The Effects of Financial Education on Risky Financial Decisions: Experimental Evidence

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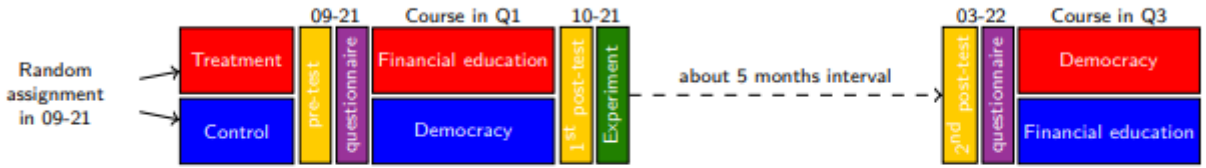
What are we doing in this paper

- We are interested in the effects of financial education on risky financial decisions
- The relationship between education and decisions is often hard to discern from real-time data
- We try to overcome this by gauging the effects of education from simulated experiments on investment, insurance and mortgage tasks
- The target group are first year students at the University of Vaasa, who participate in a course on financial literacy

Description of the intervention

- Since the academic year 2020-21, there has been two new orientating courses available for the students of the University of Vaasa: on related to the management of personal finances, and the other university community (e.g. student rights and responsibilities)
- The former is our treatment, and the latter our control group
- The data come from 2021-22 academic year
- The courses were mandatory for first year business students

Timing of the experiment



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Financial literacy course

- The course (like the parallel course) was organized completely online
- The course was equivalent to 1 credit (27.5 hours of estimated student work load)
- *The topics:*
- Budgeting and insurance
- Saving and investing
- Borrowing and housing
- *Learning methods:*
- Videos
- Assignments and exercises
- Games

Experiment design

- Experiment was voluntary for the participants
- It was incentivized (5-20 euros); payment depended on task performance
- There was 4 tasks; one of them was randomly selected as the basis for compensation
- The experiment was run using the oTree platform
- Participants played the game remotely within a time window of one week

Sample

- We had 189 students (out of over 400 attending the courses) who participated in the experiments
- We focused on first year business students (who were not self-selected) and those who had given research permission and completed the post-test: this reduced the number of observations to 128

Summary statistics of the sample

Table: Summary statistics about the participants after merging three datasets[a]

	Whole sample ($n = 128$)		Control group ($n = 64$)		Treatment group ($n = 64$)		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	p–value
Age	21.734	5.564	21.891	5.774	21.578	5.386	0.7521[b]
Female	0.523	0.501	0.594	0.495	0.453	0.502	0.1112[c]
Years lived ind.	1.375	2.450	1.531	2.576	1.219	2.326	0.4727[b]
Has children	0.023	0.152	0	0	0.047	0.213	0.0797[*, c]
Lives alone	0.688	0.465	0.656	0.479	0.719	0.453	0.4456[c]

[a] *, **, *** denote, respectively, 10%, 5% and 1% significance levels. [b] p–value of a t–test. [c] p–value of a two-sample proportions test.

Experiments

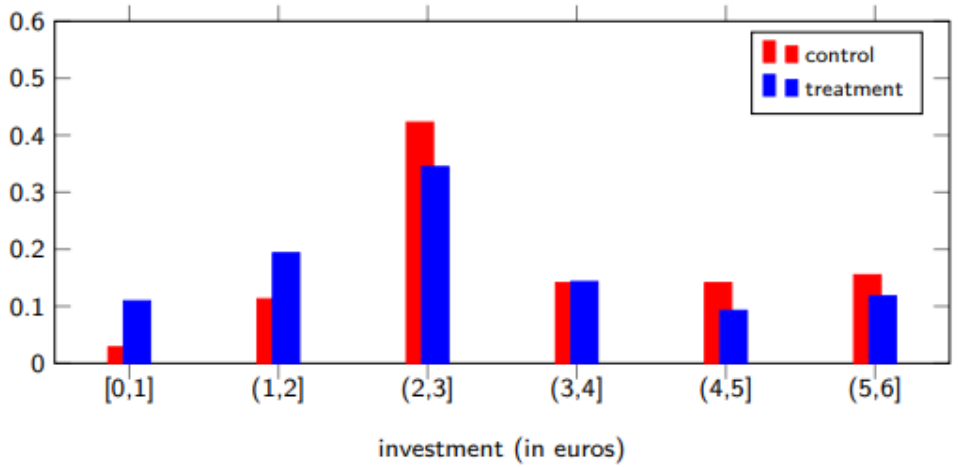
- Investment decision (Gneezy and Potters 1997 QJE)
- Insurance decision (Charness et al. 2020 JRU)
- Mortgage decision (Charness et al. 2020 JRU)
- Portfolio selection (Charness et al. 2020 JRU)

Investment task

- Participants are given an endowment of 6 euros
- They may invest part or all of it
- The project is successful with probability *p*
- If the project is successful, the investor receives a payoff of 2.5 times the amount invested + compensation for participation (max 15€ + 5€)
- If the project is unsuccessful, the investor receives only the compensation of participation (5€)
- Two rounds
- 1: $p = 0.5$
- 2: $p = 0.1$ (extreme risk)

Investment decision: results

- Mean investment (st. dev.), treament group: 3.23€ (1.62)
- Mean investment (st. dev.), control group: 3.51€ (1.47)
- p-value in t-test= 0.28 (n.s.)



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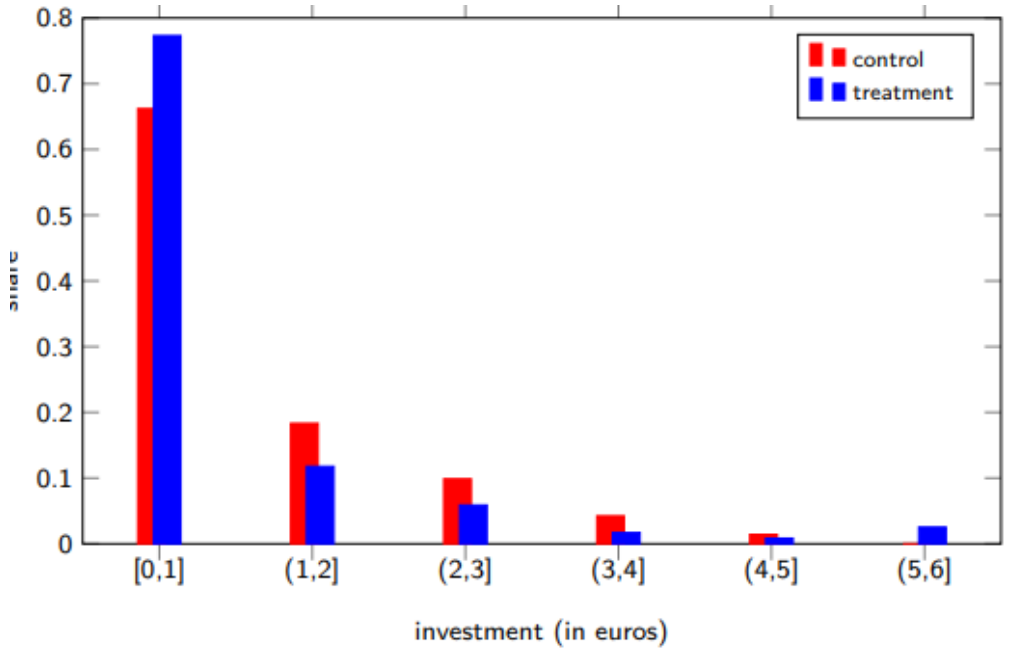
Decisions in high-risk situation

- Mean investment (st. dev.), treament group: 0.86€ (1.58)
- Mean investment (st. dev.), control group: 1.08€ (1.18)
- p-value in t-test= 0.22 (n.s.)



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Regression results

Table: OLS regression for amount invested in the risky investment task[a]

	(1)	(1R)	(2)	(3)	(4)	(5)	(6)	(7)
Demographics								
Age			0.038	0.036	0.040	0.040	0.045	0.042
			(0.035)	(0.035)	(0.031)	(0.031)	(0.032)	(0.032)
Female	0.237	0.082	0.134	0.075	0.074	0.105	0.041	0.044
	(0.180)	(0.189)	(0.210)	(0.203)	(0.222)	(0.216)	(0.229)	(0.225)
Years lived indep.			-0.127**	-0.140**	-0.125**	-0.132**	-0.112**	-0.126**
			(0.060)	(0.060)	(0.055)	(0.056)	(0.054)	(0.055)
Has children			0.702	1.162	1.300*	1.257*	0.978	1.268*
			(0.671)	(0.712)	(0.700)	(0.710)	(0.702)	(0.721)
Lives with partner[b]			0.010	-0.039	-0.071	-0.099	-0.085	-0.113
			(0.277)	(0.261)	(0.272)	(0.281)	(0.292)	(0.283)
Lives with friend[b]			0.611**	0.561**	0.555**	0.551**	0.588**	0.553**
			(0.250)	(0.259)	(0.249)	(0.254)	(0.240)	(0.251)
Socioecon. status			✓	✓	✓	✓	✓	✓
Prior financial edu.					✓	✓	✓	✓
Second round	-2.472***	-2.510***	-2.510***	-2.510***	-2.510***	-2.510***	-2.510***	-2.510***
	(0.132)	(0.147)	(0.149)	(0.149)	(0.151)	(0.151)	(0.151)	(0.151)
Treatment	-0.260	-0.380**		-0.459**	-0.358	-0.439**		-0.367
	(0.183)	(0.191)		(0.197)	(0.222)	(0.191)		(0.222)
Test score					-0.036		-0.064*	-0.035
					(0.040)		(0.035)	(0.040)
Willing to take risks						-0.038	-0.027	-0.035
						(0.058)	(0.058)	(0.058)
Observations	306	256	256	256	256	256	256	256
R^2	0.472	0.489	0.507	0.520	0.534	0.533	0.527	0.534

[a] Dependent variable is "Amount invested." *, **, *** denote, respectively, 10%, 5% and 1% significance levels. Cluster-robust standard errors are provided in parantheses. A constant and controls for the day of participation in the experiment are included but not reported here. [b] Base category: "alone." "Refused to answer" is included but not reported. [c] Categories: "1: often," "2: sometimes," "3: hardly ever" (base).

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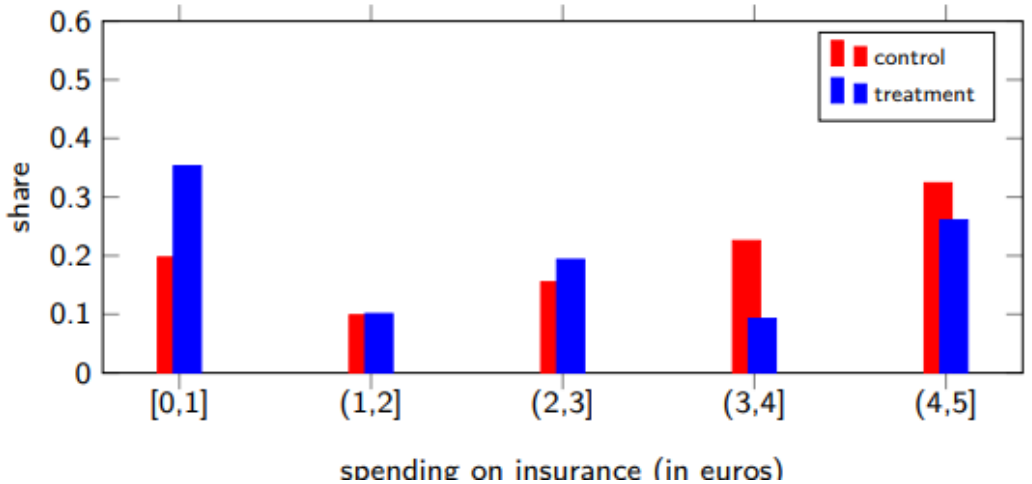
Insurance task

- Participants are given an endowment of 15€
- They face of 10% of losing this entirely
- Participants can buy insurance against this risk up to 5€
- If the loss occurs:
- Participants lose their money, but receive back three times the amount they insured
- If the loss does not occur:
- Participants keep their money minus any amount they insured
- In all cases, they can keep their compensation for participation

Results: insurance task

- Mean insurance (st. dev.), treament group: 2.16€ (1.94)
- Mean investment (st. dev.), control group: 3.20€ (1.73)
- p-value in t-test= <0.001 (***)



Regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Demographics							
Age		0.012	0.008	0.012	0.009	0.018	0.018
		(0.048)	(0.047)	(0.048)	(0.049)	(0.049)	(0.049)
Female	1.563***	1.655***	1.558***	1.465***	1.590***	1.450***	1.420***
	(0.264)	(0.310)	(0.306)	(0.337)	(0.329)	(0.352)	(0.351)
Years lived indep.		-0.081	-0.103	-0.083	-0.096	-0.061	-0.097
		(0.106)	(0.104)	(0.106)	(0.106)	(0.107)	(0.107)
Has children		1.222	1.975	1.861	1.824	1.390	1.964
		(1.212)	(1.227)	(1.285)	(1.296)	(1.276)	(1.301)
Lives with partner[b]		0.512	0.432	0.352	0.367	0.380	0.344
		(0.427)	(0.419)	(0.431)	(0.449)	(0.452)	(0.449)
Lives with friend[b]		0.233	0.152	0.116	0.111	0.171	0.165
		(0.484)	(0.475)	(0.485)	(0.488)	(0.490)	(0.490)
Socioecon. status		✓	✓	✓	✓	✓	✓
Prior financial education				✓	✓	✓	
Treatment	-0.833***		-0.752**	-0.577*	-0.742**		-0.620*
	(0.268)		(0.312)	(0.344)	(0.317)		(0.349)
Test score				-0.078		-0.124*	-0.084
				(0.067)		(0.062)	(0.068)
Risk attitudes							
Willing to take risks					-0.019	-0.000	-0.016
					(0.101)	(0.101)	(0.101)
Amount invested[d]	-0.097						-0.097
	(0.085)						(0.101)
Observations	153	128	128	128	128	128	128
Prob > F	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001
R^2	0.350	0.334	0.368	0.381	0.373	0.364	0.387

[a] Dependent variable is "Insurance spending." *, **, *** denote, respectively, 10%, 5% and 1% significance levels. Standard errors are provided in parantheses. A constant and controls for the day of participation in the experiment are included but not reported here. [b] Base category is "alone." "Refused to answer" is included but not reported. [c] Categories: "1: often," "2: sometimes," "3: hardly ever" (base). [d] Amount invested in the first round of the risky investment task.

Mortgage task

- Participants take out a loan of 10€
- They pay this back in 10 years
- Participants receive an income of 2€ every year
- Their payoff is income minus interest payments
- They choose among one of the payment plans:
- Fixed interest of 8%
- Variable interest with mean of 7% and random component of +- 2%
- Variable interest with mean of 6% and random component of +-4%

Mortgage choices

- The distribution of choices quite similar between treatment and control groups
- Pearson Chi2 –test p: 0.87

Table: Mortgage repayment plan choices by control and treatment groups

	Option A		Option B		Option C		
	Freq.	Rel. freq.	Freq.	Rel. freq.	Freq.	Rel. freq.	Total
Control	15	0.2000	46	0.6133	14	0.1867	75
Treatment	17	0.2179	47	0.6026	14	0.1795	78
Total	32	0.2092	93	0.6078	28	0.1830	153

Mortgate choice: multinomial probit results

- Multinomial probit regressions do not indicate any differences in the choice of the mortgage plan between treatment and control groups

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Option B	*Demographics*							
	Age		-0.214**	-0.214**	-0.211**	-0.271***	-0.275***	-0.272***
			(0.089)	(0.089)	(0.091)	(0.101)	(0.102)	(0.102)
	Female	✓	✓	✓	✓	✓	✓	✓
	Years lived independent		0.457*	0.458*	0.488*	0.571**	0.602**	0.604**
			(0.247)	(0.248)	(0.262)	(0.288)	(0.298)	(0.297)
	Other controls[b]		✓	✓	✓	✓	✓	✓
	Prior financial edu.[c]				✓	✓	✓	✓
	Treatment	-0.064		0.009	0.045	0.022		0.170
		(0.417)		(0.530)	(0.586)	(0.578)		(0.624)
	Test score				-0.031		-0.065	-0.075
					(0.112)		(0.110)	(0.118)
	Willing to take risks					0.567***	0.584***	0.585***
						(0.179)	(0.181)	(0.182)
	Amount invested[e]	✓						✓
Option C	*Demographics*							
	Age		-0.453*	-0.456*	-0.540**	-0.585**	-0.605**	-0.622**
			(0.233)	(0.233)	(0.254)	(0.254)	(0.257)	(0.266)
	Female	✓	✓	✓	✓	✓	✓	✓
	Years lived independent		0.553*	0.551*	0.661**	0.732**	0.793**	0.818**
			(0.310)	(0.311)	(0.337)	(0.343)	(0.353)	(0.358)
	Other controls[b]		✓	✓	✓	✓	✓	✓
	Prior financial edu.[d]				✓	✓	✓	✓
	Treatment	-0.246		-0.115	0.215	-0.095		0.292
		(0.531)		(0.620)	(0.723)	(0.665)		(0.744)
	Test score				-0.120		-0.140	-0.158
					(0.139)		(0.128)	(0.141)
	Willing to take risks					0.331	0.357*	0.362*
						(0.210)	(0.213)	(0.213)
	Amount invested[e]	✓						✓
	Observations	153	128	128	128	128	128	128
	Prob > χ^2	0.355	0.248	0.350	0.264	0.037	0.029	0.072

[a] Dependent variable is "Mortgage plan choice." Base outcome is Option A. *, **, *** denote, respectively, 10%, 5% and 1% significance levels. Standard errors are provided in parantheses. [b] Includes "Has children," "Lives with someone," and "Socioeconomic status." [c] Includes "no prior financial education," "money talked in childhood." [d] Amount invested in the first round of the risky investment task.

Portfolio selection task

- Participants receive an income of 5€ and initial capital of 50€
- They are asked to allocate all of their capital into stocks and bonds
- All of stocks and bonds have initially the value of 1. They will have the following pay-offs
- The bonds will produce a fixed return of 1% per of invested capital
- Stock B will yield a return of 0.12€ per 1€ of invested capital with a probability of 50% and -0.06€ per 1€ with p=50%
- Stock B will yield a return of 0.20€ per 1€ of invested capital with a probability of 50% and -0.10€ per 1€ with p=50%

Expected values of portfolios, regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Demographics							
Age		-0.010	-0.010	-0.011	-0.011	-0.011	-0.013
		(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Female	-0.197***	-0.196**	-0.201**	-0.184**	-0.193**	-0.178**	-0.158*
	(0.070)	(0.078)	(0.079)	(0.087)	(0.085)	(0.090)	(0.087)
Years lived independent		0.008	0.007	0.006	0.008	0.008	0.015
		(0.027)	(0.027)	(0.028)	(0.028)	(0.027)	(0.027)
Has children		-0.013	0.021	0.043	0.049	0.006	-0.040
		(0.309)	(0.319)	(0.336)	(0.337)	(0.330)	(0.329)
Lives with someone							
Lives with partner[b]		0.063	0.060	0.055	0.061	0.067	0.056
		(0.108)	(0.108)	(0.112)	(0.116)	(0.116)	(0.113)
Lives with friend[b]		0.011	0.009	0.004	0.003	0.005	-0.032
		(0.119)	(0.120)	(0.122)	(0.122)	(0.122)	(0.120)
Socioecon. status		✓	✓	✓	✓	✓	✓
Prior financial education				✓	✓	✓	
Treatment	-0.037		-0.037	-0.058	-0.037		-0.029
	(0.071)		(0.080)	(0.090)	(0.082)		(0.088)
Test score				0.010		0.005	0.013
				(0.017)		(0.016)	(0.017)
Risk attitudes							
Willing to take risk					0.008	0.008	0.008
					(0.026)	(0.026)	(0.025)
Amount invested[c]	0.060***						0.073***
	(0.023)						(0.025)
Observations	153	128	128	128	128	128	128
Prob > F	0.062	0.414	0.487	0.758	0.773	0.782	0.304
R^2	0.131	0.082	0.083	0.088	0.086	0.086	0.153

[a] Dependent variable is "Insurance spending." *, **, *** denote, respectively, 10%, 5% and 1% significance levels. Standard errors are provided in parantheses. A constant is included but not reported here. Also, controls for the day of participation in the experiment is included in the first regression model but not reported. [b] Base category is "alone." "Refused to answer" is included but not reported. [c] Amount invested in the first round of the risky investment task.

Interpretation of results

- The results are somewhat mixed:
- The clearest results apply to insurance task, where the treatment group was less risk averse than the control group
- However, in the investment task the treatment group was more risk averse
- In mortgage task and portfolio task, there were no clear differences between the groups
- There are also other differences: gender (lower risk aversion by female students) is significant in insurance tasks and portfolio tasks, but not in investment and mortgage tasks