Trust in Official Statistics across Europe:

Evidence from two waves of the Eurobarometer using Multilevel Models

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Agenda

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What is Trust in Statistics?

Trust is a complex phenomena:

- OECD manual defines trust as: *"a person's belief that another person or institution will act consistently with their expectations of positive behavior*

- Three types of trust: generalized, particularized and institutional.

- Trust in Statistics as part of **Institutional Trust**.

- Trust in Official Statistics, i.e. trust in numbers and the institution producing. (*European Statistics Code of Practice*)

- The issue of trust in statistics arises when looking *to **the demand side**,* to actual and potential users of statistics, which may have different perception and knowledge with respect to statistical information.

EUROPEAN STATISTICS CODE OF PRACTICE

For the National Statistical Authorities and Eurostat (EU statistical authority)

Adopted by the
European Statistical System Committee

16th November 2017

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Cognitive Barriers for Trust in Statistics

Different reasons for dis-trusting statistics:

1. Quetelet's "*average man*" representation of the society.

2. Statistics as a branch of mathematics: **understanding the numbers is hard.**

3. Thinking statistically requires **often System 2 of our brain** (Kahneman).

4. Political, cultural and ideological partisanship

5. **Theodore Porter (1996) in his book « Trust in Numbers » says that the history of official statistics is related to the history of objectivity in science.**

6. **High illiteracy and numeracy knowledge. OECD reports that according to their survey (2013), around 22.7% of the population of OECD report difficulties in numeracy skills.**

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SYSTEM 1

Intuition & instinct

95%

Unconscious
Fast
Associative
Automatic pilot

e: Daniel Kahneman

SYSTEM 2

Rational thinking

5%

Takes effort
Slow
Logical
Lazy
Indecisive

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Our study Trust in Statistics in Europe

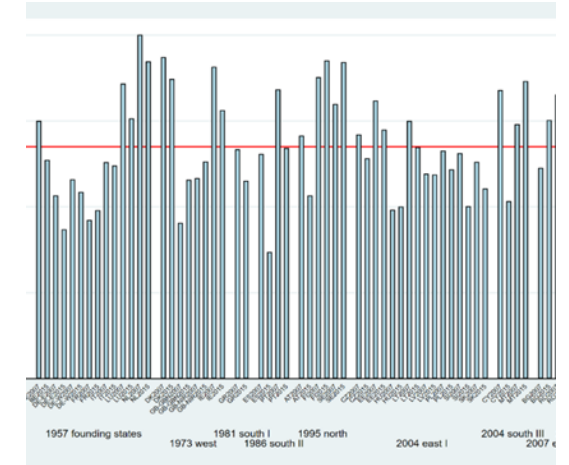**European Survey since 1974**

Trust in Official Statistics
(Eurobarometer 2007)
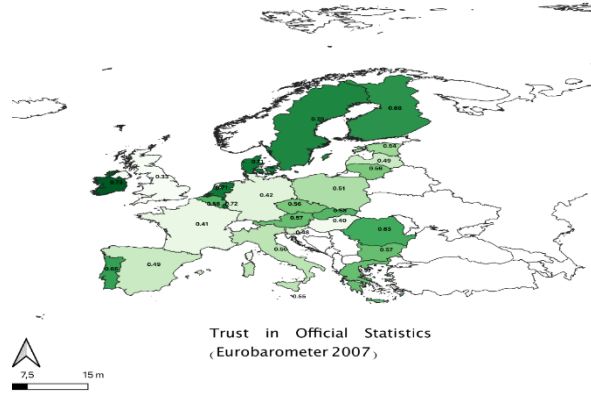
Trust in Statistics Europe 2007

Trust in Official Statistics
(Eurobarometer 2015)
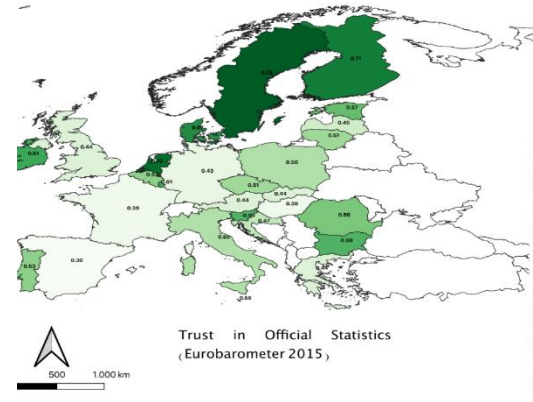
Trust in Statistics Europe 2015


- We are using the data of the Eurobarometer Surveys No. 67.2 and 83.3 conducted in year 2007 and 2015.

- The surveys have been made in all member states of the European Community using the same definition of the target population with standard samples size of 1.000 to 1.500 for great states and 500 respondents for small states.

- **Eurobarometer has introduced also the question relative to individual trust in official statistics. The questions capture a binary outcome where respondents are invited to *reply if they tend or do not tend to have trust in Official Statistics* .**

- **As clearly evidenced, there is a huge heterogeneity among European countries Countries like Sweden, Finland and Luxembourg are shown to be on the top of the classification with percentage of the population (around 70%) declaring to trust official statistics for the year 2007 and 2015.**

- **To get an impression how much the trust in official statistics varies between member states and time points, this plot shows the fraction of national respondents who tend to trust the official national statistics. The horizontal red line represents the grand-mean of the trust in official statistics. Independent of time and nation 54% of the respondents tend to trust official statistics**

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Trust in Statistics in Europe (2007-2015)
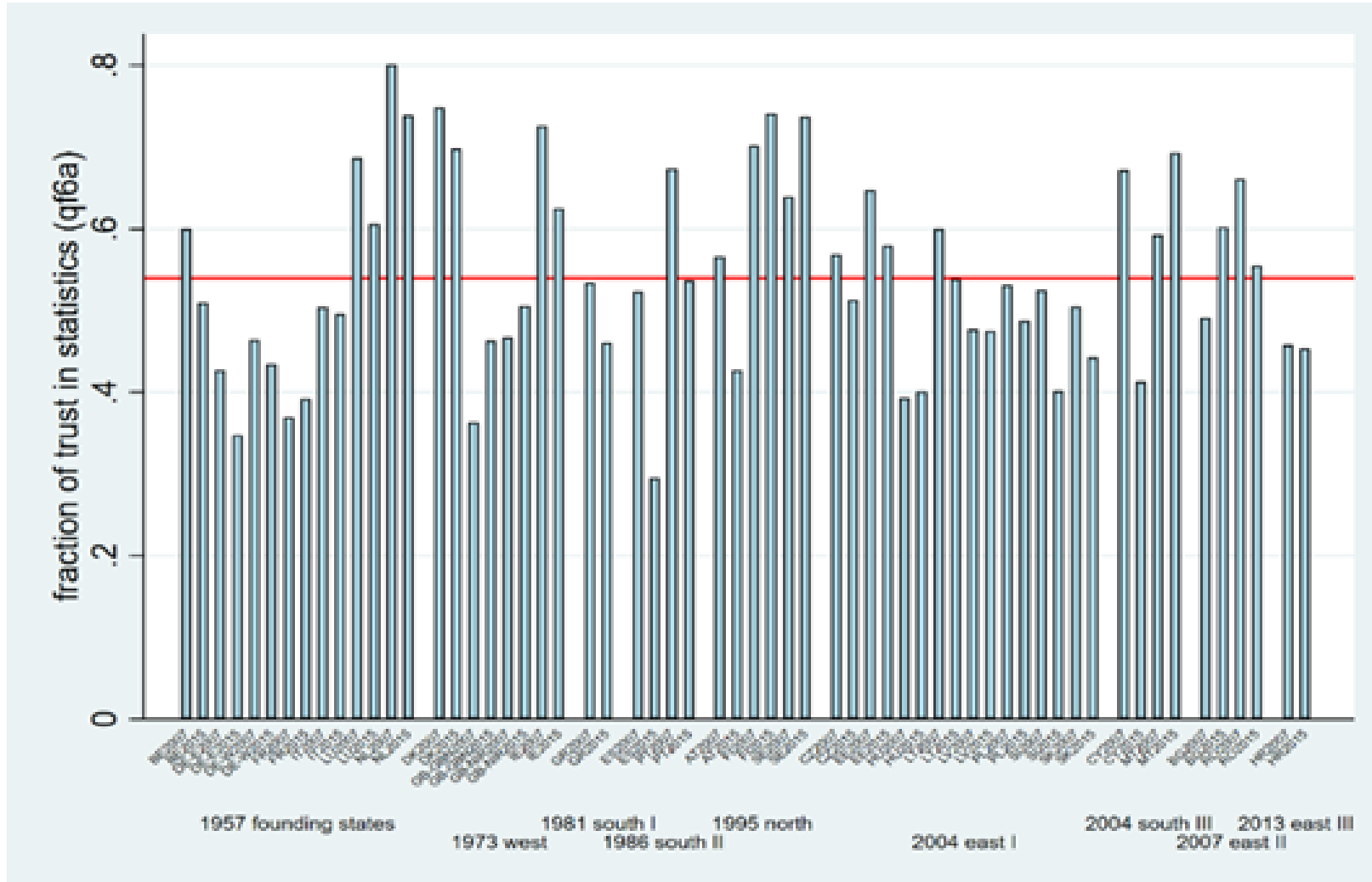
Variables we use for our Empirical Strategy

Table (1): Summary Statistics- (Baseline Level I) Eurobarometer Europe (2007)

	Mean	S.D.	min	p50	max	Count
Trust in Official Statistics (%)	0.56	0.50	0.00	1.00	1.00	22317
Statistical Literacy, sum of correct answers (%)	0.46	0.71	0.00	0.00	3.00	22317
Statistical Literacy, at least one do not answer (%)	0.59	0.49	0.00	1.00	1.00	22317
Let-Right-Political-Orientation	3.54	1.52	1.00	3.00	6.00	22317
Trust in National Government (%)	0.47	0.50	0.00	0.00	1.00	22317
Trust in National Parliament (%)	0.49	0.50	0.00	0.00	1.00	22317
Age-groups (Education)	2.27	0.89	1.00	2.00	5.00	22317
Occupation Scale	4.83	2.17	1.00	4.00	8.00	22317
Male (%)	0.45	0.50	0.00	0.00	1.00	22317
Age-groups (6)	3.72	1.68	1.00	4.00	6.00	22317
Immigrants vs. Natives (%)	0.02	0.14	0.00	0.00	1.00	22317
Type of Community: Village, Small or Large City	1.90	0.79	1.00	2.00	3.00	22317
Ownership: Apartment paid (%)	0.52	0.50	0.00	1.00	1.00	22317
Ownership: Apartment paying (%)	0.25	0.43	0.00	0.00	1.00	22317
Ownership: Internet Connection (%)	0.49	0.50	0.00	0.00	1.00	22317

Note: Average values for all the countries in the panel

Table (2): Summary Statistics- (Baseline Level 1) Eurobarometer Europe (2015)

	Mean	s.d.	min	p50	max	count
Trust in Official Statistics (%)	0.51	0.50	0.00	1.00	1.00	23636
Statistical Literacy, sum of correct answers (%)	0.35	0.55	0.00	0.00	3.00	23636
Statistical Literacy, at least one do not know answer (%)	0.37	0.48	0.00	0.00	1.00	23636
Let-Right-Political-Orientation (%)	3.45	1.50	1.00	3.00	6.00	23636
Trust in National Government (%)	0.36	0.48	0.00	0.00	1.00	23636
Trust in National Parliament (%)	0.35	0.48	0.00	0.00	1.00	23636
Age-groups Education	2.35	0.84	1.00	2.00	5.00	23636
Occupation Scale	4.85	2.17	1.00	5.00	8.00	23636
Male (%)	0.46	0.50	0.00	0.00	1.00	23636
Age-groups (6)	3.94	1.66	1.00	4.00	6.00	23636
Immigrants vs. Natives (%)	0.02	0.15	0.00	0.00	1.00	23636
Type of Community: Village, Small or Large City	1.97	0.76	1.00	2.00	3.00	23636
Ownership: Apartment paid (%)	0.50	0.50	0.00	1.00	1.00	23636
Ownership: Apartment paying (%)	0.26	0.44	0.00	0.00	1.00	23636
Ownership: Internet Connection (%)	0.74	0.44	0.00	1.00	1.00	23636

Note: Average values for all the countries in the panel

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Multilevel Modelling Equation

$$Logit\ P(=1) = \beta_{0j} + \beta_{ij}X_{ij} + \beta_j Z_j + u_{0j} + \epsilon_{ij}$$

where:

$Trust_{ij}$ = dummy outcome of trust for individual i that resides in country j
$\underline{0 = tend\ to\ not\ trust\ official\ stats\ and\ 1 = tend\ to\ trust\ official\ stats}$
β_{0j} = Expected logit of reference group at the grand mean of exogenous macro variables reference context for level 1 and level 2.
β_{ij} = Logit slope of exogenous level 1-variables (X_ij)
X_{ij} = individual charateristics i for each country j (Level 1)
β_j = Logit slope of exogenous level 2 − variables (Z)
Z_j = Exogenous Level 2 variables
u_{0j} = Country-specific random-effect of the intercept
ϵ_{ij} = Level 1 − $\dfrac{Residual}{prediction}$ error, assume mean of zero
and variance of pi^2/3

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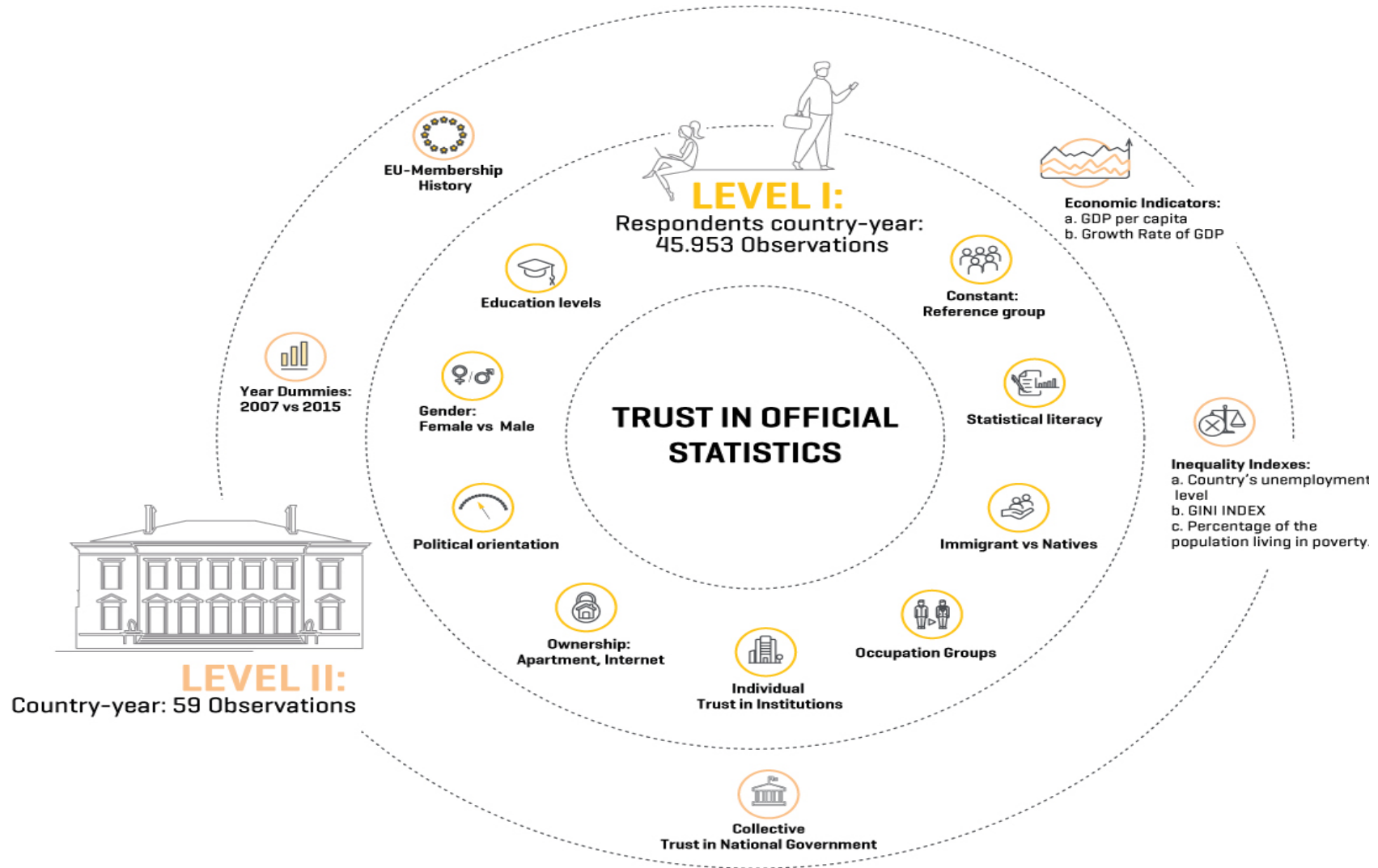
Figure 3: Multilevel Modelling to explain variation for Trust in Official Statistics in Europe

Main Results Level 1

Signifiant Results

The respondent's trust in the democratic institutions both at the National Government and Parliament has a very high and significant effect on trust in official statistics.

Statistical Literacy, higher education and age positive effect on trust in statistics.

No gender effect. Political orientation does not matter.

Living in rural or urban also is not significant for trust in Statistics.
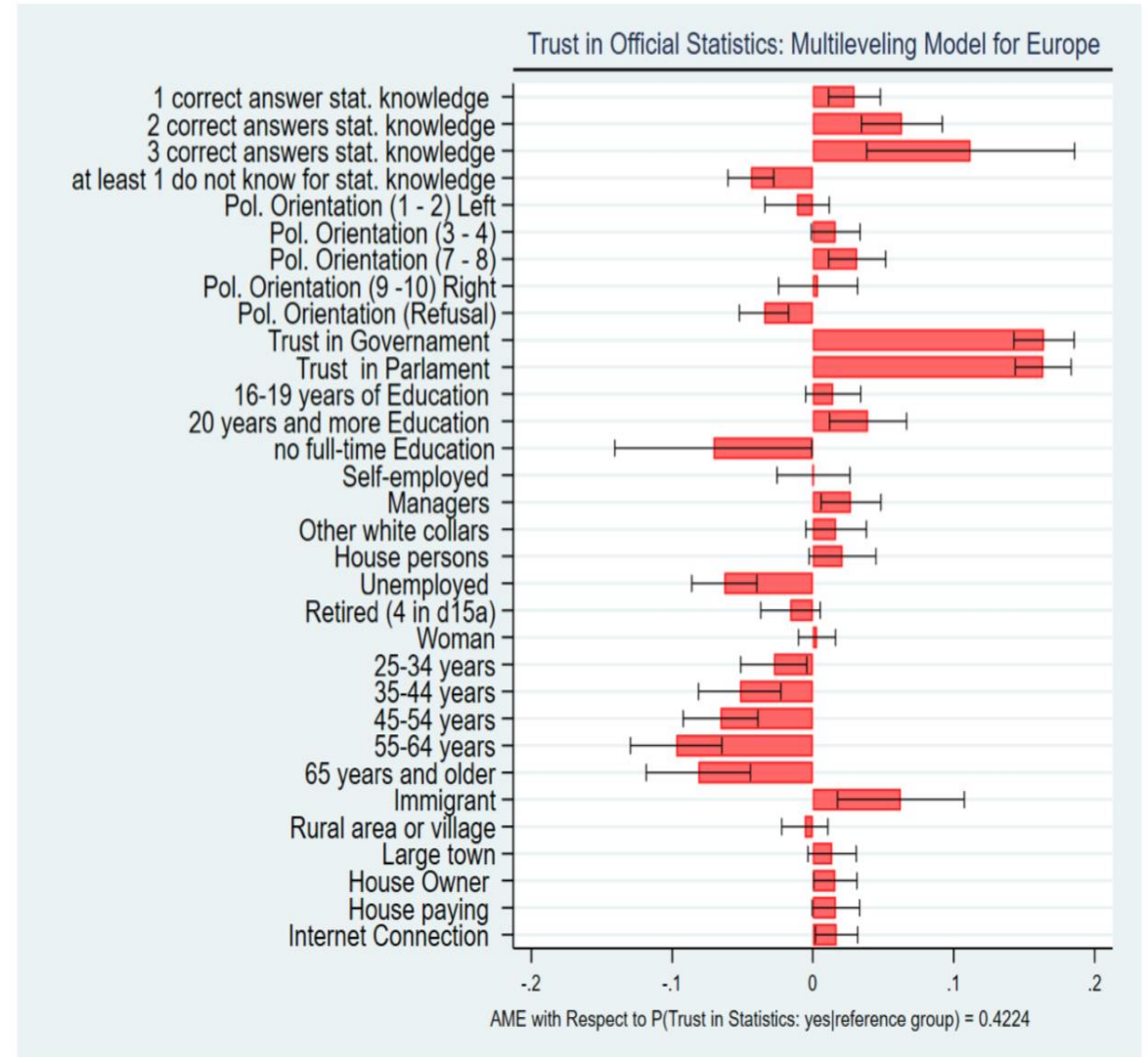
Figure 3: Trust of Official Statistics: **Multilevel** Model for Europe

*McKelvey&Zavoina Pseudo R2 (fixed & random effects) = 0.1860

*McFadden Pseudo R2 (fixed & random effects) = 0.1109

*LR-chi2 test statistics (34) = 7030.73 Prob.> chi2=0.0000

Main Results Level 2

- Our exogenous level-2 variables should explain the variation of the trust in official statistics between the EU member states.

- Looking at the national wealth indicators shows that **neither the gross domestic product per capita nor the growth rate of the GDP** in comparison to previous year have a statistical significant impact on trust in statistics.

- Even the two indicators of **social inequality – the unemployment rate and the poverty rate have no significant effect on trust in statistics**.

- In contrast to these findings, **the EU-membership history has a strong impact on the variation of trust in statistics between the EU-member state**s.

- In comparison to the average founder state of 1957, the trust level increases significantly on the average by **+10.3 percent for the eastern members of 2004, by +9.0 percent for Malta and Cyprus joining in the same yea**r, by +22,0 percent for Bulgaria and Rumania becoming member in 2007 and by 13,4 percent for Croatia entering 2013 the European Union
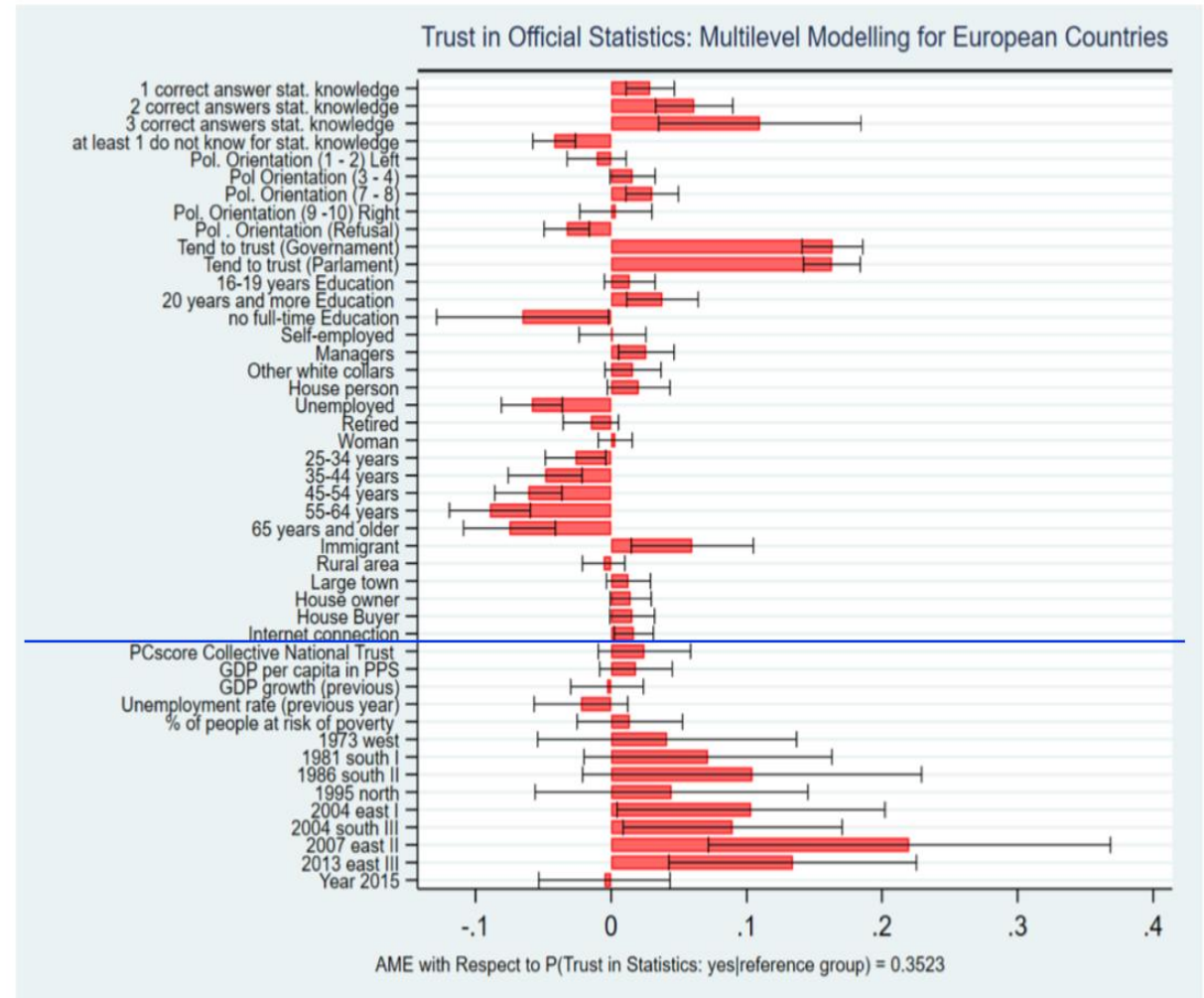

Figure 4: Trust in Official Statistics: Multilevel Model for European Countries

*McKelvey & Zavoina Pseudo R2 (fixed & random effects) = 0.1859
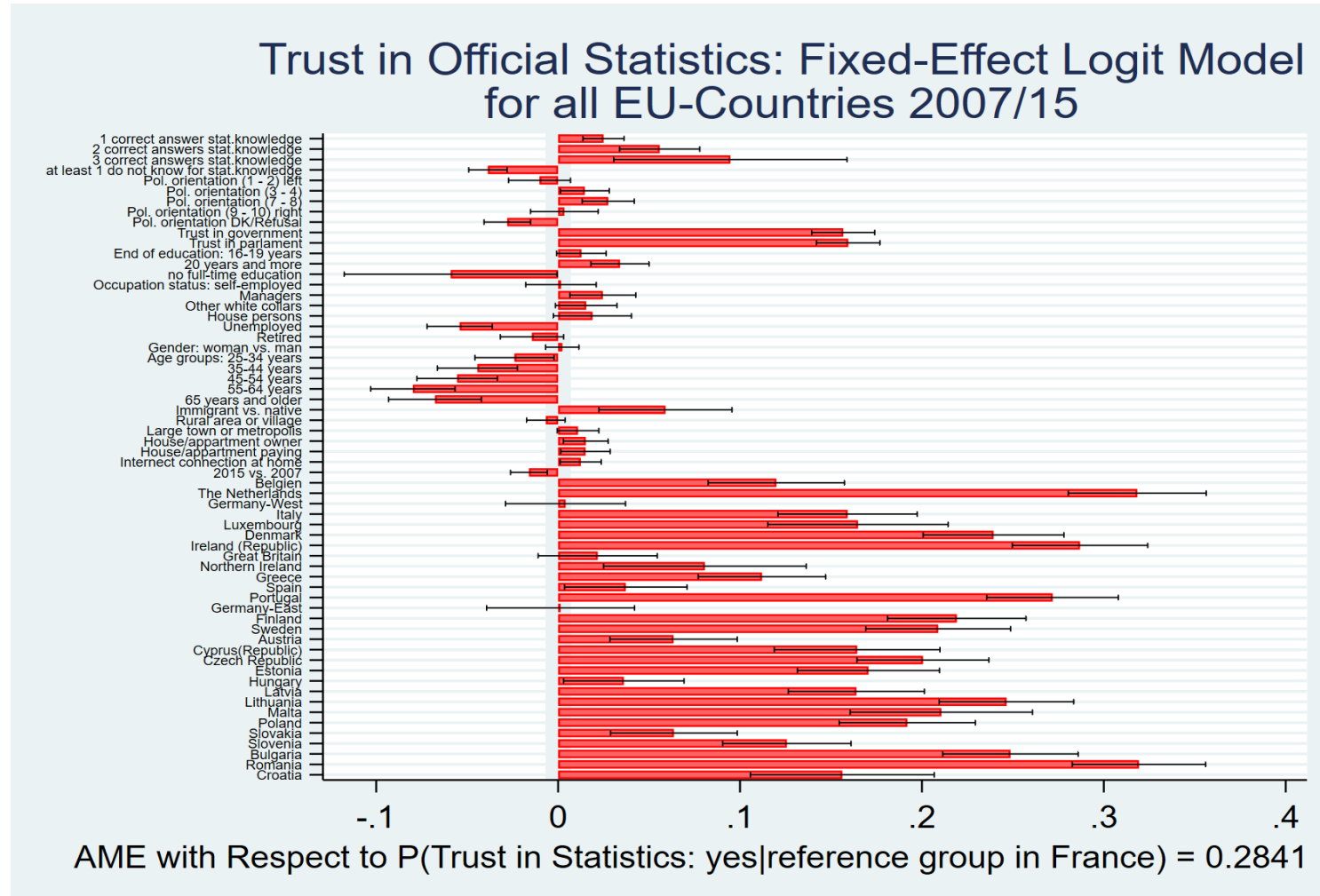* McFadden Pseudo R2 (fixed & random effects) = 0.1112
* LR-chi2 test: H0: all fixed & random effects are zero in the population
LR-chi2 test statistic (48) = 7050.56   Prob. > chi2 = 0.0000
*Bryk & Raudenbush Level 2-PRE-R2=0.2943

Robustness Analysis-Using Country Fixed Effects Modelling

Trust in Official Statistics: Fixed-Effect Logit Model for all EU-Countries 2007/15

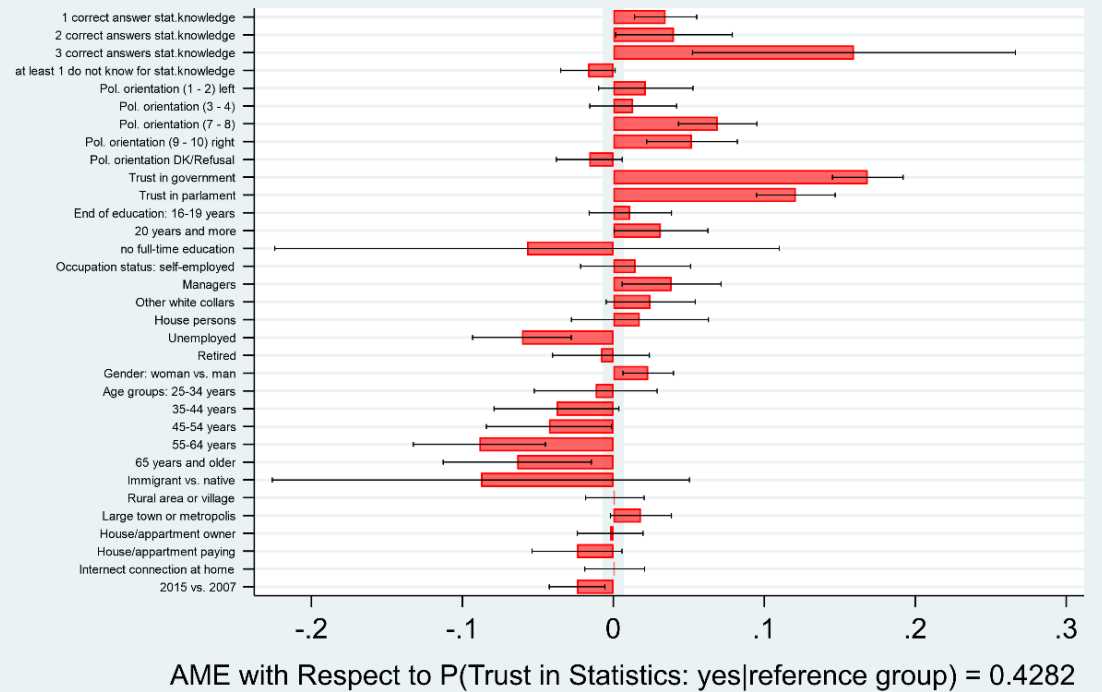AME with Respect to P(Trust in Statistics: yes|reference group in France) = 0.2841

Heterogeneity Analysis- East Vs West Europe

Trust in Official Statistics: Fixed-Effect Logit Model for Western EU-countries 2007/15
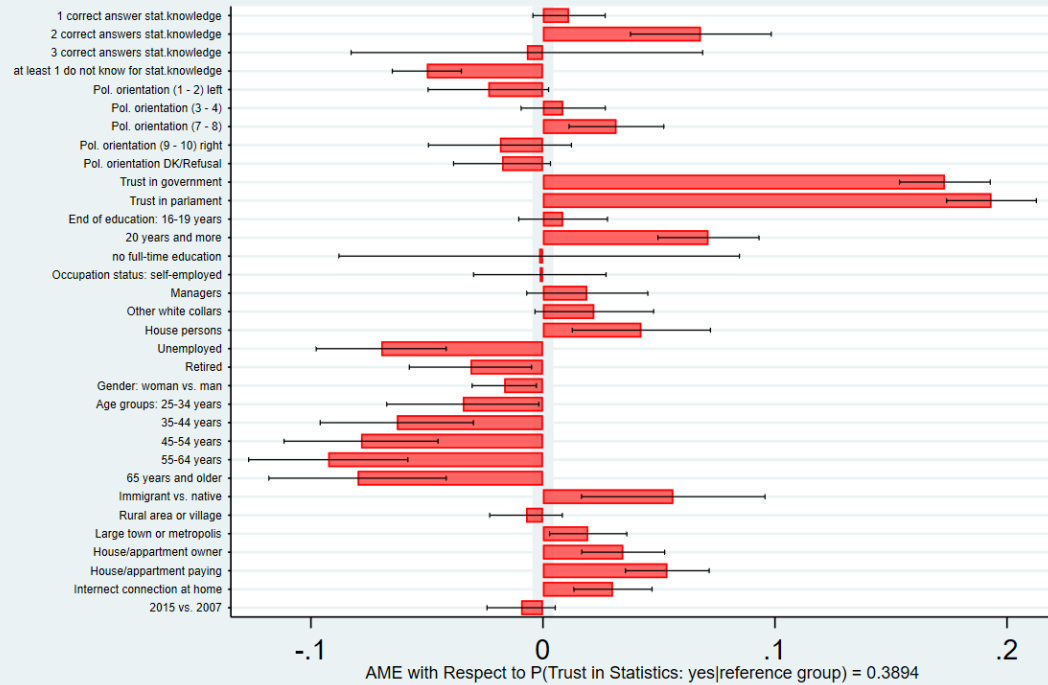
Trust in Official Statistics: Fixed-Effect Logit Model for Eastern EU-Countries 2007/15

Conclusions

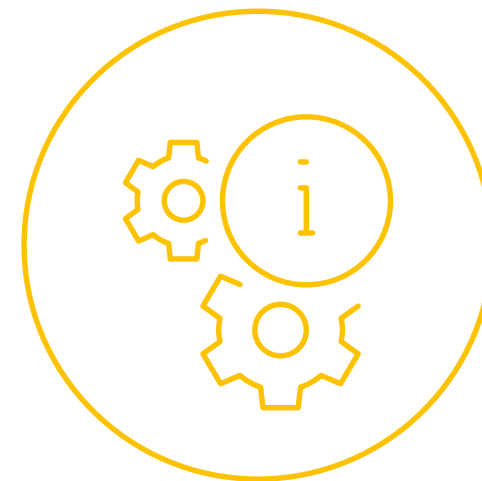|	
1	We empirically explored factors of Trust in Official Statistics affected by individual and country characteristics in Europe
2	We find that at Level 1 (individual), education and statistical literacy are crucial for increasing trust in statistics. Trust in national government and parliament increases trust in statistics.
3	At level 2 (country), we find that neither the level of GDP nor inequality explain cross-country variation.
4	Our Interpretation is that the "acquis communautaire" and the European statistical system has given a boost for trust in Statistics .

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Way forward

1	New Eurobarometer poll on trust in official statistics and science at national and European level.
2	New approach inspired by OECD "Trust Lab" (using experimental survey design)
3	Harmonized national "user surveys" on official statistics (European Code of Conduct) with question on trust
4	Research projects on "trust in official statistics"

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**Thank you,
Questions**