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Equivalence Scales and the Cost of Children: The Case of Household Splits in Denmark, France, Germany and the United Kingdom

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Abstract

Couple households may separate over time. The OECD equivalence scale is used to compare the income situation of post separation households with the pre-separation households. This scale makes assumptions about the needs of adults and children as well as economies of scale. The impact of these assumptions is checked by varying the economy of scale factor; varying the cost of a child and varying the assumptions of allocating the cost of a child between households after separation. Our main finding is that the situation of the woman's household relative to the man's household remains the same as under the original OECD scale even when the assumptions are changed. We conclude, therefore, that our findings based on OECD scale are valid.

JEL Classifications: D6, D10, J12, O52

1. Introduction

The goal of gender equality set forth in the Lisbon Roadmap has focused on individual men and women but family households are the basic unit in social life and social policy planning for couples and their children. Couple households are not static constructs; couples may separate over time. In this study we are analyzing the economic situation of post-separation women and men in households where there were children. When we compare the household incomes of separated partners to the original household income, we find that the income of each new household has dropped sharply; this unadjusted income does not vary by gender. But the unadjusted measure does not take into account that the subsequent households of the man and the woman will have a different composition in terms of the number and ages of its members. Furthermore when the original household splits into two different households these 2 new households cannot live as cheaply as the original household. The reasons for a loss of economy of scales are increasing costs for housing as well as other household goods. If there is no increase in the total income and the same in-

come is split between the two new households either one or both will experience a loss in equivalent income. The size of the loss is depending on the series of assumptions about economy of scales and cost of children. As a starting point the modified OECD equivalence scale is used to compare the incomes of household of different sizes; this scale is officially recommended for distribution analysis by the EU. The result is that the female household equivalence incomes (except Denmark) are evidently lower than for the male household equivalent incomes. The changes in equivalent incomes found, however, may depend on the equivalence scale applied and its assumptions concerning relative needs of adults and children as well as the possible economies of scale. When the goal is to make cross-national comparisons of income changes over time these assumptions can be even more critical (Atkinson et al., 2005). Thus, it is essential to check if variation in the parameter of the equivalence scale does not change our main findings. This paper will examine our results by modifying 3 properties of the OECD equivalence scale: economy of scale factor; cost of a child; and assumptions of allocating child costs between custodian and non-custodian household after separation.

2. Data and Sample Selection

The four countries in the study – Denmark, Germany, the United Kingdom and France – were chosen because in each country there were an adequate number of valid cases available for analysis; this was not the case for Spain or Belgium, for example. These four countries represent a range of welfare regimes. Denmark is a social democratic welfare state, the United Kingdom is a liberal welfare state and France and Germany are corporatist-conservative welfare states (Esping-Andersen, 1990). The countries differ in relevant factors e.g. female labour force participation, tax regulation and family policies, thus the country specifics may influence the economic consequences of separation differently. We expect that countries with a strong transfer system for separated mother's households (e.g. Denmark) better compensate for potential income losses following partner separation. For our comparisons we use the data from Consortium of Household panels for European socio-economic Research (CHER). The data for Germany (SOEP) and UK (BHPS) in CHER are derived from the respective national panel studies and the data from Denmark and France come from the European Community Household Panel (ECHP). The data from CHER cover the years from 1994 to 2001 for the countries of Denmark and France, the years 1990 – 2000 for Germany and the years 1991 – 2001 for the United Kingdom.

We use the 3 year time frame, the year before the separation, the year of the separation and the next year after the separation. We select only households where we can establish the existence of a partnership (marriage or cohabitation)

between a man and a woman living in the same household during the first year (t0). They must be separated in the following year t1 and not re-united in t2. If one of the partners has died or is living apart due to working somewhere else that couple household is excluded. We find a total of 2190 possible separation cases for analysis[1].

We include only partnered cases with full income information for the first and third year; personal interviews are completed by all adult household members and the household interview is not missing. All refusal cases and households with zero income were excluded. Cases with relatively low incomes were also excluded. We employ the following two rules. First, in each year (t0, t2) unadjusted household incomes must be greater than 30% of country specific sample mean of all separated partners. Second, the change rate of equivalent household income (t2/t0) must be in a range 30% to 200%. We keep a total number of 1562 separation partners from four countries. Over half of these individuals (56%) are part of a couple where both partners were followed; in 44% of the cases only one partner was followed. We then restrict our sample to those households with children in t0 and where there is no new partner at t2. Our final sample contains after this selection 303 men and 384 women. The income measure used here is the composite income[2] which is the summation of each specific source of income. All incomes are deflated by the consumer price indices.

3. Equivalent Income for Households with Children: The Modified OECD Scale

Without re-partnering the subsequent 2 households will be of different sizes and composition than the original household; income gain or loss must use a comparable measure of income involving assumptions about equivalent household income (Cf. Sorenson, 1992; Bradshaw et al., 2008). For our initial results we take into account the composition of the household according to the modified OECD scale used by the EU:

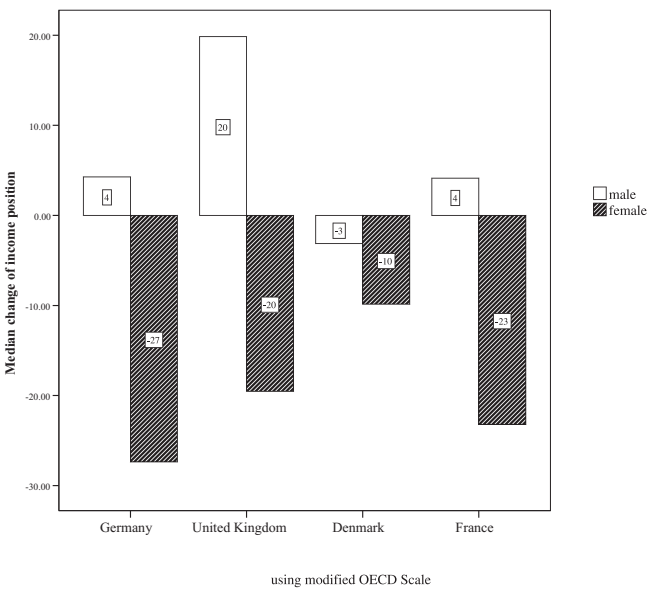
$$\text{Equivalence scale} = 1 + 0.5 \cdot (A - 1) + 0.3 \cdot YC \tag{1}$$

where A equals the number of adults plus adult children ($\geq$ 14 years) and YC equals the number of young children ($\leq$ 13 years).

[1] We find 787 separation cases for Germany, 758 for the U.K., 259 for Denmark and 386 for France.

[2] The original data does not contain contributed private transfers. We have assumed that the private transfers received by the custodian are coming from the non-custodian and therefore we deduct this amount from the income of the non-custodian.

This modified OECD equivalence scale gives the first adult in the household a value of 1.0 and the second and subsequent adult person who is 14 years of age or older a value of 0.5. Children under the age of 14 are assigned a value of 0.3 (cf. Atkinson et al, 2005). Some kind of economy of scale is implicitly introduced by assigning different weights to household members. Assuming that at t0 and t2 there are two children age 13 or under, the original household would include a couple at 1.5 and two children at .6 for a total measure of need at 2.1. When the household splits with no re-partnering, the man typically has his own household at a value of 1.0. The needs of the children typically appear in the woman's household after separation. Thus the woman household would require 1.0 for the mother and .6 for the two children for a total of 1.6. Now the requirements of both households is 2.6 not the 2.1 of the original household. As a result after separation economies of scales are lost: one or both households lose if total income not increases.



Source: CHER Database.

Figure 1: Median percentage change of post-separation equivalent household income for couples with children

The empirical picture of winners and losers for these households with children at t0 and no new partner at t2 is shown in *Figure 1*. Using the modified OECD equivalence scale this chart indicates that in each of the 4 countries the

woman's household has experienced a decrease in the household's equivalent income. In France, Germany and the United Kingdom the man's subsequent household experiences an increase in equivalent income. The change rates of the woman's and the man's household are very similar only in Denmark. The costs of separation are shared by both, although the woman's household experiences a greater loss.

4. Modifying the Factors in the Equivalence Scale

We run a series of sensitivity tests[3] to determine if the result in *Figure 1* is dependent of the choice of an equivalence scale. We apply the specification proposed by Banks/Johnson (1994):

$$\text{Equivalence scale} = (A + \eta \cdot YC)^{\theta} \qquad 0 \leq \eta \leq 1 \qquad 0 \leq \theta \leq 1 \tag{2}$$

Where A equals number of adults plus number of adult children (≥ 14 years), YC equals the number of young children (≤ 13 years), η (Eta) is the young children weight and θ (Theta) the economy of scale factor.

In this formula all adults receive the same weight (1.0) and the young child weight *Eta* reflects 'adult equivalent units'[4]. The economy of scale elasticity is introduced by *Theta* which varies between 0 and 1. The application of the formula calculates 'unadjusted incomes' for Theta = 0, where Theta = 1 results in 'per equivalent adult unit' incomes and not in 'per capita' incomes. The larger Theta is the smaller are the economies of scale assumed by the equivalence scale.

In a first step we have to find the parameters which correspond with the OECD scale. We choose for Eta a value of 0.6, because the implicit relative need of a child is 60% of the second adult in OECD scale (0.3/0.5). We estimate a value of 0.6 for Theta[5] which best reproduce the equivalence weights of the OECD scale.

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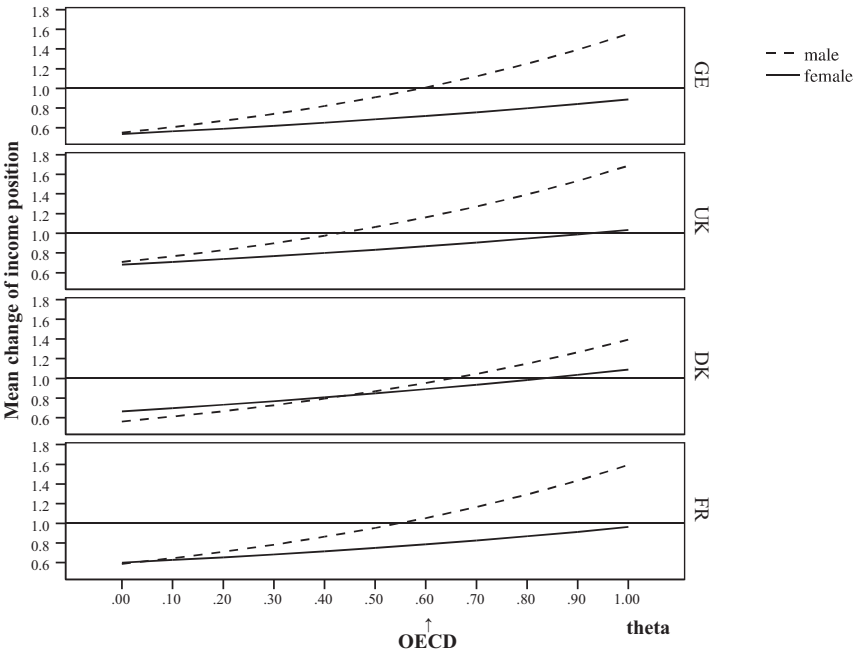
3 It is necessary here to use mean change of equivalent income instead of median change. The mean is more appropriate for sensitivity analysis when using smaller samples. It reflects better the results of parameter variation and produces no erratic data points for some extreme parameter variations.

4 The child weight in the OECD formula is somehow different from the concept of adult equivalent units; it is rather a mixture of assumptions about child cost and economy of scale.

5 Theta values for couple households with 1 kid: 0.62, 2 kids: 0.64 and 3 kids: 0.66 would reproduce the equivalence weights of the modified OECD scale. The corresponding values for single parents households are 1 kid: 0.56, 2 kids: 0.60 and 3 kids 0.62.

The first modification of the scales involves different assumptions about the economies of scale (Theta) where we use a fixed child weight (Eta) of 0.6. The curve of gender inequality of the households is graphed in *Figure 2*.

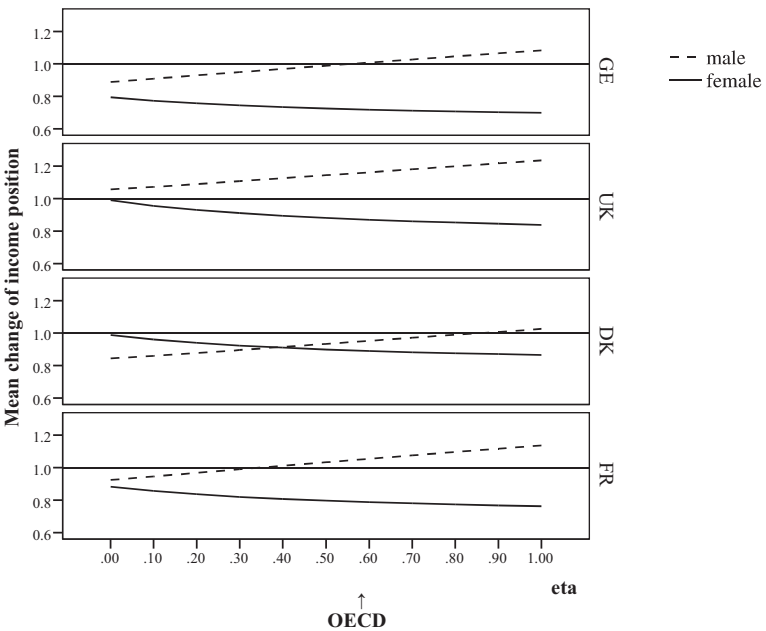


Source: CHER Database.

Figure 2: Mean percentage change of post-separation equivalent income by economy of scale factor (Theta) for couples with children (Eta = 0.6)

The economy of scale factor (Theta) determines the size of the income change rate of equivalent incomes (mean change of income position) and the gender gap in a systematic relationship. Lower economies of scales (= higher Theta values) than estimated for the OECD scale (Theta = 0.6) increase the rates both for men and women but widens the gender gap whereas lower Theta values decrease both rates and narrow the gender gap. Women are losers (or not winners) for theta values under 1.0. The classification of men as winner or loser depends on the theta value. The man's household, typically a single person household, is loser for Theta < 0.4, but gains as the assumption of the economies of scales approaches none (Theta = 1). In France, Germany and the UK the gender lines come close only at the extreme assumption (Theta = 0) where the woman's household with the children can live as cheaply as the man's house-

hold (typically a one person household). Only in Denmark is the gap between the lines always small. The two lines cross at Theta = .40. This level of theta, however, is less that the OECD assumption of a theta = .60. In Denmark at the assumption of a Theta of less than .30 she actually does better than the man although they are both losers; i.e., the mean change of income for both households is less than 1. We conclude that the better situation in Denmark for the mother's household is confirmed at every level of Theta. Even the result where both men and women are losers at about the same level is an indicator of gender equality. The inequality between the man's and the woman's household is greater in the other countries where only an extreme assumption of the highest degree for economies of scale results in gender equality for the two households. This first modification involving assumptions does not change the result that Denmark does better (lower gender gap) than France, Germany and the UK.



Source: CHER Database.

Figure 3: Mean percentage change of post-separation equivalent income by children factor (Eta) for couples with children (Theta = 0.6)

Until now this study has been restricted to the assumption of child weights found in the OECD equivalent weights for adults and children. There have

been many discussions which focus on the inadequacy of this allocation, especially for young children. Does a mother and her young child need less than two adults? The second modification of the equivalent scale involves assumptions concerning the relative weights assigned to adults and children under age 14. *Figure 3* shows the possible outcomes for the woman's and the man's household varying the child weight (Eta) under the assumption of an economy of scale similar to the (implicit) OECD's assumption of Theta=0.6. Raising the relative costs of young children above the OECD assumption (Eta=0.6) increases the male rates and decreases the female rates, resulting in a larger gender gap, where applying lower relative costs than OECD specification results in lower rates and gaps. In France and Germany the women remain losers for the whole range of Eta values where the men are losers only for values lower than in the OECD scale. No matter what the assumption of the relative costs of children vis-a-vis adults the woman's household always experiences a greater loss in Germany, France and the United Kingdom.[6] Again, only in Denmark do the lines cross under the assumption that a child weight is .40. Thus under this modification the mother's household in Denmark is better off although still below the OECD standard.

In the analysis above *(Figures 2 and 3)* we have assumed that after separation un-partnered men and women do not share the cost of the child. The cost of the child is allocated 100% to the custodian household. The man's household, when being a non-custodian, receives a weight of 1.0 and that value does not change with the number and cost of children living in the mother household. This assumption, however, may be incorrect because as a non custodial parent he will likely incur some costs. Bratberg/Tjotta (2008) have questioned this in the case of Norway. They assume that the non-custodial parent is paying some of the cost of the child during the time when the child is with that parent. This is even more important when the parents have joint custody.

In this step we focus on the third modification by varying the assumptions of who bares the cost of the child after separation. We keep the equivalence formula (2) for the pre-separation couples and modify for the post-separation situation, where we differentiate between non-custodian and custodian[7] (Bratberg/Tjotta, 2008)

$$\text{Non} - \text{Custodian Equivalence scale} = (\text{AP} + \tau \cdot \text{AC} + \tau \cdot \eta \cdot \text{YC})^{\theta} \tag{3}$$

$$\text{Custodian Equivalence scale} = (\text{AP} + (1 - \tau) \cdot \text{AC} + (1 - \tau) \cdot \eta \cdot \text{YC})^{\theta} \tag{4}$$

[6] Similar results are found in graphs of the child weight where Theta is set at .50 or .70.

[7] We differentiate between young and adult children here, where Bratberg/Tjotta (2008) did not differentiate.

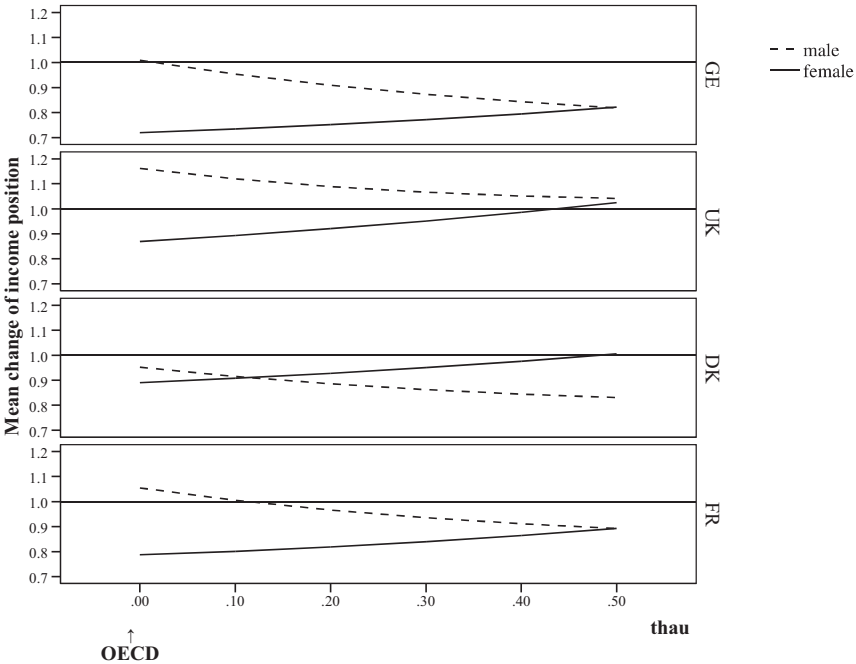
Where AP equals the number of adults (excluding children ≥14 years), AC equals the number of adult children (≥14 years), YC equals the number of young children (≤13 years), τ (Thau) is the percentage of children costs allocated to non custodians $(0 \leq \tau \leq 0.5)$, η (Eta) is the young child weight $(0 \leq \eta \leq 1)$, and θ (Theta) the economy of scale factor $(0 \leq \theta \leq 1)$.

In *Figure 4*, we focus on the third modification by varying the assumptions of who bares the cost of the child[8]. The horizontal axis presents in graph *Figure 4* represent Thau; Thau equals the various possibilities of the sharing of the cost of the child. With a Thau of 0 the assumption is the same as the OECD formula: the custodian (mother) has 100% of the child costs attributed to her household equivalent scale. At the other end of the graph is the assumption where the two parents share 50–50 in the costs of the child. In the first case the 'adult equivalent units' for the mother with one child under 14 would be 1.3 and for the non re-partnered man 1.0 (with a total for the two households of 2.3). But if the child costs were divided equally (Thau = .5) then the 'adult equivalent units' of the two households would be the same at 1.15 for the woman's household with one child and 1.15 for the man's household.

Using the OECD standard (Theta = 0.6 / Eta = 0.6) and assigning one part of the child costs to the non-custodian decreases the male change rate and increases the female in all four countries[9]. For France, Germany and the U.K we find that the higher the percentage of child cost assigned to non-custodians, the smaller the gender gap is. The man's household in these three countries always does better than the mother's household except for the assumption that the child costs are allocated evenly between households *Figure 4*. Denmark is different in that the estimates for men and women's household cross and the women's household does better than the man's when the man is covering 10% or more of the cost of the child. In the other 3 countries the lines never cross no matter what the assumptions. Thus, our conclusion is that the Danish woman has a better chance, post-separation, for gender equality. In the other three countries the average mother's household is far behind the average man's household even under the assumption that he pays some of the cost of the child during the time when the child is with him.

[8] The calculations are based on factual situation in the data: either father or mother can act as t2 custodian. Furthermore a few of the households may contain an additional person as it is possible, that one of the partners has moved into a household containing additional persons or sometime between t0 and t2 the woman bears a child. In this circumstance, however, she would most likely have a new partner and would not appear in this sample of those who have not re-partnered.

[9] The reason is that the majority of men are non-custodians and the women are custodians.



Source: CHER Database.

Figure 4: Mean percentage change of post-separation equivalent income by non-custodian factor (Thau) for couples with children (Theta = 0.6 and Eta = 0.6)

5. Conclusion

This paper has focused on our initial results based on the OECD scale (Figure 1) showing that on the average men are winners and women are losers and Danish mothers' households do significantly better post-separation than households of separated mothers in France, Germany and the United Kingdom. These results, however, employ the specific assumptions of the OECD scale; assumptions which have been questioned elsewhere. Our series of sensitivity tests determine if this result is dependent on the choice of the equivalence scale. The economy of scales factor has a much stronger impact on the result than the young children costs or the allocation of child costs between parents but both of the latter stay as important elements in equivalence specification. Applying different assumptions for equivalence scales influences the size and direction of change rates and the corresponding gender gaps. The classification of men as losers or winners depends on the assumptions made, whereas women are losers for most of our assumptions. But we find also that a range of reasonable

assumptions produced the same result: the gender gap in Denmark post separation is less than that in France, Germany and the United Kingdom. Since there is no standard in terms of these assumptions, the fact that varying them does not significant change our conclusion provides confidence in our results. However our conclusions are only valid for the countries studied, measures used and dataset analyzed.

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