Household Needs and Poverty:

With Application to Spain and the UK*

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May 1996

Abstract

We examine the sensitivity of poverty comparisons across countries with dissimilar household needs when equivalence scale parameters are varied. We use a sample of Spanish and British households, using both absolute and relative poverty lines. We sum up these comparisons using subjective confidence levels. We find, *inter alia*, that although the poor are typically more numerous in Spain than in Britain, the actual headcount differences may vary by up to 10% when needs allowances are altered, even when kept the same across the two countries. Comparisons of poverty composition across the two countries are also very sensitive to the choice of equivalence scale parameters.

JEL numbers: D31, I32
Keywords: Equivalence Scales, Classes of Equivalence Scales, Poverty, International Comparisons

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* This is an extensively revised version of Duclos and Mercader (1993). We thank Karen Gardiner for her support in using the British FES data. Our gratitude also goes

to Karen, Tony Atkinson, Gerry Redmond, Holly Sutherland and two anonymous referees for their helpful comments. They do not, of course, bear any responsibility for the final product.

1-Introduction

Distributional assessments require comparisons of individual welfare levels, which are typically unobserved. The traditional way to infer these individual welfare levels from available household micro-data is through the use of equivalence scales, which convert family incomes into equivalent incomes that are comparable across individuals. The literature on the valuations of equivalence scales is vast, the empirical results are broad, and the methodological issues are not trivial. This has left a wide range of applicable equivalence scales from which researchers interested in issues of inequality and poverty must select[1]. Moreover, not only can the appropriate scale rates be uncertain in a given society, but they may also be different between countries. Testing the sensitivity of inequality and poverty results to changes in the incorporation of needs is then a matter of considerable importance[2]. This would be particularly relevant for those international comparisons whose results can influence redistributive policies, e.g., through the transfer of resources from some countries or regions to others.

This paper uses some recently introduced parametric classes of equivalence scales[3] to discuss absolute and relative poverty in Spain and in Britain using different scenarios for the incorporation of household needs. We first check how the headcount ratio varies in Spain when household needs grow with the number of adults and

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[1] See Whiteford (1985), Buhmann et al.(1988), or Coulter et al.(1992a) for an indication of the diversity of existing equivalence scales and a discussion of the methodological issues involved in their estimation.

[2] See, for instance, the recent contributions by Coulter et al.(1992b), Atkinson et al. (1993a,b), Mercader (1993), Ruiz-Castillo (1994), and Lanjouw and Ravallion (1995).

[3] An alternative approach is provided by Atkinson (1992) [see also Bourguignon (1989)], in which poverty dominance can be tested *without* the specification of explicit functional forms for equivalence scales and poverty indices. This is done, *inter alia*, by an *ordinal* ranking of the needs of different types of families and by a consequent structure on social preferences. We do not pursue this approach here, putting instead more structure on the form of the equivalence scales and focussing on only one poverty index. This has the drawback of imposing a more restrictive structure on the poverty comparisons made, but it generally generates more complete poverty orderings across distributions.

children. Second, we consider the sensitivity of cross-country poverty comparisons to the application of scale rates that vary between countries. Third, we examine whether such cross-country poverty comparisons are also sensitive to the application of scale rates that vary simultaneously across societies. Fourth, we analyse how the composition of the poor varies with the chosen scale. We expect, for instance, that single person households will be making up a large segment of the poor population when needs are not much affected by household size and, at the other extreme, that the poor will be substantially made up of members of large households when these are granted generous needs. Are these trends, however, present and similar across countries? Finally, we summarise some of our comparative results by proposing a subjective distribution of those equivalence scale parameters that must be valued. With this, we can then assign significance levels to the distributional hypotheses being tested.

Our aim here is not to provide a complete or definitive analysis of the poverty differences between Spain and the UK. This would require, in addition to the consideration of equivalence scales, the study of other aspects of poverty measurement such as the choice of the poverty index, the identification of the poverty line, the definition of resources, the sharing of resources among household members, and the choice of the unit of analysis. We are aware that by focusing only on the study of the impact of equivalence scales on poverty differences across countries, we overlook other important ingredients to the investigation of poverty, and also overlook the interactions between these elements and the choice of equivalence scales. We nevertheless believe our study to be useful in highlighting the role and importance of household needs in international poverty comparisons.

2-Classes of Equivalence Scales

We define an equivalence scale E as an index of household needs. This index will typically depend on the characteristics of the N different household members, such as their sex and age, and on household characteristics, such as location and size. Because E is normalised by the needs of a single adult, it can be interpreted as a number of "equivalent adults", *viz*, household needs as a proportion of the needs of a single adult. We can then write $Y=X/E$, where Y is the equivalent household income and X, the

unadjusted household income. A parametric class of equivalence scales can then be defined as a function of one or of a few relevant household characteristics, with parameters indicating how needs are modified as these characteristics change.

Buhmann et al. (1988) undertake an informal survey of equivalence scales used in ten countries, and report 34 different scales which they summarise using the following class:

$$E = N^{s} \qquad \textbf{(1)}$$

with s being the single parameter summarizing the sensitivity of E to household size. The needs elasticity, s, can be expected to vary between 0 and 1. For s=0, no account is taken of household size. For s=1, Y is equal to the *per capita* household income. The larger is s, the smaller are the economies of scale in the production of Y implicitly assumed by the equivalence scale, and the greater is the impact of household size upon household needs.

An even simpler class for E would be

$$E = 1 + s\cdot(N-1) \qquad \textbf{(2)}$$

of which a version is used by O'Higgins and Jenkins (1989). For s close to zero or one, (1) and (2) are of course equivalent.

A limitation of such single-parameter classes of equivalence scales is their dependence purely on household size and not on household composition or other relevant characteristics[4]. Most equivalence scales do indeed distinguish strongly between the presence of adults and that of children, and some -- like that of McClements (1977)

[4] Although, for instance, equation (1) is adopted by Coulter et al. (1992b) for its analytical tractability, the authors also warn that they "are not suggesting that it is always appropriate to assess the incomes of, say, three adult households in the same way as those for lone mothers with two children" [Coulter et al. (1992b),p.2].

-- even discriminate finely between children of different ages[5]. The double-parameter class of equivalence scales suggested by Cutler and Katz (1992) incorporates the respective importance of the N_A adults and N_C children (with $N=N_A+N_C$) in the assessment of E in the following way:

$$E = (N_A + c \cdot N_C)^s \quad \textbf{(3)}$$

where c is a constant reflecting the resource cost of a child relative to that of an adult, and s is an indicator of the degree of overall economies of scale within the household[6]. When s=0, needs are unaffected by household size; when c=1, children count as adults [e.g., Buhmann et al. (1988)]; when c=1 and s=1, needs increase linearly with total size and children count as adults (a *per capita* scale)[7]. A simple and natural extension of the one-parameter form (2) is

$$E = 1 + a \cdot (N_A - 1) + c \cdot N_C \quad \textbf{(4)}$$

where needs are a linear function[8] of the number of adults and of the number of children.

An appropriate account of the presence of children in households can be made essential by the importance of family and child policy in most societies, by the role of children in accounting for the occurrence of large households, and by the typically

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[5] Using Spanish data, Bosch (1991) calculates for instance that the cost of the first child may have an upper limit of 45% to 75% of the cost of an adult, depending on the age and sex of the child, the cost of further children dropping very quickly.

[6] Blackburn (1994) uses, for instance, equation (3) with c=0.4 and s=0.5 to test the sensitivity of poverty comparisons across 11 countries to the choice of poverty lines.

[7] This classification could, of course, be further refined to highlight the presence of (say) adolescents or old-age pensioners, and we could also differentiate between household members using characteristics other than their age. The Data Appendix describes the definition of children used in this study.

[8] This is the form of the OECD (1982) scale, for which a=0.7 and c=0.5.

positive correlation between household size and household gross income. It is also highly relevant if poverty estimates are used to assess the relative performance of policies against poverty (including child poverty) and for the allocation of funds by international organisations such as the European Community. To distinguish between the presence of adults and children is even more relevant here given the differences in household demographic structures between Spain and the UK. Table 1 shows the frequency of different household types in the Spanish and British Household Budget Surveys that are described in the Data Appendix. We note that these relative frequencies differ considerably, with almost four times as many one-adult households in Britain as there are in Spain, and conversely with relatively many more households with three and more adults in Spain than can be found in Britain. We also see that the presence of children in Spain is much greater than in the UK[9].

To illustrate the parameterisation of the above forms and to get a taste for "reasonable" parameter ranges, we have fitted them to two widely used equivalence scales, the OECD and the McClements scales (see the Data Appendix)[10,11]. Two general observations can easily be made from the results of Table 2. Firstly, for the whole range of functional forms, the estimated values of the parameters are reasonable, always ranging (as expected) between 0 and 1. Secondly, the parameters are very precisely estimated. Thirdly, the R^2 (not shown) of the regressions is never lower than 0.95. Thus, the set of equivalence scale classes presented here appears at first sight to approximate

[9] We have also compared the weighted distribution of characteristics (including age and sex) in our sample to the 1981 Spanish census data. No significant discrepancies were found. On this, see Mercader (1995).

[10] For models (1) and (4) of Table 2, we assume multiplicative errors terms that have a log-normal distribution. Taking logs, we obtain a linear error term with a simple normal distribution and estimates can then be found using the method of ordinary [for model (1)] or non-linear [for model (4)] least squares. For models (2) and (3), a straightforward linear and normal error term is specified.

[11] Jenkins and Cowell (1994) also estimate the UK parameters of model (4) for the OECD and the McClements scales. The methods and the results obtained are very similar.

well both of the equivalence scales. Looking more carefully at the results for Spain, we notice that when a single-parameter class is used, the dependence of needs upon household size is higher for the OECD than for the McClements scale. For a double-parameter model (3) of Table 2, we see that the child parameter c -- always notably and statistically lower than the adult parameter -- is also higher for the OECD scale than for the McClements scale. This is not surprising since, as we note in the Data Appendix, the weight given to children by the OECD scale is always greater than the weight given by the McClements scale. Conversely, the parameter taking into account the number of adults is rather similar for the two scales. Again, this shows that the weight given to adults by the two equivalence scales is closer. A slightly different way of showing the same pattern of results is given by model (4), where c, the needs of a child relative to those of an adult, is notably higher for the OECD scale than for McClements, whereas the overall elasticity of household needs appears quite similar for both scales. These general results apply also to the UK.

3-Household Composition, Equivalence Scales and Poverty

3.1-The Definition of Poverty

The measure of poverty on which we focus here is the proportion of the population that is poor, the so-called headcount ratio. Counting individuals seems to us here socially preferable to counting households or equivalent adults, since it is individuals, and not equivalent adults or households, who appear to be the relevant bearers of poverty[12]. The poverty line is defined alternatively in absolute and in relative terms. We choose as the relative poverty line half the average equivalent income of the population, a standard that is much used in poverty studies. We arbitrarily set the absolute Spanish poverty line to 129.000 pts/year[13]. For the UK, the absolute poverty

[12] Other approaches are possible; see, for instance, O'Higgins and Jenkins (1989).

[13] This value corresponds to half of the mean of the Spanish income distribution in the Encuesta de Presupuestos Familiares 1980-81 when the distribution is equivalised according to the OECD scale. This poverty line is slightly higher than the one adopted by Ruiz-Castillo (1987) for per capita expenditure.

line adopted is, again, a convenient one. We take that poverty line which equalises[14] the headcount ratios for the UK and Spain when it is assumed that household needs do not vary with household size. This implies a poverty line of £45.03 per week[15]. We are conscious, of course, that this choice of absolute poverty is arbitrary, but it suits well the purpose of our illustrations.

3.2-Household Needs and Poverty in Spain

We now consider the effects on Spanish poverty of changing the equivalence scale parameters. This is shown on Figures 1 and 2 for absolute and relative poverty, respectively. The figures display the headcount ratio for different values of the parameters *s* and *c* in equation (3). Following Coulter et al.(1992b), we show in the Appendix the theoretical effects on the absolute and relative poverty headcount of changes in these parameters.

Consider Figure 1 and absolute poverty first. When *s=0*, so that household needs do not increase with size, absolute poverty equals 1.8 percent[16]. Notice that for *c=1* the surface shows estimates for the Buhmann et al.(1988) class. An obvious remark is that increases in *s* or in *c* worsen absolute poverty. Firstly, there is the 'pure poverty line effect', by which rises in *s* depress equivalized incomes for all groups except the reference one (singles with no children), and by which rises in *c* depress equivalized income for all groups except childless households, and so overall poverty increases. Secondly, this effect will be multiplied by the 'distribution shape effect'; the more dense is the income distribution around the poverty line, the greater will be the impact of the

[14] We make this normalisation since our aim here is *not* to provide definitive results on the *differential* level of absolute poverty between Spain and the UK, but rather to check the sensitivity of poverty differences to changes in the scale. Discussing the sensitivity of absolute poverty to changes in equivalence scales should also help understand the sensitivity of relative poverty to those same changes.

[15] This poverty line is slightly higher than one half of the mean of the UK income distribution in the 1985 Family Expenditure Survey when that distribution is equivalised according to the OECD scale.

[16] Note that for c=0.72 and s=0.82, which are the parameters that best approximate the OECD scale in Spain, absolute poverty is around 20%.

'pure poverty line effect'. This 'distribution shape effect' is particularly affected by the fact that we are counting individuals in poverty. So, as more and more large households fall below the poverty line, they are weighted by their relatively large number of members. As noticed by Jenkins and Cowell (1994), it can also be seen in Figure 1 that the impacts of changes in *c* tend to become more pronounced as *s* increases.

It is less obvious how relative poverty should evolve with variations in s and in c since both household equivalent income *and* the poverty line fall when these parameters increase. The theoretical results of Coulter et al.(1992b) suggest that the headcount, among other measures of poverty, will not be a monotonic function of *s* for many income distributions. As the Appendix shows, we can also expect a similar non-monotocity for changes in *c*. Cowell et al. attribute this to the "indirect poverty line effect", which depends, for variations in *s* and *c*, on the correlation between household equivalent income and $\log(N_A+cN_C)$ and $sN_C/(N_A+cN_C)$, respectively. These correlations are shown for both countries on Tables 3 and 4. For low values of s and c, they are generally positive. If, then, equivalent incomes and household size (or the number of children) are sufficiently positively correlated, increasing s (or c) can decrease the relative poverty line so much that the poverty headcount then drops.

Figure 2 illustrates this by showing U-shaped Spanish relative poverty functions of s for different values of c. For c=1, this U-shape was already found in previous studies [17]. In contrast to the British evidence reported in Banks and Johnson (1994), where poverty is monotonically decreasing in s at low values of c, the U-shaped relative poverty function of s in Figure 2 holds for all values of c in Spain. We thus observe that increasing s initially leads to a reduction of Spanish poverty whatever the value of c; the reduction continues until s reaches approximately 0.5 in Spain. In the UK, in contrast, the indirect poverty line effect dominates even for values of s fairly close to 1.

These discrepancies between the two countries are more understandable in the light of the correlation coefficients between adult presence and unadjusted income in

[17] For Spain, see for instance Mercader (1993) or Ruiz-Castillo (1994) for an application to the measurement of inequality.

Table 5. Table 5 indicates that, for a given household size, households with many adults have on average higher unequivalised incomes than households with few adults. Notice that this correlation is distinctly higher in the UK than in Spain at almost all household sizes. It is incidentally surprising to notice that at small household sizes, the correlation in Spain turns out to be negative, so that households composed of three adults have on average less income than those composed of two adults and a child. This evidence also suggests that Spanish households more often include adults that do not contribute significantly to household income (e.g., young adults remaining at home, retired relatives, women not participating in the labour market). Both economic and socio-cultural factors can provide possible explanations for such divergences between countries. It could be that the lower the earnings of adults, the greater the probability that they will wish to live in large households to take advantage of economies of scales, with the magnitude of these economies presumably varying across societies. As found in Muro et al. (1988), it could also be that Spanish second-earners (particularly wives and young adults) are relatively more active in the informal labour market than primary earners, and that their income may therefore be more largely underestimated in the survey.

There is also some evidence of a U-shaped function of c as s is kept constant, especially for larger values of s. This can be explained by two effects, both consistent with the evidence of Table 3. Since, for low c, Spanish children appear concentrated in households with greater equivalent incomes, as c is first increased, average equivalent income and the poverty line fall significantly, decreasing the poverty headcount. Second, as c keeps increasing, more and more households with children approach and enter poverty, which eventually reverses the first trend. Figure 2 also indicates a significant variation of the relative poverty headcount as c and s vary from 0 to 1. The poverty headcount reaches its maximum of 21.1% at (c=0,s=1). As we shall see later, this is also where most of the poor are members of households with four and more adults. The poverty headcount minimum of 17.7% is obtained at approximately (c=0.3, s=0.6), which is in the area of the estimated parameter values of the OECD and McClements scales discussed in Section 2. Generally, for a given c, the lowest poverty headcount is obtained

for values of s between 0.5 and 0.7.

3.3-International Comparisons and International Differences in Equivalence Scales

In comparing the distribution of economic welfare across countries, we must consider not only the issue of how to equivalise resources of households with different characteristics but also whether or not these resources can be equivalised with the same scale across countries and across time. Put in other words, are the relative needs of households necessarily the same in the UK as in Spain? If equivalence scales are based on the cost of living, then they naturally also depend on relative prices (such as for housing), which vary across countries. If the availability and cost of childcare differ across societies, then so do, presumably, the cost of children. Besides, this question is not purely theoretical since in previous studies [e.g., OECD (1986)] different equivalence scales are applied to different economies[18]. To illustrate the effect on comparative poverty of assuming different equivalence scales across countries, we take different values of *s* in the $E=N^s$ form across Spain and the UK.

Absolute Poverty

Figure 3 shows differences between the headcount of absolute poverty in Spain and in the UK for different values of s (SSP for s in Spain and SUK for s in the UK) in the two countries. Again, by construction, the difference between headcounts in Spain and the UK is taken to be 0 when no account is taken of household size ($s=0$) in the two countries. Unsurprisingly, for a fixed value of *s* in one country, Figure 3 shows that absolute poverty increases for the other country as s is increased in it, showing the pure poverty line effect and the distribution effect for that other country. Because of our choice of the functional form N^s, the marginal impact of such adjustments will be greater the more generous are the scales (*s* close to 1). From Figure 3, it is clear that uncertainty in the valuation of *SSP* and *SUK* has important consequences for the differential valuation of poverty. Because, however, of the greater presence of larger households in

[18] There may, sometimes, be evidence against the use of different equivalence scales in different countries, as reported in Phipps and Garner (1994) for instance for the case of Canada and the United States.

Spain than in the UK, poverty differences are particularly sensitive to changes in SSP.

Relative Poverty

Figure 4 shows the sensitivity of relative poverty headcount differences to changes in SSP and in SUK. These changes create the shape of a saddle, a bivariate extension of the well-known U-shaped relation between relative poverty and *s*. As *s* is increased from 0 to 1 in either country, the number of the relative poor first falls as the poverty line -- half the mean of equivalent incomes -- is lowered faster than the equivalent incomes of the poor around it. Subsequent increases in *s* bring more and more members of large households to the brink of relative poverty, such that the initial decreasing trend is reversed once *s* reaches 0.70 or so.

We can draw two important lessons from Figure 4. Firstly, for almost all combinations of *SSP* and *SUK*, Spain displays greater relative poverty than the UK (by up to 9.3%). Moreover, as Figure 6 will confirm, focussing on similar values for *SSP* and *SUK* leads unequivocally to larger headcounts in Spain than in Britain. Secondly, the *U*-shape behaviour of relative poverty is much more pronounced in the UK; this can be checked by observing headcount differences as *SSP* is changed, keeping *SUK* constant, and conversely. This suggests that the bottom of the British income distribution contains a comparatively greater concentration of small households who are lifted out of relative poverty by increases in *s*. For low values of s, the concentration of larger Spanish households below or around the poverty line thus appears comparatively greater than in the UK; the reverse occurs as s approaches 1. This is also consistent with the correlation results of Table 3.

3.4- The Impact of Household Needs on Poverty Differences Between Spain and the UK

One may object to the above analysis on the grounds that it is more "convenient" that the same equivalence scale be used in cross-country comparisons. Even, however, if scale rates are kept the same across countries, varying them simultaneously across countries can affect results significantly. We illustrate this by displaying the sensitivity of differential poverty when the parameters of the $E=(N_a+cN_c)^s$ class are allowed to vary but always remain the same across countries.

Absolute Poverty

Figure 5 shows the impact of changes in *s* and *c* on absolute poverty headcount differences. The difference between headcounts is again taken to be 0 when no account is taken of household size (*s*=0) in the two countries. Several points can be made. Firstly, the Buhmann et al.(1988) special case (when *c=1*) in Figure 5 is clearly visible; incidentally, that line is identical to what we would observe on Figure 3 if a diagonal line were to cross the surface with *SUK=SSP*. Secondly, differences in poverty are everywhere positive on Figure 5, so that Spain shows a higher headcount than the UK as soon as *s* goes above zero. Thirdly, changes in *s* or *c* do not, however, cause regular changes in poverty differences. This irregularity is particularly evident at higher values of *s*, where the differential headcount is particularly sensitive to small changes in *s* or *c*.

These features simply reflect and stress the impact of differences in the Spanish and British distributions of households and incomes. As s is increased, the magnitude of Spanish households' needs increases by more (because of the relatively greater presence of large households in Spain) than in the UK; proportionately more Spanish households fall below the poverty line, and these households also contain more individuals. The valleys and peaks of Figure 5 are similarly generated by cross-country differences in household income and composition. For instance, the British density of individuals just around the poverty line is relatively greater when children count fully and when we are between *s=0.5* and *s=0.63*: rises in *s* then temporarily diminish the level of differential poverty between Spain and Britain.

Relative Poverty

These points can partly be repeated for the impact of changes in *s* and *c* upon differential relative poverty, as displayed on Figure 6. We note that Spain always has more relative poverty than the UK, and that the difference can vary between 1.7% and more than 12%. Hence, the choice of equivalence scale parameters can matter much for determining the divergence in poverty between the two countries. For *c=1*, we observe the line for which *SUK* and *SSP* are equal on Figure 4. For a given value of *c*, the headcount difference generally increases with rises in *s*, suggesting once more that the

presence of large households around the poverty line is comparatively stronger in Spain than in Britain.

Interestingly, relative poverty headcount differences are quite sensitive to changes in *c*. It can be checked, for instance, that for *s=1*, shifting from granting full adult needs (*c=1*) to no extra needs (*c=0*) for the presence of children raises the poverty difference from 6.4% to 12.2%. This can be explained by the presence of relatively more children at the bottom of the British income distribution than can be found at the bottom of the Spanish income distribution. Alternatively, there may be relatively more children among the richer Spanish households than can be found among the more affluent British ones. Decreasing the needs of children then decreases poverty more in Britain than it does in Spain, thus increasing the headcount difference between the two countries. Both household composition and household size then have a significant impact upon the estimation of poverty in the two countries.

3.5-Household Composition and the Composition of Poverty

Household composition and the choice of equivalence scales will also have an important effect upon the characteristics of those classified as poor. This is important since popular perception often tends to associate poverty with certain socio-economic groups, such as one-parent families, elderly singles, or large families. It is also to a few of those identifiable socio-economic groups that governments sometimes find simpler to target poverty alleviation programmes. Tables 6A to 6D show how the composition of the poor population is affected when different assumptions are made on the weight of children and household size.

Take Tables 6A and 6B first, which indicate how the population of the poor (relative and absolute) in the UK and in Spain is split into six types of households (single adults, single-parent households, childless couples, couples with children, and households with 3 and more than 3 adults) when the size elasticity of needs, s, varies from 0 to 1 but when needs are unaffected by the presence of children. At s=0, we find that the relatively and absolutely poor in Britain are very much made of single adults (42% and 66%, respectively). In Spain, however, the significant part of the poor population is found in two-adult households (49% and 43%), with only 8% and 22% of

the relatively and absolutely poor being single adults. As s increases from 0 to 1, however, the picture changes rapidly. In the UK, the proportion of single adults among the poor falls very quickly. For absolute poverty, this is due to the large increase in the total headcount ratio from 1.8% to 15%; for relative poverty, this is caused by a rapid exit of the single adults out of poverty, a consequence of the fall in the relative poverty line. When s=1, about half of the poor in Britain are found among two-adult households. In Spain, as s rises from 0 to 1, we note a rapid fall in the proportion of the poor who belong to one-adult and two-adult households and a very substantial rise (from below 20% to 53% of the poor population) in the proportion of those who live in households of four and more adults.

Analogous differences in the composition of the poor across the two countries can be found when we consider the case of c=1 shown in Tables 6C and 6D. Note that the results are necessarily identical to those of Tables 6A and 6B when s=0. As s increases, the poor in Britain become largely and quickly members of two-adult households with children, and single adults become even more quickly a negligible portion of the poor. The proportion of the poor living in single-parent households first rises and then falls as s is increased. As s rises in Spain, the proportion of members of two-adult households among the poor remains everywhere substantial (above 30%), and households with four and more adults double in importance (to around 40% of the poor population). The proportion of single-parent households stays very low (usually below 1%), an observation which we can also make for c=0 in Table 6B; that proportion is usually 10 times larger for Britain in Table 6C. As for Tables 6A and 6B, the *composition* of the poor is quite similar whether we consider relative or absolute poverty.

As discussed above, however, the choice of relative versus absolute poverty is crucial for the *size* of the headcount ratio. The headcount can also be quite sensitive to whether we count individuals (as we do generally in this paper) or households. The last two lines of Tables 6C and 6D show these two types of headcount statistics for the case of c=1. The most important fluctuations are for the measurement of relative poverty in Britain. As s increases from 0 to 1, we find that the British poverty headcount goes from 18% to 12% to 14% if we count individuals, and from 23% to 11% to 12% if we count

households; these are clearly substantial variations. For Spain, the proportion of individuals in relative poverty moves little from 20% to 19% and to 21%, when s increases from 0 to 1, and the proportion of households in poverty stays pretty much between 20% and 23%.

Comparing Tables 6A and 6B with Tables 6C and 6D, respectively, shows the importance of accounting for the presence of children in computing household needs. When c increases from 0 to 1, the proportion of the poor living in one-parent households increases significantly in both countries (but more dramatically so in the UK) and for both types of poverty. This is associated with important falls in the proportion of the British poor who belong to one- and two-adult childless households. Increasing c also raises very significantly the presence of two-adult households with children among the Spanish and British poor.

Interestingly, the relative poverty headcount in the UK is more sensitive to the incorporation of children's needs than is the case in Spain. For s=1, for instance, we find that 9.1% or 14.3% are relatively poor in Britain depending on whether c=0 or c=1. In Spain, the figures are both close to 21%. This suggests, again, that there is either a disproportionate number of children around the relative poverty line in Britain, or that there is a disproportionate number of children among the relatively affluent Spanish households[19].

We have also tested how our results changed when we varied the relative poverty line in each country to 40% or 60% of average equivalent income. As the relative poverty line increases, the proportion of the poor who are single adults generally decreases in both countries for any value of s and c. The proportion of the poor who belong to childless two-adult households conversely increases. This suggests that single adults are disproportionately found at the very bottom of the income distributions. As the relative poverty line increases from 40% to 60% of average equivalent incomes, the headcount

[19] A more detailed look at the data does indeed reveal that children are disproportionately found among the more affluent Spanish households. The average number of children is also greater in Spain than in the UK at all deciles.

increases from generally well below 10% to around 20% in Britain, and from about 12% to close to 30% in Spain. Relative poverty in Spain always exceeds relative poverty in Britain, regardless of the values of s, c, or the percentage of average equivalent income used as the relative poverty line.

3.6-Uncertainty of Needs and Distributional Analysis

One use of sensitivity tests is to show the range of scale parameter values for which a particular result holds. Alternatively, one may specify a range of possible parameter values and attach a subjective significance level to a particular result. More precisely, an agreement is first reached on a plausible range for various parameter values that must be specified to test for a distributional result. A subjective probability distribution of such parameter values is also agreed, making possible an assessment of the (subjective) significance of that result.

This approach can be applied, for instance, to the specification of various poverty lines, to the likelihood that equivalence scales ought to be applied identically in all countries, and to the uncertainty over the correct scale rates to apply on a given distribution of households. This approach makes it generally impossible to draw conclusions with perfect confidence; it does normally allow, however, to say something with at least some confidence. We illustrate this in the light of the uncertainty as to the proper *s* value (of the Buhmann et al. (1988) class) to apply, and on whether the same *s* should be applied to both Spain and the UK.

One can first propose that the *s* of Britain, for instance, can plausibly not exceed a range of 0.1 below or above the *s* value of the Buhmann et al. form for Spain (with *s* never negative or above 1). If we also assume a uniform subjective density distribution of *SSP* and *SUK* (see Figures 3 and 4), conditional on *SSP* never being away from *SUK* by more than 0.1, we find that the absolute poverty headcount in Spain is greater than that in Britain with a 83% level of confidence, and that the relative poverty headcount in Spain is always larger than that in Britain, whatever this choice of *SSP* and *SUK*, yielding a 100% subjective level of confidence.

This method explicitly allows for subjective ranges of plausible values to apply to a whole array of choices that must be made in distributional analyses, whether or not

the choices are the same for all countries considered. The method also conveys an honest picture of the analytics involved: by carrying with it an explicit confidence interval, it indicates that such distributional comparisons are intrinsically subject to uncertainty. The conclusions that can be reached are generally neither black nor white, unlike those conveyed by a choice of specific parameter values. It is then often not possible to say that Spain has definitely more or fewer poor than Britain; all that may be concluded is that, at (say) a 80% degree of confidence over a distribution of equivalence scale parameters, Spain has more or fewer poor than Britain.

This requires, of course, an *a priori* subjective choice of the distribution of parameter values over which to assess the confidence level of a result. There are two major reasons for which this choice is less critical than it may appear. Firstly, there normally exists some degree of relatively objective consensus over the maximum range of various parameter values. Buhmann et al.(1988) report for instance that the approximate values of *s* rarely fall outside the interval [0.20, 0.80]. Secondly, and more importantly, small changes in the range and in the assumed distribution of the parameter values will never alter the results momentously; in particular, smooth changes in the assumed distributions make the significance level of the results vary *continuously* between 0% and 100%. This makes our conclusions much more amenable to the presence of analytical subtleties and uncertainties than does the choice of only one parameter value, for which the conclusion is either black or white (0% or 100% confidence). Because of this, results based on the approach just illustrated are less likely to be radically misleading than results derived from parameter point values.

4-Conclusion

We have illustrated the impact of alternative assessments of household needs upon absolute and relative poverty in Spain and in the UK. The study mainly distinguishes itself from other international comparisons of income distributions by its focus on the role of household composition. Because of important differences in the joint distributions of household characteristics and income, poverty differences between the two countries vary sizeably with equivalence scale parameters even if such parameters are altered simultaneously in the two economies. We find, for instance, that although the

poor are typically more numerous in Spain than in Britain, the actual headcount differences may vary by up to 7% (absolute poverty) and 10% (relative poverty) when needs allowances are altered, even when kept the same across the two countries. That is, between 1.7% and 12.2% more of the Spaniards are relatively poor than can be found among the British, the actual figure depending on the importance granted to household size and to children in assessing household needs. The composition of poverty is also very sensitive to the choice of equivalence scale parameters. In Britain, the poor are very dominantly either single adults or members of two-adult households depending on which equivalence scale parameter values are chosen. The picture is quite different in Spain, where no majority group emerges among the poor. Compared to Britain, single adults are in Spain an insignificant portion of the poor, but members of households with three and more adults are very important, especially for high values of the elasticity of needs with respect to household size. Finally, the use of a subjective distribution of equivalence scale parameters suggests that we can be sure with quite a high degree of confidence that there are proportionately more poor in Spain than in Britain.

Data Appendix

On the Choice of Equivalence Scales

The McClements (1977) equivalence scale distinguishes between the presence of children of different ages and the presence of extra adults in the household. The weights given by this scale are the following (before housing costs):

Single adult	1.00
spouse of head	0.64
other second adult	0.79
third adult	0.69
each subsequent adult	0.59

child aged 16-17:0.59 13-15:0.44 11-12:0.41 8-10:0.38
5-7 :0.34 2-4:0.29 0-1:0.15

By definition, a child is less than 16 years old or less than 18 but in full-time education. The scale is widely used by the British Central Statistical Office and by the Department of Social Security for the analysis of income distribution in Britain. As noticed in Coulter et al (1992a), "the McClements Scale has semi-official status in the UK for income distribution assessments" (p.104). The OECD scale is given by $E=1+0.7*(N_A-1)+0.5*N_C$.

Both the McClements and the OECD scales thus depend on household size and household composition. As can be checked, however, the McClements scale is typically less "generous" for children than the OECD one. That the OECD scale is one of the most commonly used in developed countries for distributional assessments makes it particularly natural for international comparisons.

British and Spanish Data

The Encuesta de Presupuestos Familiares (EPF) is a family expenditure survey carried out by the Instituto Nacional de Estadística. The final sample of around 24,000 households which we use for 1980-81 represents the more than 10 million Spanish households. The UK Family Expenditure Survey (FES) is a continuous enquiry into the expenditure and income of private households in the United Kingdom (UK), carried out by the Office of Population Censuses and Surveys on behalf of the Department of Employment. The annual initial sample is about 11,000 households, representing roughly 1 in 2000 of all UK households, with a response rate of around 70%, and yielding a final sample of 7012 households in 1985. People living in hostels, hotels, boarding houses and institutions are excluded in both surveys. Both surveys are weighted to obtain a representative sample of the overall population of needs and household characteristics.

The definition of income includes all main components: earnings, self-employment income, state and social security benefits, investment income, and certain forms of income in kind. From these are deducted income tax and social security contributions. No attempt is made to impute income on assets such as owner-occupied houses or consumer durables. Income is considered before any housing cost. For a discussion of the homogeneity of definitions across countries, see Mercader (1995), where reference is also made to the reliability of the income data in the Spanish Household Survey; on this, see also Ruiz-Castillo (1994).

The definition of children varies according to the equivalence scales used and there is therefore no obvious choice in the context of our study. Scales (such as the McClements) define children as being less than 16 years or less than 18 and still in full time education. The cut-off age for the OECD scale has often been taken to be 14 years. For the purpose of our study, we thus take as children those below 14 years old.

Appendix:

Coulter et al (1992b) derive the effects of a change in the elasticity parameter, s, on poverty indices. We follow here their methodology to show the impact of changes in the two parameters, c and s, upon the headcount poverty ratio H[20].

We distinguish household types by their number of adults, N_A, and children, N_C, where $N_A=1,...,N_A^*$ and $N_C=0,...,N_C^*$. We define $N_A^*(N_C^*+1)$ distinct groups with $p_{i,j}$ being the population share of households with i adults and j children. Unadjusted income is assumed to be continously distributed with group density function $g_{i,j}(X)$. Let E be the number of equivalent adults in the household:

$$E_{N_A,N_C} = (N_A + cN_C)^s \qquad \textbf{(5)}$$

Following Coulter et al (1992b), define for convenience

$$E^s_{N_A,N_C} = \frac{\delta \ln E}{\delta s} = \ln(N_A + cN_C) \qquad \textbf{(6)}$$

and

$$E^c_{N_A,N_C} = \frac{\delta \ln E}{\delta c} = \frac{sN_C}{N_A + cN_C} \qquad \textbf{(7)}$$

The poverty line for group (i,j) is defined as:

$$Z_{i,j} = Z_{1,0}E_{i,j} \qquad \textbf{(8)}$$

that is, $Z_{i,j}$ is a multiple of the poverty line for a childless single-adult household. We distinguish the absolute and the relative poverty lines with $Z_{1,0}=\pi$ and $Z_{1,0}=\lambda\bar{Y}$, where π and λ are constants, and $\bar{Y}$ is the average of equivalent incomes Y.

The headcount can then be written as:

---

[20] For c=1, the results naturally correspond to those shown in equation (15) of Coulter et al (1992b). On this, also see Jenkins and Cowell (1994).

$$H = \sum_{i=1}^{N_A^*} \sum_{j=0}^{N_C^*} p_{i,j} \int_0^{Z_{i,j}} g_{i,j}(Y)dY \qquad \textbf{(9)}$$

We then find that, for x=s,c:

$$\frac{\delta H}{\delta x} = \sum_{i=1}^{N_A^*} \sum_{j=0}^{N_C^*} p_{i,j} \cdot E_{i,j}^{x} \cdot g_{i,j}\left(Z_{i,j}\right) \cdot Z_{i,j} \cdot \left(1 - T_{i,j}^{x}\right) \qquad \textbf{(10)}$$

where $T^s=0$ for absolute poverty and

$$T_{i,j}^{x} = \frac{1}{E_{i,j}^{x}}\left[\frac{Cov(\overline{Y}_{i,j}, E_{i,j}^{x})}{\overline{Y}} + \overline{E}^{x}\right] \qquad \textbf{(11)}$$

for relative poverty. $\overline{Y}_{i,j}$ is the average of group (i,j) equivalent incomes, and $\overline{E}^{x}$ is the average of $E_{i,j}^{x}$ over all groups (i,j).

Note that three effects appear in equation (10): a pure poverty line effect ($E_{i,j}^{x}$), a within-group distribution effect [$g_{i,j}(Z_{i,j}) \bullet Z_{i,j}$], and an indirect poverty line effect ($T_{i,j}^{x}$). For each group, these effects are weighted by the group's importance in the overall population ($p_{i,j}$).

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Table 1

Proportion (%) of households by size and number of children

	Spain					UK				
N_A ->	1	2	3	+3	Total	1	2	3	+3	Total
N_C										
0	7.8	21.7	11.3	12.7	53.5	26.6	31.0	8.8	6.5	72.8
1	0.3	7.4	4.8	6.6	19.0	1.1	6.7	2.9	1.6	12.3
2	0.1	10.7	3.0	3.4	17.3	0.8	8.6	0.9	0.5	10.9
3	0.1	4.4	1.2	1.2	6.8	0.1	2.3	0.4	0.1	3.0
+3	0.0	2.0	0.6	0.8	3.6	0.1	0.8	0.1	0.1	1.0
Total	8.3	46.1	20.9	24.7	100	28.7	49.4	13.1	8.8	100

Table 2

Parameter estimates on four classes of equivalence scales, estimated with the OECD and McClements scales

COUNTRIES			SPAIN		UK	
EQUIVALENCE SCALES			OECD	McClements	OECD	McClements
(1)	$E = N^s$	s	0.77 (0.000)	0.71 (0.001)	0.76 (0.000)	0.68 (0.001)
(2)	$E = 1 + s \cdot (N-1)$	s	0.62 (0.000)	0.53 (0.001)	0.62 (0.001)	0.52 (0.001)
(3)	$E=1+a(N_A-1)+cN_C$	a	0.7 (0)	0.7 (0.001)	0.7 (0)	0.66 (0.001)
		c	0.5 (0)	0.36 (0.001)	0.5 (0)	0.35 (0.001)
(4)	$E = (N_A + cN_C)^s$	s	0.82 (0.000)	0.81 (0.001)	0.80 (0.000)	0.77 (0.001)
		c	0.72 (0.001)	0.49 (0.002)	0.74 (0.001)	0.54 (0.003)

Table 3

Correlation between equivalent incomes and $\log(N_A+cN_C)$

s=col c=row	Spain					UK				
	0	0.25	0.5	0.75	1	0	0.25	0.5	0.75	1
0	0.290	0.168	0.040	-0.086	-0.203	0.564	0.447	0.291	0.105	-0.090
0.25	0.310	0.198	0.076	-0.051	-0.175	0.561	0.446	0.286	0.090	-0.117
0.5	0.313	0.200	0.074	-0.059	-0.190	0.543	0.420	0.249	0.040	-0.173
0.75	0.308	0.190	0.057	-0.083	-0.220	0.523	0.389	0.203	-0.015	-0.229
1	0.302	0.176	0.035	-0.112	-0.251	0.504	0.357	0.159	-0.067	-0.278

Table 4

Correlation between equivalent incomes and $sN_C/(N_A+cN_C)$

s=col c=row	Spain					UK				
	0	0.25	0.5	0.75	1	0	0.25	0.5	0.75	1
0	-	0.115	0.150	0.178	0.196	-	0.091	0.104	0.106	0.098
0.25	-	0.089	0.085	0.072	0.051	-	0.061	0.022	-0.029	-0.085
0.5	-	0.068	0.034	-0.007	-0.051	-	0.036	-0.039	-0.123	-0.201
0.75	-	0.050	-0.007	-0.068	-0.128	-	0.015	-0.087	-0.192	-0.280
1	-	0.034	-0.041	-0.118	-0.187	-	-0.003	-0.126	-0.245	-0.337

Table 5

Correlation between unadjusted income and adult presence, for a given household size

	United Kingdom	Spain
Total Population	0.496	0.215
N=2	0.140	-0.006
N=3	0.345	-0.013
N=4	0.389	0.070
N=5	0.450	0.161
N=6	0.411	0.249
N=7	0.255	0.292
N=8	0.750	0.294
N=9 or more	0.728	0.349

Table 6A

Composition of poverty in the UK when household needs are unaffected by the presence of children ($E=N_A^s$)

% of the poor

House-hold types	s	Relative Poverty					Absolute Poverty				
		1	0.75	0.5	0.25	0	1	0.75	0.5	0.25	0
1 adult		5.8	18.3	35.1	42.5	41.7	7.8	19.7	42.8	58.8	66.2
1 adult + children		0.3	0.6	1.1	3.5	6.9	0.2	0.5	1.2	1.6	1.8
2 adults		37.1	43.1	40.7	36.8	35.5	38.2	39.6	25.8	16.3	12.1
2 adults + children		11.3	11.8	10.6	10.7	12.5	11.6	12.6	18.9	18.7	19.0
3 adults		18.2	12.3	6.8	4.0	2.3	19.0	13.0	7.5	4.5	0.8
4+ adults		27.2	13.8	5.6	2.5	1.0	23.1	14.9	3.7	0	0
Total		100	100	100	100	100	100	100	100	100	100
Headcount ratio		9.1	9.2	11.5	15.2	18.3	15.0	6.0	2.7	2.0	1.8

Table 6B

Composition of poverty in Spain when household needs are unaffected by the presence of children ($E=N_A^s$)

% of the poor

House-hold types	s	Relative Poverty					Absolute Poverty				
		1	0.75	0.5	0.25	0	1	0.75	0.5	0.25	0
1 adult		1.8	3.4	6.1	7.6	8.3	1.8	3.4	7.0	13.2	21.9
1 adult + children		0.1	0.2	0.4	0.6	0.8	0.1	0.2	0.4	0.7	1.2
2 adults		15.4	19.1	22.6	25.2	27.2	15.3	18.1	20.0	22.8	26.0
2 adults + children		7.9	9.6	12.0	16.6	21.6	7.8	9.9	12.0	15.9	16.9
3 adults		22.3	23.9	24.6	23.8	22.2	22.2	23.7	24.5	19.5	17.7
4+ adults		52.5	43.8	34.2	26.2	19.9	52.8	44.6	36.1	27.7	16.2
Total		100	100	100	100	100	100	100	100	100	100
Headcount ratio		21.1	19.0	18.1	18.7	20.2	22.8	11.3	5.5	2.9	1.8

Table 6C

Composition of poverty in the UK when household needs are determined by household size ($E=N^s$)

% of the poor

House-hold types	s	Relative Poverty					Absolute Poverty				
		1	0.75	0.5	0.25	0	1	0.75	0.5	0.25	0
1 adult		1.4	5.0	20.6	38.5	41.7	3.3	7.0	26.2	53.5	66.2
1 adult + children		6.7	8.6	9.0	7.9	6.9	4.9	8.4	8.9	3.6	1.8
2 adults		5.0	10.5	18.8	28.3	35.5	16.0	14.1	15.7	14.8	12.1
2 adults + children		57.3	53.1	38.6	19.7	12.5	46.2	49.0	36.0	21.4	19.0
3 adults		14.6	12.1	7.6	3.6	2.3	16.1	12.0	6.8	6.6	0.8
4+ adults		15.0	10.6	5.4	1.9	1.0	13.4	9.5	6.3	0	0
Total		100	100	100	100	100	100	100	100	100	100
Headcount ratio (% of individuals)		14.3	11.6	11.8	15.4	18.3	35.8	16.8	4.5	2.2	1.8
Headcount ratio (% of households)		12.3	10.3	11.4	17.3	23.2	28.0	14.1	5.5	3.9	3.5

Table 6D

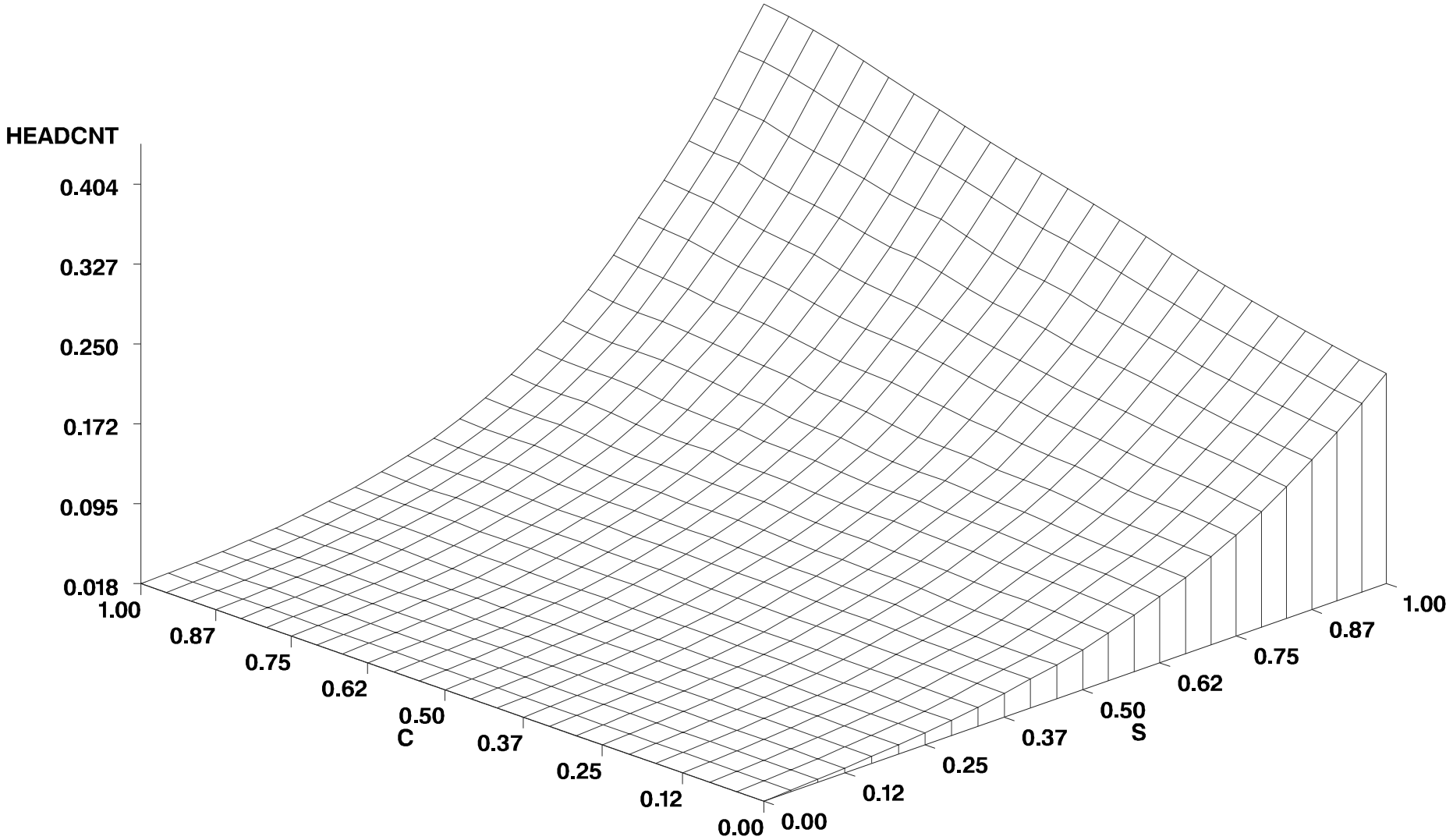
Composition of poverty in Spain when household needs are determined by household size ($E=N^s$)

% of the poor

House-hold types	s	Relative Poverty					Absolute Poverty				
		1	0.75	0.5	0.25	0	1	0.75	0.5	0.25	0
1 adult		1.2	2.0	4.5	7.4	8.3	1.0	1.9	4.8	11.0	21.9
1 adult + children		0.6	0.6	0.6	0.7	0.8	0.5	0.7	0.8	1.3	1.2
2 adults		5.2	10.7	17.7	23.5	27.2	8.4	10.3	13.8	19.1	26.0
2 adults + children		26.3	25.3	23.3	21.4	21.6	27.4	25.9	22.2	21.9	16.9
3 adults		24.0	24.3	23.9	22.7	22.2	22.3	23.8	25.4	19.0	17.7
4+ adults		42.7	37.0	29.9	24.4	19.9	40.5	37.4	32.9	27.6	16.2
Total		100	100	100	100	100	100	100	100	100	100
Headcount ratio (% of individuals)		20.7	18.4	18.2	18.6	20.2	40.4	19.9	8.0	3.5	1.8
Headcount ratio (% of households)		22.4	19.2	19.9	21.5	23.4	34.7	18.2	8.6	4.6	3.1

Figure 3

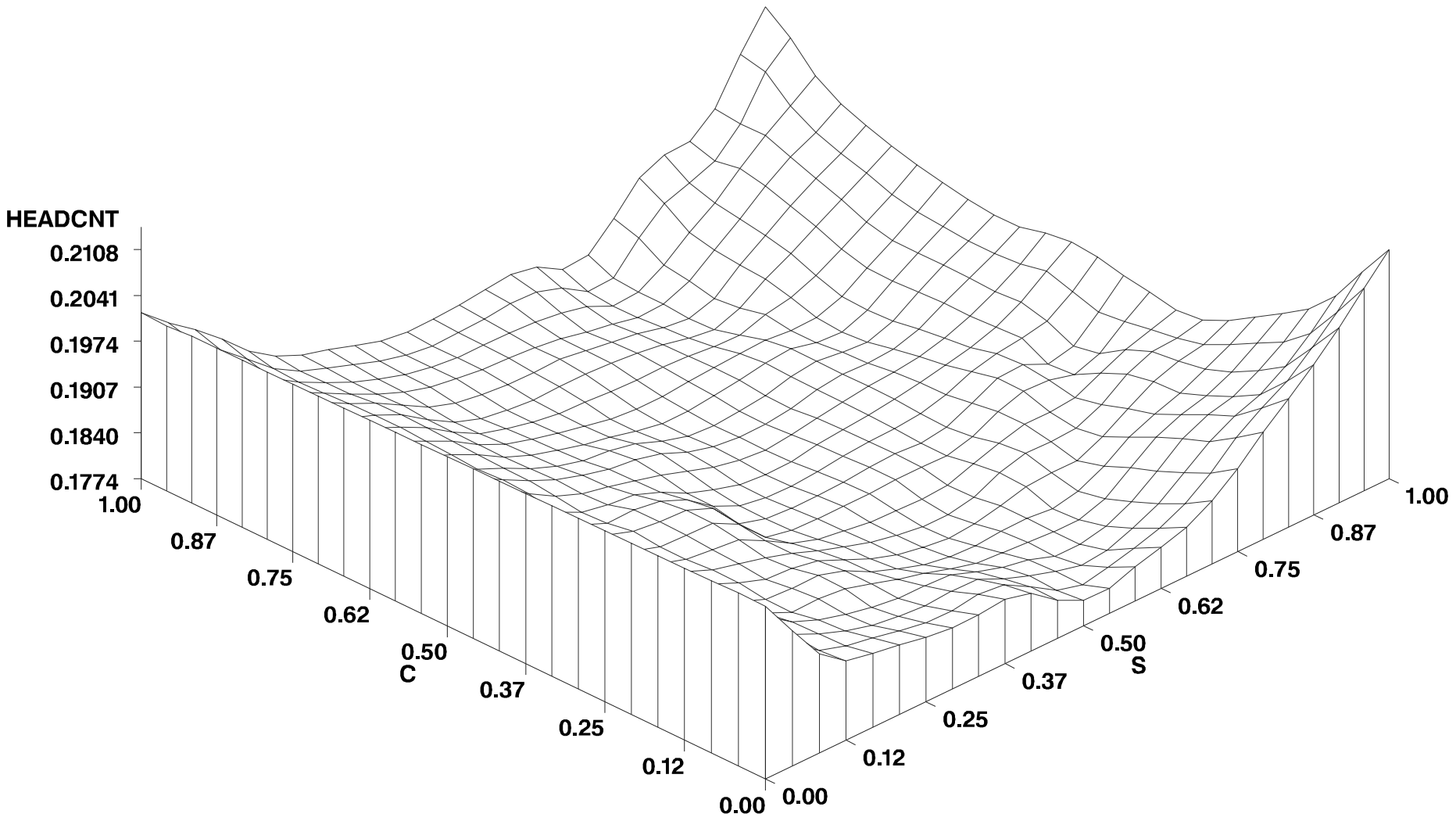
The Impact of Equivalence Scale Parameters
on the Poverty Headcount in Spain
Absolute Poverty Line



Using the Cutler and Katz class of equivalence scales

Figure 4

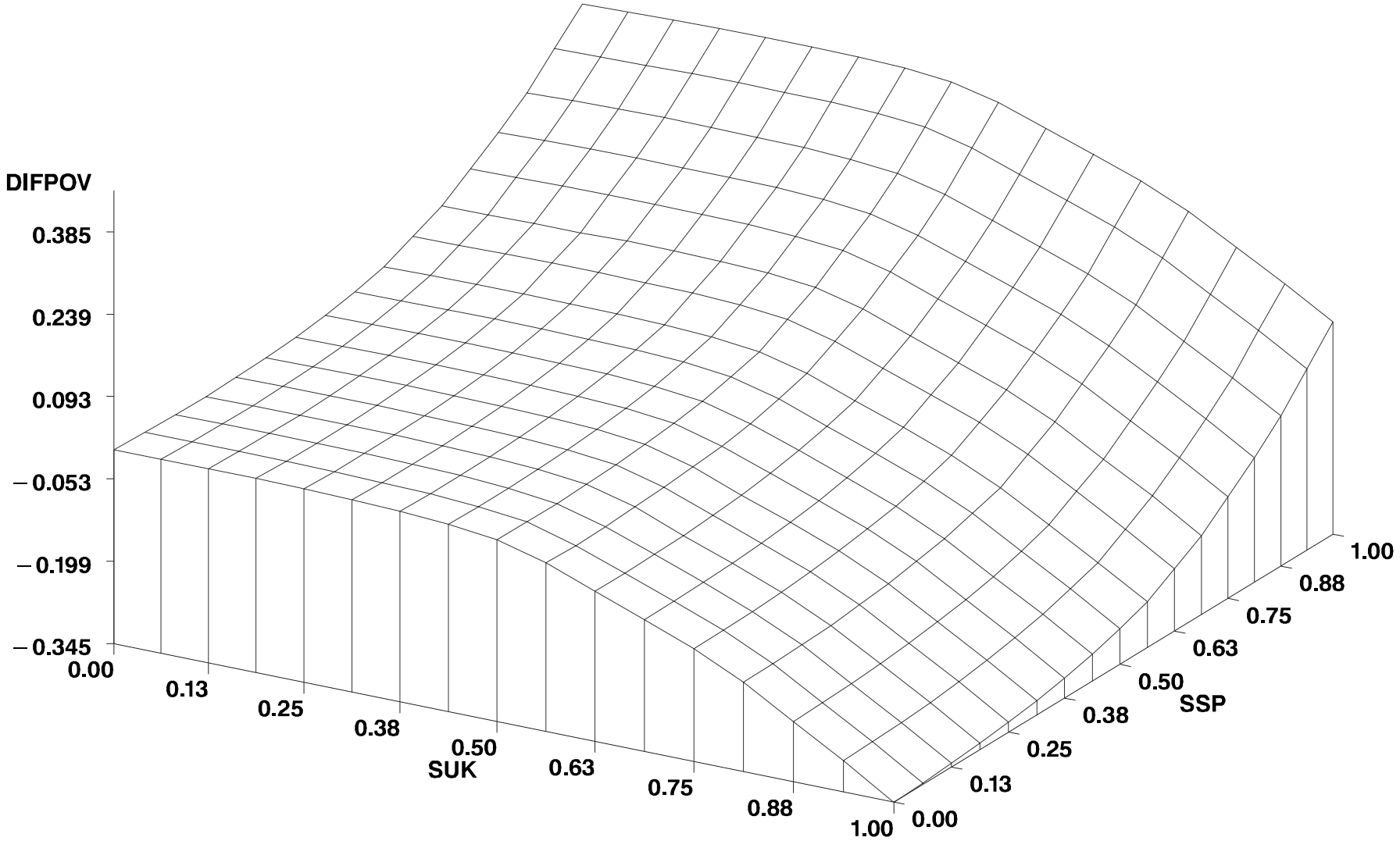
The Impact of Equivalence Scale Parameters
on the Poverty Headcount in Spain
Relative Poverty Line



Using the Cutler and Katz class of equivalence scales

Figure 5

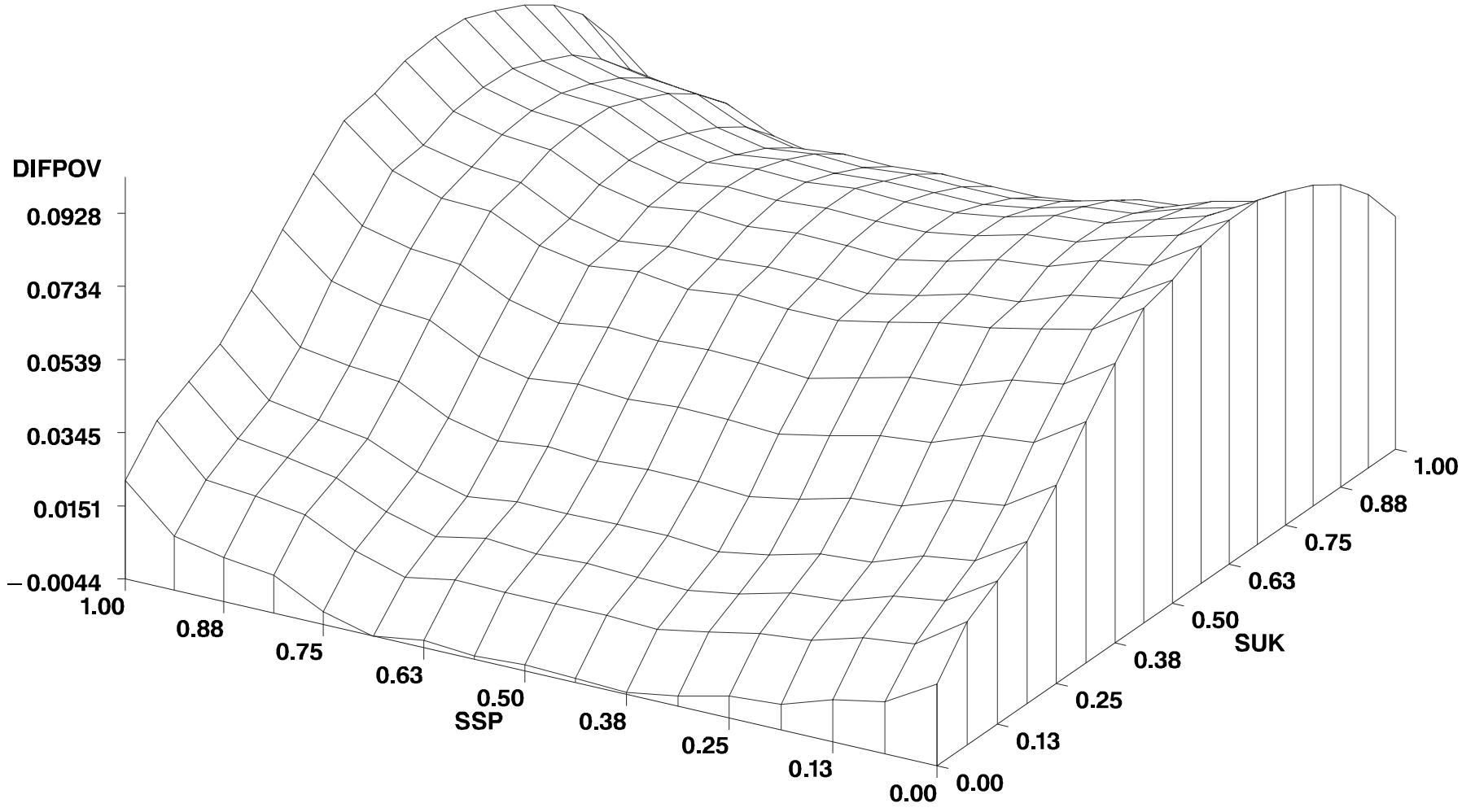
Impact of Independent Variations in "s" Upon Headcount Differences Between Spain and the UK Absolute Poverty Line



Using the Buhmann et al. class of equivalence scales

Figure 6

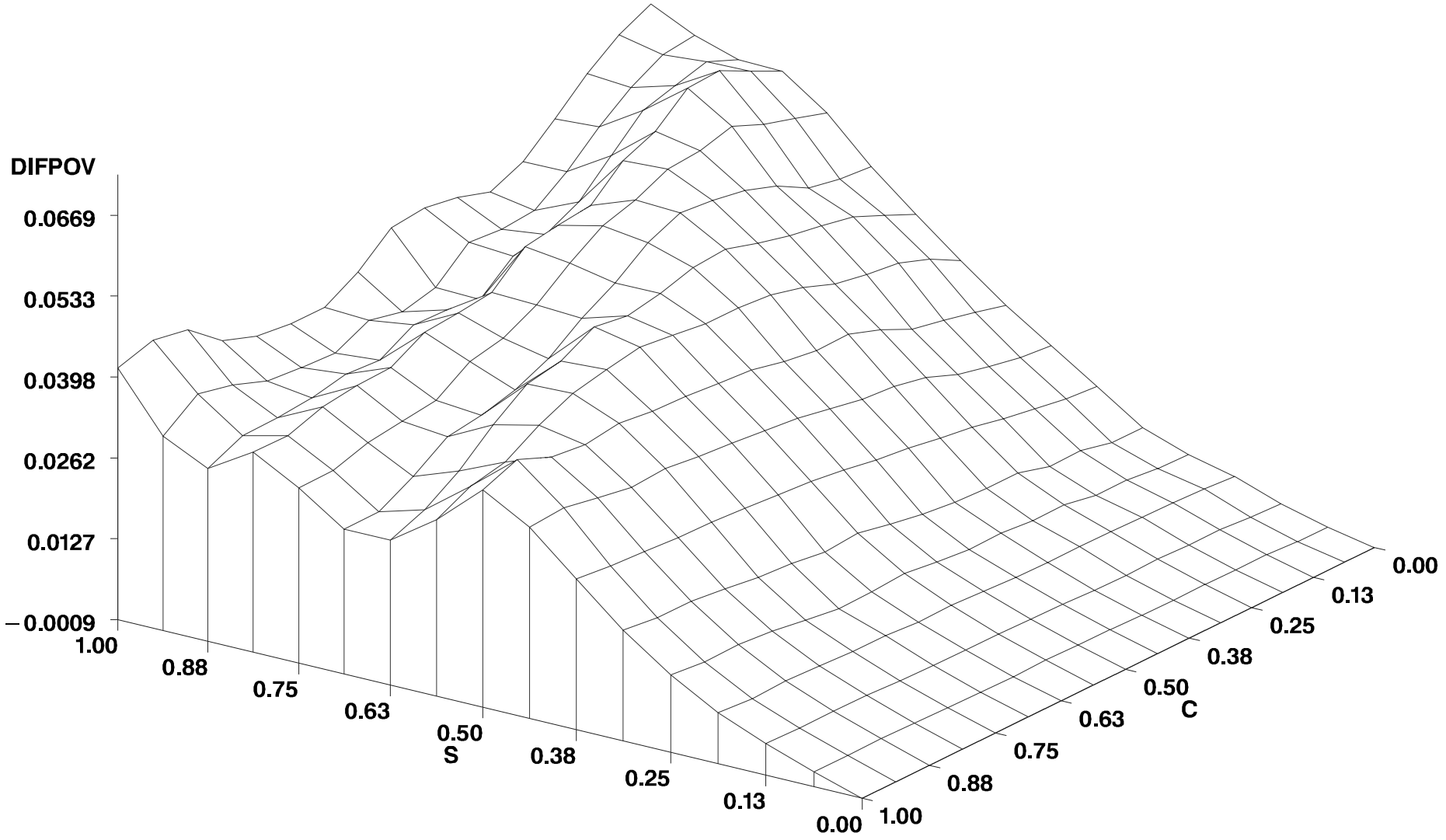
Impact of Independent Variations in "s" Upon Headcount Differences Between Spain and the UK Relative Poverty Line



Using the Buhmann et al. class of equivalence scales

Figure 7

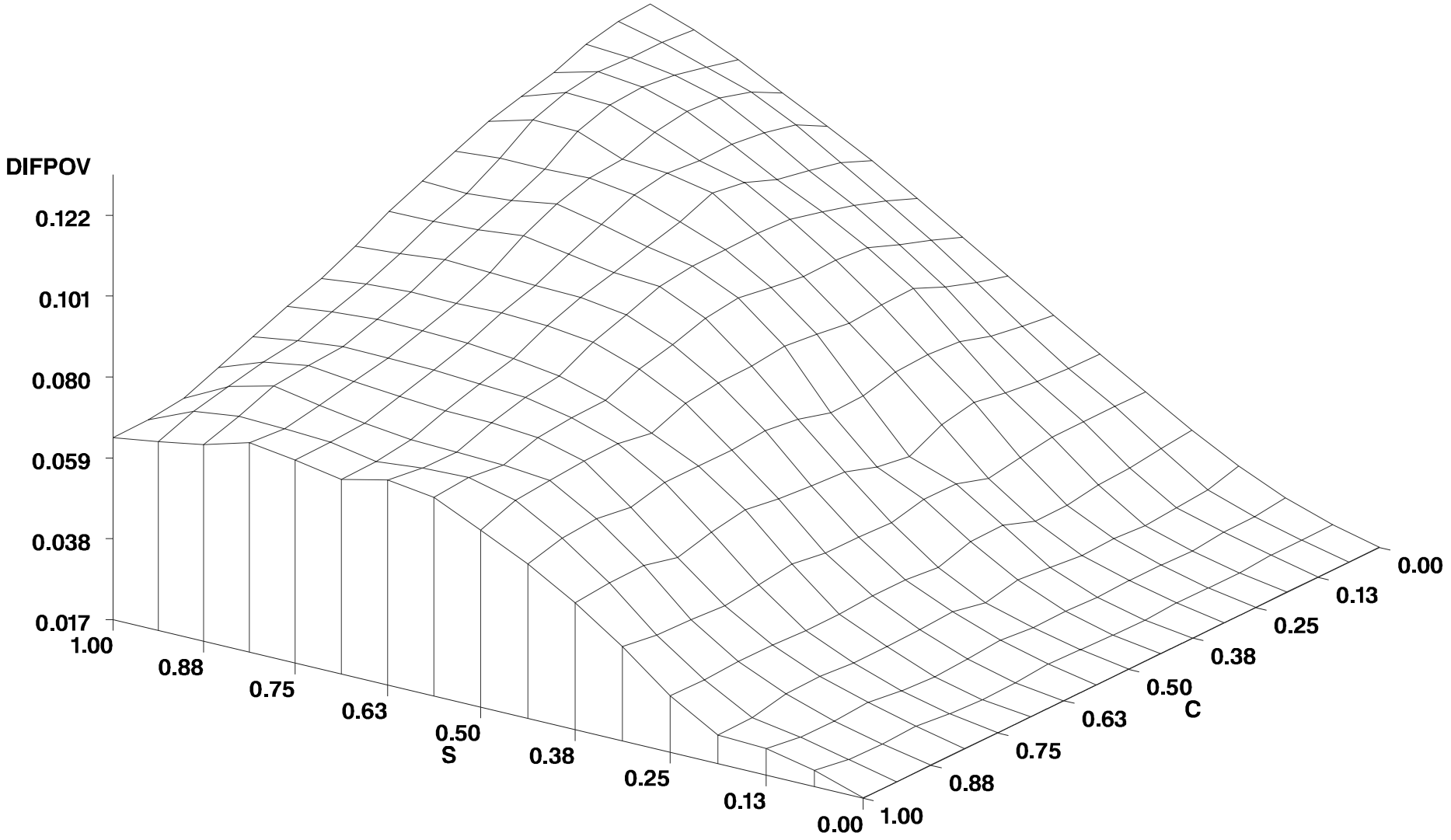
The Impact of Equivalence Scale Parameters on Headcount Differences Between Spain and the UK Absolute Poverty Line



Using the Cutler and Katz class of equivalence scales

Figure 8

The Impact of Equivalence Scale Parameters on Headcount Differences Between Spain and the UK Relative Poverty Line



Using the Cutler and Katz class of equivalence scales