Subjective Income Poverty and Equivalence Scales: Eastern vs Western European countries

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Motivation

- EU – at-risk-of-poverty rate
  - 60% of median equivalised income
  - OECD-modified equivalence scale (1; 0.5; 0.3)
  - Used since the late 1990s

* Cross-country comparisons: a single equivalence scale for all countries or single methodology to estimate equivalence scales, possibly differing across countries(Hagenaars et al., 1994)?

- Economies of scale can be strongly country-specific, depending on the national structure of living costs, consumption of durable and non-durable goods, and goods with different economies of scale in general

Motivation

- Eastern European (EE – "new EU" except CY, MT) countries – adopted the OECD-modified scale when joining the EU

- OECD-modified scale - based on the available research regarding equivalence scales using data from Western European (WE – "old EU") countries and other market oriented OECD countries

- Differences in the structure of household consumption expenditure that inevitably existed in the EE were ignored

- Assumption: economies of scale may differ in EE and WE countries because of the different consumption structures

* Is the equivalence scale from the 1990s suitable nowadays (even for WE contries)?

Formulating hypothesis

- Food – low economies of scale
- Housing – high economies of scale

Table Structure of consumption expenditure by COICOP (%) – regional averages (weighted by country population share)

	2005		2015	
	EE	**WE**	**EE**	**WE**
CP01 **Food** and non-alcoholic beverages	29.0*	12.7*	23.2*	14.0*
CP04 **Housing**, water, electricity, gas and other fuels	25.2	28.2	32.5	32.5

Source: Eurostat database EU-HBS (Mysíková and Želinský, 2019)

Notes: * The means in EE and WE are statistically different at the 5% level (t-test).

- Economies of scale may be lower in EE than in WE (weights of adults and children higher)

Estimating equivalence scale

- Methods:
  - Expert-based scales
  - Demand system derived scales (consumption expenditures)
  - **Subjective equivalence scales**
    - Income evaluation question (Leyden Poverty Line)
    - **Minimum income question (MIQ) (Subjective Poverty Line)**
    - Minimum spending question
    - Income satisfaction
    - Evaluations of material well-being

Literatute review

- Subjective poverty lines are typically higher than the officially used ones → subjective poverty rates higher

- Economies of scale from estimation of subjective poverty lines are typically greater than those in the OECD-modified scale → weights of adults and children in the scale are lower in the subjective approach

- Generally confirmed by our analysis

Data and variables

- EU-SILC 2017
- Collected since 2005, compulsory for all EU members, harmonised by Eurostat → comaparability
- Questions on HH and individual (16+) levels
- MIQ: *"In your opinion, what is the very lowest net monthly income that your household would have to have in order to make ends meet, that is to pay its usual necessary expenses? Please answer in relation to the present circumstances of your household, and what you consider to be usual necessary expenses (to make ends meet)."*

Data and variables

OLS regression

- Dependent variable – minimum income **ln(Z)**
- Key explanatory variables
  - actual income **ln(Y)** (monthly net in Euros)
  - Household size:
  - **a) Adults – 3 dummies:**
    - 2-adult HH
    - 3-adult HH
    - 4+ -adult HH
    - (ref. 1-adult HH)
  - **b) Children – 2 dummies:**
    - 1 child
    - 2+ children
    - (ref. childless HH)

Aim to estimate separately the weights of adults and children in order to compare to the OECD-modified scale

Data and variables

Control variables:

- Derived from individual characteristics – as shares within adult household members (contrary to household head, reference person etc.)
  - Share of currently working members, females, members with tertiary education (defined by ISCED codes 5-6), and younger members aged 16-30

- Household level
  - Type of ownership of the dwelling, size of the flat/house, degree of urbanization of the place of residence
  - Assessments of the economic situation of households – ability to make ends meet (6-point scale), severe material deprivation (binary)

Methodology - SPL

Intersection method to estimate subjective poverty line (SPL) using MIQ - minimum income Z estimated as a function of actual income Y

SPL - intersection (Z^*), where $Z = Y$

Double logarithmic form:
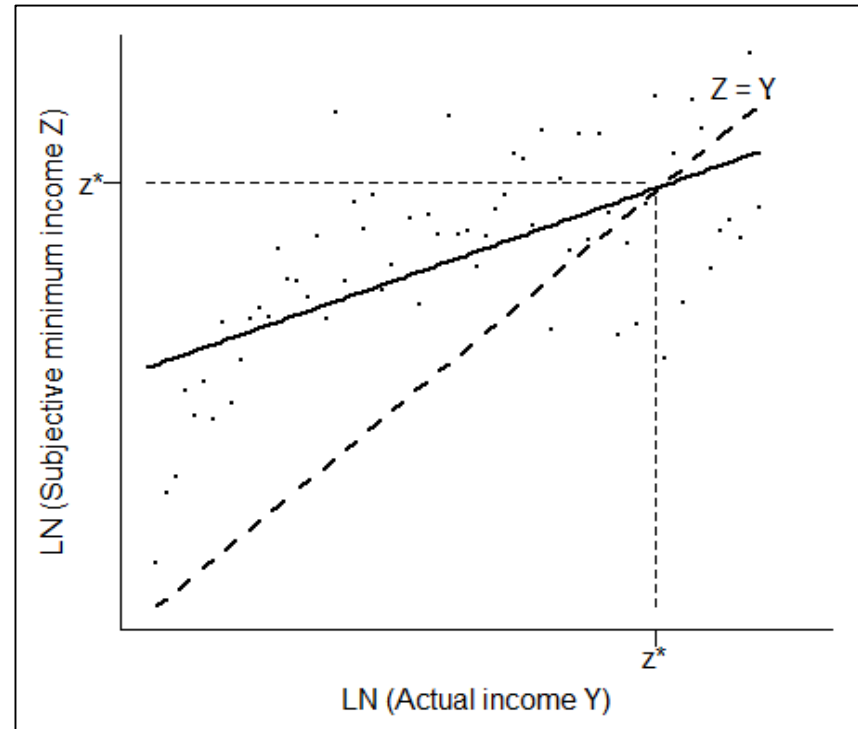
Methodology - SPL

- SPL (Goedhart et al., 1977) - income level at which $Z = Y = Z*$

$$\ln(Z) = \alpha + \beta \ln(Y) \ \rightarrow \ \ln(Z^*) = \frac{\alpha}{1-\beta}$$

* Original research included only Y (and HH size), but we (and others) control:

$$\ln(Z) = \alpha + \beta \ln(Y) + \sum_{i=1}^{3} \gamma_i A_i + \sum_{j=1}^{2} \delta_j C_j + \sum_{l=1}^{n} \theta_l X_l \ \rightarrow$$

$$\ln(Z^*) = \frac{\alpha + \sum_{i=1}^{3} \gamma_i A_i + \sum_{j=1}^{2} \delta_j C_j + \sum_{l=1}^{n} \theta_l X_l}{1 - \beta}$$

Methodology – equivalence scale

- SPLs for various household types: the relevant household size variables are kept at the required values, with the rest of explanatory variables at their means
- partial weights (w) for adults and children are derived separately as the relative change in the adult and child specific SPLs when an additional person is added
- derive a **weighted average** of the partial weights *w* according to the shares of households (*s*)

Table Monthly SPLs (in Euros) and derived SES for the Czech Republic

Adults	SPL^A	Weight of additional adult (w^A)	Structure of households (s^A)	**Children**	SPL^C	Weight of additional child (w^C)	Structure of households (s^C)
1 adult	561			Childless	677		
2 adults	729	0.299	0.692	1 child	745	0.101	0.548
3 adults	836	0.191	0.206	2+children	810	0.097	0.452
4+ adults	951	0.206	0.101				
Weight (W^A)		**0.267**	$\sum = 1.0$	**Weight (W^C)**		**0.099**	$\sum = 1.0$

Results - SES

	Weight of			Adults - uniform		Weight of		Children - uniform
	2nd adult	3rd adult	4th and next adults	**Adults - uniform**	1st child	2nd and next children	**Children - uniform**
Eastern Europe							
BG	0.598	0.357	0.447	**0.513**	0.159	0.139	**0.151**
CZ	0.299	0.191	0.206	**0.267**	0.101	0.097	**0.099**
EE	0.590	0.455	0.425	**0.546**	0.196	0.045	**0.128**
HR	0.447	0.327	0.241	**0.370**	0.148	0.133	**0.140**
HU	0.370	0.258	0.301	**0.336**	0.098	0.139	**0.115**
LT	0.412	0.371	0.426	**0.404**	0.172	0.063	**0.129**
LV	0.586	0.344	0.436	**0.515**	0.192	0.124	**0.166**
PL	0.431	0.235	0.278	**0.348**	0.045	0.106	**0.071**
RO	0.219	0.049	-0.057	**0.119**	0.124	0.086	**0.108**
SI	0.428	0.261	0.269	**0.366**	0.048	0.062	**0.055**
SK	0.362	0.303	0.340	**0.341**	0.138	0.097	**0.120**
Simple average				*0.375*			*0.117*

Results - SES

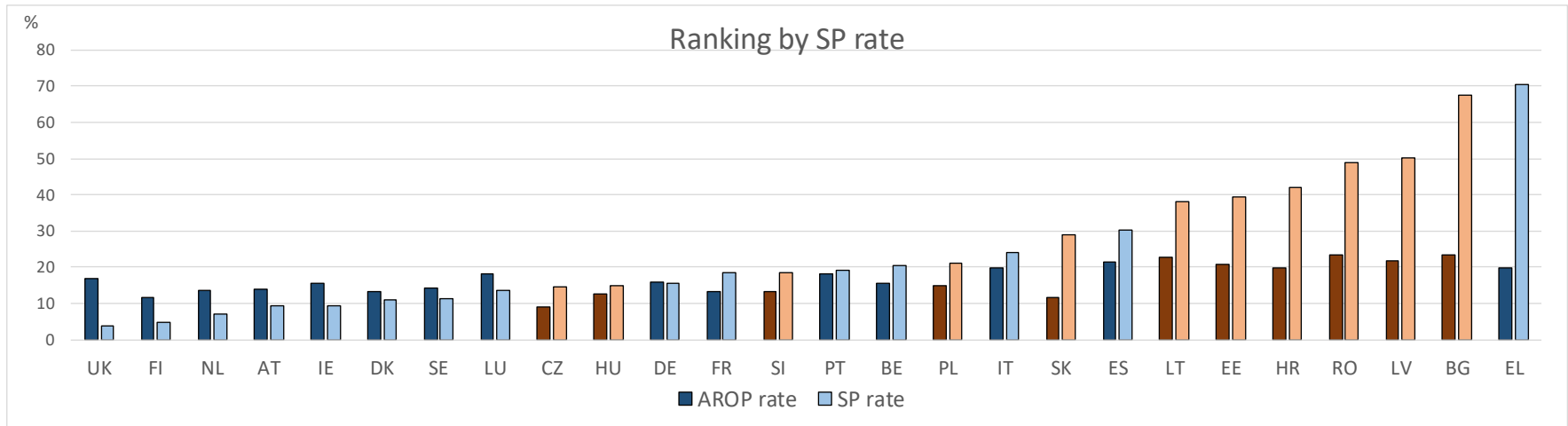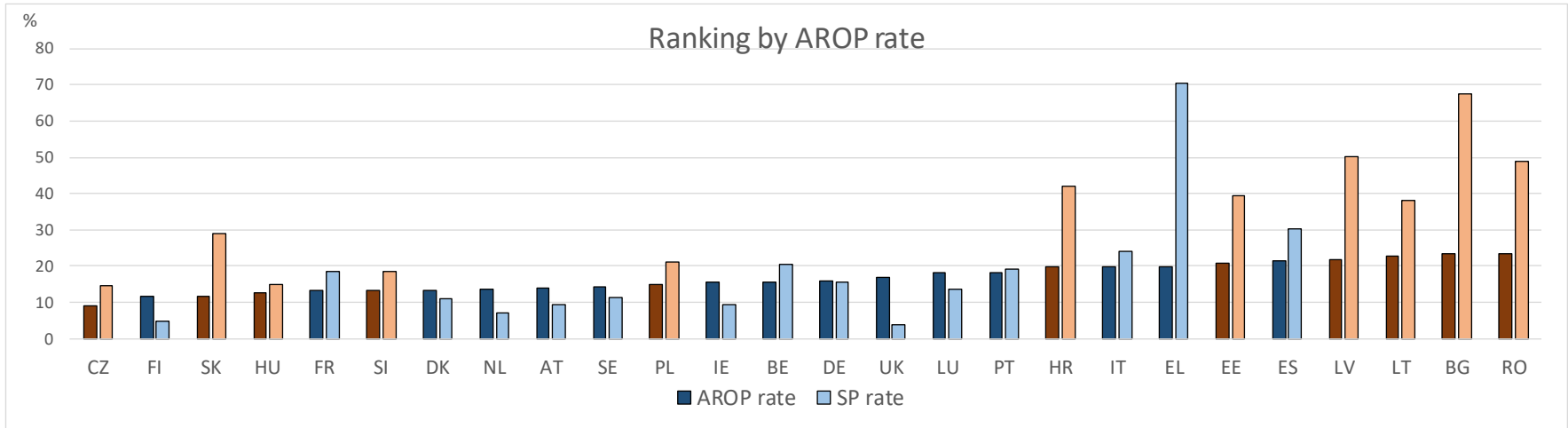|	Weight of					Weight of	
	2nd adult	3rd adult	4th and next adults	**Adults - uniform**	1st child	2nd and next children	**Children - uniform**
Western Europe							
AT	0.387	0.153	0.205	**0.319**	0.065	0.096	**0.079**
BE	0.364	0.141	0.247	**0.311**	0.142	0.083	**0.111**
DE	0.344	0.147	0.154	**0.303**	0.116	0.141	**0.127**
DK	0.389	0.309	0.209	**0.372**	0.125	-0.026	**0.044**
EL	0.357	0.259	0.233	**0.315**	0.087	0.073	**0.080**
ES	0.254	0.126	0.186	**0.216**	0.098	0.055	**0.080**
FI	0.203	0.182	0.252	**0.203**	0.157	0.100	**0.127**
FR	0.388	0.160	0.207	**0.339**	0.028	0.043	**0.036**
IE	0.284	0.130	0.163	**0.238**	0.134	0.016	**0.071**
IT	0.223	0.163	0.179	**0.202**	0.083	0.101	**0.091**
LU	0.304	0.085	0.320	**0.265**	0.078	0.082	**0.080**
NL	0.167	0.112	0.047	**0.151**	0.081	0.057	**0.067**
PT	0.306	0.163	0.189	**0.256**	0.086	0.148	**0.108**
SE	0.201	0.234	0.118	**0.201**	0.031	0.123	**0.083**
UK	0.321	0.027	0.104	**0.255**	0.158	0.015	**0.085**
Simple average				*0.263*			*0.085*

Results – Subjective equivalence scales

* SES ➔ lower weights than in the OECD-modified scale
* The ranking of countries by weights roughly corresponds to the East-West division: **higher weights in EE** (economies of scale lower)
* Adult weights: exception in RO
* Child weights: exception in SI and PL

Results – AROP – SES and OECD-modified

Ranking by original AROP rate

■ AROP rate - original   ■ AROP rate - using subjective equivalence scales

Ranking by AROP rate using SES

■ AROP rate - original   ■ AROP rate - using subjective equivalence scales

Results – SP rate and AROP

Ranking by AROP rate

Ranking by SP rate
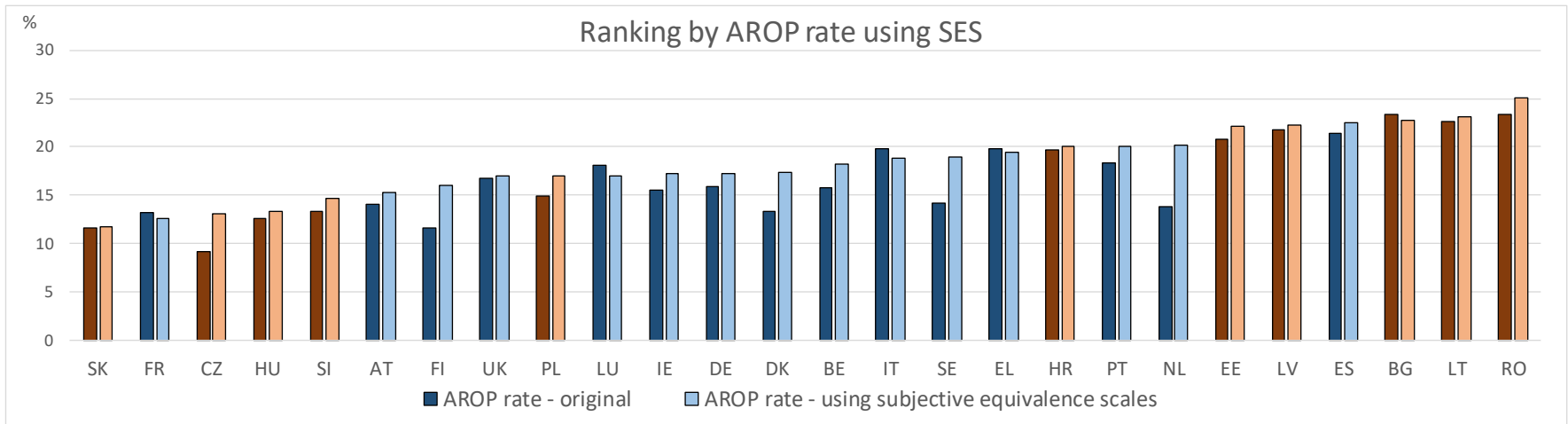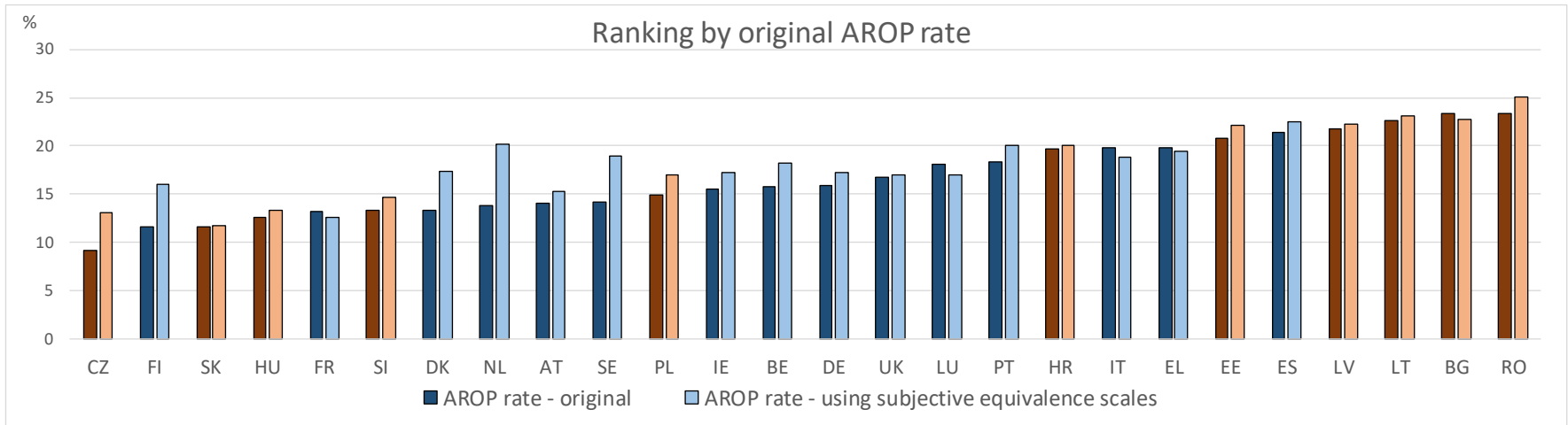
Conclusions

* Subjective economies of scale are higher (weights are lower) than suggested by the OECD-modified scale

* Subjective economies of scale are lower in Eastern than in Western Europe

* AROP using SES does not change the ranking dramatically

* Subjective poverty rate considerably changes the ranking of European countries when compared to AROP – East-West division apparent

  (more precisely, Eastern-plus-Southern versus Western division)

* Country-specific equivalence scales would be more appropriate not only for country-specific purposes, e.g. in terms of social policies inspirations, but also for cross-country comparisons

* SP rates are informative, add people to the pool of „poor"

Thank you for attention

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References:

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Goedhart, T., Halberstadt, V., Kapteyn, A., van Praag, B. M. S. (1977). The poverty line: Concept and measurement. *The Journal of Human Resources*, 12(4): 503–520.

Mysíková, M., Želinský, T. (2019). On the measurement of the income poverty rate: The equivalence scale across Europe. *Statistika: Statistics and Economy Journal*, 99 (4): 383–397.

See also our recent paper:

Mysíková, M., Želinský, T., Jirková, M., Večerník, J. (2021). Equivalence scale and income poverty: Two approaches how to estimate country-specific scale for the Czech Republic. *Social Indicators Research*, online first. DOI: 10.1007/s11205-021-02636-4.