

# Exploring differences in financial literacy across countries: the role of individual characteristics, experience, and institutions

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Rising importance of financial literacy for consumers from several reasons:

- Rising capital-to-income ratios – more to invest...
- Challenged PAYG public pensions – rising importance of the private pension schemes...
- Digitalization of the banking/financial industry...

Households (will) face more direct and more risky products

Do they possess enough financial literacy to deal with such developments and how prepared are they across countries?

## Motivation (cont'd)

Numerous studies analyzing impact of financial literacy on behaviors (see Fernandes et al., 2014 *Manag. Scie.*; Lusardi and Mitchell, 2014 *J. Econ. Lit.* for overview)

Some comparative (descriptive) studies on differences in financial literacy across countries

- Standard & Poor's survey (2014)
- OECD's survey on adults' financial literacy (e.g. Atkinson and Messy, 2012)
- Comparisons based on unharmonized data (e.g. Lusardi and Mitchell, 2011)
- An exception is a study by Jappelli (2010 *Econ. J.*) analyzing macroeconomic determinants of econ. literacy

Remaining gap in the literature...

## Our contribution...

- We reveal (potential) drivers of the financial literacy gaps across countries by utilizing novel dataset from the OECD/INFE
- We are the first study to employ counterfactual decomposition techniques to study differences in financial literacy across countries

## Main results...

- Financial literacy gaps can be substantial, e.g. Finland vs. Croatia or Russia
- Differences in individual characteristics and experience with finance cannot fully explain the observed gaps
- Larger part of the gaps (in some cases) is due to different economic environments

## 1 Data

- Variables

## 2 Empirical strategy

- Determinants of financial literacy
- Decomposition analysis
- Unexplained differences vs. institutions

## 3 Results

- Determinants of financial literacy
- Decomposition analysis
- Unexplained differences vs. institutions

## 4 Summary

- Representative microdata from the OECD/INFE (International Network for Financial Education) survey [◀ OECD results](#)
- Our sample – 12 countries over the world covering 15K individuals
- Information on financial knowledge, behaviors and attitudes of individuals + standard demographic characteristics
- The data contains more detailed financial literacy questions than previously used in surveys (Lusardi and Mitchell, 2014)
- Comparability across countries – large degree of harmonization ensured

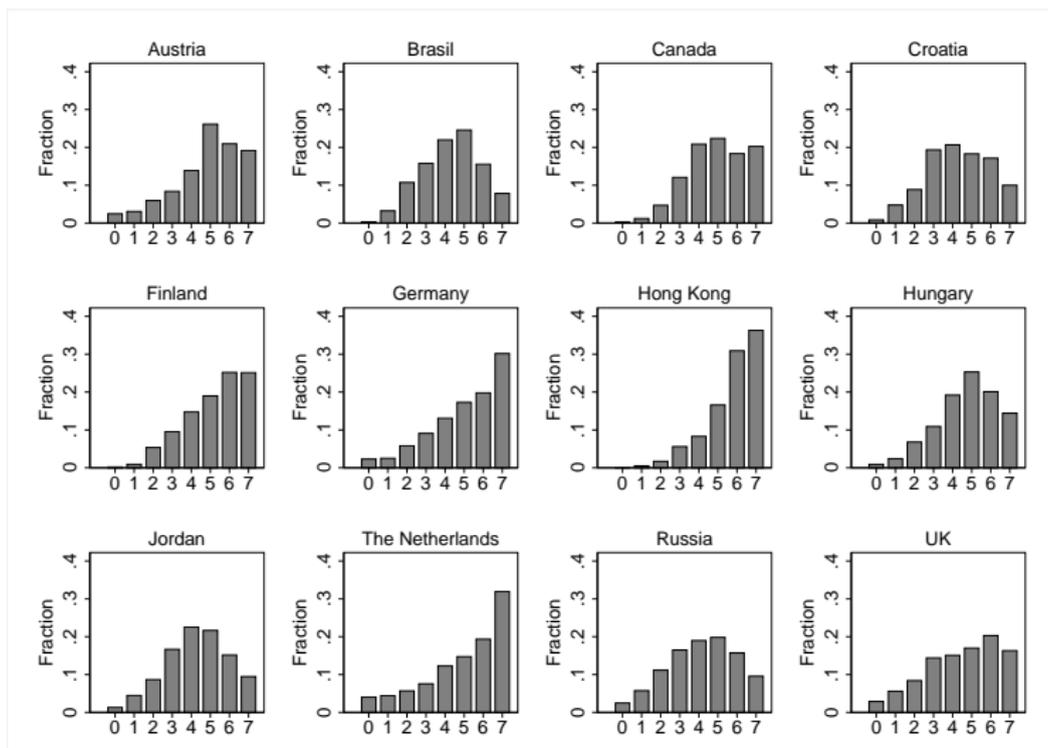
## Dependent variable

- Financial literacy score created similarly to the extant literature (Lusardi and Mitchell, 2014)
- Sum of binary variables taking value 1 if the  $j$ -th FL question ( $Q$ ) answered correctly:

$$FL = \sum_{j=0}^7 Q_j$$

- Questions cover the following topics: time value of money, interest paid on loan, interest and principal, compound interest, risk and return, inflation, and risk diversification
- Both multiple-choice and open-ended questions

## Distribution of financial literacy score across countries



# Variables (cont'd)

## Explanatory variables

Variable	Description
<i>Individual (basic) characteristics</i>	
Income buffer	Dummy variable: 1 if an individual has a financial buffer for at least three months in the case he/she loses his/her job (a proxy for wellbeing)
Gender	Dummy variable: 1 if female and 0 otherwise
Single	Dummy variable: 1 if an individual lives in a single-member household and 0 otherwise
University education	Dummy variable: 1 if university education is the highest attained one and 0 otherwise
Age category (18-29)	Dummy variable: 1 if an individual aged from 18 to 29 and 0 otherwise
Age category (30-49)	Dummy variable: 1 if an individual aged from 30 to 49 and 0 otherwise
Age category (50-69)	Dummy variable: 1 if an individual aged from 50 to 69 and 0 otherwise
Age category (70+)	Dummy variable: 1 if an individual aged 70+ and 0 otherwise
Employed	Dummy variable: 1 if paid employment (working for someone else) and 0 otherwise
Self-employed	Dummy variable: 1 if self-employed (working for him/herself) and 0 otherwise
Retired	Dummy variable: 1 if retired and 0 otherwise
Other, not-working	Dummy variable: 1 if unemployed or not-working (e.g. apprentice, looking for work, looking after home, unable to work due to sickness, student) and 0 otherwise
<i>Experience with finance</i>	
Having budget	Dummy variable: 1 if an individual is responsible for budget and has a budget and 0 otherwise
Active saver	Dummy variable: 1 if an individual actively saves in one of the following schemes (cash at home, savings account, informal savings club, investment products) and 0 otherwise
Holding risky financial assets	Dummy variable: 1 if an individual holds shares or bonds in his/her financial portfolio and 0 otherwise
Financial planning	Dummy variable: 1 if an individual sets long-term financial goals and 0 otherwise

- As a preliminary step, we estimate OLS determinants of financial literacy
- Then, we devise a two-step empirical strategy to explain differences in financial literacy across countries by:
  - Decomposing gaps in financial literacy in a counterfactual way
  - Correlating the unexplained part of the gaps with institutional environments

- We estimate determinants of financial literacy by OLS:

$$FL = X\beta' + \gamma I + \varepsilon,$$

where  $FL$  is the financial literacy score,  $X$  contains constant and predictors (both exogenous and endogenous),  $I$  includes country fixed effects, and  $\varepsilon$  is an (i.i.d.) error term

- We estimate OLS with and without country fixed effects

# Decomposition analysis

- In the first-stage, we decompose mean differences in financial literacy score across countries (Blinder, 1973 *IER*; Oaxaca, 1973 *JHR*)
- We decompose gaps to a part that is due to different endowments between considered groups and a part that cannot be explained by such differences
- Based on the linear model, we can write the two-fold decomposition as

$$\Delta \hat{\mu}_{FLc} = \underbrace{(\bar{X}_c - \bar{X}_{c=j})' \hat{\beta}_c}_{\text{Endowment effect/explained}} + \underbrace{\bar{X}'_{c=j} (\hat{\beta}_c - \hat{\beta}_{c=j})}_{\text{Coefficient effect/unexplained}},$$

where  $c = AT, BR, CA, HR, \dots, UK$  and the benchmark is Finland,  $j$

## Decomposition beyond mean

- As a sensitivity check, we decompose the distributions in financial literacy between countries using recentered influence function (RIF) regressions along with the B-O technique (Firpo et al., 2007, 2009 *Econometrica*)
- A RIF regression is similar to a standard regression, except that the dependent variable is replaced by the recentered influence function of the statistic of interest
- We run RIF regressions for the 10th, 50th and 90th percentiles

# Unexplained differences vs. institutions

- Inspired by Christelis et al. (2013 *Rev. Econ. Stat.*), we correlate the unexplained parts of the gap  $\bar{X}'_{c=j}(\hat{\beta}_c - \hat{\beta}_{c=j})$  with selected macroeconomic indicators (one-by-one)
- The list of aggregate indicators affecting financial literacy at country-level comes from Jappelli (2010)

Country	GDP per capita (current \$USD)	Internet users (% of the population)	Life expectancy (years)	Enrolment ratio, upper secondary, both sexes (%)	Stock market total value to GDP (%)	Social contributions (% of revenue)
Austria	43,665	83.93	81.84	95.75	7.33	32.33
Brazil	8,757	59.08	74.68	90.97	31.19	31.68
Canada	43,316	88.47	82.14	119.30	77.59	23.70
Croatia	11,580	69.80	77.28	97.66	1.25	35.32
Finland	42,405	92.65	81.39	115.23	56.61	33.67
Germany	41,177	87.59	81.09	106.68	38.25	54.61
Hong Kong	42,351	84.95	84.28	113.22	478.70	N.A.
Hungary	12,366	72.83	75.96	102.67	10.00	30.10
Jordan	4,096	53.40	74.20	77.88	10.73	0.27
Netherlands	44,293	93.10	81.70	124.47	54.45	36.69
Russia	9,329	70.10	70.91	98.77	20.26	21.00
UK	43,930	92.00	81.60	83.20	103.06	21.23

Source: World Bank data, 2014-2015 averages

# Results: determinants of financial literacy

## OLS estimates of determinants of financial literacy

	(1)	(2)	(3)	(4)
Income buffer	0.621*** (0.030)	0.439*** (0.031)	0.473*** (0.033)	0.306*** (0.034)
Gender (female)	-0.429*** (0.029)	-0.452*** (0.028)	-0.387*** (0.030)	-0.419*** (0.029)
Single	-0.078** (0.039)	-0.131*** (0.039)	-0.023 (0.040)	-0.094** (0.040)
University education	0.543*** (0.031)	0.655*** (0.033)	0.452*** (0.032)	0.568*** (0.033)
Age category (18-29)	-0.148** (0.074)	-0.015 (0.074)	-0.236*** (0.077)	-0.056 (0.076)
Age category (30-49)	0.067 (0.070)	0.135* (0.069)	-0.059 (0.073)	0.044 (0.072)
Age category (50-69)	0.247*** (0.061)	0.288*** (0.059)	0.092 (0.063)	0.156** (0.062)
Employed	0.217*** (0.042)	0.239*** (0.041)	0.133*** (0.043)	0.142*** (0.042)
Self-employed	0.088 (0.055)	0.188*** (0.056)	-0.043 (0.055)	0.087 (0.056)
Retired	-0.048 (0.059)	0.023 (0.058)	-0.116* (0.060)	-0.045 (0.060)
Having budget			-0.066** (0.030)	-0.005 (0.031)
Active saver			0.080** (0.033)	0.072** (0.033)
Holding risky financial assets			0.392*** (0.037)	0.293*** (0.038)
Financial planning			0.213*** (0.031)	0.174*** (0.031)
Constant	4.507*** (0.079)	4.878*** (0.089)	4.662*** (0.084)	4.853*** (0.094)
Country fixed effects	No	Yes	No	Yes
Adjusted $R^2$	0.099	0.144	0.107	0.148
Observations	12,298	12,298	10,810	10,810

Note: Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Results: decomposition analysis

## Blinder-Oaxaca decomposition at mean

	AT	BR	CA	HR	DE	HK	HU	JO	NL	RU	UK
<i>Baseline</i>											
I. Differential											
Difference (raw)	0.302*** (0.058)	0.759*** (0.061)	0.292*** (0.061)	0.899*** (0.067)	0.023 (0.067)	-0.509*** (0.058)	0.506*** (0.065)	0.787*** (0.064)	-0.040 (0.069)	0.839*** (0.068)	0.667*** (0.068)
Difference (%)	5.9%	15.5%	5.7%	18.6%	0.5%	-9.2%	10.1%	16.1%	-0.7%	17.3%	13.5
II. Decomposition											
Explained	0.179*** (0.032)	0.115** (0.048)	-0.207*** (0.037)	0.161*** (0.035)	-0.036 (0.035)	-0.066 (0.046)	0.175*** (0.042)	-0.289*** (0.066)	-0.167*** (0.050)	0.094** (0.048)	-0.091*** (0.033)
Unexplained	0.123* (0.068)	0.644*** (0.080)	0.499*** (0.069)	0.738*** (0.078)	0.059 (0.075)	-0.443*** (0.074)	0.331*** (0.080)	1.076*** (0.091)	0.127 (0.084)	0.745*** (0.085)	0.758*** (0.075)
<i>Baseline + Experience</i>											
I. Differential											
Difference (raw)	0.036 (0.058)	0.772*** (0.061)	0.010 (0.063)	0.737*** (0.069)	-0.191*** (0.067)	-0.496*** (0.057)	0.289*** (0.069)	0.679*** (0.064)	-0.027 (0.068)	0.846*** (0.067)	0.367*** (0.071)
Difference (%)	0.7%	15.8%	0.2%	15.0%	-3.6%	-9.0%	5.6%	13.7%	-0.5%	17.4%	7.2%
II. Decomposition											
Explained	0.123*** (0.047)	0.246*** (0.057)	-0.365*** (0.046)	0.134*** (0.044)	-0.131*** (0.047)	-0.141*** (0.049)	0.278*** (0.057)	-0.264*** (0.067)	-0.145** (0.061)	0.191*** (0.054)	-0.203*** (0.047)
Unexplained	-0.087 (0.076)	0.525*** (0.086)	0.375*** (0.073)	0.604*** (0.083)	-0.060 (0.080)	-0.355*** (0.073)	0.011 (0.092)	0.943*** (0.092)	0.117 (0.090)	0.655*** (0.089)	0.569*** (0.082)

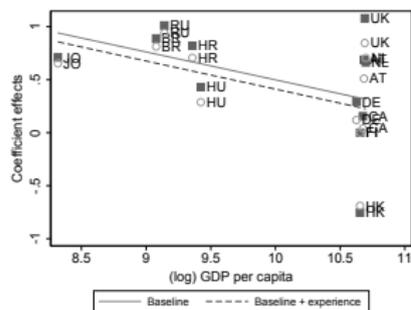
Note: Finland is benchmark. Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Results: unexplained differences vs. institutions

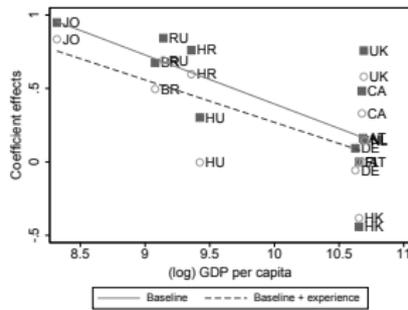
Similarly to Bover et al. (2016), we present results of this stage in graphical form

GDP per capita

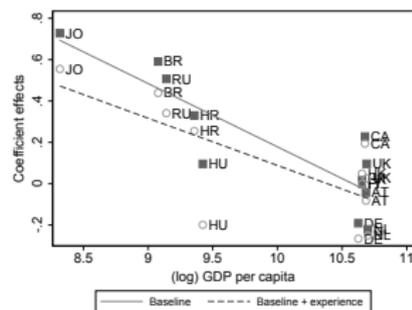
10th percentile



Mean



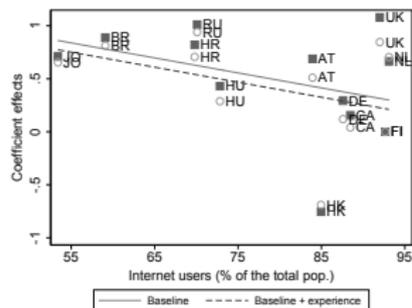
90th percentile



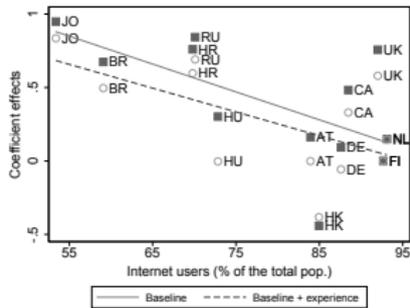
# Results: unexplained differences vs. institutions (cont'd)

## Internet usage

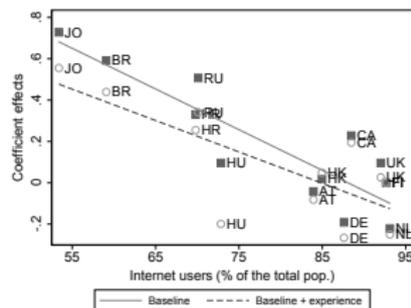
### 10th percentile



### Mean



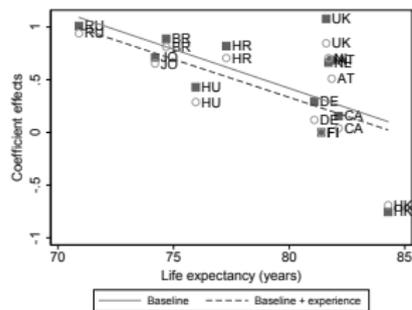
### 90th percentile



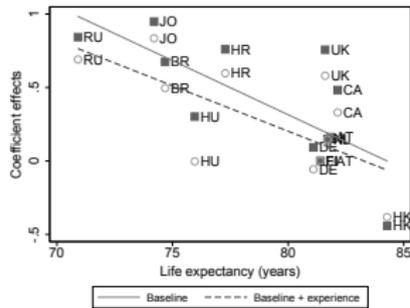
# Results: unexplained differences vs. institutions (cont'd)

## Life expectancy

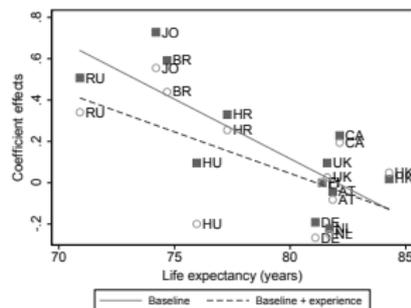
### 10th percentile



### Mean



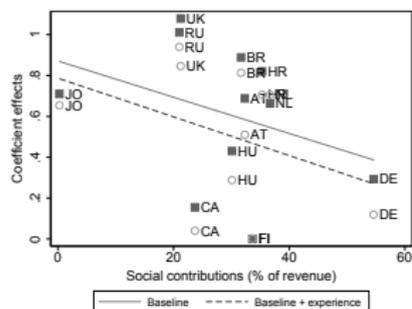
### 90th percentile



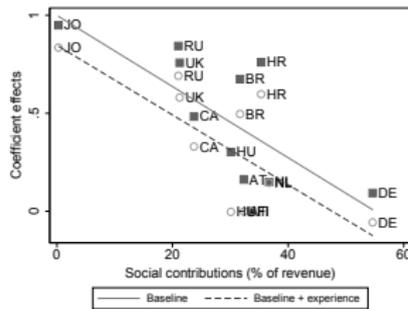
# Results: unexplained differences vs. institutions (cont'd)

## Welfare state

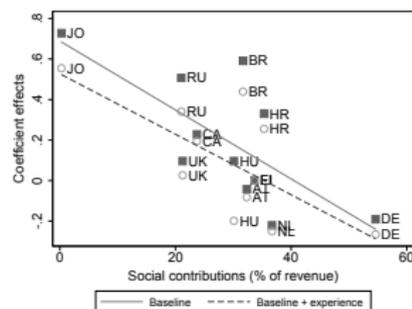
### 10th percentile



### Mean



### 90th percentile



# Results: unexplained differences vs. institutions (cont'd)

## Which institutions matter the most?

Indicator	10th percentile		Mean		90th percentile	
	Standardized effect	Rank	Standardized effect	Rank	Standardized effect	Rank
<i>Baseline</i>						
GDP per capita	-0.222	4	-0.289**	5	-0.288***	4
Gross enrolment ratio	-0.292*	3	-0.293***	4	-0.233**	5
Internet users	-0.200	5	-0.297***	3	-0.338***	2
Life expectancy	-0.489*	1	-0.514**	1	-0.440**	1
Social contributions rate	-0.121*	6	-0.301***	2	-0.307***	3
Stock market capitalization	-0.368***	2	-0.247***	6	-0.078	6
<i>Baseline + Experience</i>						
GDP per capita	-0.217*	4	-0.253**	4	-0.237**	4
Gross enrolment ratio	-0.243*	3	-0.242***	5	-0.189*	5
Internet users	-0.196	5	-0.264*	3	-0.289***	2
Life expectancy	-0.474**	1	-0.452**	1	-0.360**	1
Social contributions rate	-0.123*	6	-0.288***	2	-0.279***	3
Stock market capitalization	-0.326***	2	-0.184***	6	-0.036	6

Note: Country-level regressions of the unexplained parts of the gap estimated from the mean and quantile decomposition analyses on a set of aggregate indicators which have been standardised (i.e. values demeaned and divided by their standard deviations). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

- The gaps in financial literacy can be substantial across countries
- Differences in financial literacy cannot be fully explained by varying individuals characteristics and experience with finance
- Larger part of the gaps (in some cases) is due to different economic environments
- There is a potential space for harmonization of environments with regards to decrease inequality in financial literacy
- Our results inform policy how to enhance financial literacy in an efficient way

Thank you for your attention!

## OECD (2016) results – all participating countries

