among investors who invest in stocks and mutual funds, and own more complex products, such as options.

In this paper we propose a simple scale to measure financial interest and investigate and compare the effect of financial literacy and financial interest on financial-risk tolerance. We evaluate the effects not only at the means but also over the whole distribution of risk tolerance. We further investigate the interactive effect of these two constructs on risk tolerance.

The literature proposes various means to measure risk tolerance with on-going discussion on the benefits of various measures. The discussion on suitable measures involves whether researchers should use subjective survey measures or objective measures from register data (Hermansson, 2018; Schooley and Worden, 1996). Considerations when deciding on suitable subjective risk-tolerance measures include whether context-related questions or more general questions should be posed (Dohmen et al., 2011). Another consideration is whether to use one- dimensional or multi-dimensional constructs (MacCrimmon and Wehrung, 1986; Menkhoff and Sakha, 2017). Several studies use data collected through the American Survey of Consumer Finances (SCF; e.g. Bonsang and Dohmen, 2015; Fisher and Yao, 2017). In that survey, respondents answered one question to rate their willingness to take risk when saving or investing. Others argued that multiple questions should be used when measuring risk tolerance (Loomes and Pogrebna, 2014; Menkhoff and Sakha, 2017).

The present study uses a subjective, multi-item measure of risk tolerance collected through a survey investigation. To test the robustness of our results, we also use an objective measure operationalized as the percentage of stocks to total financial wealth (cf. (Wärneryd, 1996). We analyze unique data that combine survey data (collected from 12,156 bank clients in 2013) with bank record data from each respondent. The analysis shows that although financial literacy and financial interest are associated with higher risk tolerance, financial interest shows a significantly higher association. We also find differences across the risk-tolerance distribution. Results show that financial interest has its greatest association at the medium to high range of risk tolerance, whereas financial literacy shows its greatest association at the lower range of risk tolerance. We also conclude that the interaction of financial literacy and financial interest on risk tolerance is insignificant. Hence, being financially literate *and* having a great interest in financial matters does not lead to additional risk tolerance. We find that the control variables (including gender, demographic, and socioeconomic data) explain approximately 13.6% of risk-tolerance heterogeneity. The model that also includes financial literacy increases the explanatory power to 18.4%, whereas the model that instead also includes financial interest yields an R^2 of 24.5%. Hence, financial interest appear to offer additional explanation to risk-tolerance heterogeneity. Thus, the findings contribute to the literature on financial-risk tolerance. Although much previous research concludes that financial literacy, a cognitive trait, affects risk taking (i.e., stock market participation), this study finds that non-cognitive traits (interest or motivation) may have an even larger impact. The robustness test confirms our findings.

In the educational literature, researchers often debate the relationship between interest and knowledge, that is, how a person's interest in a topic interacts with what he or she knows about that topic (e.g., Tobias, 1994; Wlodkowski and Ginsberg, 2017). Though the iterative process of interest and knowledge development is relevant to investigate, the cross-sectional nature of our data do not allow further investigation into this process.

The remainder of the paper is organized as follows. In Section 2, we describe the method and the data. Section 3 provides the results of the analysis where data were analyzed using linear (ordinary least squares [OLS]) regressions and quantile regressions. Section 4 includes robustness checks, estimating a model with an objective risk-tolerance measure (the ratio of investments in stock to total amount invested through the bank) using fractional outcome regressions. Section 5 has our conclusions and Section 6 provides limitations and suggestions for future research.

2. Data and method

Data accrued from one of Sweden's largest retail banks with a market share of approximately 20% of the Swedish retail market. We collected two types of data: anonymized data from the bank's register of household customers (register data) and data from a survey sent to individual customers included in the register sample (survey data).

In the spring of 2013, we drew a random sample of 90,528 customers from the bank's 2,254,420 Swedish customers. The conditions for including a customer in the sample was that the customer had an engagement with the bank and was 18 years or older. The register data include individual-level demographic and socioeconomic data (age, gender, geographical location, income, financial assets, loans and mortgages).

We sent a questionnaire by post in the spring of 2013 to all customers in the register sample. An academic institution was the sender – and also the receiver of the responses – in order to achieve independence from the bank. No reminders were sent. Returning the survey were 16,062 respondents, yielding a response rate of 17.7%. The survey data provided additional demographic and socioeconomic data, such as marital and family status, education, employment, and housing status. In addition,

we received data on customers' risk tolerance, financial literacy, and financial interest. Of the returned surveys, 13,525 were completely answered. We excluded surveys answered by respondents that stated they were clients in more than one bank. The reason for this was to obtain a fair approximation of the respondent's wealth and proportion invested in risky assets. Wealth is operationalized as the total amount invested through the bank, that is, in savings accounts, mutual funds and stocks. The final sample size amounted to 12,156. See Table 1 for a descriptive summary.

We acknowledge that the response rate is relatively low and that the sample used is a convenience sample. Still, the response rate is in line with similar studies (Kramer, 2016; Lusardi et al., 2011). Comparing the survey data with the register data and the average Swedish population,[3] the sample represents the Swedish population, except that customers responding to the survey are significantly older, wealthier, and better educated. We test for selection bias in the robustness test. The average age in the sample is 55.7 years (std. dev. 1.79 years), which is higher than the bank-register data (49.7 years) and the overall average age in Sweden, which is 41.2 years. The average age in Sweden, however, also includes individuals younger than 18 whereas our sample only includes individuals who are 18 years old or older. The sample financial wealth is, on average, 512,289 SEK with a fairly large standard deviation of 1,028,002 SEK. The survey financial wealth is higher than the average financial wealth for the Swedish population, whose average financial wealth amounts to 305,000 SEK.[4] It is also higher than wealth reported in the bank's register data where the average wealth is 317,000 SEK. Education is measured according to five alternatives, from no finalized education to post-gymnasial education, three years or longer. The most common educational status is gymnasial education (equivalent to upper secondary school). Compared to the national average, this share is lower (27.0% compared to 45%), and the share of postgymnasial education is higher (52.6% compared to 34%). Thus, the sample is better educated than Swedes in general.

In addition to age, wealth, and education, the models also include the variables gender, large city (i.e., Stockholm, Göteborg, Malmö, and Linköping/Norrköping), income, mortgage, work status, family status, and housing as controls. The gender variable (men = 1, women = 0), has a mean of 0.49, thus marginally implicating more women than men in the sample. A majority of the sample – and the overall population – lives in large cities (0.83, std. dev. 0.38). The mean monthly net income after tax averages 17,479 SEK (std. dev. 13,020 SEK). This is in line with the income of the Swedish population, given the age structure of the sample. The average mortgage is 337,520 SEK with the standard deviation amounting to 963,325 SEK (other forms of loans and consumer credits are relatively small in Sweden). The variable work-status variable includes six alternatives: working full or part time, being retired, long-term sick leave, student, or unemployed. The most common work status is working full time (44.2%). The share of retired persons is higher in the sample than in the population at large, and is as expected, given the age structure of the sample. Family status includes the alternatives being single, married, or living in a couple relationships, and having or not having children. The most common family status is being married or living in a couple relationship with children (43.8%). Housing includes four alternatives: rental apartment, tenant-owned apartment, house, or farmhouse. The most common housing status is house ownership (55.0%). Compared to the housing situation in Sweden at large, the share of rental apartments score is lower (20.6% compared to 30%), and the share of houses scores higher (55.0% compared to 43%). Shares of tenant-owned apartments and farmhouses are in line with the national average.

We initially estimate the following relationship using OLS regression. The dependent variable is risk tolerance (RT) and the independent variables are financial literacy (FL) and financial interest (FI). The model also includes several control variables (CV), such as demographic and socioeconomic variables.

$$\mathrm{RT_j} = \beta_{0\mathrm{j}} + \beta_1 \mathrm{FL_j} + \beta_2 \mathrm{FI_j} + \beta_\mathrm{i} \mathrm{CV_{i\ j}} + \varepsilon_\mathrm{j} \quad (1)$$

We also include an interaction variable in the equation above to investigate whether the interaction between financial interest and financial literacy is significant. We then use quintile regression to evaluate if the effects of the financial literacy and financial interest differ over the distribution of risk tolerance. We use the interval from the 10th to the 90th percentiles. We run the equations simultaneously and obtain an estimate of the entire variance–covariance matrix of estimators by bootstrapping.

$$\mathrm{Q\ 0.90\ (RT)} = \beta_{0\ 0.90} + \beta_{0.90,1}\ \mathrm{FL} + \beta_{0.90,2}\ \mathrm{FI} + \beta_{0.90,\mathrm{i}}\ \mathrm{CV_i} \quad (2)$$

$$\mathrm{Q\ 0.10(RT)} = \beta_{0\ 0.10} + \beta_{0.10,1}\ \mathrm{FL} + \beta_{0.10,2}\ \mathrm{FI} + \beta_{0.10,\mathrm{i}}\ \mathrm{CV_i} \quad (3)$$

We then test if the difference in the quintiles is significant, for example:

$$\begin{aligned}\mathrm{Q\ 0.90\ (RT)} - \mathrm{Q\ 0.10\ (RT)} &= (\beta_{0\ 0.90} - \beta_{0\ 0.10}) \\ &+ (\beta_{0.90,1}\ \mathrm{FL} - \beta_{0.10,1}\ \mathrm{FL}) \\ &+ (\beta_{0.90,2}\ \mathrm{FI} - \beta_{0.10,2}\ \mathrm{FI}) + (\beta_{0.90,\mathrm{i}}\ \mathrm{CV_i} \beta_{0.10,\mathrm{i}}\ \mathrm{CV_i}) \end{aligned} \quad (4)$$

2.1. The dependent variable

The measure of risk tolerance (RT) is assessed through survey questions about the trade-off between risk and return. Risk tolerance preferences are often measured using survey questions (see e.g., Dohmen et al., 2011; Grable and Lytton, 1999). The RT variable comprises three questions raised in the survey:

1. I can accept losing part of my saving if the chance of getting a good return is great
2. I think one has to take risks to gain something
3. I would like to increase risk because the return is too low

The answers are indicated on a Likert-type scale ranging from 1 (Totally disagree) to 7 (Totally agree). The confirmatory factor analysis (CFA, presented in Table 2) provides a test for unidimensionality (Gerbing and Anderson, 1988). The factor loadings are above 0.5, as suggested by Bollen (1989). Item reliability (R^2) measures show values above the recommended 0.5 (Bollen, 1989), except for the third statement, where the R^2 is 0.26. Composite reliability for the construct is 0.99, exceeding the recommended level of 0.70 (Hair et al., 1988). The average variance extracted is 0.98, and thus above 0.5 (as in Fornell and Larcker, 1981). The high reliability is due to small indicator measurement errors.

The subjective risk tolerance measure has content validity, because gains and losses are both included in the question (cf. MacCrimmon and Wehrung, 1986).

2.2. The independent variables

Financial literacy in this paper is defined as knowledge of financial concepts, that is, inflation and risk diversification (e.g., (Anderson et al., 2017; Lusardi, 2008)). Financial literacy is measured through a quiz including six questions (see Table 3). We

[3] Data on the Swedish population is collected from Statistics Sweden (SCB) www.scb.se.

[4] This information was reported in 2007, which is the most recent available statistics from Statistics Sweden.

Table 1
Descriptive summary.

Variable	Mean	St.dev.	Min	Max	Skewness	Kurtosis
Risk tolerance	0.083	1.26	−1.98	2.80	0.13	2.10
Financial literacy	2.22	1.79	0	6	0.50	2.20
Financial interest	0.006	1.57	−2.33	3.09	0.15	1.97
Age	55.7	16.7	18	100	−0.33	2.33
Gender (Male)	0.49	0.50	0	1	0.06	1.00
Large city	0.83	0.38	0	1	−1.73	4.01
Income	17,479	13,020	0	366,957	3.72	60.0
Wealth	512,289	1,028,002	1	3.6e+07	10.5	225
Mortgage	337,520	963,323	0	5.4e+07	27.0	1389
Work status	2.27	1.39	1	6	0.94	3.33
Full time	0.442					
Part time	0.093					
Retired	0.343					
Long-term sick leave	0.036					
Student	0.040					
Unemployed	0.048					
Education	3.56	1.29	1	5	−0.46	2.16
No finalized education	0.089					
Pregymnasial education	0.114					
Gymnasial education	0.270					
Postgymnasial ed. <3 yrs	0.204					
Postgymnasial ed. ≥3 yrs	0.322					
Family status	2.99	1.20	1	5	−0.69	2.07
Single w/o children	0.223					
Single w children	0.037					
Couple w/o children	0.284					
Couple w children	0.438					
Other	0.018					
Housing	2.44	0.86	1	4	−0.54	2.16
Rental apartment	0.206					
Tenant-owned apartment	0.199					
House	0.550					
Farmhouse	0.045					

This table presents summary statistics on the sample of 12,156 survey respondents. The dependent variable, risk tolerance (RT), is a construct captured through three survey questions. Financial literacy and financial interest are independent variables; the remaining variables are controls. The variables' means, standard deviation, min and max, skewness and kurtosis are reported. For the control variables, we report work status, education, family status, and housing means and the shares that have stated a certain alternative. Work status ranges from working full time to being far from employment (unemployed). Housing ranges from a low degree of ownership (rental apartment) to a high degree of ownership (owning a farm house). Education ranges from a low level (no finalized education) to a high level (postgymnasial ≥ 3 years) of education. Family status ranges from a low degree of relationship involvement (single without children) to a high degree of involvement (couple with children). Considering the shares, in our sample 44.2% work full time. Wealth is the respondent's total amount invested through the bank in savings accounts, mutual funds, and stocks. Mortgage is the respondent's total amount of mortgage at the bank. Income, wealth, and mortgage are stated in Swedish crowns (SEK). On June 24 2019, 1 SEK was equivalent to 0.11 USD. Income is the respondent's monthly income.

Table 2
Measurement model for risk tolerance (RT).

Risk tolerance (RT)	Mean	Factor loading	Measurement error	z-value	Item Reliability	Composite Reliability	AVE
I can accept to lose part of my saving capital if the chance of getting a good return is great	2.99	0.83	0.007	116.27	0.69	0.99	0.98
I think one has to take risk in order to gain something	3.39	0.82	0.007	114.38	0.67		
I would like to increase risk since return is too low	4.98	0.51	0.008	63.83	0.26		

This table presents the confirmatory factor analysis conducted to assess the measurement model for the construct of RT, that is, the means, factor loadings, measurement errors, *z*-values and item reliability for each survey question or statement included in the construct. The answers to the questions range from 1 to 7 on a Likert-type scale, where 1 corresponds to totally disagree and 7 corresponds to totally agree. The composite reliability for the construct exceeds the recommended level of 0.70 (aligned with Hair et al., 1988). The high values of composite reliability and average variance extracted (AVE) are due to the small indicator measurement errors.

developed the questions in accordance with the Swedish context and therefore they differ to some extent from questions used by, for example Anderson et al. (2017) and Lusardi (2008, 2012). In Sweden, a relatively large part of the population owns their home or apartment (2/3 of the population according to Statistics Sweden). Half of Swedish households have a mortgage, and a majority of these mortgages have variable interest rates. For the individual, the central bank (the Riksbank) has an inflation target and to understand the relationship between inflation and nominal and real interest rates is relevant knowledge. In Sweden, it is common to save directly in stocks (about 32% of the population) and in mutual funds (62% of the population), whereas direct bond investments are less common (8% of the population; Swedish investment fund association, 2016).[5] To know that mutual funds have different risk levels, and that saving in equity funds is riskier than saving in balanced or fixed-income funds, is therefore highly relevant. Other important concepts

[5] The shares above only include the direct private saving and not pension savings managed by the pension system.

Table 3
Financial literacy (FL), questions and answers.

Question	Answer	Correct answer (%)
1. How high is the Riksbank's inflation target?	2%	34.44
2. If there is a risk that the inflation will exceed the inflation target, what should the Riksbank do?	Raise the repo rate	37.05
3. If the nominal interest rate is 5%, and the expected inflation is 2%, how high will the real interest rate be (approx.)?	3%	31.74
4. A savings product where you will receive a guaranteed amount at maturity, and the return follows the equity market, is called:	Equity-linked security	32.14
5. Mutual funds have different risk levels; which of these mutual fund types is generally viewed as having the highest risk?	Equity fund	72.84
6. The definition of the P/E-ratio is:	Price per share divided by earnings per share	15.33

This table presents the six financial literacy questions used to assess the variable Financial Literacy. We developed the questions to fit the Swedish context (cf. Gunnarsson and Wahlund, 1997). The Table shows the question and the correct answer. Respondents were instructed to select one of four alternatives, including the alternative "I don't know." The table also shows the share of the respondents who selected the correct answer on each question.

Table 4
Financial literacy (FL) distribution of correct answers.

Number of correct answers	Percentage	Cumulative percentage
0	19.13	19.13
1	23.54	42.68
2	17.18	59.86
3	14.34	74.20
4	11.87	86.07
5	8.46	94.52
6	5.48	100.00

This table presents the share of the sample with a certain number of correct answers. For example, the share of the sample with three correct answers is 14.34%. The table also accumulates the correct answers. For example, close to 60% have less than 3 correct answers.

include price/earnings(P/E)-ratio and instruments such as equity-linked securities. Gunnarsson and Wahlund (1997) use a similar context-driven approach when measuring financial literacy.

Approximately 43% of respondents answered 0 or 1 question correctly, and only 26% had more than 3 correct answers. The question about different risk levels of mutual funds (Q5) received the highest percentage of correct answers (72.84%) and the question about the P/E-ratio (Q6) generated the lowest percentage of correct answer (15.33%). The number of correct answers varied between 0 and 6 and the mean number of correct answers amounted to 2.24 (Std. dev. 1.79). Table 4 shows the distribution of the number of correct answers.

Financial interest is measured by three survey questions:

1. I am interested in economic matters and financial markets
2. I follow the media about developments on the financial markets
3. I follow the media about the developments of new saving products

Answers are indicated on a Likert-type scale ranging from 1 (Totally disagree) to 7 (Totally agree). We intended the first question, "I am interested in economic matters and financial markets," to capture the individual interest (rather than situational interest) and stable involvement in the subject (cf. Hidi, 1990; Schiefele, 1991). The other two measures intend to capture manifestations of claimed interest: The extent to which the respondent follows media about developments of financial markets and savings products. Interest means that the individual looks for more information about a subject. Thus, we intend the two latter measures to capture the information-acquisition aspect of interest. Together the three measures enhance content validity. We conducted a confirmatory factor analysis (CFA, presented in Table 5. The factor loadings, the item and composite reliability, as well as AVE, are in line with recommended levels.

3. Results

3.1. Descriptive results

Table 6 shows the correlation matrix. The correlation between the independent variables financial literacy and the financial-interest construct shows the highest correlation in the table (0.5006 with a significance at the 1% level).

3.2. Empirical results

The results from the OLS regression appear in Table 7. The table reports standardized beta coefficients. In Column 1, we estimate the association of financial literacy and financial interest on risk tolerance. Results show that, on average, financial interest exhibits a higher association (0.309) than financial literacy (0.179). The two variables have an explanatory power of 18.3%. Column 2 shows the results from estimating the association of the control variables. Most control variables confirm previous findings on explanations for risk tolerance. Specifically, men and wealthy individuals are more risk tolerant. Risk tolerance is also higher among those who are well educated and those who work full time. The control variables yield a lower explanatory power (13.6%) than the effects of financial literacy and financial interest reported in column 1. In Column 3, we estimate the effect of financial literacy together with controls, and in Column 4, we estimate the effect of financial interest together with controls. The results illustrate that financial interest together with controls yields a higher explanatory power than financial literacy and controls (24.5% vs. 18.4%).[6] In Column 5, we estimate the full model. The results confirm the findings reported in Column 1. Financial interest shows a stronger association with risk tolerance (0.318) than financial literacy (0.119).

We further test these results by running the same regression, this time operationalizing financial interest as a single-item construct. The question "I am interested in economic issues and financial markets" has a strong congruence with the variable financial interest (cf. Bergkvist and Rossiter, 2007). We therefore

[6] Empirical models of financial risk taking report R^2–values at around 25% (Cesarini et al., 2008).

Table 5
Measurement model for financial interest (FI).

Financial interest	Mean	Factor loading	Measurement error	z-value	Item reliability	Composite reliability	AVE
I am interested in economic issues and financial markets	3.80	0.86	0.0035	246.65	0.74	1.00	0.99
I follow the developments in media about financial markets	3.62	0.93	0.0031	302.96	0.86		
I follow the development in media about saving products	3.08	0.76	0.0045	164.36	0.58		

This table presents the confirmatory factor analysis of the construct financial interest: the means, factor loadings, measurement errors, *z*-values, and item reliability for each survey question or statement. The answers to the questions range from 1 to 7 on a Likert-type scale, where 1 corresponds to totally disagree and 7 corresponds to totally agree. The composite reliability for the construct exceeds the recommended level of 0.70 (Hair et al., 1988). The high values of composite reliability and AVE are due to the small indicator measurement errors.

Table 6
Correlation matrix.

	RT	FL	FI	Age	Gender	Urban	Income	Wealth	Mortgage	Work status	Housing	Education	Family status
RT	1.000												
FL	.3334*	1.000											
FI	.3987*	.5006*	1.000										
Age	−.1392*	.0780*	.1800*	1.000									
Gender	.2256*	.2939*	.2514*	.0611*	1.000								
LargeCity	−.0717*	−.0861*	−.0624*	.1048*	−.0193	1.000							
Income	.1667*	.2151*	.1286*	−.0605*	.1670*	−.1140*	1.000						
Wealth	.1200*	.2038*	.2211*	.2259*	.0751*	−.0262*	.0756*	1.000					
Mortgage	.1483*	.1649*	.1331*	−.0785*	.1542*	−.1574*	.1810*	.0007	1.000				
Work status	−.1392*	−.1017*	−.0429*	.1722*	−.1015*	.0646*	−.3470*	.0355*	−.1630*	1.000			
Housing	.0813*	.1510*	.1353*	.1677*	.0609*	.1130*	.0885*	.0863*	.1420*	−.0907*	1.000		
Education	.1420*	.2268*	.0862*	−.2545*	−.0879*	−.1487*	.2243*	.0263*	.1267*	−.1877*	−.0078	1.000	
Family status	.0954*	−.1079*	.0463*	−.1257*	.0941*	.0143	.1061*	−.0377*	.0993*	−.1053*	.3516*	.0797*	1.000

This table presents the correlation between all the variables used in the regressions. Most correlations are significant at the 1% level (denoted * in this table). Work status, housing, education, and family status are considered ordinal. Work status ranges from being far from employment (unemployed) to working full time. Housing ranges from a low degree of ownership (rental apartment) to a high degree of ownership (owning a farmhouse). Education ranges from a low level (no finalized education) to a high level (postgymnasial $\geq$ 3 years) of education. Family status ranges from a low degree of relationship involvement (single without children) to a high degree of involvement (couple with children).

run the regression with solely this item as the operationalization of financial interest. The results are similar as for the three item construct, yielding a standardized beta value for financial literacy of 0.140 ($t = 14.07$) and 0.287 ($t = 28.55$) for financial interest. Thus, the association between financial interest and risk tolerance remains higher than the association between financial literacy and risk tolerance. The control variables in Column 5 show that higher risk tolerance aligns with youth, male, wealth, and full-time employment. Further, individuals who live in a house and have finalized higher education are more risk tolerant. In Column 6, we estimate the interactive effect of financial literacy and financial interest on risk tolerance. The results show that the interaction variable financial literacy $\times$ financial interest is insignificant; 0.005 ($t = 0.36$). Hence, being both financially literate and having a strong financial interest is not associated with additional risk tolerance.

To test whether standardized beta values of financial interest and financial literacy are statistically significantly different from each other, we estimated their corresponding 95% confidence intervals with bias corrected bootstrap (1000 replications). In the event the confidence intervals overlapped by less than 50%, the beta values would be considered statistically significantly different from each other (Cumming, 2009). We standardize the variables in Model 1 and run the OLS regression. The result shows that the confidence intervals of financial interest and financial literacy do not overlap. The confidence interval of financial interest ranges from 0.298 to 0.341, whereas the confidence interval for financial literacy ranges from 0.099 to 0.1395. Hence, the association between financial interest and risk tolerance is significantly higher than the association between financial literacy and risk tolerance.

To examine and compare financial-literacy and financial-interest differences in risk tolerance over the risk-tolerance distribution, we present a series of quintile regressions in Table 8. For illustrative purposes, we also plotted coefficients for each percentile in Figs. 1 and 2, with a 95% confidence interval, shown in the grey area. Quantile regressions are used to test if the effects of the independent variables differ, depending on the distribution of the dependent variable. Hence, the assumption is that the effects of financial interest may be greater on the xth percentile than the yth percentile of the risk-tolerance distribution.

The results of the quantile regressions show that the association between financial interest and risk tolerance is higher than the association between financial literacy and risk tolerance over the whole risk-tolerance distribution. The results further show that the effects of financial literacy are greatest at the lower end of the distribution, at the 30th percentile (0.111), whereas the lowest association is at the highest end of the distribution of risk tolerance, that is, at the 90th percentile (0.035). In contrast, the effects of financial interest are greatest at the 60th percentile of the RT distribution (0.327), and, contrary to financial literacy, the smallest effect of financial interest on risk tolerance is noted at the 10th percentile (0.131). Hence, financial literacy has the greatest effect on risk tolerance for individuals with low-range risk tolerance, whereas financial interest has the greatest association with risk tolerance for individuals with medium- to high-range financial interest. Further, financial literacy has the lowest association on risk tolerance for individuals with high risk tolerance, whereas financial interest has the lowest association on risk tolerance for individuals with low risk tolerance.

We further test if the differences between the percentiles are statistically significant by using an interquantile range regression. Table 9 refers to risk tolerance as the dependent variable and shows that the differences between the 90th, 50th, and 10th percentiles are statistically significant for financial interest. Regarding financial literacy, the differences between the 90th and 10th percentiles and between the 90th and 50th percentiles are

Table 7
Results from estimating the OLS regression model.

	(1)	(2)	(3)	(4)	(5)	(6)
Variable						
Financial literacy	0.179***		0.249***		0.119***	0.118***
	(0.007)		(0.006)		(0.007)	(0.007)
Financial interest	0.309***			0.363***	0.318***	0.315***
	(0.008)			(0.008)	(0.008)	(0.012)
Literacy × Interest						0.005
						(0.004)
Age		−0.093	−0.176***	−0.204***	−0.230***	−0.229***
		(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Age^2		−0.090	−0.008	−0.007	0.021	0.021
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender		0.212***	0.143***	0.131***	0.108***	0.108***
		(0.023)	(0.024)	(0.023)	(0.023)	(0.023)
Large city		−0.033***	−0.020**	−0.014	−0.011	−0.011
		(0.029)	(0.028)	(0.027)	(0.027)	(0.027)
Income		−0.024***	−0.020**	−0.010**	−0.009	−0.009
		(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Wealth		0.180***	0.131***	0.104***	0.091***	0.091***
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Mortgage		0.038***	0.027***	0.014	0.013	0.013
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Work status (Full time)						
Part time		−0.026***	−0.023***	−0.026***	−0.025***	−0.024***
		(0.039)	(0.038)	(0.036)	(0.035)	(0.036)
Retired		−0.030*	−0.046***	−0.057***	−0.062***	−0.062***
		(0.041)	(0.039)	(0.038)	(0.038)	(0.038)
Long-term sick leave		−0.031***	−0.031***	−0.031***	−0.032***	−0.032
		(0.060)	(0.058)	(0.056)	(0.056)	(0.056)
Student		−0.011	−0.015*	−0.021**	−0.022**	−0.022**
		(0.062)	(0.054)	(0.059)	(0.058)	(0.058)
Unemployed		−0.014	−0.013	−0.013	−0.012	−0.012
		(0.056)	(0.060)	(0.051)	(0.051)	(0.051)
Education (No finalized education)						
Pregymnasial education		0.021	−0.004	−0.002	−0.011	−0.011
		(0.051)	(0.050)	(0.048)	(0.048)	(0.048)
Gymnasium		0.063***	0.014	0.014	−0.004	−0.003
		(0.046)	(0.045)	(0.043)	(0.043)	(0.042)
Postgymnasial education, <3 yrs		0.087***	0.031**	0.030**	0.010	0.010
		(0.046)	(0.046)	(0.044)	(0.044)	(0.044)
Postgymnasial education, ≥3 yrs		0.122***	0.027	0.049***	0.013	0.014
		(0.045)	(0.045)	(0.042)	(0.043)	(0.043)
Family status (single w/o children)						
Single w. children		0.001	0.004	0.002	0.004	0.004
		(0.060)	(0.059)	(0.057)	(0.057)	(0.057)
Couple w/o children		0.014	0.002	0.001	−0.003	−0.003
		(0.032)	(0.031)	(0.029)	(0.030)	(0.030)
Couple w. children		0.029**	0.017	0.025**	0.019*	0.019*
		(0.032)	(0.031)	(0.030)	(0.030)	(0.030)
Other		−0.009	−0.010	−0.010	−0.011	−0.011
		(0.088)	(0.085)	(0.081)	(0.081)	(0.081)
Housing (Rental apartment)						
Tenant-owned apartment		0.040***	0.025*	0.017	0.013	0.013
		(0.036)	(0.036)	(0.034)	(0.034)	(0.034)
House		0.059***	0.040***	0.037***	0.030**	0.030**
		(0.034)	(0.033)	(0.031)	(0.031)	(0.031)
Farmhouse		0.018*	0.008	0.009	0.005	0.005
		(0.058)	(0.056)	(0.055)	(0.054)	(0.054)
Constant	–***	–***	–***	–	–	–
	(0.019)	(0.140)	(0.138)	(0.134)	(0.133)	(0.135)
Adj. R^2	0.183	0.136	0.184	0.245	0.252	0.254
Observations	12,156	12,156	12,156	12,156	12,156	12,156

This table reports the OLS regression in which risk tolerance (RT) is the dependent variable. Sample size is $N = 12{,}156$. The table reports standardized beta coefficients. Column 1 shows OLS regression results for financial literacy and financial interest. Column 2 shows OLS regression results for the control variables. Column 3 shows OLS regression results for financial literacy together with controls and Column 4 shows regression results for financial interest and controls. Column 5 shows the OLS regression results for the full model, as expressed in Eq. (1). Column 6 shows the results when including the interaction variable financial literacy × financial interest. Income, wealth, and mortgage represents ln(income), ln(wealth) and ln(mortgage). Work status, education, and family status are treated at categorical variables. The base levels are indicated in the parentheses. Robust standard errors appear in parenthesis, ***, **, and * denote significance at the 1%, 5%, and the 10% level respectively.

Table 8
Results from estimating the quantile regression model.

Quantile	Financial literacy Beta	Financial interest Beta
Q (0.10)	0.093***	0.131***
	(0.013)	(0.013)
Q (0.20)	0.102***	0.211***
	(0.012)	(0.013)
Q (0.30)	0.111***	0.266***
	(0.011)	(0.012)
Q (0.40)	0.106***	0.304***
	(0.010)	(0.011)
Q (0.50)	0.093***	0.311***
	(0.010)	(0.011)
Q (0.60)	0.079***	0.327***
	(0.010)	(0.012)
Q (0.70)	0.072***	0.306***
	(0.010)	(0.012)
Q (0.80)	0.062***	0.292***
	(0.009)	(0.011)
Q (0.90)	0.035***	0.280***
	(0.009)	(0.013)
Controls	Yes	Yes
Observations	12,156	12,156

This table presents simultaneous quintile regressions with percentiles ranging from 0.10 to 0.90. Sample size is $N = 12{,}156$. The coefficients are standardized beta coefficients. The regressions follow the model expressed by Eqs. (2) and (3) above. Control variables are included. Bootstrapped standard errors are given in parentheses. ***, **, and * denote significance at the 1%, 5%, and the 10% level respectively.

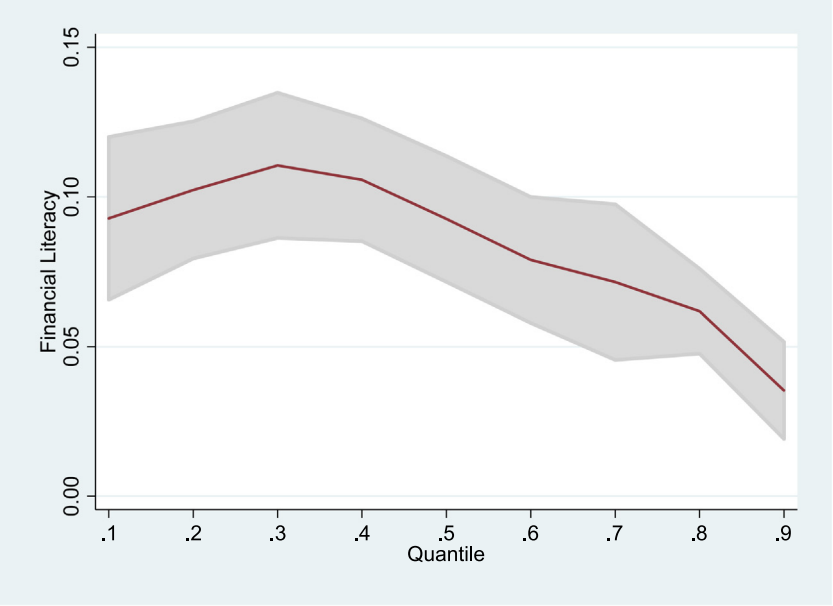

Fig. 1. The financial literacy coefficient estimates on risk tolerance. *Note:* The Model uses quintile regression with control variables and bootstrap method, plotted with 95 percent confidence interval (grey area).

significant, whereas the difference between the 50th and 10th percentiles is not significant.

4. Robustness tests

Our main results imply that financial literacy and financial interest positively affect risk tolerance. We then conduct a number of robustness tests. Checking for multicollinearity, the VIF test shows values less than 1.55.

The measures could potentially be endogenous, pointing to reverse causality. For example, a person with higher risk tolerance might be more motivated to acquire knowledge about financial concepts as well as follow financial-market development, that is, exhibit greater financial interest. Endogeneity of the regressors causes a bias in the OLS regression estimates because the regressor correlates with the error term. We correlate the independent variables (financial literacy and financial interest) one at a time with the error term of the OLS regression (cf. Wooldridge, 2015), and found we cannot reject the hypothesis of reverse causality. This is as what could be expected because the process of developing financial interest, financial literacy, and risk tolerance over time is the most likely iterative. A person's interest in a subject interacts with what the person knows about the subject (Wlodkowski and Ginsberg, 2017).

We check for selection bias by conducting a number of group analyses including interaction variables to the regressions. The results appear in Table 10. We check whether the effects of financial literacy and financial interest on risk tolerance differ

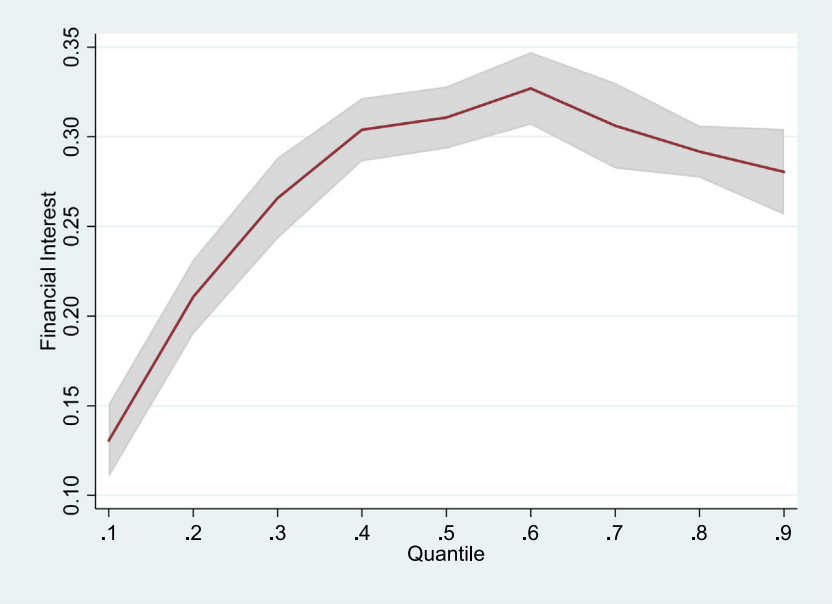

Fig. 2. The financial interest coefficient estimates on risk tolerance. *Note.* The Model uses quintile regression with control variables and the bootstrap method, plotted with 95% confidence interval (grey area).

Table 9
Results from estimating the inter-quintile regression model with RT as dependent variable.

Inter-quantile comparison	Financial literacy Difference in beta	Financial interest Difference in beta
(0.90–0.10)	−0.059***	0.144***
	(0.014)	(0.016)
(0.50–0.10)	0.002	0.175***
	(0.011)	(0.012)
(0.90–0.50)	−0.061***	−0.031**
	(0.012)	(0.014)
Controls	Yes	Yes
Observations	12,156	12,156

This table presents the interquintile range regression with RT as the dependent variable and financial literacy and financial interest as independent variables. The sample size is $N = 12{,}156$. Regressions follow the model, expressed by Eq. (4), focusing on the interquintile comparison. Control variables are included. Bootstrapped standard errors are given in parentheses. ***, **, and * denote significance at the 1%, 5%, and the 10% level, respectively.

with regards to age, education, and wealth, because our sample consists of older, more educated, and wealthier individuals compared to the Swedish population at large. Prior researchers found that gender affects the effect of financial literacy on financial risk taking (e.g., Almenberg and Dreber, 2015; Bannier and Neubert, 2016). We therefore also interact gender with financial literacy and with financial interest.

We can conclude that age does not affect the association between financial literacy and risk tolerance. The results further show that education has a significant positive effect (0.062) on the association of financial literacy on risk tolerance and a significant negative effect on the association of financial interest with risk tolerance (−0.050). However, the effects are small, only significant at the 10% level. We conclude that the interactive effect of wealth is insignificant for financial literacy and for financial interest. The findings endure also when testing an interaction with the categorical variables of age and financial wealth. We further conclude that for men, the association between financial interest and risk tolerance is significantly larger than for women (0.041). However, the difference on the effect of financial literacy is not significantly different between genders (cf. Almenberg and Dreber, 2015).

Table 10
Interaction variables.

	(1)	(2)	(3)	(4)
Variable				
Financial literacy (FL)	.155***	.068**	.153**	.127***
	(.024)	(.021)	(.051)	(.010)
Financial interest (FI)	.314***	.365***	.233***	.290***
	(.028)	(.024)	(.058)	(.011)
FL * Age	−0.039			
	(.000)			
FI * Age	.004			
	(.000)			
FL * Education		.062*		
		(.005)		
FI * Education		−.050*		
		(.006)		
FL * Wealth			−0.037	
			(0.004)	
FI * Wealth			0.086	
			(0.005)	
FL * Gender				−0.020
				(.014)
FI * Gender				.041***
				(.016)
Age	−0.219***			
	(0.004)			
Education		−.003		
		(.015)		
Wealth			.097***	
			(0.012)	
Gender				0.120***
				(0.039)
Controls	Yes	Yes	Yes	Yes
Observations	12,156	12,156	12,156	12,156
Adj. R^2	.2524	.2526	.2524	.2529

This table presents the OLS regression with interaction variables. The sample size is $N = 12{,}156$. We interact financial literacy and financial interest with age (Column 1), education (Column 2), wealth (Column 3), and gender (Column 4). Age, education, and wealth are continuous variables. Standardized beta coefficients are reported. Robust standard errors appear in parenthesis, ***, **, and * denote significance at the 1%, 5%, and the 10% level respectively.

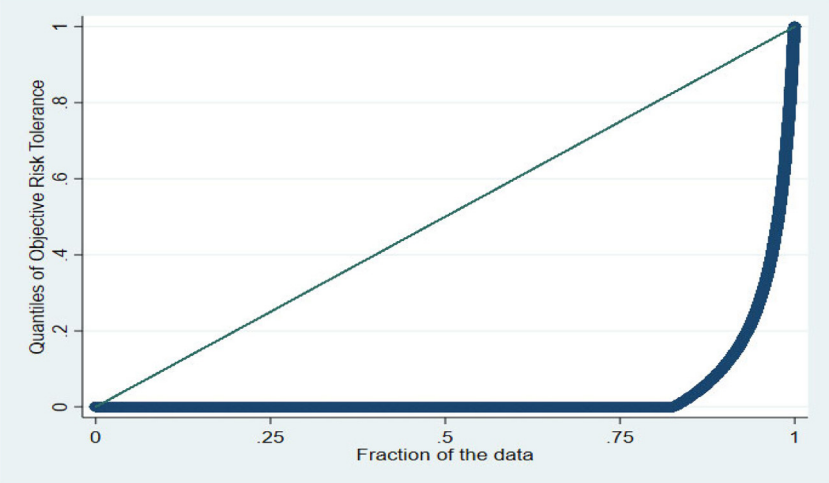

Fig. 3. Quintile graph of Objective Risk Tolerance (ORT).

4.1. An alternative risk-tolerance measure

As an extended robustness test, we investigate the effects of financial literacy and financial interest on objective risk tolerance. The objective risk tolerance (ORT), is operationalized as the ratio of investments in stock (equity) to total financial wealth (cf. Wärneryd, 1996, 1999). Information on the amount invested in stocks as well as total amount invested through the bank (i.e., wealth) was obtained from the bank's register data.

Because respondents are clients in this bank – and no other banks – the total amount invested through the bank is defined as the client's financial wealth. Because mutual funds also include less risky fixed-income funds and balanced funds, we chose to include only stock investments to secure the content validity of the measure. ORT thus ranges from 0 to 1. The mean is 0.067 and the standard deviation in 0.16. The correlation between ORT and RT is 0.1361 (significant at the 1% level). VIF test values are less than 1.55. ORT exhibits a high degree of skewness (3.10) because a majority of individuals in the sample do not own equity, demonstrated in Fig. 3.

We first estimate the following relationship. Objective risk tolerance (ORT) is the dependent variable. Similar to Model 1, financial literacy (FL) and financial interest (FI) are independent variables. The model also includes several control variables (CV), such as demographic and socioeconomic variables.

$$\mathrm{ORT_j} = \beta_{0j} + \beta_1 \mathrm{FL_j} + \beta_2 \mathrm{FI_j} + \beta_i \mathrm{CV_{i\ j}} + \varepsilon_j \quad (5)$$

Because the distribution of ORT lies in the interval [0,1], we also use a fractional outcome regression (Papke and Wooldridge, 1996). Using non-linear least squares (NLS) is recommended for continuously distributed outcomes on a bounded interval.

$$E(\mathrm{ORT}|x) = G(\beta_{0j} + \beta_1 FI_j + \beta_2 FL_j + \beta_i CV_{i\ j}) \quad (6)$$

Here G (·) is the probit function. A probit function can be used with robust standard errors computed as defaults, even if the true model is not probabilistic.

The results are reported in Table 11. The estimation of Model 5 shows that financial literacy and financial interest have significant effects on objective risk tolerance. The standardized beta coefficients amount to 0.080 and 0.119 respectively. Estimating Model 6, we compute the average marginal effects of the variables at their means. The results show that one score higher in the financial literacy test increases objective risk tolerance by 0.40 percentage points, on average, over the whole distribution of financial literacy. The marginal effects show that a 1% increase in financial interest increases objective risk tolerance by 0.8 percentage points, on average, over the whole distribution of financial interest. Thus, the marginal effect is higher for financial interest than for financial literacy.

To conclude, the overall findings endure also when using an objective measure of risk tolerance. Financial literacy and financial interest significantly align with risk tolerance, and financial interest shows a stronger association.

5. Conclusion

This study investigates and compares the effects of financial literacy and financial interest on individuals' financial risk tolerance. We use a unique data set that allows us to use both subjective and objective measures of financial risk tolerance. The analyses show that both financial literacy and financial interest are associated with higher risk tolerance and we conclude that financial interest has a significantly higher impact on risk tolerance than financial literacy. We also conclude that specifically financial interest offers an additional explanation of financial-risk tolerance. We also find differences in the association between the variables and risk tolerance across the risk-tolerance distribution. The effects of financial literacy are highest at the lower end of the risk-tolerance distribution and smallest at the higher end. Financial interest shows a different pattern with the highest effect at the medium-to-high range, whereas the lowest effect of financial interest on risk tolerance is at the lowest end of the distribution. Thus, individuals' financial literacy has the greatest association with risk tolerance for individuals with lower risk tolerance, while financial interest has the largest association when the individual already has a fairly high risk tolerance.

Study results add to the growing literature on heterogeneity in risk tolerance. They also contribute to the field of financial literacy. Specifically, results point to the relevance of financial interest, or internal motivation, on risk tolerance. Assuming that financial literacy does lead to improved financial behavior, we discuss what measures should be taken to improve the general public's knowledge of financial issues. In a combined survey and experimental study, Hung and Yoong (2013) found that participants who themselves take initiative to seek financial advice perform better than those who receive advice automatically and for free. The results endure regardless of the level of financial literacy. Their results point to the relevance of interest and motivation in positive financial performance. In this study, we test this relevance explicitly and confirm its relevance.

Table 11
Objective risk tolerance, financial literacy and financial interest.

	OLS- regression (1)	Fractional outcome regression (2)	
Variable		Coef.	Marginal effect
Financial literacy	0.080***	0.044***	0.004***
	(0.001)	(0.008)	(0.001)
Financial interest	0.119***	0.090**	0.008***
	(0.001)	(0.009)	(0.001)
Age	−0.169***	0.000	0.000
	(0.000)	(0.006)	(0.001)
Age^2	0.237***	0.000	0.000
	(0.000)	(0.000)	(0.000)
Gender	0.028***	0.040	0.004
	(0.003)	(0.025)	(0.002)
Large city	−0.016*	−0.038	−0.003
	(0.001)	(0.032)	(0.003)
Income	−0.037***	−0.010**	−0.001**
	(0.001)	(0.004)	(0.000)
Wealth	0.236***	0.242***	0.022***
	(0.001)	(0.002)	(0.001)
Mortgage	−0.016	0.003	0.000
	(0.000)	(0.002)	(0.000)
Work status			
Part time	0.006	−0.046	−0.004
	(0.004)	(0.045)	(0.003)
Retired	0.067***	0.103***	0.009***
	(0.005)	(0.037)	(0.003)
Long-term sick leave	0.045***	0.261***	0.027***
	(0.008)	(0.068)	(0.008)
Student	0.014**	0.047	0.004
	(0.006)	(0.089)	(0.008)
Unemployed	0.014**	−0.032	−0.003
	(0.006)	(0.076)	(0.005)
Education			
Pregymnasial education	0.013	0.065	0.005
	(0.006)	(0.050)	(0.004)
Gymnasium	0.035**	0.089*	0.007*
	(0.005)	(0.048)	(0.004)
Postgymnasial education, <3 yrs	0.027*	0.085*	0.007*
	(0.006)	(0.048)	(0.004)
Postgymnasial education, ≥3 yrs	0.027	0.066	0.006
	(0.006)	(0.046)	(0.004)
Family status			
Single w. children	−0.005	−0.135*	−0.011**
	(0.006)	(0.072)	(0.005)
Couple w/o children	−0.014	−0.024	−0.002
	(0.004)	(0.031)	(0.003)
Couple w. children	−0.017	−0.035	−0.003
	(0.004)	(0.033)	(0.003)
Other	−0.006	−0.118	−0.010
		(0.144)	(0.011)
Housing			
Tenant-owned apartment	−0.002	0.051	0.004
		(0.041)	(0.004)
House	−0.005	0.029	0.003
		(0.038)	(0.003)
Farmhouse	0.012	0.113*	0.010*
		(0.061)	(0.010)
Constant	-***	−5.00***	
	(0.007)	(0.202)	
Observations			
Adj. R^2	0.142		
Observations	12,156		12,156

This table presents the results from (1) the OLS regression and (2) the fractional outcome regression with ORT as the dependent variable. The OLS-regression reports standardized beta coefficients. The fractional outcome regression reports coefficients and marginal effects. The sample size is $N = 12{,}156$. Marginal effects are average effects at the means of the variables. Standard errors are given in parentheses. ***, **, and * denote significance at the 1%, 5%, and the 10% level, respectively. The fractional outcome regression yields a pseudo R^2 of 0.131.

6. Limitations and suggestions for future research

The present study suffers from a number of limitations. It is almost a tautology that we know more about a subject that interests us. Previous researchers established a link between interest in a topic and knowledge about the same topic. Because this study uses cross-sectional data, iterative processes of financial knowledge and financial literacy remain to be explored. Furthermore, because the items measuring financial interest were self-reported, we cannot rule out the possibility that observed positive associations were a consequence of positive desirability bias.

This study points to the relevance of analyzing long-term individual interest (e.g., Renninger, 2000) in relation to individuals' risk tolerance. Future research could investigate the interest construct further, that is, the effects of various forms of interest, such as temporary situational interest vis-à-vis long-term individual interest. Further investigations on the interest construct also include investigations of its relationship to other noncognitive traits (i.e., personality) as well as joint effects of cognitive and noncognitive traits on individuals' risk tolerance and financial well-being. The research on grit — passion for long term goals, for example, finds that a consistency of interest combined with perseverance of effort explain individual success in various domains (Duckworth et al., 2007).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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