How much does financial literacy matter? A simulation of potential influences on inequality levels

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Introduction

- The project aims to investigate the role of financial literacy (FL) in reducing inequality levels
- FL is a mix of financial and numerical knowledge, for good autonomous wealth management and self-confident participation in economic life (OECD 2014)
- The literature suggests that FL can be a valid tool to improve financial well-being and behaviours of households (Kaiser et al. 2021)

Literature and contribution

- FL has indeed a positive impact on:
  - Wealth management, saving and investing behavior, retirement planning (van Rooij et al., 2012; Lusardi and Mitchell, 2014)
  - Retirement wealth inequality (Lusardi et al., 2017)
  - Confidence and financial well-being (Bucciol et al., 2021; Collins and Urban, 2020; Bucher-Koenen et al., 2021)
  - Chances of a fair borrowing (Almenberg et al., 2020)
  - Economic growth (Bucci et al., 2022)

- Our contribution appears of interest for two main reasons:

1. Looking at a FL increase as "innovative social policy" is particularly crucial nowadays if we consider that the pandemic hit the poor the most (Clark et al. 2021)
2. The literature still neglects how FL affects the inequality levels. Our paper may support evidence to introducing mandatory FL in schools

Research questions

Based on the influence function regression method proposed by Firpo et al. (2009), our analysis wants to shed light on the following points:

1. Does FL influence distributional statistics (mean, Gini index, deciles) of household income and wealth?
2. If FL influences are significant, in which direction they go?
3. How do these potential influences change across subgroups of population?

We focus on Italy as a case study because of (i) its critically low FL levels among the OECD countries; (ii) the only OECD country with statistically significant gender gap at an early stage of life (PISA, 2014); and (iii) no mandatory financial education in schools before 2023

The mechanism behind

Based on the existing literature, we expect that:

1. An educational policy increasing FL (e.g. mandatory FL in schools) significantly improves levels of FL among students
2. Higher FL is positively correlated with higher income levels
3. Higher income and FL levels lead to higher wealth values in the medium/long run
4. A larger impact among vulnerable groups may engender a lower income inequality

Data and sample

- The analysis relies on data from the Bank of Italy's Household Income and Wealth Survey (SHIW)
- This survey collected questions on the financial knowledge of Italian respondents in the 2006, 2008, 2010, and 2016 waves
- Among them, we use the 2016 wave because it is the only one reporting the 'Big Three' questions (on inflation, compound interest, and risk diversification) as defined in the international literature on FL
- **Sample of analysis:** 7,421 individuals, mainly householders (i.e. household member with the highest income)

⏩ Sample characteristics

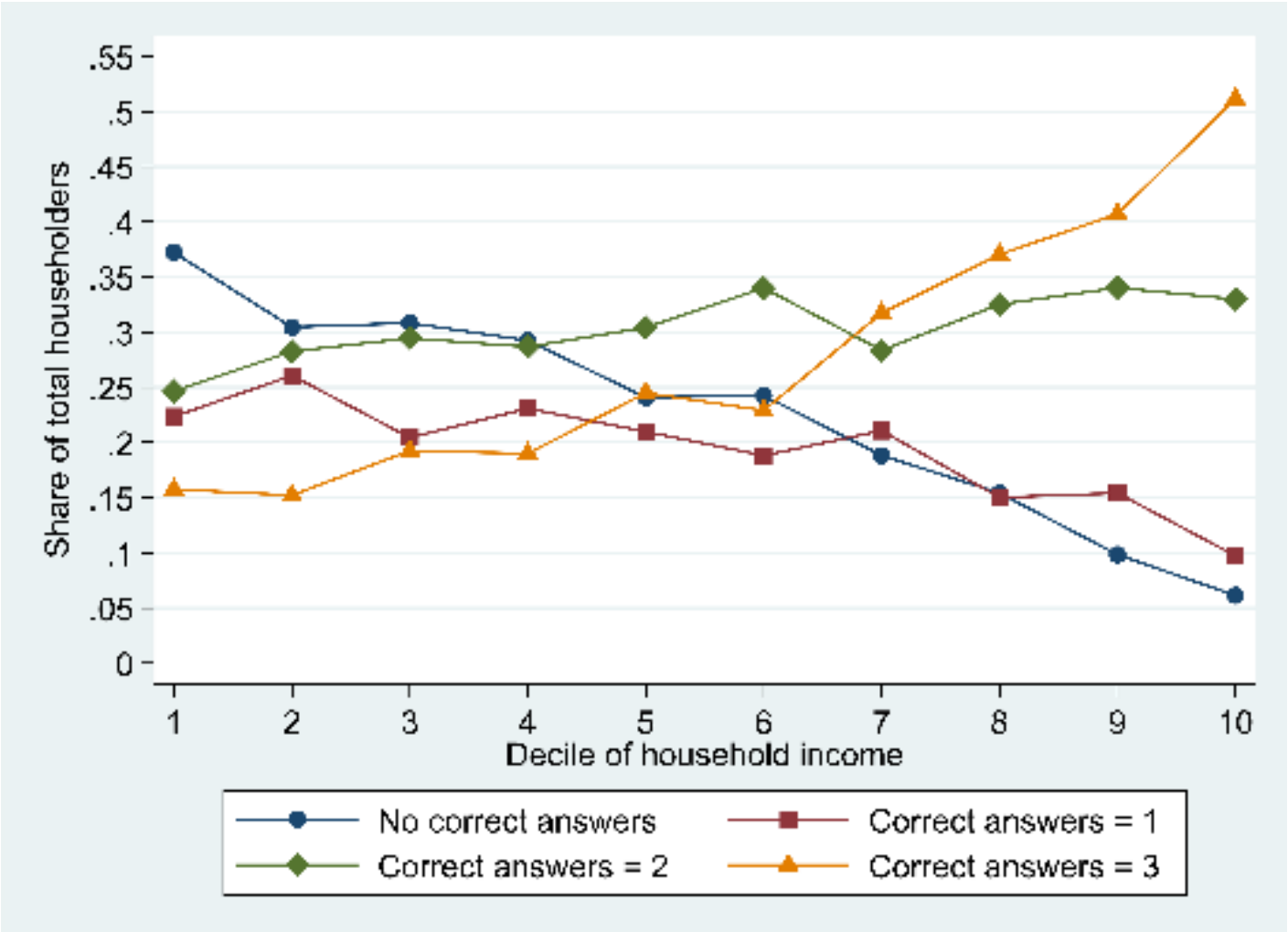
How to measure FL - The Big Three

1) 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?
   a) More than €102; b) Exactly €102; c) Less than €102; d) Do not know

2) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?
   a) More than today; b) Exactly the same; c) Less than today; d) Do not know

3) Do you think that the following statement is true or false? *"Buying a single company stock usually provides a safer return than a stock mutual fund."*
   a) True; b) False; c) Do not know

Descriptive statistics - FL and household income



Household wealth

Descriptive statistics - FL distribution across country

How to reply to our research questions? Base scenario

N. of correct answers = 0

N. of correct answers = 3

How to reply to our research questions? 10% Swap

How to reply to our research questions? Full swap

Econometric methods

The unconditional quantile regression (UQR) method (Firpo et al. 2009) allows to create these 'hypothetical' scenarios

This method involves, for each observation, the calculation of recentered influence functions on a distributional statistic $v(F)$

Example of influence function on mean value: $\text{IF}(y; v, F_y)_i = y_i - \mu$

Effects of marginal changes (10%-swap) through simple OLS estimations

Important elements of the analysis:

- Outcome variable $y \rightarrow$ Household equivalized disposable income (wealth)
- Observed distributional statistics $\rightarrow$ Mean, Gini index, nine deciles ⏩ rob check
- Considering mainly householders' FL, results may represent a *lower bound*

Model specifications

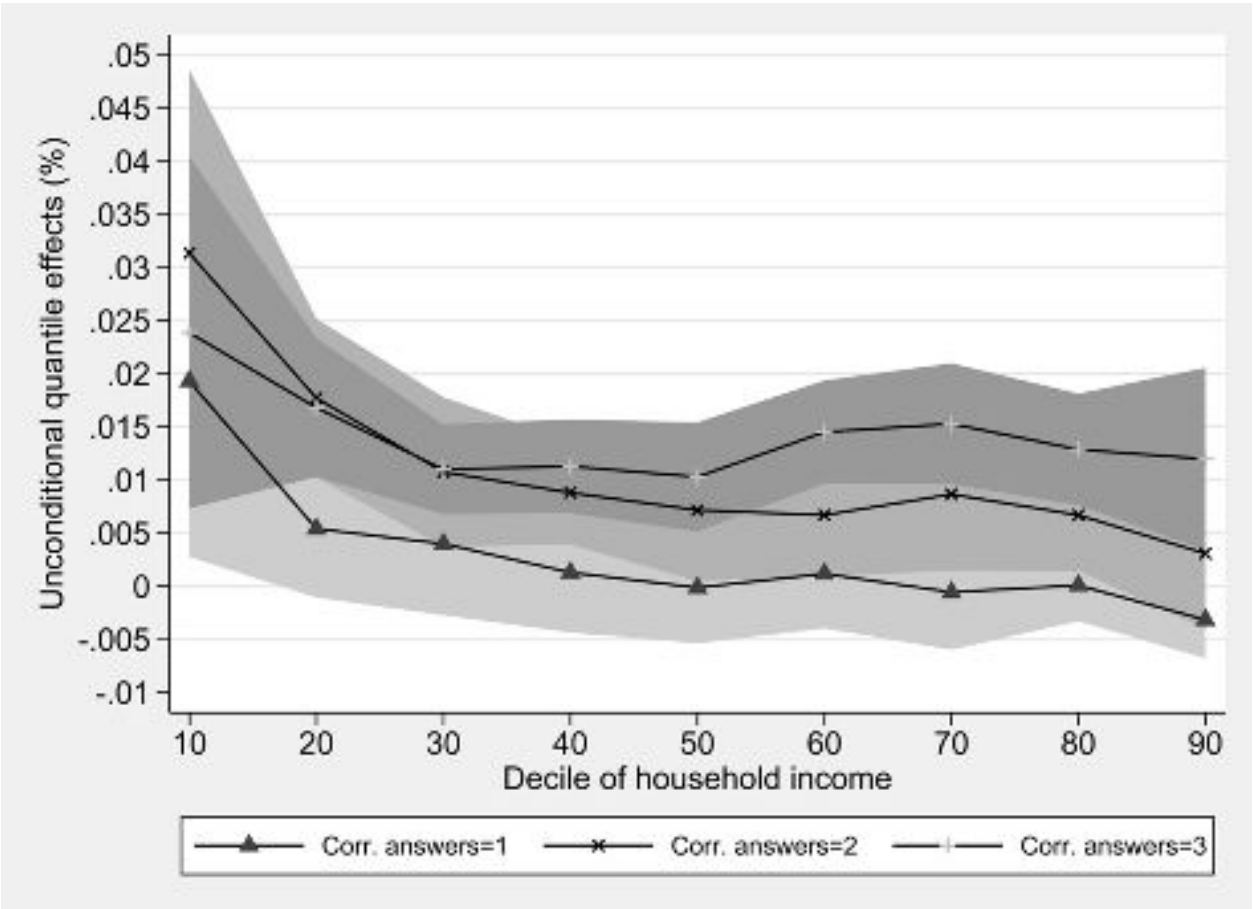
- Results of the UQR method has the merit to be not conditioned by the vector Z of covariates included in the model
- We can then consider relevant characteristics which may diverge across groups of respondents and lead to incorrect influences on $v(F)$
- The vector Z includes:
  - Respondent's characteristics (gender, citizenship, age group, education level, dummy for tertiary education of parents, marital status, and occupational status)
  - Household characteristics (household size, presence of minors, work intensity, macro-region of residence)
- We also explore **heterogeneous effects** by gender, age group, education level, macro-region of residence, citizenship, presence of minors, family members, and household size

Unconditional effects on the mean and Gini index

VARIABLES	Household income		Household wealth	
	Mean value	Gini index	Mean value	Gini index
Effects in absolute terms				
Correct answers = 1	19.5	-0.002*	1,082	-0.003**
Correct answers = 2	160.7**	-0.003***	3,324***	-0.001
Correct answers = 3	285.3***	-0.000	5,205***	-0.001
Effects in relative terms				
Correct answers = 1	0.001	-0.007*	0.008	-0.004**
Correct answers = 2	0.008**	-0.009***	0.025***	-0.002
Correct answers = 3	0.015***	-0.001	0.039***	-0.002
Observations	7421	7421	7421	7421
R-squared	0,427	0,157	0,217	0,073
Sample distributional statistic	19.420	0,320	133.472	0,616

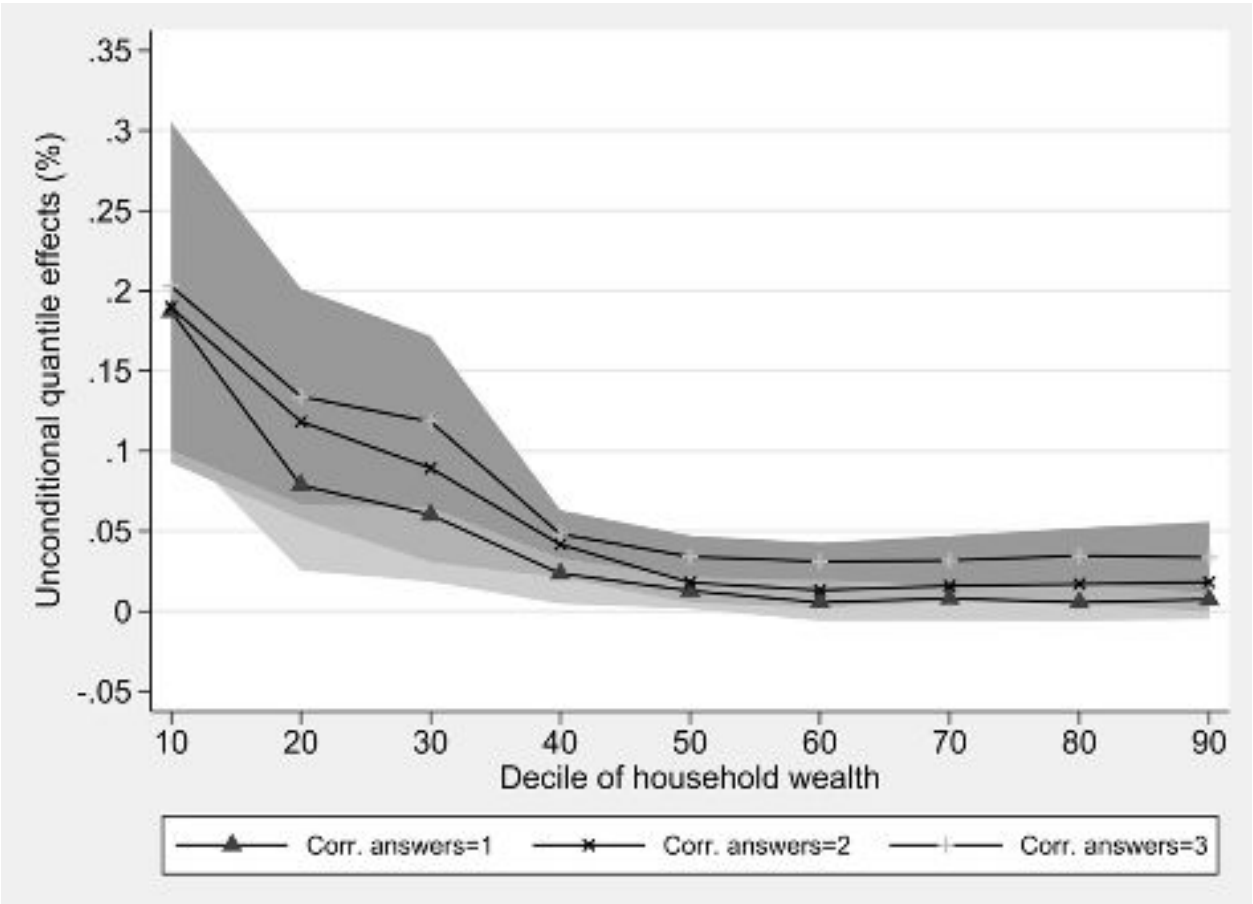
- **To be noted**: A lump sum leading to the same household income increase would cost about EUR 4.1-7.3 billion per year in Italy
- For a full-swap scenario, multiply coefficients by 10 check

Unconditional effects along the household income distribution



absolute terms

Unconditional effects along the household wealth distribution



absolute terms

Heterogeneous effects on household income statistics

Type of householder	Mean value			Gini index		
	Correct answers = 1	Correct answers = 2	Correct answers = 3	Correct answers = 1	Correct answers = 2	Correct answers = 3
Total sample	0.001	0.008**	0.015***	-0.007*	-0.009***	-0.001
Male	0.003	0.010**	0.018***	-0.009*	-0.010*	-0.002
Female	-0.000	0.009***	0.011**	-0.006	-0.005	-0.001
Aged 40 or lower	0.012***	0.016***	0.017***	-0.022	-0.018	-0.015
Aged 41-50	0.001	0.008	0.024***	-0.004	-0.019***	0.005
Aged 51-60	0.001	0.005	0.001	-0.003	-0.008	-0.008
Aged 61-70	0.007**	0.010***	0.010***	-0.007	-0.001	-0.005
Aged 71 or more	-0.003	0.007	0.018***	-0.005	-0.005	0.009
Primary education or lower	-0.001	0.004	0.015*	0.001	-0.001	0.004
Lower secondary education	0.003	0.005*	0.009***	-0.010**	-0.018***	-0.010***
Upper secondary education	0.003	0.015**	0.020***	-0.006	-0.004	-0.004
Tertiary education	0.032**	0.047***	0.052***	-0.005	0.022	0.046**
Nort-East	0.002	0.012	0.020*	-0.008	-0.010**	0.005
North-West	0.003	0.008	0.024**	-0.003*	-0.007	0.011
Middle	0.005	0.015*	0.012**	-0.009	-0.001	-0.004
South	0.000	0.008*	0.007***	-0.004	-0.014**	-0.018**
Islands	-0.005	0.001	0.009	-0.004	-0.006	-0.005

Heterogeneous effects on household income statistics II

Type of householder	Mean value			Gini index		
	Correct answers = 1	Correct answers = 2	Correct answers = 3	Correct answers = 1	Correct answers = 2	Correct answers = 3
Total sample	0.001	0.008**	0.015***	-0.007*	-0.009***	-0.001
Local	0.001	0.009**	0.015***	-0.007*	-0.008**	-0.001
Foreign	-0.001	0.002	0.002	-0.008	-0.014	-0.003
No minors	-0.001	0.008**	0.013***	-0.004	-0.004	0.002
Presence of minors	0.010***	0.012***	0.021***	-0.022*	-0.027**	-0.016
Other household member	0.008***	0.016***	0.019***	-0.010	-0.016**	-0.007
Breadwinner member	-0.002	0.005	0.011**	-0.006	-0.006	0.002
Household size = 1	-0.002	0.006	0.008	-0.002	-0.001	0.005
Household size = 2	-0.000	0.012*	0.017***	-0.010	-0.000	0.004
Household size = 3	0.004	0.004	0.017***	-0.009	-0.013*	-0.004
Household size = 4	0.009**	0.011***	0.020***	-0.015*	-0.030***	-0.005
Household size = 5 or more	0.005	0.011	0.022***	-0.024	-0.044**	-0.038**

household wealth

The Big Three effects on household income and wealth statistics - Baseline DK option

VARIABLES	Household income		Household wealth	
	Mean value	Gini index	Mean value	Gini index
Numeracy				
Wrong answer	0.005*	-0.001**	0.015*	-0.003
Correct answer	0.011***	-0.005**	0.023**	-0.004
R-squared	0,424	0,157	0,213	0,073
Inflation				
Wrong answer	0.003	-0.006	-0.001	-0.003
Correct answer	0.006**	-0.006**	0.018**	-0.001
R-squared	0,422	0,157	0,213	0,073
Risk Diversification				
Wrong answer	0.007***	-0.006	0.015**	-0.003
Correct answer	0.013***	-0.001	0.033***	-0.000
R-squared	0,427	0,156	0,218	0,073
Observations	7.421	7.421	7.421	7.421

Conclusions and policy implications

- FL has been recognized as **new tool** against financial fragility and mispractices
- We show that, at least in Italy, FL actually increases the average financial well-being, reducing income and wealth inequalities at the same time (lower bound effects)
- Benefits for income and wealth levels are significant even if FL **partially increases** across population (N. of correct answers lower than 3)
- The **"progressive effects"** of FL appear stronger especially among the most vulnerable respondents (low-educated ones and those living in the South of Italy)
- Results recommend introducing financial education in schools where everyone can access it **more equally**

To sum up

- In our dataset 23% of the sample, 5.77 million Italian respondents, fail to provide any correct answers to the Big Three questions
- Approximately 400,000 newborns in Italy every year (ISTAT, 2021)
- To make our 10%-swap hypothesis realistic, compulsory financial education should be included in school for at least two consecutive years
- *Of course, under the assumption of a persistent effect on FL levels*

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Thank you for your attention!

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Summary Statistics Distribution I

Variable	Total sample		Financially illiterate		Financially literate	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
Household equivalised disposable income	19.420	12.992	17.560	11.066	24.268	16.036
Household equivalised disposable wealth	133.472	216.471	112.819	185.959	187.307	273.659
Correct answers = 0	0,226	0,419	0,313	0,464	0	0
Correct answers = 1	0,193	0,395	0,267	0,442	0	0
Correct answers = 2	0,303	0,460	0,420	0,494	0	0
Correct answers = 3	0,277	0,448	0	0	1	0
Female	0,496	0,500	0,526	0,499	0,418	0,493
Foreign	0,064	0,244	0,077	0,267	0,028	0,164
Aged 40 or lower	0,177	0,381	0,171	0,377	0,191	0,393
Aged 41-50	0,212	0,409	0,200	0,400	0,242	0,428
Aged 51-60	0,194	0,395	0,183	0,387	0,221	0,415
Aged 61-70	0,178	0,383	0,173	0,378	0,193	0,394
Aged 71 or more	0,239	0,427	0,272	0,445	0,153	0,360
Primary education or lower	0,214	0,410	0,265	0,442	0,082	0,275
Lower secondary education	0,284	0,451	0,308	0,462	0,221	0,415
Upper secondary education	0,366	0,482	0,330	0,470	0,459	0,498
Tertiary education	0,136	0,342	0,096	0,295	0,239	0,426
Graduated parents	0,150	0,357	0,116	0,321	0,237	0,425
Observations	7.421		5.444		1.977	

Summary Statistics Distribution II

Variable	Total sample		Financially illiterate		Financially literate	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
Single	0,195	0,397	0,200	0,400	0,183	0,386
Married	0,535	0,499	0,507	0,500	0,607	0,488
Divorced/separated/widowed	0,270	0,444	0,293	0,455	0,210	0,407
Blue-collar worker	0,183	0,387	0,194	0,395	0,156	0,363
White-collar worker	0,151	0,358	0,130	0,336	0,204	0,403
Teacher/manager/director	0,059	0,236	0,041	0,197	0,109	0,311
Self-employed	0,095	0,293	0,085	0,279	0,121	0,326
Unemployed	0,061	0,239	0,068	0,253	0,041	0,199
Retired from work	0,278	0,448	0,281	0,449	0,272	0,445
Other retired	0,082	0,275	0,103	0,304	0,029	0,167
Other inactivity status	0,090	0,286	0,099	0,298	0,067	0,250
Household size = 1	0,337	0,473	0,368	0,482	0,256	0,436
Household size = 2	0,267	0,442	0,262	0,440	0,281	0,450
Household size = 3	0,176	0,381	0,165	0,371	0,205	0,404
Household size = 4	0,160	0,367	0,144	0,351	0,202	0,402
Household size = 5 or more	0,060	0,238	0,062	0,241	0,056	0,229
Presence of minors	0,238	0,426	0,214	0,410	0,302	0,459
Observations	7.421		5.444		1.977	

Summary Statistics Distribution III

Variable	Total sample		Financially illiterate		Financially literate	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
Work intensity < 0.5	0,071	0,257	0,076	0,266	0,058	0,233
Work intensity = 0.5	0,173	0,378	0,177	0,381	0,164	0,370
0.5 < Work intensity < 1	0,102	0,302	0,097	0,296	0,114	0,318
Work intensity = 1	0,654	0,476	0,650	0,477	0,664	0,472
Nort-East	0,279	0,448	0,274	0,446	0,290	0,454
North-West	0,196	0,397	0,181	0,385	0,235	0,424
Middle	0,205	0,404	0,185	0,388	0,258	0,438
South	0,244	0,430	0,284	0,451	0,141	0,348
Islands	0,076	0,265	0,076	0,266	0,076	0,264
Observations	7.421		5.444		1.977	

Summary Statistics Distribution IV

Variable	Total sample		Financially illiterate		Financially literate	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
Numeracy correct	0.501	0.500	0.309	0.462	1	0
Inflation correct	0.614	0.487	0.466	0.498	1	0
Risk Diversification correct	0.516	0.499	0.330	0.470	1	0
No DK	0.711	0.453	0.600	0.489	1	0
One DK	0.117	0.321	0.162	0.368	0	0
Two DK	0.166	0.372	0.230	0.420	0	0
All Big Three DK	0.005	0.072	0.007	0.084	0	0
Numeracy DK	0.200	0.400	0.276	0.447	0	0
Inflation DK	0.233	0.423	0.322	0.467	0	0
Risk Diversification DK	0.032	0.176	0.044	0.206	0	0
Observations	7.421		5.444		1.977	

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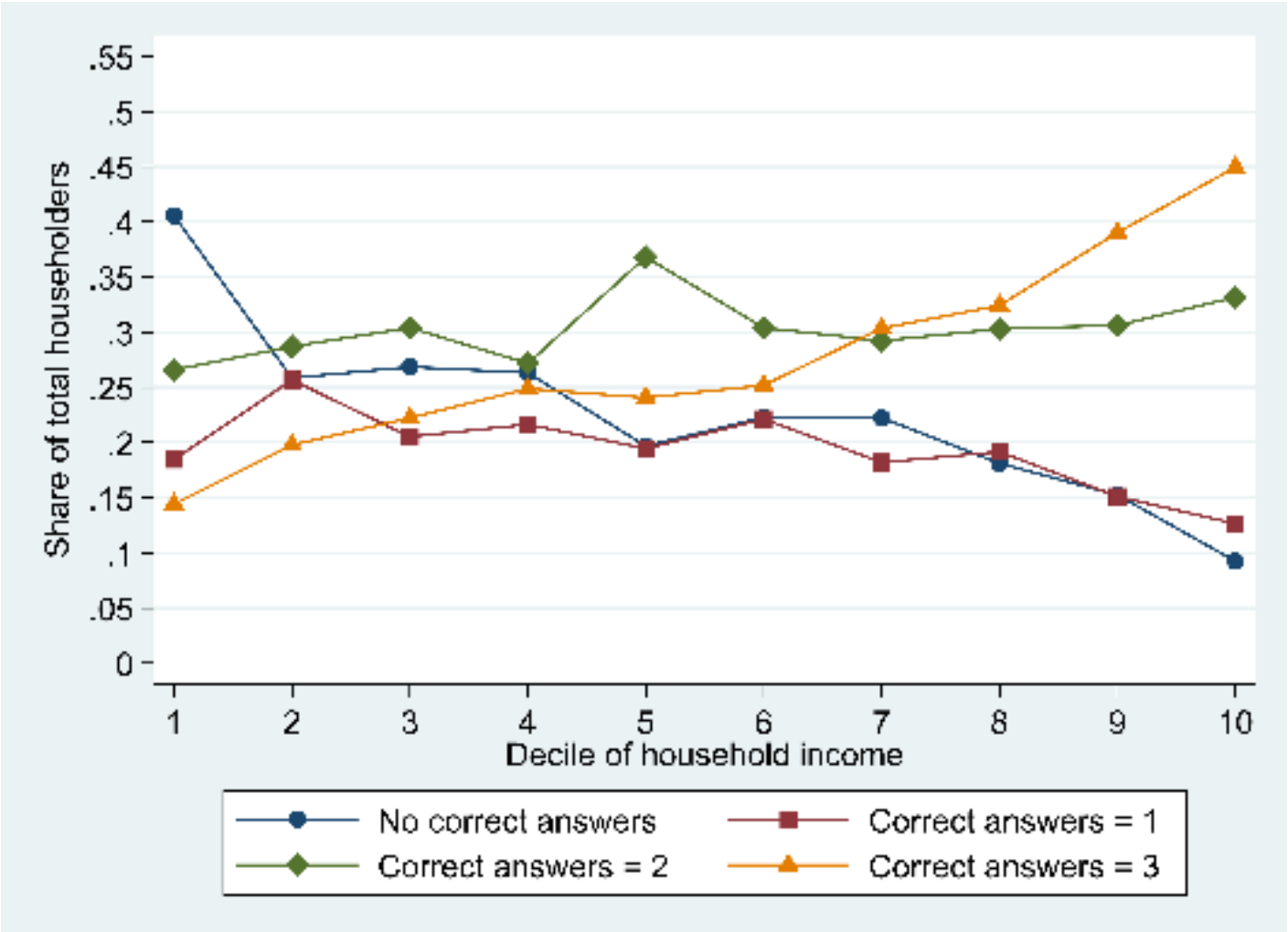
Descriptive statistics - FL and household wealth



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Effects on alternative inequality indexes

VARIABLES	Household income			Household wealth		
	Gini index	Mean log deviation	Atkinson index (e=1)	Gini index	Mean log deviation	Atkinson index (e=1)
Effects in absolute terms						
Correct answers = 1	-0.023*	-0.093	-0.071	-0.027**	-0.584***	-0.117***
Correct answers = 2	-0.028***	-0.116	-0.088	-0.010	-0.514***	-0.103***
Correct answers = 3	-0.003	-0.056	-0.043	-0.014	-0.515***	-0.103***
Effects in relative terms						
Correct answers = 1	-0.071*	-0.338	-0.293	-0.044**	-0.362***	-0.146***
Correct answers = 2	-0.087***	-0.418	-0.363	-0.016	-0.319***	-0.128***
Correct answers = 3	-0.011	-0.204	-0.177	-0.022	-0.320***	-0.129***
Observations	7421	7421	7421	7421	7421	7421
R-squared	0.157	0.157	0.157	0.073	0.152	0.152
Sample distributional statistic	0.320	0.277	0.242	0.616	1.610	0.800

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Results by share swap

Share swap	Correct answers = 1	Correct answers = 2	Correct answers = 3
10%	0.001	0.008**	0.015***
20%	0.002	0.016**	0.030***
30%	0.003	0.024**	0.045***
40%	0.004	0.032**	0.060***
50%	0.005	0.040**	0.075***
60%	0.006	0.048**	0.090***
70%	0.007	0.056**	0.105***
80%	0.008	0.064**	0.120***
90%	0.009	0.072**	0.135***
100%	0.010	0.080**	0.150***

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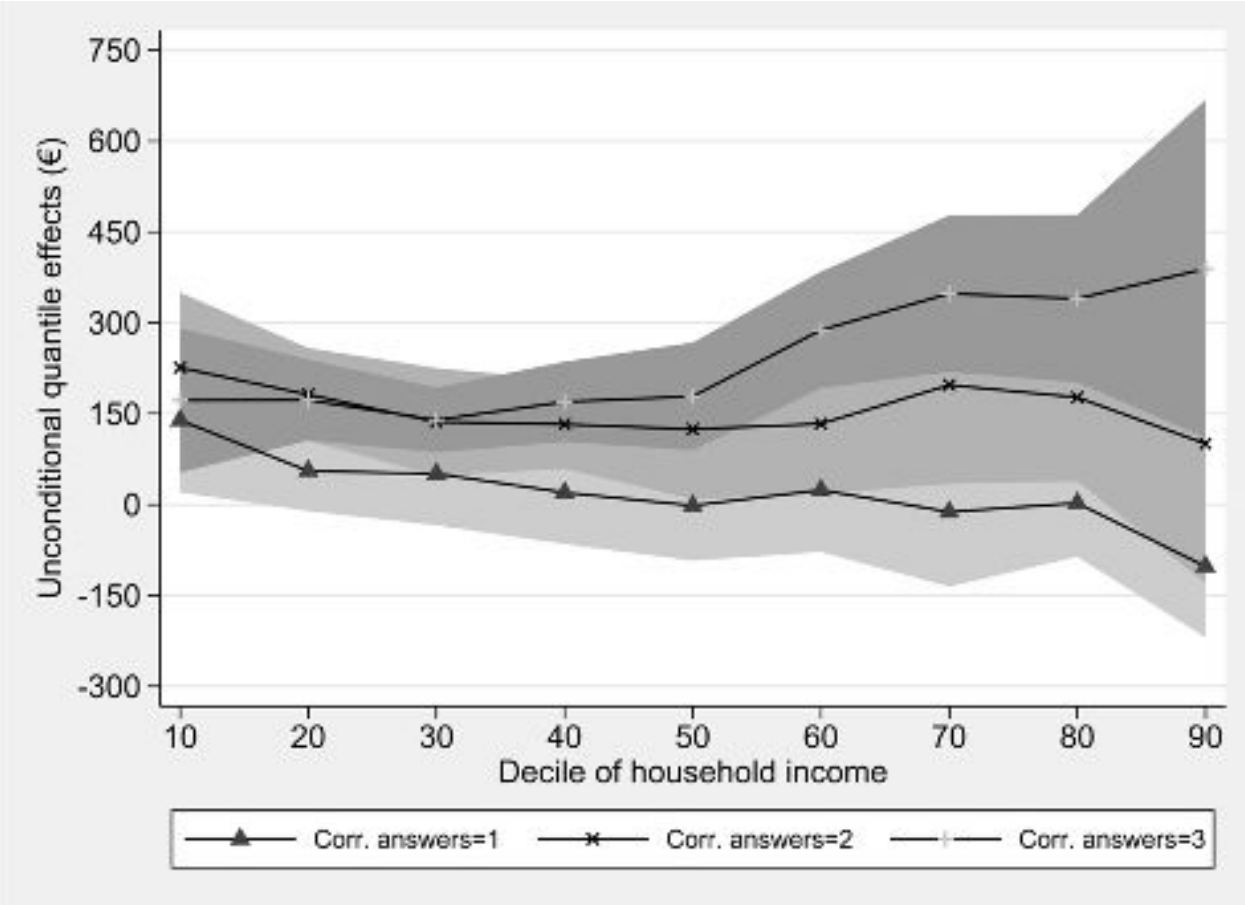
Unconditional effects along the household income distribution (abs. terms)



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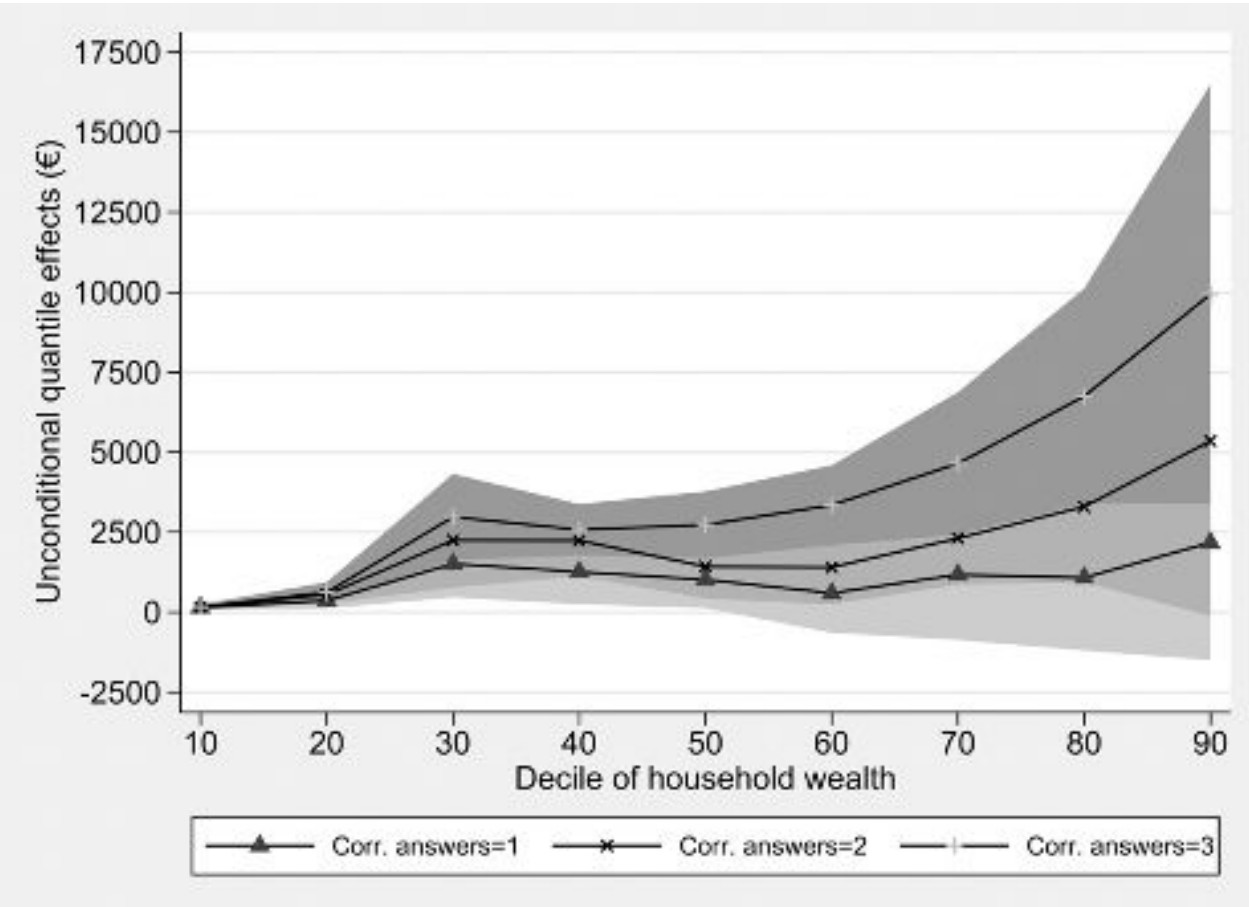
Unconditional effects along the household wealth distribution (abs. terms)



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Heterogeneous effects on household wealth statistics

Type of householder	Mean value			Gini index		
	Correct answers = 1	Correct answers = 2	Correct answers = 3	Correct answers = 1	Correct answers = 2	Correct answers = 3
Total sample	0.008	0.025***	0.039***	-0.004**	-0.002	-0.002
Male	0.014	0.027***	0.051***	-0.005*	-0.002	0.002
Female	0.004	0.026***	0.024**	-0.005**	-0.001	-0.001**
Aged 40 or lower	0.007	0.018**	0.017	-0.007	-0.003	-0.002
Aged 41-50	-0.000	0.021	0.026**	0.003	0.002	-0.001*
Aged 51-60	0.005	0.014	0.027**	-0.003	-0.001	-0.006
Aged 61-70	0.015	0.021***	0.037**	-0.013**	-0.007	-0.011
Aged 71 or more	0.008	0.033*	0.081***	-0.004	-0.004	0.014*
Primary education or lower	0.008	0.026**	0.052**	-0.003	0.001	-0.002
Lower secondary education	0.012*	0.010	0.028***	-0.004	-0.008*	-0.004
Upper secondary education	0.003	0.030**	0.031***	-0.008*	-0.002	-0.007
Tertiary education	0.081***	0.120***	0.145***	-0.001	0.018	0.026**
Nort-East	0.001	0.024	0.048	-0.003	-0.007	0.003
North-West	0.023	0.042	0.069*	0.001	0.008	-0.003
Middle	0.022***	0.036**	0.041*	-0.002	0.002	0.002
South	0.009	0.021*	0.015*	-0.007*	-0.000	-0.007
Islands	-0.022	-0.011	-0.010	0.003	0.001	0.004

Heterogeneous effects on household wealth statistics II

Type of householder	Mean value			Gini index		
	Correct answers = 1	Correct answers = 2	Correct answers = 3	Correct answers = 1	Correct answers = 2	Correct answers = 3
Total sample	0.008	0.025***	0.039***	-0.004**	-0.002	-0.002
Local	0.009	0.027***	0.040***	-0.004*	-0.001	-0.002
Foreign	0.007**	0.003**	-0.001	-0.001**	-0.008***	-0.003
No minors	0.006	0.027**	0.043***	-0.004*	-0.001	-0.000
Presence of minors	0.014*	0.018	0.028***	-0.008	-0.003	-0.009*
Other household member	0.011	0.022**	0.033***	-0.003	-0.003	-0.006
Breadwinner member	0.006	0.026**	0.040***	-0.006**	-0.001	-0.001
Household size = 1	0.005	0.039***	0.040*	-0.002	0.002	0.001
Household size = 2	0.007	0.030*	0.054***	-0.004	0.004	0.007
Household size = 3	0.005	0.009	0.037***	-0.011*	-0.009	-0.010**
Household size = 4	0.013	0.020	0.022*	-0.005	-0.003	-0.001**
Household size = 5 or more	0.017	0.007	0.052**	-0.009	-0.022***	-0.027***

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