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HOUSEHOLD NEEDS AND POVERTY: WITH APPLICATION TO SPAIN AND THE U.K.

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We examine the sensitivity of U.K.–Spanish poverty comparisons to variations in the dependence of equivalence scales on household size and composition, using evidence from national household budget surveys. We sum up these comparisons using subjective confidence levels. Taking into account the dissimilarities in the distribution of incomes and needs across countries, 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 percent of the population 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. Generally, however, the proportion of single adults among the poor is much less important in Spain than in Britain, the reverse being true for households with three or more adults.

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 and it has left a wide range of applicable equivalence scales from which researchers and policy-makers can select. Recent work in the field has emphasized that the choice of particular scale inevitably introduces important value judgements on how *needs* of individuals differing in non-income characteristics are assessed, and that it might therefore be appropriate to recognize the lack of agreement in this choice when measuring and comparing inequality and poverty levels. The practical importance of this issue has reinforced this view.[2]

Note: 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]See Whiteford (1985) or Buhmann *et al.* (1988) for an indication of the diversity of existing equivalence scales. Also, see Coulter *et al.* (1992a) for a discussion of the methodological issues involved in the models often used for the estimation of equivalence scales.

[2]See, for instance, the recent sensitivity tests provided by Buhmann *et al.* (1988), Coulter *et al.* (1992b), Atkinson *et al.* (1993) and Lanjouw and Ravallion (1995). Since this paper was initially submitted in December 1994, several papers on the topic have also appeared, including two in the *Review* [Burkhauser, Smeeding, and Merz (1996) and DeVos and Zaidi (1997)] which also deal with the issue of the sensitivity of international poverty comparisons. These two papers conclude that the poverty ranking of countries is quite robust to the choice of equivalence scales, but that the socio-demographic composition of poverty is rather sensitive to that choice.

Allowing the assessment of needs to vary turns out to be especially relevant in a cross-country comparative analysis, particularly when countries compared differ significantly in their socio-economic fabric. There is in this case the added issue that not only can the appropriate scale rates be uncertain in a given country, but they may also be different between countries. That is, being uncertain about the valuation of needs in a particular society, we certainly cannot be sure that such a valuation must be identical across differing societies. Testing the sensitivity of inequality and poverty results in changes to the incorporation of needs which is a matter of crucial importance particularly for those international comparisons whose results can influence redistributive policies, e.g. through the transfer of resources from some countries or regions to others, or in the assessment of transnational or alternative anti-poverty policies.

This paper uses some recently introduced parametric classes of equivalence scales to compare poverty in Spain and in Britain using different scenarios for the incorporation of household needs. Needs are taken to be a function of household size and composition, in the manner of Banks and Johnson (1994) and Jenkins and Cowell (1994), where both of these elements matter for distributional comparisons. We first check how the headcount ratio varies in Spain when household needs grow with the number of adults and 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 summarize 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.[3]

In sum, our analysis takes a rather crude (though very popular) index of poverty and analyses what can be said from a U.K.–Spanish poverty comparison when a wide interval of views in the assessment of family size and composition is incorporated. By focusing only on the study of the impact of equivalence scales

[3]An alternative approach is provided by Atkinson (1992) [see also Atkinson and Bourguignon (1982, 1987) and 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. Although this is a line of research which we consider to be valuable, and which we hope to develop in future work, we do not pursue it here since we do not only wish to *compare* poverty (in an ordinal setting), but we also want to measure *differences* in poverty, and check how the size of these differences vary with variations in modelling assumptions. It is, in fact, such measured differences in poverty which typically inform transnational social policy-making. We furthermore wish to test whether poverty comparisons are sensitive to applying different equivalence scales to different countries (as is often implicitly done in practice), in exercise which is not possible in the multidimensional setting of Atkinson (1992) since identical "welfare" functions of needs and incomes are used across distributions.

on poverty differences across countries, we overlook other important ingredients to the investigation of poverty, such as the choice of the poverty index, the poverty line definition, the definition of resources, the definition of children, the sharing of resources among household members, or the choice of the unit of analysis. We also overlook the interactions between these elements and the choice of equivalence scales.[4] The reader should thus keep in mind that we do not wish to provide a complete or definitive analysis of poverty differences between Spain and the U.K., but rather to contribute to the understanding of the key role played by equivalence scale issues in such cross-country distributional 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. Since E is normalized 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 summarize using the following class:

$$E = N^s \tag{1}$$

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.[5]

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.[6] Most equivalence scales do indeed distinguish strongly between the presence of adults and that of children, and some—like that of

[4]For an analysis of the impact of some of these elements on the U.K.–Spanish poverty comparison, see Mercader (1993).

[5]An even simpler class for E would be

$$E = 1 + s \cdot (N - 1) \tag{1A}$$

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

[6]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].

McClements (1977)—even discriminate finely between children of different ages.[7] 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:

$$E = (N_A + c \cdot N_C)^s \tag{2}$$

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.[8] 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)[9,10].

TABLE 1

PROPORTION (%) OF HOUSEHOLDS BY SIZE AND NUMBER OF CHILDREN

N_A = col	Spain					U.K.				
N_C = row	1	2	3	+3	Total	1	2	3	+3	Total
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

The need for an appropriate account of the presence of children in households is supported by the importance of family and child policy in many countries and by the role of children in accounting for the occurrence of large households. It has also already been found to matter empirically in the assessment of poverty in individual countries [e.g. Jenkins and Cowell (1994)]. To distinguish between the presence of adults and children is even more relevant here given the observed differences in household demographic structures between Spain and the U.K. 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

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

[8]Blackburn (1994) uses, for instance, equation (2) with $c = 0.4$ and $s = 0.5$ to test the sensitivity of poverty comparisons across 11 countries to the choice of poverty lines.

[9] 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.

[10]A simple and natural extension of the one-parameter form (1) is

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

where needs are a linear function of the number of adults and of the number of children. This is the form of the OECD (1982) scale, for which $a = 0.7$ and $c = 0.5$.

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 U.K.[11]

To get a taste for "reasonable" parameter ranges for form (2) when we come to the analysis of results later, we have fitted it (and other forms) to two widely used equivalence scales, the OECD and the McClements scales (see the Data Appendix).[12] The OECD scale is commonly used by international bodies such as the European Community and it is also the scale more widely used in Spain. As noticed by Coulter *et al.* (1992a), however, "the McClements scale has semi-official status in the U.K." (p. 104). For both samples and for both countries, the estimated values of the parameters c and s are very precisely estimated. Unsurprisingly (given the weights which the scales give respectively to adults and children), the needs c of a child relative to those of an adult are notably higher for the OECD scale ($c \simeq 0.73$) than for the McClements scale ($c \approx 0.51$), whereas the overall elasticity of household needs (parameter s) appears quite similar for both scales (around 0.80).

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.[13] 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. Results on absolute poverty are also analysed since they can provide useful insights for the interpretation of relative poverty results. We arbitrarily set the absolute Spanish poverty line to 129.000 pts/year.[14] For the U.K., the absolute poverty line adopted is, again, a convenient one. Without any serious attempt to make absolute poverty lines effectively equivalent across the two countries, we take for the U.K. that poverty line which equalizes the headcount ratios for the U.K. and Spain when it is assumed that household needs do not vary with

[11]We have compared the weighted sample distribution of households by household size and age of the head with the 1981 Spanish census data. We found that one-person households are under-represented in the Spanish sample by about 24 percent (in particular households with a head younger than 29 or older than 70) while households with four to six adults appear slightly over-represented (by between 5 and 10 percent).

[12]The results can be found in Duclos and Mercader (1993).

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

[14]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 equivalized according to the OECD scale. This poverty line is slightly higher than the one adopted by Ruiz-Castillo (1987) for per capita expenditure.

household size.[15] This implies a poverty line of £45.03 per week.[16] We are conscious, of course, that this choice of absolute poverty is arbitrary, but it suits well the purpose of our illustrations since we are interested in how differences in absolute poverty headcount are *affected* by different needs assumptions, and not so much by the *value* of these differences as such.

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 (2). 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.

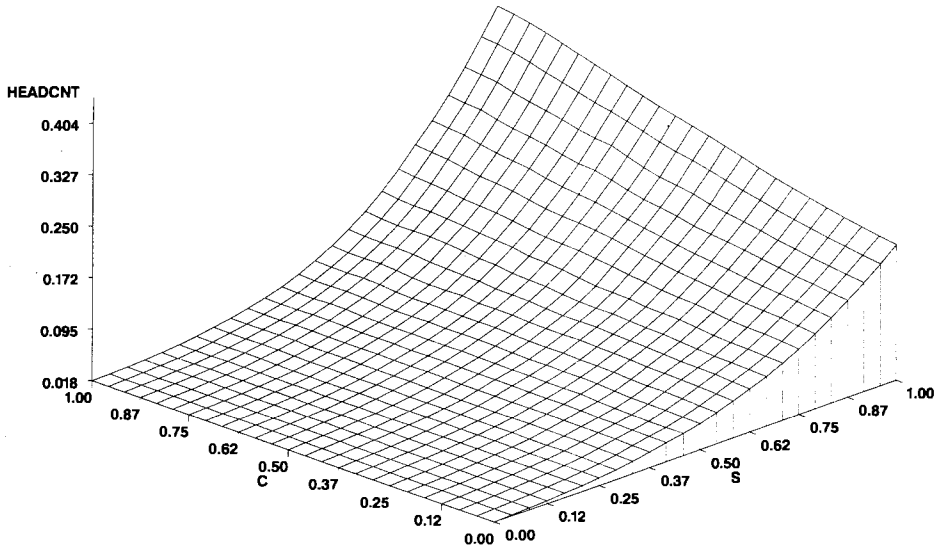

Figure 1. The Impact of Equivalence Scale Parameters on the Poverty Headcount in Spain—Absolute Poverty Line (Using the Cutler and Katz Class of Equivalence Scales)

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.[17] 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,

[15]We make this normalization since our aim here is *not* to provide definitive results on the *differential* level of absolute poverty between Spain and the U.K., 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.

[16]This poverty line is slightly higher than one-half of the mean of the U.K. income distribution in the 1985 Family Expenditure Survey when that distribution is equivalized according to the OECD scale.

[17]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 percent.

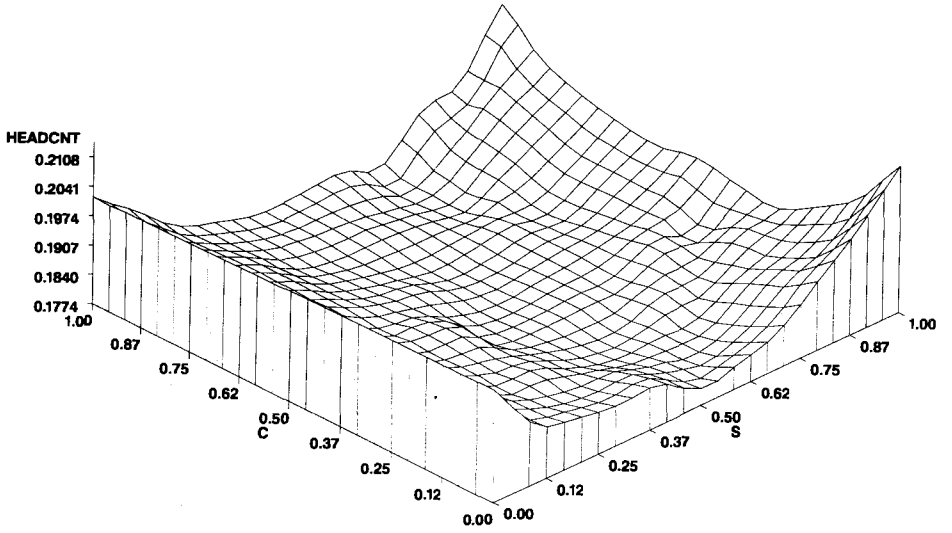

Figure 2. The Impact of Equivalence Scale Parameters on the Poverty Headcount in Spain—Relative Poverty Line (Using the Cutler and Katz Class of Equivalence Scales)

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 "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-monotoncity 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 2 and 3. 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. 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 U.K., 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 Table 4. Table 4 indicates that, for a given household size, households with many adults have on average higher unequivalized incomes than households with few adults. Notice that this correlation is distinctly higher in the U.K. 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. It is also possible that the income of Spanish second-earners (particularly wives and young adults) is more largely underestimated in the survey since, as found in Muro *et al.* (1988), these second-earners are relatively more active in the informal labour market than primary earners.

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 2. 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.

TABLE 2

CORRELATION BETWEEN EQUIVALENT INCOMES AND $\log(N_A + cN_C)$

	Spain					U.K.				
s = col c = row	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

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 percent 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 percent 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 equivalize resources of households with different characteristics but also whether or not these resources can be equivalized with the same scale across countries and across time. Put in other words, are the relative needs of households necessarily the same in the U.K. 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 U.K.

Absolute Poverty

Figure 3 shows differences between the headcount of absolute poverty in Spain and in the U.K. for different values of s (SSP for s in Spain and SUK for s in the U.K.) in the two countries. Again, by construction, the difference between headcounts in Spain and the U.K. 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. Due to 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. Due to the greater presence of larger households in Spain than in the U.K. 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

[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.

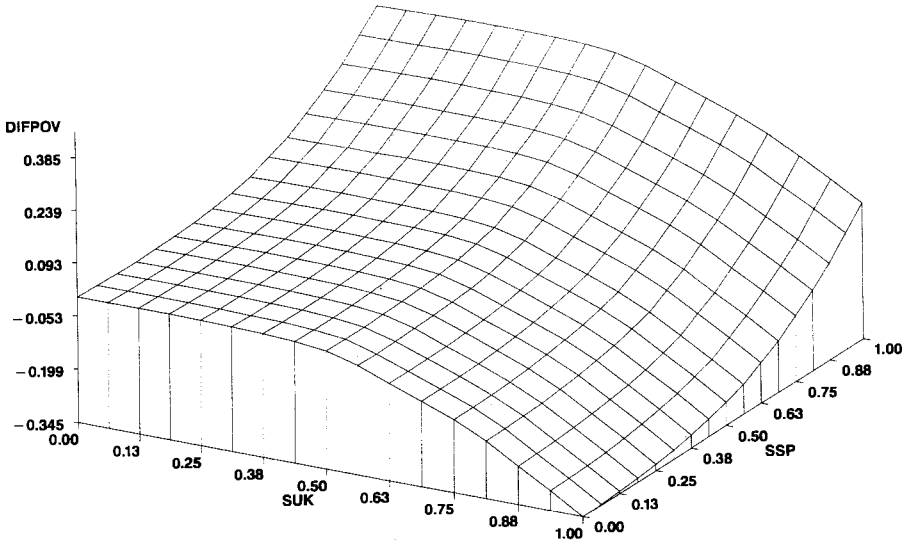

Figure 3. Impact of Independent Variations in "s" Upon Headcount Differences Between Spain and the U.K.—Absolute Poverty Line (Using the Buhmann *et al.*, Class of Equivalence Scales)

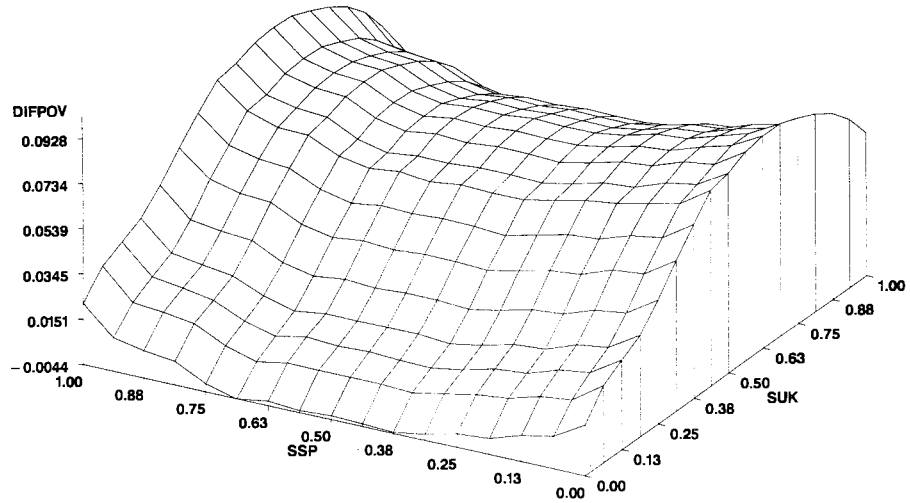

Figure 4. Impact of Independent Variations in "s" Upon Headcount Differences Between Spain and the U.K.—Relative Poverty Line (Using the Buhmann *et al.*, Class of Equivalence Scales)

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 loweredfaster 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.

TABLE 3

CORRELATION BETWEEN EQUIVALENT INCOMES AND $SN_c/(N_A + cN_C)$

	Spain					U.K.				
s = col c = row	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 4

CORRELATION BETWEEN UNADJUSTED INCOME AND ADULT PRESENCE, FOR A GIVEN HOUSEHOLD SIZE

	U.K.	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

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 U.K. (by up to 9.3 percent). Moreover, as Figure 6 will confirm, focusing on similar values for SSP and SUK leads unequivocally to larger headcounts in Spain than in Britain. This can possibly be explained by differences in the extent of redistribution towards the poor found in the two countries. At the beginning of the last decade, the U.K. had (and still has) a relatively complex and generous system of social protection (income support, unemployment insurance, child benefits, ...), while Spain was just starting the development of its welfare state (still today relatively much less generous). The fact that at that time Spain did not have any kind of universal income support programme may thus partly explain why Spain shows a greater proportion of relative poor than the U.K. Secondly, the U-shape behaviour of relative poverty is much more pronounced in the U.K.; 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 U.K.; the reverse occurs as s approaches 1. This is also consistent with the correlation results of Table 2.

3.4. *The Impact of Household Needs on Poverty Differences Between Spain and the U.K.*

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 U.K. 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

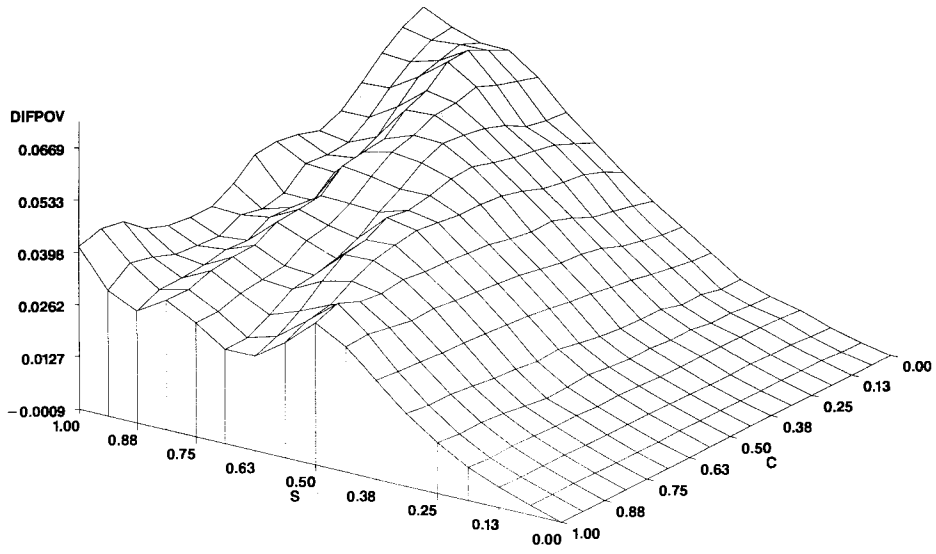

Figure 5. The Impact of Equivalence Scale Parameters on Headcount Differences Between Spain and the U.K.—Absolute Poverty Line (Using the Cutler and Katz Class of Equivalence Scales)

magnitude of Spanish households' needs increases by more (because of the relatively greater presence of large households in Spain) than in the U.K.; 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 U.K., and that the difference can vary between 1.7 percent and more than 12 percent. Hence, the choice of equivalence scale parameters can greatly matter 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.

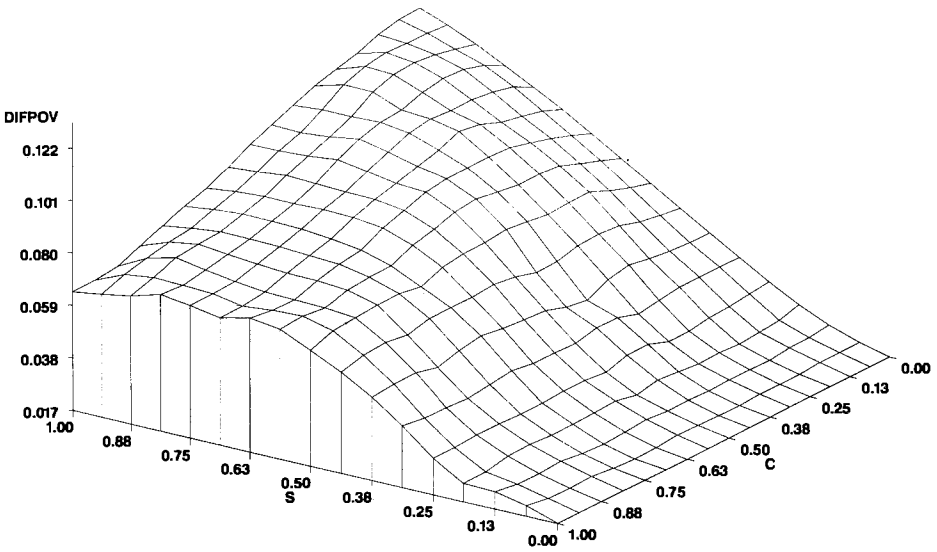

Figure 6. The Impact of Equivalence Scale Parameters on Headcount Differences Between Spain and the U.K.—Relative Poverty Line (Using the Cutler and Katz Class of Equivalence Scales)

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 percent to 2.2 percent. 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. Governments sometimes find simpler to target poverty alleviation programmes to a few of these identifiable socio-economic groups. Tables 5A to 5D

TABLE 5A

COMPOSITION OF POVERTY IN THE U.K. WHEN HOUSEHOLD NEEDS ARE UNAFFECTED BY THE PRESENCE OF CHILDREN ($E = N_A^s$)

(% of the poor)

Household 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

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 5A and 5B first, which indicate how the population of the poor (relative and absolute) in the U.K. 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 composed of single adults (42 percent and 66 percent, respectively). In Spain, however, the significant part of the poor population is found in two-adult households (49 percent and 43 percent), with only 8 percent and 22 percent of the relatively and absolutely poor being single adults. As s increases from 0 to 1, however, the picture changes rapidly. In the U.K., 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 percent to 15 percent; for relative

TABLE 5B

COMPOSITION OF POVERTY IN SPAIN WHEN HOUSEHOLD NEEDS ARE UNAFFECTED BY THE PRESENCE OF CHILDREN ($E = N_A^s$)

(% of the poor)

Household Types	s	Relative Poverty 1	0.75	0.5	0.25	0	Absolute Poverty 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 5C

COMPOSITION OF POVERTY IN THE U.K. WHEN HOUSEHOLD NEEDS ARE DETERMINED BY HOUSEHOLD SIZE ($E = N^s$)

(% of the poor)

Household Types	s	Relative Poverty 1	0.75	0.5	0.25	0	Absolute Poverty 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

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 percent to 53 percent 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 5C and 5D. Note that the results are necessarily identical to those of Tables 5A and 5B when $s = 0$. As s increases, the poor in Britain become largely and quickly members of

TABLE 5D

COMPOSITION OF POVERTY IN SPAIN WHEN HOUSEHOLD NEEDS ARE DETERMINED BY HOUSEHOLD SIZE ($E = N^s$)

(% of the poor)

Household 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

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 percent), and households with four and more adults double in importance (to around 40 percent of the poor population). The proportion of single-parent households stays very low (usually below 1 percent), an observation which we can also make for $c = 0$ in Table 5B; that proportion is usually 10 times larger for Britain in Table 5C. As for Tables 5A and 5B, the *composition* of the poor is quite similar whether we consider relative or absolute poverty.

As discussed above, however, the choice of relative vs. 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 5C and 5D 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 percent to 12 percent to 14 percent if we count individuals, and from 23 percent to 11 percent to 12 percent if we count households; these are clearly substantial variations. For Spain, the proportion of individuals in relative poverty moves little from 20 percent to 19 percent and to 21 percent, when s increases from 0 to 1, and the proportion of households in poverty stays pretty much between 20 percent and 23 percent.

Comparing Tables 5A and 5B with Tables 5C and 5D, 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 U.K.) 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 U.K. 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 percent or 14.3 percent are relatively poor in Britain depending on whether $c = 0$ or $c = 1$. In Spain, the figures are both close to 21 percent. 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 percent or 60 percent 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 percent to 60 percent of average equivalent incomes, the headcount increases from generally well below 10 percent to around 20 percent in Britain, and from about 12 percent to close to 30 percent 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 however allow us to say something with at least some confidence. We illustrate this in light of the uncertainty as to the proper s value (of the Buhmann *et al.* (1988) class) to apply, and as to whether the same s should be applied to both Spain and the U.K.

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

[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 U.K. at all deciles.

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 percent level of confidence, and that the relative poverty headcount in Spain is always larger than that in Britain, whatever the choice of SSP and SUK, yielding a 100 percent subjective level of confidence.[20]

This method explicitly allows for subjective ranges of plausible values to be applied 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 percent 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 percent and 100 percent. 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 percent or 100 percent confidence). Due to 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 U.K. The study mainly distinguishes itself from other international comparisons of income distributions by its focus on the role of household composition. Due to the 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

[20]These levels of confidence must of course be taken with care since, as we noted above, a number of elements relevant to a more complete analysis of poverty have not been sufficiently modeled here. This is particularly true for the comparisons of absolute poverty.

Spain than in Britain, the actual headcount differences may vary by up to 7 percent (absolute poverty) and 10 percent (relative poverty) of the population when needs allowances are altered, even when kept the same across the two countries. That is, between 1.7 percent and 12.2 percent more Spaniards are relatively poor than 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 Office of National Statistics (formerly, Central Statistical Office) and by the Department of Social Security for the analysis of income distribution in Britain. 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. Since the OECD scale is one of the most commonly used in developed countries for distributional assessments it is a particularly natural choice 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 U.K. Family Expenditure Survey (FES) is a continuous enquiry into the expenditure and income of private households in the United Kingdom (U.K.), 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 2,000 of all U.K. households, with a response rate of around 70 percent, and yielding a final sample of 7,012 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 (1993), where reference is also made to the reliability of the income data in the Spanish Household Survey; on this, see also Sanz (1996) and Oliver-Alonso (1997).

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.[21]

We distinguish household types by their number of adults, N_A, and children, N_C, where $N_A = 1, \ldots, N_A^*$ and $N_C = 0, \ldots, N_C^*$. 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 continuously distributed with group density function $g_{i,j}(X)$. Let E be the number of equivalent adults in the household:

$$E_{N_A,N_C} = (N_A + cN_C)^s. \tag{3}$$

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

$$E^s_{N_A,N_C} = \frac{\delta \ln E}{\delta s} = \ln (N_A + cN_C) \tag{4}$$

[21]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).

and

$$E^{c}_{N_A,N_C} = \frac{\delta \ln E}{\delta c} = \frac{sN_C}{N_A + cN_C}. \tag{5}$$

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

$$Z_{i,j} = Z_{1,0} E_{i,j} \tag{6}$$

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:

$$H = \sum_{i=1}^{N_A^*} \sum_{j=0}^{N_C^*} p_{i,j} \int_0^{Z_{i,j}} g_{i,j}(Y)\, dY. \tag{7}$$

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

$$\frac{\delta H}{\delta x} = \sum_{i=1}^{N_A^*} \sum_{j=0}^{N_C^*} p_{i,j} \cdot E^x_{i,j} \cdot g_{i,j}(Z_{i,j}) \cdot Z_{i,j} \cdot (1 - T^x_{i,j}) \tag{8}$$

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

$$T^x_{i,j} = \frac{1}{E^x_{i,j}} \left[\frac{\mathrm{Cov}(\bar{Y}_{i,j}, E^x_{i,j})}{\bar{Y}} + \bar{E}^x \right] \tag{9}$$

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

Note that three effects appear in equation (8): a pure poverty line effect $(E^x_{i,j})$, a within-group distribution effect $[g_{i,j}(Z_{i,j}) \cdot Z_{i,j}]$, and an indirect poverty line effect $(T^x_{i,j})$. For each group, these effects are weighted by the group's importance in the overall population $(p_{i,j})$.

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