

# The Distributional Impact of Public Services in Europe

Rolf Aaberge

Research Department , Statistics Norway  
and ESOP, University of Oslo

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# Motivation

- Focusing solely on distributions of cash income yields an incomplete and perhaps a misleading picture of the distribution of economic well-being
- The omission of public services from the definition of income may call into question ***the validity of income comparisons*** across population subgroups, over time, and ***between countries***.
- The omission can have important policy implications given the wide range of policies that aim to fight poverty and exclusion.

# Purpose

- Discuss methodological approaches for estimating *the distribution of extended income*
  - Extended income is the sum of cash income and in-kind transfers (childcare, education, health care and long-term care)
- *Estimate poverty and inequality in distributions of extended income for 23 European countries based on EU-SILC and OECD data for 2006 and 2009*

# This talk is based on results from

- Aaberge, R., A. Langørgen and P. Lindgren (2016): “Equivalence Scales and the Distributional Impact of Public In-Kind Transfers”, Mimeo, Statistics Norway.
- Aaberge, R., A. Langørgen and P. Lindgren (2017): “The Distributional Impact of Public Services in European Countries”, Chapter 8 in Atkinson, A.B., Guio, A.-C. and Marlier, E. (eds.), Monitoring Social Europe, Luxembourg: Publications Office of the European Union, 2017.

# Outline

- Valuation method
- Allocation method
- *Accounting for heterogeneity in needs for public services*
- Empirical results
- Conclusions

# Valuation method

- The value of public services is assumed to equal the cost of producing them
- Data sources for in-kind transfers:
  - OECD Family Database
  - OECD Education Database
  - OECD System of Health Accounts
- Data sources for cash income:
  - EU-SILC

# Valuation .....

- Our measure of in-kind transfers is the value of public services targeted to an individual:
  - ◆ Actual receipt of some public services (education and childcare)
  - ◆ Expected receipt of other services (health care and long-term care)

# Allocation method

- The value of public services are allocated to individuals
- Each individual is assumed to receive the average benefit in her/his target group and country
- ECEC (education and early childhood education and care) allocation also utilises information on hours received per week from the EU-SILC database
- 28 different target groups defined by age and gender
- Household in-kind benefits are equal to the sum of in-kind benefits received by individual household members



## Needs-adjusted EU scale (NA scale)

- The purpose of equivalence scales is to convert incomes into a measure of material well-being that is comparable across different household types
- According to the EU scale children need less income than adults, and larger households need less income per person than smaller households to obtain equal living standard
- The purpose of needs-adjusting the EU-scale is to account for relatively high needs for public services among children and elderly people
- The NA-scale adjusts the EU scale by assigning higher weights to children and the elderly

# Cost function approach

In line with the approach of Aaberge, Bhuller, Langørgen and Mogstad (2010), *JPubEcon*, we use the cost functions

$$C_{hk}^*(W_{hk}) = V^{-1}(W_{hk})\gamma_{+hk}, \quad h = 1, 2, \dots, H_k, k = 1, 2, \dots, K.$$

to define the following family of relative equivalence scales:

$$NA_{hk} = \frac{C_{hk}^*(W_{rk})}{C_{rk}^*(W_{rk})} = \frac{\gamma_{+hk}}{\gamma_{+rk}}, \quad h = 1, 2, \dots, H,$$

where  $NA_{hk}$  is the scale factor for household  $h$  and  $C_{rk}^*(\cdot)$  is the cost function of the reference household  $r$  in country  $k$ .

This structure, called independence of base utility, has previously been discussed by Lewbel (1989) and Blackorby and Donaldson (1993).

# Decomposition of country-specific scales

The  $NA_{hk}$  scale admits the following decomposition

$$NA_{hk} = \theta_{rk} CI_h + (1 - \theta_{rk}) NC_{hk}$$

where  $CI_h = \gamma_{0hk} / \gamma_{0rk}$  is the equivalence scale for cash income,  
 $NC_{hk} = (\gamma_{+hk} - \gamma_{0hk}) / (\gamma_{+rk} - \gamma_{0rk})$  is the scale for non-cash income, and  
 $\theta_{rk} = \gamma_{0rk} / \gamma_{+rk}$  is the weight assigned to cash income in the composite  
 NA scale for extended income. This weight is equal to the ratio  
 between the needs for cash income and the needs for extended  
 income of the reference household  $r$ .

# A common European scale

As demonstrated by Aaberge, Langørgen and Lindgren (2013) the following equivalence scale satisfies the conditions of unit consistency and reference independence:

$$NA_h = \frac{\sum_{k=1}^K w_k \frac{\gamma_{+hk}}{\gamma_{++k}}}{\sum_{k=1}^K w_k \frac{\gamma_{+rk}}{\gamma_{++k}}}, \quad h = 1, 2, \dots, H.$$

where  $\gamma_{+hk}$  and  $\gamma_{+rk}$  are the total need of extended income of household  $h$  and the reference household  $r$ , as evaluated by the needs parameters of country  $k$ ,  $\gamma_{++k} = \sum_{h=1}^H \gamma_{+hk}$  and  $w_k, k = 1, 2, \dots, K$  are country-specific weights that are constant and independent of the needs parameters and the reference household.

The NA scale satisfies the conditions of *unit consistency* and *reference independence*.

For further details see Aaberge, Langørgen and Lindgren (2013): «Equivalence Scales and the Distribution of Public In-Kind Transfers», Mimeo.

# Estimation of the common scale

- We use mean spending on specific public services targeted to 28 population subgroups defined by age and gender as estimates of the need parameters
- The median cash equivalent income can be considered as a counterpart of the mean spending of services and is used as an estimate of the needs parameter of the reference household  $\gamma_{ork} = median(x_{ok}^{EU})$
- The need for cash income for households that are not of the reference type is defined by  $\gamma_{ohk} = \gamma_{ork} EU_h$

Equivalence scales, non-cash incomes include ECEC, education, health care and long-term care, 2009

| Type                 | Age          | EU   | NA   |
|----------------------|--------------|------|------|
| <b>Single male</b>   | <b>18-24</b> | 1.00 | 0.99 |
|                      | <b>25-34</b> | 1.00 | 0.99 |
|                      | <b>35-44</b> | 1.00 | 1.00 |
|                      | <b>45-54</b> | 1.00 | 1.03 |
|                      | <b>55-64</b> | 1.00 | 1.07 |
|                      | <b>65-74</b> | 1.00 | 1.16 |
|                      | <b>75+</b>   | 1.00 | 1.31 |
| <b>Single female</b> | <b>18-24</b> | 1.00 | 0.99 |
|                      | <b>25-34</b> | 1.00 | 1.01 |
|                      | <b>35-44</b> | 1.00 | 1.01 |
|                      | <b>45-54</b> | 1.00 | 1.03 |
|                      | <b>55-64</b> | 1.00 | 1.06 |
|                      | <b>65-74</b> | 1.00 | 1.14 |
|                      | <b>75+</b>   | 1.00 | 1.33 |
| <b>Couple</b>        | <b>18-24</b> | 1.50 | 1.51 |
|                      | <b>25-34</b> | 1.50 | 1.53 |
|                      | <b>35-44</b> | 1.50 | 1.54 |
|                      | <b>45-54</b> | 1.50 | 1.59 |
|                      | <b>55-64</b> | 1.50 | 1.66 |
|                      | <b>65-74</b> | 1.50 | 1.83 |
|                      | <b>75+</b>   | 1.50 | 2.18 |

|                                   |                                  |      |      |
|-----------------------------------|----------------------------------|------|------|
| <b>Couple, 1 child:</b>           | <b>0</b>                         | 1.80 | 1.92 |
|                                   | <b>1-2</b>                       | 1.80 | 1.99 |
|                                   | <b>3 - education age</b>         | 1.80 | 2.12 |
|                                   | <b>Primary education</b>         | 1.80 | 2.21 |
|                                   | <b>Lower secondary education</b> | 1.80 | 2.26 |
|                                   | <b>Upper secondary education</b> | 2.00 | 2.49 |
| <b>Couple, 2 children:</b>        | <b>0</b>                         | 2.10 | 2.30 |
|                                   | <b>1-2</b>                       | 2.10 | 2.43 |
|                                   | <b>3 - education age</b>         | 2.10 | 2.70 |
|                                   | <b>Primary education</b>         | 2.10 | 2.88 |
|                                   | <b>Lower secondary education</b> | 2.10 | 2.98 |
|                                   | <b>Upper secondary education</b> | 2.50 | 3.44 |
| <b>Single mother, 1 child:</b>    | <b>0</b>                         | 1.30 | 1.39 |
|                                   | <b>1-2</b>                       | 1.30 | 1.45 |
|                                   | <b>3 - education age</b>         | 1.30 | 1.59 |
|                                   | <b>Primary education</b>         | 1.30 | 1.68 |
|                                   | <b>Lower secondary education</b> | 1.30 | 1.73 |
|                                   | <b>Upper secondary education</b> | 1.50 | 1.96 |
| <b>Single mother, 2 children:</b> | <b>0</b>                         | 1.60 | 1.77 |
|                                   | <b>1-2</b>                       | 1.60 | 1.90 |
|                                   | <b>3 - education age</b>         | 1.60 | 2.17 |
|                                   | <b>Primary education</b>         | 1.60 | 2.35 |
|                                   | <b>Lower secondary education</b> | 1.60 | 2.45 |
|                                   | <b>Upper secondary education</b> | 2.00 | 2.91 |

Note: Household types with children in lower secondary education level include only children below 14 years of age.  
 The age group 18-24 years includes only persons above secondary education age.

## Mean extended income shares by income components and country. Percent, 2009

| Country        | Cash income | ECEC | Education | Health care | Long-term care |
|----------------|-------------|------|-----------|-------------|----------------|
| Austria        | 77.4        | 0.8  | 7.5       | 12.4        | 1.9            |
| Belgium        | 76.4        | 2.0  | 7.1       | 11.7        | 2.8            |
| Czech Republic | 77.8        | 1.1  | 7.0       | 13.6        | 0.6            |
| Denmark        | 72.4        | 3.3  | 8.5       | 12.2        | 3.7            |
| Estonia        | 78.0        | 1.0  | 9.1       | 11.3        | 0.5            |
| Finland        | 77.7        | 2.3  | 7.0       | 9.8         | 3.2            |
| France         | 76.6        | 2.1  | 6.6       | 12.3        | 2.5            |
| Germany        | 78.4        | 1.0  | 5.9       | 13.5        | 1.2            |
| Greece         | 79.6        | 0.3  | 6.4       | 13.2        | 0.5            |
| Hungary        | 77.5        | 1.9  | 8.4       | 11.7        | 0.6            |
| Iceland        | 76.0        | 2.2  | 9.6       | 10.1        | 2.2            |
| Ireland        | 73.2        | 0.7  | 11.6      | 13.3        | 1.2            |
| Italy          | 77.0        | 1.6  | 7.5       | 12.1        | 1.8            |
| Luxembourg     | 72.7        | 1.4  | 9.2       | 16.5        | 0.1            |
| Netherlands    | 72.9        | 1.6  | 8.0       | 12.2        | 5.2            |
| Norway         | 74.6        | 2.2  | 10.0      | 9.8         | 3.4            |
| Poland         | 78.9        | 1.1  | 8.1       | 11.0        | 0.9            |
| Portugal       | 75.7        | 0.9  | 8.0       | 15.1        | 0.3            |
| Slovakia       | 77.4        | 1.1  | 7.1       | 14.3        | 0.1            |
| Slovenia       | 79.4        | 1.2  | 7.7       | 10.1        | 1.6            |
| Spain          | 74.5        | 1.4  | 7.5       | 15.0        | 1.6            |
| Sweden         | 72.5        | 3.1  | 7.4       | 12.1        | 4.9            |
| UK             | 75.5        | 2.3  | 8.4       | 12.5        | 1.3            |

Source: EU-SILC, OECD.



# Empirical results on the next slide show that

- Inequality and poverty estimates proves to be significantly smaller for extended income than for cash income

## Gini-coefficient for the distribution of income by income definition and country

| Country         | Cash income (EU) |              | Extended income (EU) |              | Extended income (NA) |              |
|-----------------|------------------|--------------|----------------------|--------------|----------------------|--------------|
|                 | 2006             | 2009         | 2006                 | 2006         | 2006                 | 2009         |
| Austria         | 0.261            | 0.260        | 0.207                | 0.213        | 0.213                | 0.211        |
| Belgium         | 0.262            | 0.261        | 0.208                | 0.213        | 0.213                | 0.210        |
| Czech Republic  | 0.252            | 0.248        | 0.196                | 0.208        | 0.208                | 0.205        |
| Denmark         | 0.240            | 0.248        | 0.186                | 0.184        | 0.184                | 0.191        |
| <b>Estonia</b>  | <b>0.328</b>     | <b>0.312</b> | <b>0.271</b>         | <b>0.283</b> | <b>0.283</b>         | <b>0.264</b> |
| Finland         | 0.259            | 0.252        | 0.209                | 0.213        | 0.213                | 0.206        |
| France          | -                | 0.295        | -                    | -            | -                    | 0.241        |
| Germany         | 0.298            | 0.289        | 0.244                | 0.254        | 0.254                | 0.243        |
| <b>Greece</b>   | <b>0.343</b>     | <b>0.328</b> | <b>0.281</b>         | <b>0.289</b> | <b>0.289</b>         | <b>0.281</b> |
| Hungary         | 0.255            | 0.240        | 0.199                | 0.203        | 0.203                | 0.196        |
| Iceland         | 0.278            | 0.255        | 0.218                | 0.221        | 0.221                | 0.206        |
| Ireland         | 0.313            | 0.328        | 0.243                | 0.257        | 0.257                | 0.261        |
| Italy           | 0.321            | 0.310        | 0.255                | 0.264        | 0.264                | 0.258        |
| Luxembourg      | 0.274            | 0.277        | 0.217                | 0.218        | 0.218                | 0.215        |
| Netherlands     | 0.271            | 0.252        | 0.207                | 0.213        | 0.213                | 0.196        |
| <b>Norway</b>   | <b>0.232</b>     | <b>0.228</b> | <b>0.178</b>         | <b>0.180</b> | <b>0.180</b>         | <b>0.177</b> |
| Poland          | 0.320            | 0.311        | 0.261                | 0.269        | 0.269                | 0.265        |
| <b>Portugal</b> | <b>0.366</b>     | <b>0.335</b> | <b>0.290</b>         | <b>0.298</b> | <b>0.298</b>         | <b>0.272</b> |
| Slovakia        | 0.246            | 0.260        | 0.188                | 0.204        | 0.204                | 0.218        |
| Slovenia        | 0.226            | 0.238        | 0.187                | 0.188        | 0.188                | 0.198        |
| Spain           | 0.312            | 0.332        | 0.248                | 0.259        | 0.259                | 0.269        |
| <b>Sweden</b>   | <b>0.232</b>     | <b>0.238</b> | <b>0.170</b>         | <b>0.173</b> | <b>0.173</b>         | <b>0.181</b> |
| <b>UK</b>       | <b>0.328</b>     | <b>0.328</b> | <b>0.263</b>         | <b>0.276</b> | <b>0.276</b>         | <b>0.266</b> |

## At-risk-of-poverty by income definition and country. Percent

| Country        | Cash income (EU) |      | Extended income (EU) |      | Extended income (NA) |      |
|----------------|------------------|------|----------------------|------|----------------------|------|
|                | 2006             | 2009 | 2006                 | 2009 | 2006                 | 2009 |
| Austria        | 11.8             | 11.9 | 7.5                  | 7.2  | 5.6                  | 5.3  |
| Belgium        | 15.1             | 14.6 | 9.0                  | 9.7  | 7.3                  | 7.4  |
| Czech Republic | 9.5              | 8.9  | 5.0                  | 5.1  | 4.8                  | 4.8  |
| Denmark        | 10.5             | 12.4 | 8.1                  | 9.4  | 5.2                  | 6.8  |
| Estonia        | 19.6             | 15.7 | 14.5                 | 12.1 | 14.1                 | 11.1 |
| Finland        | 12.5             | 12.8 | 8.8                  | 9.2  | 5.9                  | 6.6  |
| France         | -                | 12.8 | -                    | 7.5  | -                    | 6.5  |
| Germany        | 14.7             | 15.5 | 10.6                 | 10.6 | 9.3                  | 8.8  |
| Greece         | 20.5             | 20.0 | 12.7                 | 13.1 | 12.5                 | 13.1 |
| Hungary        | 12.2             | 12.1 | 7.2                  | 6.4  | 5.6                  | 5.0  |
| Iceland        | 9.5              | 9.0  | 6.2                  | 6.7  | 3.7                  | 5.0  |
| Ireland        | 16.5             | 15.2 | 9.2                  | 9.6  | 7.0                  | 6.6  |
| Italy          | 19.7             | 18.1 | 11.6                 | 11.4 | 11.5                 | 11.0 |
| Luxembourg     | 13.4             | 14.5 | 8.2                  | 8.5  | 5.9                  | 6.2  |
| Netherlands    | 9.8              | 9.6  | 6.2                  | 6.6  | 4.2                  | 4.3  |
| Norway         | 11.2             | 10.0 | 8.4                  | 7.4  | 6.6                  | 5.2  |
| Poland         | 17.3             | 17.4 | 11.4                 | 11.4 | 10.3                 | 10.9 |
| Portugal       | 18.2             | 18.0 | 10.0                 | 9.3  | 9.4                  | 9.3  |
| Slovakia       | 10.5             | 12.0 | 5.3                  | 7.1  | 5.9                  | 7.6  |
| Slovenia       | 10.8             | 12.7 | 7.7                  | 9.2  | 6.2                  | 7.8  |
| Spain          | 19.7             | 20.6 | 11.2                 | 12.8 | 11.8                 | 12.8 |
| Sweden         | 10.1             | 12.5 | 7.5                  | 8.9  | 5.3                  | 6.4  |
| UK             | 18.8             | 17.1 | 11.3                 | 11.3 | 10.6                 | 9.3  |

## The empirical results based on extended income show that

- Inequality estimates are in most cases higher and poverty estimates lower when we use the NA scale rather than the EU scale
- ***Poverty estimates by household types*** are significantly affected by the choice of equivalence scale
  - Poverty rates among single non-elderly adults without children are overestimated when estimates rely on the EU scale
  - Poverty rates among single adults with children and single elderly aged 75 and above based on the EU scale are underestimated

# A counterfactual approach for evaluating the effect of in-kind transfers

- Hypothetical economy where public services are offered by the market and paid by the households
- Budget balancing tax reduction; i.e. expenditure saved from privatising public services is offset by an equivalent reduction in taxes
- Tax reduction in terms of a fixed flat rate

## In-kind transfers as a share of total social benefits (OECD) and relative reduction of tax burden, 2009

| Country        | In-kind transfers' share of total social benefits | Relative income tax reduction | Relative reduction in employers' social contribution |
|----------------|---|-------------------------------|--|
| Norway         | 0.50  | 0.95                          | -  |
| Sweden         | 0.54  | 1.00                          | -  |
| Denmark        | 0.54  | 0.75                          | -  |
| Hungary        | 0.46  | 0.94                          | -  |
| Netherlands    | 0.58  | 0.68                          | -  |
| Slovenia       | -   | 0.78                          | -  |
| Czech Republic | 0.46  | 1.47                          | 0.11   |
| Finland        | 0.48  | 0.92                          | -  |
| Iceland        | 0.74  | 0.79                          | -  |
| Belgium        | 0.47  | 0.87                          | -  |
| Austria        | 0.37  | 0.74                          | -  |
| Luxembourg     | 0.41  | 1.30                          | 0.10   |
| Slovakia       | 0.39  | 2.24                          | 0.12   |
| France         | 0.46  | 1.28                          | 0.09   |
| Germany        | 0.37  | 0.71                          | -  |
| Italy          | 0.41  | 0.75                          | -  |
| Ireland        | 0.50  | 1.60                          | 0.16   |
| Estonia        | -   | 1.47                          | 0.10   |
| Poland         | 0.4   | 0.82                          | -  |
| UK             | 0.51  | 0.87                          | -  |
| Spain          | 0.48  | 1.57                          | 0.12   |
| Portugal       | 0.45  | 1.02                          | 0.01   |
| Greece         | 0.29  | 0.62                          | -  |

## Gini-coefficients for individuals in the distributions of income by income definition and country, 2009

| <b>Income definition</b> | <b>Cash income (EU)</b> | <b>Extended income (EU)</b> | <b>Extended income (NA)</b> | <b>Counterfactual income (NA)</b> | <b>Gross income (NA)</b> |
|--------------------------|-------------------------|-----------------------------|-----------------------------|-----------------------------------|--------------------------|
| Norway                   | 0.228                   | 0.175                       | 0.177                       | 0.295                             | 0.296                    |
| Sweden                   | 0.238                   | 0.181                       | 0.181                       | 0.289                             | 0.289                    |
| Denmark                  | 0.248                   | 0.191                       | 0.191                       | 0.299                             | 0.306                    |
| Hungary                  | 0.240                   | 0.191                       | 0.196                       | 0.314                             | 0.317                    |
| Netherlands              | 0.252                   | 0.193                       | 0.196                       | 0.309                             | 0.321                    |
| Slovenia                 | 0.238                   | 0.198                       | 0.198                       | 0.293                             | 0.306                    |
| Czech Republic           | 0.248                   | 0.193                       | 0.205                       | 0.314                             | 0.307                    |
| Finland                  | 0.252                   | 0.204                       | 0.206                       | 0.310                             | 0.312                    |
| Iceland                  | 0.255                   | 0.202                       | 0.206                       | 0.294                             | 0.299                    |
| Belgium                  | 0.261                   | 0.206                       | 0.210                       | 0.322                             | 0.328                    |
| Austria                  | 0.260                   | 0.207                       | 0.211                       | 0.316                             | 0.326                    |
| Luxembourg               | 0.277                   | 0.210                       | 0.215                       | 0.339                             | 0.335                    |
| Slovakia                 | 0.260                   | 0.202                       | 0.218                       | 0.300                             | 0.300                    |
| France                   | 0.295                   | 0.238                       | 0.241                       | 0.338                             | 0.336                    |
| Germany                  | 0.289                   | 0.234                       | 0.243                       | 0.344                             | 0.356                    |
| Italy                    | 0.310                   | 0.247                       | 0.258                       | 0.360                             | 0.368                    |
| Ireland                  | 0.328                   | 0.247                       | 0.261                       | 0.419                             | 0.403                    |
| Estonia                  | 0.312                   | 0.257                       | 0.264                       | 0.364                             | 0.356                    |
| Poland                   | 0.311                   | 0.255                       | 0.265                       | 0.341                             | 0.344                    |
| UK                       | 0.328                   | 0.258                       | 0.266                       | 0.395                             | 0.401                    |
| Spain                    | 0.332                   | 0.261                       | 0.269                       | 0.375                             | 0.368                    |

# Conclusion

- The empirical results show that the inclusion of public welfare services like childcare, education, health care and long-term care has a significant effect on estimates of income inequality and poverty in 23 European countries
- The counterfactual analysis shows that government interventions through taxation and public services have a substantial effect on inequality as well as poverty in all countries
- Decomposition of the Gini coefficient shows that income taxes have a stronger equalising effect than public in-kind transfers



# Conclusions....

- Our study show that the omission of public in-kind transfers from the standard definition of household income may call into question the validity of comparisons of economic well-being across population subgroups, over time, and between countries.
- This omission can have important policy implications given the wide range of policies that aim to fight poverty and reduce inequality.
- For these reasons, the Stiglitz-Sen-Fitoussi Commission stressed the importance of broadening the measures of household resources to reflect in-kind transfers and differences in needs.