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THE INTER-COUNTRY COMPARISON OF THE COST OF CHILDREN MAINTENANCE USING HOUSING EXPENDITURE¹

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ABSTRACT

It is interesting to compare maintenance costs of children between countries with similar yet different family policy regimes because this could yield valuable lessons for researchers and policy-makers and also for the sake of methodological development.

In this study, we aim to conduct a comparative analysis of the equivalence scales in Austria, Italy, Poland and France taking into account the age of children. To this end, we use data from the European Income and Living Condition (EU-SILC) to calculate equivalence scales for mono- and duo-parental households for the first and second child. The four countries share common European cultural context, yet differ with respect to social environment, in particular to family policy. We apply the Engel estimation method proposing the share of housing spending in total expenditures as a tool to obtain commodity-specific equivalence scales.

Our results are consistent with other studies showing that the cost of a first child is higher than that of a later child. The scale values are not the same across all the countries concerned, with the highest cost observed in Italy and the lowest in Poland.

Key words: equivalence scales, EU-SILC, housing expenses, Engel curves

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1. Introduction

The calculation of equivalence scales measuring the maintenance cost of children may be based on multiple estimation methods (Barten, 1964; Betti, Lundgren 2012; Gorman, 1976; Pashardes, 1991; Pollak, Wales, 1979; Szulc, 2009). Obviously, the choice of an appropriate method of estimation depends primarily on the research objectives and, secondly, on the availability of data. Typically, in the case of the analysis for a single country, researchers have a much wider choice of options than in the case of an analysis aimed at international comparisons, where the method selection is much more frequently restricted by the availability of data comparable between respective countries. Many methods of estimations, commonly used in international comparisons, are based on the expenditures on food as a measure of welfare. In this paper, we attempt to verify whether equivalence scales calculated on the basis of housing expenses are capable of indicating internationally comparable costs of children maintenance. In particular, we aim at distinguishing between the maintenance cost of the first and the second child and between different age categories of children.

The study was carried out for four European countries: Austria, France, Italy and Poland. The choice of these countries was driven by differences in implemented family policies and in family benefits spending, which may impact on the dominant model of care and, consequently, maintenance costs of children. As for the level of family-related public spending, in 2013⁵ France was the most generous from all these countries, with approximately 3.65% of Gross Domestic Product (GDP) transferred to families in the form of various childcare benefits (OECD, 2016a). These transfers were lower in Austria (2.61% GDP), Italy (1.97%) and Poland (1.61% in 2012). Children's participation rate in the preschool institutions (creches and nursery schools) was highly differentiated too, with the lowest value in Poland and the highest in France (OECD, 2016b). Making a reference to Esping-Andersen's (1990) typology of welfare state regimes, we can distinguish Austria and Italy, where the public support for families is dominated by direct financial transfers making up for incomes lost by a parent taking care of children, and France that combines direct financial transfer, important fiscal deductions and an extended public infrastructure of pre-school institutions. In Poland, where the family policy is still underdeveloped as compared to the three other countries of analysis, relatively long family leaves are accompanied by financial direct transfers and limited infrastructure of pre-school institutions. Different levels of public spending and different types of family-related policy instruments in these countries may affect importantly the level of children maintenance costs.

This paper is organized as follows. In the first part, we review estimation methods used in the calculation of the equivalence scales. In the second part, we present the data used for estimations, elaborate on our method and discuss the

⁵ The latest year for which the most updated data were available.

results that we obtained for four European countries. Concluding remarks include our reflexion on the use of housing expenses in international comparisons of maintenance costs of children.

2. Measures of the cost of child maintenance

There are a vast number of methods for estimating the cost of children in the economic literature. The cost of children is most frequently defined as the incremental income the parents must spend after the birth of a first or later child. Firstly, this does not account for the public cost of children incurred by the government. Secondly, alternative costs, the major one being the cost of lost income resulting from partial or full withdrawal from professional activity for the sake of childcare, are not considered. The easiest way of estimating such individual direct costs is to compare the budgets of childless persons to those who have children, i.e. by calculating equivalence scales (Panek, 2011). By using equivalence scales, one can estimate how much more a household of a certain demographic structure must spend as compared to a reference household, e.g. a childless one, in order to achieve an equal level of welfare (Szulc, 2007).

Equivalence scales are calculated according to the demographic structure and the expenses of a household, rather than its income for three main reasons. Firstly, when declaring their expenses, respondents tend to be more accurate than in assessing their incomes. Secondly, expenses are a better indicator of permanent income, that is an income earned in a lifetime perspective and, thirdly, they more accurately reflect the respondents' standards of living (Dudek, 2011). The demographic structure of a household most frequently means the composition of the household, including the number of both adults and children.

Equivalence scales may be calculated in many ways and we distinguish, most basically, two types of scales: normative and empirical. The former, also referred to as expert scales as independent experts assess the welfare needs of adults and children, include the OECD scale, Luxembourg Income Study (LIS) scale or scales devised by national offices of statistics in individual countries (Cieciela, 2003). Their advantage is the simplicity of calculations and ease of comparisons, the drawback being the arbitrary selection of weights (Dudek, 2009).

Empirical scales, in turn, are based on the observation of actual consumption of households (in the so-called objective approach) or their subjective declared assessment of the capability to maintain on their own (subjective approach) (Dudek, 2011). Among the objective approximate methods, the method described by Engel (1895) is the oldest and, at the same time, most popular. It involves the comparison of spending between families of different demographic structure and the same welfare level, which is measured by the share of expenditures on food in the total spending of households.

In order to calculate the Engel scale, the so-called Engel curves have to be estimated on the basis of single-equation econometric models (Panek 2011). The

dependent variable in these models is the share of expenditures on food in all expenditures, whereas the explanatory variables include income and demographic characteristics of households. In the next step, in order to calculate equivalence scales, the shares of food spend of the reference household is compared to the respective share of a household with the selected number of children. Equivalence scales are obtained by comparing total spending x of households with different demographic structure with total spending of the reference household x^0 .

The main objection raised against the Engel method (Cieciela 2003, Dudek 2011) is that it only considers expenses on food. Another objection concerns the fallacy of the assumption as to the equality of preferences of children and adults. Despite these objections, the method is frequently used in empirical studies, mainly due to its simplicity and high availability of required data.

An alternative to the Engel method is constituted by the welfare indicator proposed by Rothbarth (1943), who measured households' welfare on the basis of the absolute level of spending on the so-called adult goods, i.e. those consumed by adults only, such as for instance alcohol and cigarettes. Most researchers claim that, contrary to the Engel method, the cost of children maintenance obtained using the Rothbarth method is underestimated (Dudek 2011). This is because no change of preferences as regards adult goods is admitted following the birth of a next family member.

Another group of methods for estimating the cost of children, which seems more accurate but also more difficult to apply, is represented by methods based on utility functions, also known as complete demand models (Muellbauer 1974). These scales are a function of utility, which is not observable in the reality. This is the strongest objection against this type of equivalence scales, known as the issue of equivalence scales identifiability (Cieciela 2003, Dudek 2011). In order to identify the model, which is the basis for estimating the equivalence scales, it is necessary to input additional information on households or to make additional assumptions (Blundell 1998, Lewbel and Pendakur 2006), e.g. as to the independence of the scales on the utility level according to the ESE (Equivalence Scale Exactness) or IB (Independence of Base) option (Cieciela 2003).

Controversies around the results obtained through the above-described objective methods led to the emergence of subjective methods that, however, are still not as commonly used as the approximate methods (Dudek 2011). Instead of real spending data, subjective methods rely on respondents' opinions about their incomes. The opinions are gathered by the means of a questionnaire in which the respondents indicate the level of income corresponding, in their opinion, to specific ranking level (Leiden method). Usually, the following ranking scale is used for the income level: very bad, bad, insufficient, barely sufficient, good and very good (van Praag, van der Sar 1988).

Each of the above methods has both advantages and disadvantages. In short, normative scales, mostly used for international comparisons, are established by expert and need not to reflect empirical results of estimations. The Engel scale does not consider the effect of scale arising when a new family member is born,

thus overestimating the maintenance costs. On the contrary, the Rothbarth method underestimates these costs as no assumption is made that the consumption of the so-called adult goods changes when a family enlarges. Deaton and Muellebauer (1986) discuss the limitations of these methods in more detail. Methods based on utility functions seem more precise, although distinctly more complicated. And subjective methods require collecting additional statistical data, which is time- and cost-consuming.

3. Empirical analysis

3.1. Data and methodology

Data used in this study were derived from the European Union Statistics on Income and Living Conditions (the EU-SILC) database for the year 2010. The EU-SILC study is carried out according to a harmonized questionnaire on a sample of around 130 thousand households in 27 countries of the European Union, as well as Island and Norway. The EU-SILC database provides comparable multidimensional microdata on incomes, poverty, social exclusion, labour, education and health, both at the household and individual level. The EU-SILC household budget survey used in this study captures the income and living conditions for majority of European countries, including social and demographic characteristics of the respondents, their income and spending.

In this analysis, we applied the Engel method for the calculation of the cost of children. However, in contrast to the original approach, we used the share of housing expenses in total spending as a tool to compute the commodity-specific equivalence scales. Our results should be interpreted very carefully because housing is rather a public household good whereas food is rather private. Methods based on food expenditure overestimate and those based on housing expenditure underestimate child costs due to economies of scale. In absolute terms, the levels of housing expenses and incomes remain varied in Austria, France, Italy and Poland (Table 1), for households with positive income. In particular, Poland registers a considerably lower level of expenses and incomes than the other three countries. In relative terms, the share of housing expenses in the average income is very similar in Austria (11.5%), France (10.4%) and Italy (9.3%), and visibly higher in Poland (14.0%). Meanwhile, the average number of children is the most elevated in Polish households (1.25), mostly because of visibly higher proportion of households with children aged 6 and over. This may be due to the facts that fertility rates were still high in Poland at the turn of the 1980s and 1990s, and that Polish adolescent leave their family houses relatively late, as compared to their counterparts in three other countries of our analysis.

Table 1. Descriptive statistics of EU-SILC data for Austria, France, Poland and Italy

| Country | Austria | France | Poland | Italy |
|---|---------|--------|--------|--------|
| Average yearly income (Euro) | 43,417 | 44,875 | 10,473 | 36,441 |
| Average monthly housing expenses (Euro) | 500.85 | 465.44 | 146.73 | 339.09 |
| Average number of children | 1.01 | 1.18 | 1.25 | 0.88 |
| Share of children: under age of 3 | 4.99 | 6.25 | 6.63 | 4.56 |
| aged 3-6 | 6.51 | 7.64 | 7.73 | 6.46 |
| aged 6-18 | 21.08 | 23.21 | 26.28 | 20.26 |
| aged 18-25 | 8.07 | 10.13 | 15.82 | 10.76 |
| Number of observations | 6,188 | 11,044 | 12,930 | 19,147 |

Source: Author's own analysis based on EU-SILC data.

Based on the EU-SILC data, the equivalence scales were calculated by comparing the share of housing expenses in total spending for households with different demographic structure. Several assumptions were made here. Firstly, the scales were calculated separately for single parents and households with both parents raising the children together. In the first case, a single individual without children was taken as the reference household, while in the second one it was a household constituted by a couple with no children. For all cases, other individuals cohabiting with the family in a single household, apart from the children and parents, are possible.

Secondly, two definitions of a child were considered. According to one, this means any individual up to the age of 18. According to the other, apart from individuals up to the age of 18, the term includes also those under the age of 25 who continue their studies and remain to be supported by their parents. The analysis distinguishes also various age groups of children, assuming age brackets that are at least partly aligned with the applicable education system. The group of children were broken down by age into the following brackets: age up to 3, 3-6 years, 6-18 years and 18-25 years.

Thirdly, the presented results were limited only to households with one child or two children. As the percentage of households with three children in the analysed sample was at the very low level of 3.73% (lowest in Italy – 2.35%, highest in Poland – 4.91%), the estimates of the cost of a third and later child would have been inaccurate. Accordingly, the calculated equivalence scales show the cost of a first and a second child.

3.2. Equivalence scales by child's order

Table 2 presents the equivalence scales estimated using the share of housing expenses in total spending as the welfare measure for four countries of Europe, separately for households with one parent and with two parents. The highest cost

of children raised in households with two parents is observed in Italy (Table 2). The cost of a first child reaches around 55% of the spending of a childless household of two adults, and the marginal cost of a second child in Italy corresponds to additional 17% of the reference household spending. The marginal costs of a first and second child in a two-parent household remain lower in Austria and France, but still higher than in Poland. We observe the lowest marginal costs of a first and second child were observed in the latter, both in the case of single-parent households (19 percentage points and 12 p.p., respectively) and two-parent households (approx. 29 p.p. and approx. 9 p.p., respectively).

Table 2. Marginal cost of children in Austria, France, Poland and Italy

| Country | Austria | | France | | Poland | | Italy | |
|-----------------------|---------------|-------|--------|-------|--------|-------|-------|-------|
| Child age limit | 18 | 25 | 18 | 25 | 18 | 25 | 18 | 25 |
| | Single parent | | | | | | | |
| 1 st child | 0.229 | 0.224 | 0.339 | 0.333 | 0.193 | 0.188 | 0.276 | 0.277 |
| 2 nd child | 0.139 | 0.145 | 0.184 | 0.190 | 0.119 | 0.124 | 0.215 | 0.214 |
| | Two parents | | | | | | | |
| 1 st child | 0.369 | 0.391 | 0.322 | 0.345 | 0.285 | 0.307 | 0.547 | 0.541 |
| 2 nd child | 0.155 | 0.158 | 0.112 | 0.115 | 0.094 | 0.096 | 0.172 | 0.171 |

Source: Authors' own analysis based on EU-SILC data.

The difference in the level of cost of child maintenance in Poland and Italy is striking as the countries are characterised by similar family policy and, at least at first glance, traditional approach to the involvement of women in the care activities. Despite numerous similarities, Poland differs from Italy in terms of professional activity of women. According to Eurostat data, in 2014 the employment rate among women in production age in Poland was 55%, and in Italy it was lower by 8 p.p., standing at 47% (Eurostat 2015). Many Polish women decide to set up a family only after they gain the eligibility to financial benefits during the leave, and return to professional activity once their children become more self-reliant. Italian women much more frequently remain permanently professionally inactive. Additionally, the maternity benefit in Poland is characterised by the highest income replacement rate (100%) while in Italy it is lower (80%) and paid only over 13 weeks (EP 2014). Salaries and benefits obtained by working mothers may explain the differences in the cost of children in Poland and Italy.

Social policy supporting single parents results in slightly lower marginal cost of a first child in all the countries. This effect is most strongly visible in Italy, especially for a first child. Consequently, the costs of a first child in single-parent households in Italy are lower than in France. However, the marginal cost of a second child again is the highest in Italy. In all countries except Austria, the

marginal cost of a second child is higher in single-parent households than in those with two parents.

In all countries, the economies of scale are visible as the marginal cost of a second child is lower than the marginal cost of a first child. The largest economies of scale in the case of single parents are observed in France, which is probably largely driven by the design of the local family policy with strong incentives for having a second child and later children. In the case of parents raising children together, the largest economies of scale are seen in Italy, which is not surprising considering the very high cost of a first child.

3.3. Equivalence scales by child's age and number of parents in household

While in France and Austria the older the child, the lower its marginal maintenance cost (Tables 3 and 4), we obtained different results for Italy and Poland. In the former the relationship was opposite, whereas in the latter it is non-linear – highest values relate to the middle child age group. In each country the same pattern was maintained, regardless of the number of parents and children, assuming that in the case of two children, both belong to the same age group.

Table 3. Marginal cost of children up to 18 years old in single-parent households by child age group

| Country | Austria | | France | | Poland | | Italy | |
|-----------------|---------|-------|--------|-------|--------|-------|-------|-------|
| Child age limit | 18 | 25 | 18 | 25 | 18 | 25 | 18 | 25 |
| One child | | | | | | | | |
| Child age | | | | | | | | |
| cat1 | 0.278 | 0.256 | 0.459 | 0.437 | 0.187 | 0.170 | 0.209 | 0.213 |
| cat2 | 0.244 | 0.224 | 0.419 | 0.399 | 0.236 | 0.214 | 0.271 | 0.276 |
| cat3 | 0.166 | 0.192 | 0.140 | 0.163 | 0.156 | 0.181 | 0.348 | 0.341 |
| Two children | | | | | | | | |
| Child age | | | | | | | | |
| cat1, cat1 | 0.442 | 0.417 | 0.710 | 0.684 | 0.303 | 0.285 | 0.388 | 0.392 |
| cat2, cat2 | 0.390 | 0.368 | 0.648 | 0.626 | 0.376 | 0.350 | 0.484 | 0.490 |
| cat3, cat3 | 0.276 | 0.322 | 0.231 | 0.271 | 0.258 | 0.302 | 0.605 | 0.593 |
| cat1, cat2 | 0.416 | 0.392 | 0.679 | 0.655 | 0.339 | 0.317 | 0.435 | 0.440 |
| cat1, cat3 | 0.356 | 0.368 | 0.451 | 0.463 | 0.281 | 0.294 | 0.492 | 0.489 |
| cat2, cat3 | 0.332 | 0.345 | 0.424 | 0.438 | 0.316 | 0.326 | 0.543 | 0.540 |

Note: cat1 – children under age of 3, cat2 – children aged 3-6, cat3 – children aged 6-18.

Source: Authors' own analysis based on EU-SILC data.

In Austria, France and Poland the cost of children in households with a second little child is the lowest when the first child belongs to the oldest age group. This is probably due to the fact that the costs of children decrease with age in those

countries. The relationship is observed both in single-parent and two-parent households. In Poland, as opposed to Austria and France, the cost of children in the first years of life is lower when the first child is in the same, lowest, age bracket, rather than the middle bracket, independently of the number of parents in the household. In this respect, Poland and Italy are similar. This relationship may be explained by limited access to public care for youngest children in these countries. Economies of scale allow limiting the cost of formal and informal care in the case when both children are of similar age.

Table 4. Marginal cost of children in two-parent households by child age group

| Country | Austria | | France | | Poland | | Italy | |
|-----------------|---------|-------|--------|-------|--------|-------|-------|-------|
| Child age limit | 18 | 25 | 18 | 25 | 18 | 25 | 18 | 25 |
| One child | | | | | | | | |
| Child age | | | | | | | | |
| cat1 | 0.451 | 0.463 | 0.356 | 0.368 | 0.281 | 0.294 | 0.492 | 0.489 |
| cat2 | 0.424 | 0.438 | 0.332 | 0.345 | 0.316 | 0.326 | 0.543 | 0.540 |
| cat3 | 0.231 | 0.271 | 0.276 | 0.322 | 0.258 | 0.302 | 0.605 | 0.593 |
| Two children | | | | | | | | |
| Child age | | | | | | | | |
| cat1, cat1 | 0.663 | 0.672 | 0.491 | 0.498 | 0.372 | 0.382 | 0.629 | 0.626 |
| cat2, cat2 | 0.618 | 0.628 | 0.451 | 0.459 | 0.429 | 0.434 | 0.713 | 0.711 |
| cat3, cat3 | 0.299 | 0.353 | 0.361 | 0.422 | 0.336 | 0.396 | 0.816 | 0.799 |
| cat1, cat2 | 0.640 | 0.650 | 0.471 | 0.478 | 0.400 | 0.408 | 0.670 | 0.668 |
| cat1, cat3 | 0.470 | 0.504 | 0.424 | 0.459 | 0.354 | 0.389 | 0.720 | 0.710 |
| cat2, cat3 | 0.450 | 0.484 | 0.405 | 0.440 | 0.382 | 0.415 | 0.764 | 0.755 |

Note: cat1 – children under age of 3, cat2 – children aged 3-6, cat3 – children aged 6-18.

Source: Authors' own analysis based on EU-SILC data.

Only in France the cost of children appears higher in households with a single parent than in households with two parents. It should be noted that the cost of children of single parents is calculated referring to single-person households rather than to childless couple households, as in the case of two-parent households. When comparing the two types of households with children, we are not in the position to discern the impact of child presence from the impact of different spending structures for single-person households and couple households respectively.

If, for the sake of this study, we accept an assumption that the spending structure of all households with no children is the same, regardless of the number

of adults, the following relationships may be observed. The smallest difference between households with one and two parents in the cost of children occurs in Poland, and the largest in Italy, irrespective of the child age. The largest difference in the cost of a first child between households with a single parent and two parents, respectively, is observed for the youngest children in Poland and in Italy, and for the children from the middle age bracket in Austria. As far as the cost of a large number of children is considered, there is no constant pattern reflecting the effects of the support for single parents in the countries concerned.

4. Conclusions

The study presents the calculation results of the cost of children using the share of housing expenses in total spending. Consistently with other studies (Balli, Tiezzi, 2013; Kot, 2014), the equivalence scales calculated using the Engel method indicate that the cost of a first child is higher than that of a later child, be it in Austria, France, Poland or Italy. The differences in the cost of children depending on the assumed upper child age limit are insignificant, and for two children practically unnoticeable. This means that the maintenance cost of adult children is negligible. The scale values are not the same across all the countries concerned, with the highest cost observed in Italy and the lowest in Poland.

Analyses comparing the cost of children between countries are rare. To the best of the authors' knowledge, in the literature there is no study based on an objective method to cover the four countries (Austria, France, Italy and Poland). An analysis carried out by Bishop et al. (2014) and Kalbarczyk-Stęclik et al. (2017) based on a subjective method considers a wide set of European countries. Unfortunately, the comparison of results obtained with two distinctive approaches is considerably limited. We observe that the cost of children calculated using housing expenses is higher than the one calculated with the subjective method, both in the case of the first and the second child, which is a common result of the two methods' comparison.

It should be noted that the above conclusions were drawn using a commodity-specific equivalence scale rather than overall household equivalence scale. Our results are comparable in terms of main patterns of cost distribution by child order in a family, child's age and type of a household, to the results obtained with the use of original Engel's method, which supports our approach.

However, the share of housing expenses is strongly determined by the ownership structure on the property market of a given country. In the case of countries characterised by highly diversified structure of housing property ownership and a different level of development of property rental and purchase markets the method relying on housing expenses could be more applicable to cost calculation on domestic level rather than to international comparisons.

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APPENDIX

Table A1. Estimation results of Engel curves for Austria, France, Poland and Italy

| Country | Austria | | France | | Poland | | Italy | |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 18 | 25 | 18 | 25 | 18 | 25 | 18 | 25 |
| Child age limit | | | | | | | | |
| | Coeff. | Coeff. | Coeff. | Coeff. | Coeff. | Coeff. | Coeff. | Coeff. |
| log income | -0.019** | -0.019** | -0.022** | -0.021** | -0.020** | -0.020** | -0.029** | -0.029** |
| log hhszise | 0.005** | 0.004** | 0.005** | 0.004** | 0.005** | 0.004** | 0.012** | 0.013** |
| share of kids | | | | | | | | |
| aged 0-3 | 0.002 | 0.003 | 0.009** | 0.011** | 0.000 | 0.001 | -0.006 | -0.006 |
| aged 3-6 | 0.001 | 0.002 | 0.008** | 0.009** | 0.001 | 0.003 | -0.003 | -0.003 |
| aged 6-18 | 0.002 | 0.003 | 0.005** | 0.006** | 0.001 | 0.002 | -0.003 | -0.003* |
| aged 18-25 | | 0.006** | | 0.004* | | 0.004** | | -0.002 |
| constant | 0.211** | 0.210** | 0.235** | 0.234** | 0.193** | 0.193** | 0.302** | 0.302** |
| Number of observations | 6,187 | 6,185 | 11,029 | 11,029 | 12,710 | 12,710 | 18,986 | 18,986 |
| F test | 576** | 482** | 801** | 669** | 1,013** | 846** | 1,434** | 1,195** |

Note: ** - significant at 1%, * - significant at 5%.

Source: Authors' own analysis based on EU-SILC data.