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# Financial Literacy, Economic Preferences, and Adolescents' Field Behavior

Michael Razen\*<sup>†</sup>    Jürgen Huber\*    Laura Hueber\*    Michael Kirchler\*  
Matthias Stefan\*

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## Abstract

Financial literacy and economic preferences are considered to be important drivers of health, income, and general well-being. We bridge the gap between studies on financial literacy and research on economic preferences by investigating how they interplay with each other and with the field behavior of adolescents. First, we report that financial literacy scores are positively associated with patience, male gender, and educational level of the father. Second, we observe that risky field behavior like smoking and gambling is positively associated with various measures of risk-tolerance, and negatively associated with patience. Finally, we discuss implications for financial education programs.

JEL classification: C93, D91, D81, G53, J13

Keywords: Experimental finance, financial literacy, time preferences, risk preferences, adolescents.

## Highlights:

- We link adolescents' financial literacy to socioeconomic background, economic preferences and field behavior.
- Financial literacy is positively associated with male gender and fathers' education.
- Financial literacy is positively correlated with patience.
- Risky field behavior is positively associated with various measures of risk-taking, but negatively with patience.

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# 1 Introduction

Financial literacy, i.e. the “combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and to ultimately achieve individual financial wellbeing”<sup>1</sup>, is an important skill for living a successful economic life. However, studies suggest that individuals and households have major problems in understanding simple financial concepts such as compound interest, diversification, and time value of money (Bucher-Koenen and Lusardi, 2011; Lusardi and Mitchell, 2011a). This lack of knowledge is found across age groups and appears to be a wide-spread phenomenon across industrialized and developing countries (Lusardi and Mitchell, 2014). There still is only little evidence about financial literacy skills of adolescent people, about drivers of adolescents’ financial (il)literacy, and the interplay with economic preferences.

Economic preferences—in particular risk and time preferences—are important drivers of well-being in life as well. For instance, Becker et al. (2012) analyze data from the German SOEP and show that risk- and time preferences are related to life outcomes. More patience (i.e., the ability to delay gratification) and a higher willingness to take risks are positively related to better health levels and life satisfaction among a representative sample of German adults. Moffitt et al. (2011) and Sutter et al. (2013) analyze the impact of risk- and time preferences among kids and adolescents. Moffitt et al. (2011) show that more patient kids are healthier and better educated and have a lower propensity to commit a criminal act as adults compared to less patient kids. Moreover, Sutter et al. (2013) report that more patient adolescents consume less alcohol, smoke less and are in general healthier compared to less patient peers. In addition, these individual preferences are not stable, but develop over the course of childhood and adolescence, as, for instance, Harbaugh et al. (2002), Bucciol et al. (2010), and Sutter et al. (2013) show for risk and time preferences.

In this paper we connect these two strands of literature (on the determinants of financial literacy and on economic preferences and field behavior) by investigating the interplay between financial literacy, socioeconomic background, economic preferences, and self-reported field behavior of adolescents. In particular, we analyze (i) the relationship between socioeconomic characteristics on the one hand and financial literacy and economic preferences (risk and time preferences) on the other hand. Moreover, we analyze (ii) the relationship between financial literacy and economic preferences and, finally, we explore (iii) the impact of financial literacy and economic preferences on risky field behavior such as gambling and smoking.

## 2 Experimental Design

The study was conducted in the classrooms of the participating school classes. The questionnaire administered to the students consisted of two parts. In the first part, we presented the participants with three incentivized experiments, eliciting (i) risk preferences (RISK) and (ii) time preferences (TIME I and TIME II). For the RISK experiment, we applied the approach by Eckel and Grossman (2002) and presented subjects with a set of six different lotteries. Each lottery comprised two equally likely payoffs ranging from €10/€10 in Lottery 1 to €0/€24 in Lottery 6 (see Table 1 for an overview of all experiments and the Online Appendix for the experimental instructions).

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<sup>1</sup><https://www.oecd.org/financial/education/2018-INFE-FinLit-Measurement-Toolkit.pdf>, retrieved April 2, 2020.

Subjects were asked to choose the lottery that best fitted their individual preferences. Here, our variable of interest is the number of the lottery the subjects chose. Hence, higher values of RISK indicate higher risk tolerance.

**Table 1: Experimental tasks.** This table outlines the choice lists for experiments on risk (RISK) and time preferences (TIME I and TIME II). In experiment RISK, subjects had to *select one* of the 6 lotteries presented in column 1. Note that the lotteries exhibit increasing expected returns and increasing risk. In Experiment TIME I, subjects had to choose between a payout today and a higher payout in a week *for each of the 6 pairs*. In Experiment TIME II, subjects had to decide between a payout in one week and a higher payout in two weeks *for each of the 6 pairs*.

Lottery/Decision	RISK		TIME I		TIME II	
	(1 decision)		(6 decisions)		(6 decisions)	
	50%	50%	Today	One week	One week	Two weeks
1)	€10	€10	€10	€11	€10	€11
2)	€13	€8	€10	€12	€10	€12
3)	€16	€6	€10	€13	€10	€13
4)	€19	€4	€10	€14	€10	€14
5)	€22	€2	€10	€15	€10	€15
6)	€24	€0	€10	€16	€10	€16

As outlined in columns 2 and 3 in Table 1, time preferences were elicited using Multiple Price Lists (MPL) (Angerer et al., 2015). In Experiment TIME I, subjects decided between a payout today and a payout in one week. In particular, we showed 6 pairs of payoffs where one option (“Option A”) paid out €10 now across all decisions, while the payout of the other option in one week (“Option B”) increased from €11 to €16 in steps of €1 from decision 1 to 6. For each decision pair, we asked the subjects to select whether they preferred the payment now, or the payment in a week. Here, our variable of interest is the switching point from “payout today” to “payout in one week”. Later switching points indicate a stronger preference for immediate gratification, as subjects need a higher compensation to be willing to wait one week for the payment. More precisely, we are looking at the first decision from which on subjects chose the later payment. It tells us the upper bound for the additional compensation required by the subject (the lower bound is the last decision where subjects chose the earlier payment). For a more intuitive interpretation of the regression output, we then reversed the list of observed switching points, such that higher values of TIME I indicate higher patience. Hence, TIME I ranges from 0 (never choosing to wait for the higher payment) to 6 (always choosing to wait for the higher payment). In Experiment TIME II, subjects had to go through the same six decisions, but the payout in Option A was implemented in one week and the payout in Option B in two weeks. We included this experiment to get a more comprehensive picture of adolescents’ time preferences and to control for potential immediacy effects in Experiment TIME I. Analogous to TIME I, higher values of TIME II indicate higher patience.

Payouts were determined by a two-stage random draw: First, one of the three experiments was randomly selected. Second, the payout procedure for the corresponding experiment was implemented. If Experiment RISK was selected, another random draw revealed whether subjects would receive the high or the low payout of their chosen lottery. If Experiment TIME I or

TIME II was selected, another random draw revealed which of the six decisions would be paid out. Depending on their choice in this decision, subjects received either the earlier or the later payment.<sup>2</sup> Accordingly, future payouts in Experiments TIME I or TIME II were paid out one or two weeks after the survey, respectively.

In the second part of the experiment – run directly after the first part –, we asked two basic financial literacy questions, testing adolescents’ understanding of the concepts of compound interest and diversification (Lusardi and Mitchell, 2017). For our analysis, we use the variable FINLIT, which represents the total number of correct answers and, hence, can take on values from 0 to 2.<sup>3</sup> Moreover, we asked subjects about their GAMBLING, and SMOKING behavior,<sup>4</sup> elicited subjects’ ability to resist temptations using two questions (SELF\_DISCIPLINE and SELF\_DISCIPLINE\_OTHERS),<sup>5</sup> and measured their self-reported risk tolerance in general (SELF\_RISK\_GENERAL) and in financial matters (SELF\_RISK\_FINANCE) using the German SOEP questionnaire (Dohmen et al., 2011).<sup>6</sup> See the Online Appendix for further details.

The experiment was conducted with a total of 627 students in 35 different classes at several schools in the Austrian province of Tyrol. The data collection of this study is part of a large, multi-year project on financial literacy/education among adolescents in Austria. Together with the Chamber of Labor in the province of Tyrol, we have developed a novel financial education program called *FiT – Financial Training*. This program features an online learning platform and combines workshop sessions in school with subsequent self-taught learning via the platform. *FiT – Financial Training* covers three aspects of financial education: practicing reflective and de-biased decision making, improving patience and savings behavior, and promoting financial literacy. The experiments presented in this study served as the test battery prior to the workshop to analyze the status-quo of financial literacy and economic preferences among adolescents.

The target group for this study were students in 9<sup>th</sup> and 10<sup>th</sup> grade. The average age of subjects was 15.8 years with a standard deviation of 1.9 years. The data collection process took place from October 2017 to June 2019. Concerning school type, 32 percent of all subjects attended a vocational school, 39 percent a high school, and 30 percent a polytechnic school (i.e., the final year of compulsory schooling in Austria).<sup>7</sup> 60 percent of our subjects were female. The average payout from the experimental tasks was €11 with a standard deviation of €5. Table A.1

<sup>2</sup>The random draws were conducted by a volunteer from the class. For this purpose, we prepared a non-transparent bag with a set cards numbered from 1 to 3 for the first round. If Experiment RISK was selected, the second draw was conducted by replacing the three cards in the bag by one white and one orange ball (representing the high and the low payment). If Experiment TIME I or TIME II was selected, we conducted the second draw by placing a set of six cards ranging from 1 to 6 in the bag.

<sup>3</sup>The questions are based on the questionnaire in Lusardi and Mitchell (2011b): Q1: “Assume, you have EUR 100 on your savings account and the interest rate is 2% per year. How much do you have after five years, if you do not withdraw any money from your savings account during this time?” (Answers: more than 110 Euro; exactly 110 Euro; less than 110 Euro; do not know). Q2: “If you want to invest, which of the following strategies usually provides the lower risk? An investment in ...” (Answers: a single stock; several stocks; do not know).

<sup>4</sup>GAMBLING: “How often do you gamble?”; SMOKING: “How often do you smoke?”. For each question, answers were given on a 5-point scale (never; seldom; occasionally; often; very often).

<sup>5</sup>“Please indicate for the following statements, to what extent they apply to you:” SELF\_DISCIPLINE: “I can easily resist temptations.”; SELF\_DISCIPLINE\_OTHERS: “Other people would call me self-disciplined.” Answers were given on a 5-point scale (strongly disagree; rather disagree; neither agree nor disagree; rather agree; strongly agree).

<sup>6</sup>SELF\_RISK\_GENERAL: “How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?” Answers were given on a 11-point Likert-scale (0: not at all willing to take risks; 10: very willing to take risks); SELF\_RISK\_FINANCE: “How do you see yourself: Are you a person who is fully prepared to take risks in investment decisions or do you try to avoid taking risks?” Answers were given on an 11-point Likert-scale (0: not at all willing to take risks; 10: very willing to take risks).

<sup>7</sup>When comparing our sample with the distribution of school types in Austria, we find that our sample is fairly representative with a slight bias towards pupils from polytechnic and vocational schools. However, we do not

in the Online Appendix provides descriptive statistics and further details on the variables elicited in the experiment.

### 3 Results

Table 2 summarizes the results. In a systematic approach, we use FINLIT and the experimentally elicited economic preferences TIME I, TIME II and RISK as dependent variables in ordered logistic regression models (see columns 1-4). Here, socioeconomic background variables serve as explanatory variables. For the model with economic preferences, we additionally add FINLIT to measure the interplay between financial literacy and economic preferences, and add the corresponding self-reported levels of financial risk-taking and ability to resist temptations as validity checks. Moreover, we also use SMOKING and GAMBLING as dependent variables in columns 5 and 6, serving as proxies for risky field behavior. Those variables are explained by socioeconomic background variables, FINLIT to measure the impact of financial literacy on risky field behavior, and self-reported levels of ability to resist temptations and risk-taking. In what follows, we only discuss significant coefficients.<sup>8</sup>

**Result 1:** *Financial literacy scores are positively associated with male gender, mathematics skills, and the educational level of the father.*

As outlined in column 1 of Table 2, age, male gender, and math skills exhibit positive coefficients. Moreover, we show that the educational level of the father, but not of the mother, is positively related to adolescents' financial literacy scores—irrespective of subjects' gender. Taken together, these findings indicate that financial literacy is currently a male-dominated field.

**Result 2:** *Experimentally elicited patience is positively associated with financial literacy scores and with adolescents' own perception of their ability to resist temptations.*

We find that adolescents with high financial literacy scores are better in delaying gratification (see column 2 of Table 2). Note that the compensation for waiting one additional week for the payment is considerable in our experiment (ranging from at least 10 percent to 60 percent). Moreover, SELF\_DISCIPLINE, i.e., the self-reported ability to resist temptation, is also positively associated with patience. Hence, subjects' own perception of their ability to resist temptations is in line with the experimentally elicited measures of patience. Of the socioeconomic variables, the adolescents' religious background partly explains patience, as those with Islamic confession show less patience compared to their Roman-Catholic peers. While existing literature suggests that it might not be religiousness *per se* that drives this effect (see, e.g., McCullough and Willoughby, 2009; Renneboog and Spaenjers, 2012), it still hints at a relevant target group for education policies. Importantly, the reported effects on time preferences are robust with respect to the dates of the earlier payment, and are not limited to the case where the earlier payment is in immediate prospect (see column 3 of Table 2).

**Result 3:** *Experimentally elicited risk-taking is higher for male adolescents and is positively associated with self-reported risk-tolerance.*

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consider this to be an issue, as we have a sufficiently large sample for each school type and we control for various socio-economic variables.

<sup>8</sup>Note that the number of observations varies across regressions, as some participants were not able to answer all socioeconomic questions (e.g., educational level of their parents) or showed inconsistent behavior in the experiments. We treated these observations as missing values.

As can be seen in column 4 of Table 2, the coefficients for MALE subjects and self-reported risk-taking in financial matters (SELF\_RISK\_FINANCE) are positively associated with experimentally elicited risk-taking. The finding on gender differences in risk-taking is well established among student and general population samples (see e.g., [Eckel and Grossman, 2008](#); [Charness and Gneezy, 2012](#)). We support these findings by showing that these patterns are already prevalent at the age of 14-17 years.

**Result 4:** *Risky field behavior is negatively associated with ability to resist temptations and positively related to self-reported risk-taking.*

Columns 5 and 6 of Table 2 outline the results. We find that male adolescents engage more frequently in GAMBLING (financial risk), but less frequently in SMOKING (health risk). This indicates that gender effects in risky field behavior are not uniform, but do depend on the activity. Note that the gender effect on GAMBLING also supports Result 3 on experimentally elicited risk-taking, where the stakes are monetary. In addition, we show that older adolescents exhibit a higher tendency to engage in both types of risky field behavior. Moreover, we find that those adolescents with higher levels of self-reported SELF\_DISCIPLINE smoke and gamble less than their peers. We further observe that self-reported risk-taking in financial matters is positively associated with gambling behavior.<sup>9</sup> These findings are in line with [Sutter et al. \(2013\)](#) who report that more patient adolescents consume less alcohol, smoke less, and are healthier in general.

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<sup>9</sup>We have also run a robustness check accounting for potential peer-effects in risky field behavior including leave-out means on a school class level – see Table A.2 in the Online Appendix. We find no peer-effects for MEAN\_GAMBLING ( $p = 0.266$ ) and MEAN\_SMOKING ( $p = 0.078$ ). Most importantly, controlling for peer behavior does not affect our main finding that risky field behavior is negatively associated with the ability to resist temptations and positively related to self-reported risk-taking. Likewise, the positive (negative) relationship between male gender and gambling (smoking) habits is robust when controlling for peer behavior.



**Table 2: Experimental findings.** The table shows ordered logistic regressions for the dependent variables FINLIT, TIME I, TIME II, RISK, SMOKING and GAMBLING. FINLIT represents the number of correct answers in the financial literacy questions (0, 1 or 2). TIME I and TIME II measure subjects' experimentally elicited time preferences (integers from 0 to 6) with higher values implying more patience. RISK measures experimentally elicited risk attitudes (integers from 1 to 6) with higher values indicating more risk-taking. SMOKING and GAMBLING are integers between 1 and 5, with higher values indicating more frequent engagement. MALE is a binary dummy indicating gender. EDUCATION\_MOTHER and EDUCATION\_FATHER represent the highest education level of subjects' parents (1: Primary school, 2: Vocational school, 3: A-Levels, 4: University). CONFESSION=ISLAM and CONFESSION=OTHER are indicator variables for subjects' religious denomination, with the reference category being "Roman Catholic". SCHOOL=VOCATIONAL and SCHOOL=HIGHSCHOOL are indicator variables for subjects' current education type, with the reference category "Polytechnic school". MATH\_SKILL denotes subjects' mathematics grade in their previous school report card, with higher numbers indicating better grades (we reversed the Austrian grade scale to make the interpretation of the coefficient more intuitive). SELF\_DISCIPLINE reflects subjects' self-reported ability to resist temptations, while SELF\_RISK\_FINANCE and SELF\_RISK\_GENERAL reflects subjects' self-reported willingness to take risks in financial matters and in general, with higher values indicating higher ability to resist temptations and higher willingness to take risks, respectively. Standard errors, clustered on school class level, are in parentheses. \*, \*\*, and \*\*\* represent the 5%, 1 %, and 0.1% significance level, respectively.

	FINLIT	TIME I	TIME II	RISK	SMOKING	GAMBLING
AGE	0.137* (0.061)	-0.144* (0.068)	0.001 (0.079)	0.106* (0.051)	0.238*** (0.057)	0.169*** (0.051)
MALE	0.547** (0.189)	-0.314 (0.219)	-0.279 (0.234)	0.777*** (0.203)	-0.465* (0.189)	0.517** (0.166)
EDUCATION_MOTHER	0.035 (0.105)	0.168* (0.082)	0.169 (0.093)	-0.093 (0.103)	0.024 (0.151)	-0.063 (0.132)
EDUCATION_FATHER	0.225* (0.114)	0.019 (0.112)	0.020 (0.118)	0.197 (0.113)	0.025 (0.126)	0.024 (0.144)
CONFESSION=ISLAM	-0.436 (0.321)	-0.479* (0.215)	-0.743*** (0.202)	0.170 (0.323)	-0.694 (0.418)	-0.253 (0.312)
CONFESSION=OTHER	-0.001 (0.225)	-0.692** (0.252)	-0.536 (0.408)	0.277 (0.246)	0.080 (0.174)	-0.192 (0.318)
SCHOOL=VOCATIONAL	0.077 (0.306)	0.302 (0.433)	-0.149 (0.403)	0.071 (0.291)	0.745* (0.308)	0.577* (0.287)
SCHOOL=HIGHSCHOOL	-0.017 (0.343)	0.374 (0.422)	0.161 (0.356)	0.389 (0.302)	-0.174 (0.271)	0.256 (0.233)
MATH_SKILL	0.200* (0.082)					
SELF_RISK_GENERAL					0.095 (0.056)	
FINLIT		0.342* (0.168)	0.409* (0.162)	-0.039 (0.125)	-0.155 (0.150)	0.208 (0.132)
SELF_DISCIPLINE		0.196* (0.095)	0.151 (0.097)	0.087 (0.094)	-0.328* (0.133)	-0.247* (0.112)
SELF_RISK_FINANCE				0.185*** (0.035)		0.166*** (0.047)
Observations	573	476	489	536	539	539
Pseudo R <sup>2</sup>	0.036	0.028	0.026	0.039	0.075	0.060
Chi <sup>2</sup>	55.870	32.359	41.408	108.754	74.788	84.625

## 4 Conclusion

In this paper we bridged the gap between the literature on the determinants of financial literacy and the literature on economic preferences and field behavior. Our findings imply that financial literacy can positively impact behavior, and also that it is a male-dominated field (both on the adolescents' and the parents' side), which calls for financial education programs particularly tailored for female adolescents.

Taken together, our results also underline the importance of financial education as a family effort. This claim is supported by a comprehensive survey by [Gudmunson and Danes \(2011\)](#), who propose a conceptual framework of family financial socialization as a conclusion of reviewing financial literacy research from the past 40 years.

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# Online Appendix

## A Additional Table

**Table A.1: Descriptive Statistics.** This table outlines descriptive statistics regarding subjects' GENDER, their mother's and father's education (EDUCATION\_MOTHER and EDUCATION\_FATHER), RELIGION, MATH\_SKILL (Austrian grades in reversed order; i.e., here, higher numbers indicate better grades) and SCHOOL\_TYPE. Financial literacy scores are represented by FINLIT. SMOKING, and GAMBLING stand for subjects' self-reported risky field behaviors. Self-reported risk-taking in general (SELF\_RISK\_GENERAL) and in financial matters (SELF\_RISK\_FINANCE) are elicited on a 11-point Likert-scale, respectively. SELF\_DISCIPLINE measures subjects' self-reported ability to temptation on a 5-point scale (higher values indicate higher levels of self-discipline). RISK represent subjects' lottery choice in the respective experiment (integers from 1 to 6, higher values indicate higher risk tolerance). TIME I and TIME II are based on the switching point (in reversed order) from the earlier to the later payment in the respective experiments (integers from 0 to 6, higher values indicate higher patience). Note that consistency requires subjects to only choose one lottery in the RISK task, and to never switch back from the later payment to the earlier payment in the TIME I and TIME II tasks. Due to their limited interpretability, we had to drop the corresponding observations.

	Relative distribution across categories
GENDER	Male: 0.40; Female: 0.60;
EDUCATION_MOTHER	Primary school: 0.26; Vocational school: 0.48; A-Levels: 0.17; University: 0.10;
EDUCATION_FATHER	Primary school: 0.18; Vocational school: 0.56; A-Levels: 0.16; University: 0.11;
RELIGION	Roman Catholic: 0.73; Islam: 0.13; Other: 0.14;
SCHOOL_TYPE	Polytechnic school: 0.30; Vocational school: 0.32; High school: 0.39;
MATH_SKILL	1: 0.03; 2: 0.25; 3: 0.37; 4: 0.23; 5: 0.11;
FINLIT	Zero correct answers: 0.28; One correct answer: 0.48; Two correct answers: 0.24;
TIME I	Scale from 0 (less patient) to 6 (more patient): 0: 0.07; 1: 0.04; 2: 0.21; 3: 0.29; 4: 0.13; 5: 0.07; 6: 0.18;
TIME II	Scale from 0 (less patient) to 6 (more patient): 0: 0.09; 1: 0.05; 2: 0.25; 3: 0.26; 4: 0.11; 5: 0.07; 6: 0.17;
RISK	Scale from 1 (less risk tolerant) to 6 (more risk tolerant): 1: 0.44; 2: 0.13; 3: 0.15; 4: 0.12; 5: 0.06; 6: 0.11;
GAMBLING	Never: 0.67; Rarely: 0.24; Occasionally: 0.07; Often: 0.02; Very often: < 0.01;
SMOKING	Never: 0.68; Rarely: 0.09; Occasionally: 0.08; Often: 0.09; Very often: 0.07;
SELF_DISCIPLINE	Scale from 1 (difficult to resist temptation) to 5 (easy to resist temptation); 1: 0.05; 2: 0.14; 3: 0.47; 4: 0.27; 5: 0.07;
SELF_RISK_FINANCE	Mean: 3.37; SD: 2.30; (0: not at all willing to take risks, 10: very willing to take risks);
SELF_RISK_GENERAL	Mean: 5.51; SD: 2.27; (0: not at all willing to take risks, 10: very willing to take risks);

Notes: In the first version of the questionnaire, we used more detailed multiple price lists with 20 items each to elicit risk and time preferences. However, student responses revealed that these decision problems were too complex for our target group. We switched to a single choice list to elicit risk preferences, and reduced the number of items to six in the time preferences tasks by widening the intervals between the decisions, which clearly improved understanding of the experiment. In addition, we included questions on self-assessed risk-taking and ability to resist temptation to get a more comprehensive picture in our analyses. We thus do not have observations for these variables for the first two of the 35 participating classes. As can be seen in Appendix B, we elicited additional variables such as savings and spending behavior, language spoken at home, family members living in the same household, flat is rented or own property, and future plans after finishing school. These variables are part of our multi-year research project and do not enter this study.

Table A.2: The table shows ordered logistic regressions for the dependent variables SMOKING and GAMBLING. SMOKING and GAMBLING are integers between 1 and 5, with higher values indicating more frequent engagement. MALE is a binary dummy indicating gender. EDUCATION\_MOTHER and EDUCATION\_FATHER represent the highest education level of subjects' parents (1: Primary school, 2: Vocational school, 3: A-Levels, 4: University). CONFESSION=ISLAM and CONFESSION=OTHER are indicator variables for subjects' religious denomination, with the reference category being "Roman Catholic". SCHOOL=VOCATIONAL and SCHOOL=HIGHSCHOOL are indicator variables for subjects' current education type, with the reference category "Polytechnic school". MATH\_SKILL denotes subjects' mathematics grade in their previous school report card, with higher numbers indicating better grades (we reversed the Austrian grade scale to make the interpretation of the coefficient more intuitive). SELF\_DISCIPLINE reflects subjects' self-reported ability to resist temptations, while SELF\_RISK\_FINANCE and SELF\_RISK\_GENERAL reflects subjects' self-reported willingness to take risks in financial matters and in general, with higher values indicating higher ability to resist temptations and higher willingness to take risks, respectively. FINLIT represents the number of correct answers in the financial literacy questions (0, 1 or 2). MEAN\_GAMBLING and MEAN\_SMOKING represent the school class averages (leave-out means) of GAMBLING and SMOKING, respectively. Standard errors, clustered on school class level, are in parentheses. \*, \*\*, and \*\*\* represent the 5%, 1 %, and 0.1% significance level, respectively.

	SMOKING	GAMBLING
AGE	0.215*** (0.058)	0.170** (0.056)
MALE	-0.481** (0.183)	0.519** (0.168)
EDUCATION_MOTHER	0.027 (0.151)	-0.063 (0.133)
EDUCATION_FATHER	0.034 (0.129)	0.024 (0.143)
CONFESSION=ISLAM	-0.673 (0.419)	-0.253 (0.312)
CONFESSION=OTHER	0.125 (0.178)	-0.190 (0.311)
SCHOOL=VOCATIONAL	0.491 (0.316)	0.583 (0.307)
SCHOOL=HIGHSCHOOL	-0.149 (0.234)	0.255 (0.237)
FINLIT	-0.129 (0.146)	0.209 (0.127)
SELF_DISCIPLINE	-0.316* (0.133)	-0.246* (0.112)
SELF_RISK_GENERAL	0.104 (0.055)	
MEAN_SMOKING	0.406 (0.231)	
SELF_RISK_FINANCE		0.166*** (0.046)
MEAN_GAMBLING		-0.038 (0.522)
Observations	539	539
Pseudo R <sup>2</sup>	0.076	0.060
Chi <sup>2</sup>	120.480	84.121

## B Experimental Tasks

### DECISION GAMES (read out aloud)

Dear students,

please read the following instructions carefully. The decision games which will be conducted now are very simple. There are no right or wrong decisions in the following games, rather you should decide according to your preferences. Hence, in each decision, just select the alternative that you prefer.

During the questionnaire you are not allowed to talk with other students or to use your mobile phone. If you do not follow this code of conduct you will be excluded from all games and payments.

So, let us start. We will now hand out the instructions to you. Note that all your answers are anonymous. In order to guarantee your anonymity, you are asked to generate a personal code which only you can know.

If you have any questions, please do not hesitate to ask at any time by giving a hand sign and we will answer your questions in private. We will now read the instructions together and explain the decision games in detail.

## GENERAL INSTRUCTIONS

We will now read the instructions together to ensure that everyone clearly understands them. In the following tasks, you can earn money based on your decisions. You will soon receive further information on these tasks.

We now ask you to generate your personal code in order to keep your answers anonymous and to administer the payments afterwards.

## PLEASE GENERATE YOUR CODE

Your personal code consists of several individual components which only you can know. Please be focused while generating the code because you will need it again later on.

1. Third letter of the first name of your mother (A-Z): (1) = \_\_\_
2. Third letter of the first name of your father (A-Z): (2) = \_\_\_
3. Day of your birthday (01-31): (3) = \_\_\_ \_\_\_
4. Month of your birthday (01-12): (4) = \_\_\_ \_\_\_
5. Number of siblings (0-9): (5) = \_\_\_

YOUR CODE IS:	___	___	_____	_____	___
	(1)	(2)	(3)	(4)	(5)



## INFORMATION ON THE DECISION GAMES

We now explain the different decision games and the payout rules in detail. In total, there are three decision games. In the first game, you are asked to choose one out of a set of different payout alternatives. In the second and third game, there are six decisions to be made. In each of these decisions, you can choose between option A and option B.

After everyone has made all of their decisions, one of you will randomly draw a card from an non-transparent box. There are three cards in this box, which are numbered 1, 2, and 3, respectively. The card which is drawn determines the game which is relevant for your payout.

If the first game is drawn, you will receive the payout according to your decision and based on a another random draw of either an orange or a white ball. If the second or third game is drawn, then randomly drawn another card (with numbers from 1 to 6) determines which decision is paid out. You will then receive the payment according to your decision. Please make each decision carefully, as all of them might be relevant for your payoff.

**PART 1: RANDOM DRAW**

In this game, you will receive either a higher or a lower monetary amount with equal probability. Whether you receive the higher or the lower amount is determined by chance. However, you can choose how far the higher and the lower possible payout are apart. Below, you see a list with six different pairs of payouts. Each pair consists of a higher and a lower possible payout. You have to choose which combination of possible payouts you prefer. Depending on the random draw, either the higher or lower amount is paid out.

The procedure for the random draw works as follows: After all decisions have been made, one white and one orange ball are put into a non-transparent box. One of you will then blindly draw one ball from the box. If the orange ball is drawn, you receive the lower payout (left column). If the white ball is drawn, you receive the higher payout (right column).

Please now choose the combination of possible payouts you prefer.

Decision	Orange Ball		White Ball
<input type="radio"/>	€10	or	€10
<input type="radio"/>	€8	or	€13
<input type="radio"/>	€6	or	€16
<input type="radio"/>	€4	or	€19
<input type="radio"/>	€2	or	€22
<input type="radio"/>	€0	or	€24

Short comprehension question:

If the orange ball is drawn I receive \_\_\_ Euro.

If the white ball is drawn I receive \_\_\_ Euro.

**PART 2: PAYMENT TODAY or PAYMENT IN 1 WEEK**

In the following 6 decisions, you can choose whether you prefer €10 today, or a higher payment in one week. The amount of the payment in one week increases in each decision by €1 (from €11 in the first decision to €16 in the sixth decision).

Please indicate in each of the six rows, which option you prefer (€10 today, or the higher payment in one week).

No.	A: Payment today	A	B	B: Payment in 1 week
1)	€10 today	<input type="radio"/>	<input type="radio"/>	€11 in 1 week
2)	€10 today	<input type="radio"/>	<input type="radio"/>	€12 in 1 week
3)	€10 today	<input type="radio"/>	<input type="radio"/>	€13 in 1 week
4)	€10 today	<input type="radio"/>	<input type="radio"/>	€14 in 1 week
5)	€10 today	<input type="radio"/>	<input type="radio"/>	€15 in 1 week
6)	€10 today	<input type="radio"/>	<input type="radio"/>	€16 in 1 week

**PART 3: PAYMENT IN 1 WEEK or PAYMENT IN 2 WEEKS**

In the following 6 decisions, you can choose whether you prefer €10 in one week, or a higher payment in two weeks. The amount of the payment in two weeks increases in each decision by €1 (from €11 in the first decision to €16 in the sixth decision). Please indicate in each of the following six rows, which option you prefer (€10 in one week, or the higher payment in two weeks).

No.	A: Payment in 1 week	A	B	B: Payment in 2 weeks
1)	€10 in 1 week	<input type="radio"/>	<input type="radio"/>	€11 in 2 weeks
2)	€10 in 1 week	<input type="radio"/>	<input type="radio"/>	€12 in 2 weeks
3)	€10 in 1 week	<input type="radio"/>	<input type="radio"/>	€13 in 2 weeks
4)	€10 in 1 week	<input type="radio"/>	<input type="radio"/>	€14 in 2 weeks
5)	€10 in 1 week	<input type="radio"/>	<input type="radio"/>	€15 in 2 weeks
6)	€10 in 1 week	<input type="radio"/>	<input type="radio"/>	€16 in 2 weeks

## FINAL QUESTIONNAIRE<sup>10</sup>

General questions:			
a)	Do you have a bank account?	<input type="radio"/> yes	<input type="radio"/> no
b)	What is your monthly disposable income?	total: _____ € =	
	How much of your total disposable income is:	1) _____ € +	
	1) Pocket money	2) _____ € +	
	2) Income from a job	3) _____ €	
	3) From other sources (e.g. gifts)		
c)	How much do you save average per month?	_____ €	
d)	Suppose you had €100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?	<input type="radio"/> more than €110	
		<input type="radio"/> exactly €110	
		<input type="radio"/> less than €110	
		<input type="radio"/> do not know	
e)	If you want to invest money, which of the following strategies usually provides the lower risk? An investment in ...	<input type="radio"/> ...a single stock.	
		<input type="radio"/> ...several stocks.	
		<input type="radio"/> do not know	
f)	Imagine you would like to buy a jacket for €125 and sunglasses for €15. The salesperson informs you that the jacket is sold for €120 in another branch of the store which is 20 minutes away. Would you walk to the other branch?	<input type="radio"/> yes	
		<input type="radio"/> no	
g)	58% of the entire American (North and South American) population lives in North America. What do you think is the percentage share of the total EU-population living in Italy? Please write your estimation in the adjacent field.		

<sup>10</sup>We also intended to elicit three behavioral biases (mental accounting, anchoring, and framing effects) via non-incentivized questions. Moreover, we included one question about BETTING behavior, asking subjects about how often they bet with friends. However, we did not include these questions in our analysis, as in feedback discussions in class subjects told us that there was lack of understanding of the questions. In addition, we implemented the variable BANK\_ACCOUNT as outlined below. To test whether this financial decision variable is related to financial literacy and economic preferences, we run a logit regression with the binary variable BANK\_ACCOUNT as dependent variable and with financial literacy score and the economic preferences as explanatory variables (next to the battery of control variables we elicited). We find no significant relationship between financial literacy/economic preferences and having a bank account in the full specification with all control variables. Importantly, only 13% of all subjects in our sample do not have a bank account and thus we believe that this variable does not serve well as a proxy for a financial decision variable.

	<p>Imagine that a company has to take action in order to deal with an imminent economic crisis. It is estimated that 600 employees will lose their jobs due to the crisis.</p> <p>Two plans have been developed how to deal with the crisis. Suppose that the consequences of both plans are known with certainty:</p>	
h)	<ul style="list-style-type: none"> <li>- If plan A is executed, 200 employees keep their job.</li> <li>- If plan B is executed, then there is a probability of one third (1/3) that all 600 employees keep their job and a probability of two third (2/3) that all 600 employees lose their job.</li> </ul> <p>Which plan would you execute?</p>	<input type="radio"/> Plan A <input type="radio"/> Plan B

How often ...

	never	seldom	occasionally	often	very often
...do you bet with friends?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...do you gamble?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...do you smoke?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	strongly disagree	rather disagree	neither agree nor disagree	rather agree	strongly agree
I can easily resist temptations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other people would call me very self-disciplined.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Monthly expenses
Mobile phone	----- €
Clothing	----- €
Lunch	----- €
Sports	----- €
Transport (e.g. bus or train ticket, ...)	----- €
School (e.g. books, ...)	----- €
Further leisure activities (e.g. going-out, cinema, ...)	----- €

How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?

Not at all willing to take risks							Very willing to take risks			
0	1	2	3	4	5	6	7	8	9	10
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How do you see yourself: Are you a person who is fully prepared to take risks in investment decisions or do you try to avoid taking risks?

Not at all willing to take risks							Very willing to take risks			
0	1	2	3	4	5	6	7	8	9	10
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Further questions:			
a)	Age		
b)	Gender	<input type="radio"/> female	<input type="radio"/> male
c)	Religion		
d)	Language you usually speak at home		
e)	Family members you are living with	<input type="radio"/> both parents <input type="radio"/> only father	<input type="radio"/> only mother <input type="radio"/> -----
f)	Highest education level of your mother	<input type="radio"/> compulsory sch. <input type="radio"/> A-levels	<input type="radio"/> vocational sch. <input type="radio"/> university
g)	Highest education level of your father	<input type="radio"/> compulsory sch. <input type="radio"/> A-levels	<input type="radio"/> vocational sch. <input type="radio"/> university
h)	Do you live in a rented or on owned flat	<input type="radio"/> rented flat <input type="radio"/> owned flat <input type="radio"/> do not know	
i)	What was your math grade in your last year's school report card?	.	
e)	What are your plans after you finished school?	<input type="radio"/> work <input type="radio"/> do not know	<input type="radio"/> study <input type="radio"/> -----
k)	Which school type (e.g. commercial high school, vocational school, high school, ...) do you attend?	.	

Thank you for your participation!



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2020-05

Michael Razen, Jürgen Huber, Laura Hueber, Michael Kirchler, Matthias Stefan

Financial Literacy, Economic Preferences, and Adolescents' Field Behavior

**Abstract**

Financial literacy and economic preferences are considered to be important drivers of health, income, and general well-being. We bridge the gap between studies on financial literacy and research on economic preferences by investigating how they interplay with each other and with the field behavior of adolescents. First, we report that financial literacy scores are positively associated with patience, male gender, and educational level of the father. Second, we observe that risky field behavior like smoking and gambling is positively associated with various measures of risk-tolerance, and negatively associated with patience. Finally, we discuss implications for financial education programs.

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