



THE ECONOMIC AND SOCIAL RESEARCH INSTITUTE

RELATIVE POVERTY LINES: AN
APPLICATION TO IRISH DATA FOR
1973 AND 1980

Brian Nolan

February 1988

Working Paper No. 4

Working Papers are not for publication
and should not be quoted without prior
permission from the author(s).

Relative Poverty Lines: An Application
to Irish Data for 1973 and 1980

Introduction

The need to conceive of poverty in developed economies as being relative rather than absolute in nature - with the minimum acceptable income and standard of living varying between different societies and over time - is now widely accepted. Within this general framework, the choice of a specific poverty line for a particular society at a particular date is fraught with difficulty. A number of different approaches to deriving such poverty lines have been developed and were reviewed in the second Working Paper in our series "Concepts of Poverty and the Poverty Line" (Callan and Nolan, 1987).

As discussed in that paper, a major objective of the analysis of the survey data currently being gathered in the ESRI project on poverty, income distribution and the usage of State services will be to apply a number of these approaches. Not only will this provide a great deal of new information about the extent and nature of poverty in Ireland, it will also allow us to explore the relationship between poverty lines derived from the different approaches when applied to a common data-set, which has not previously been possible. It must be acknowledged, however, that unanimity about the precise location of 'the' poverty line is unlikely to be achievable: indeed, as recently emphasised by Foster and Shorrocks (1987a), even given agreement on a particular

conceptual approach "a feature common to all proposed methods is a significant degree of arbitrariness in the value assigned to the poverty standard" (p. 1). The recognition of these difficulties has led to the exploration by Atkinson (see 1987a, for example) and Foster and Shorrocks (1987a, b) of the possibilities for at least partial ranking of different distributions as having 'more' or 'less' poverty, even when the poverty line is allowed to vary over a certain range.

In this general context, one relatively straightforward method of comparing poverty in two distributions which may be applied when only data about incomes (and not about lifestyles, living conditions, or views about adequacy) are available, and may yet be quite revealing, is the use of *purely relative poverty lines*. Such relative poverty lines take as their basis average disposable income in each distribution, for example, and arbitrarily set, say, 50 per cent of that figure as the poverty line for each. If a number of different lines is used - say 40 per cent, 50 per cent and 60 per cent - then not only can the sensitivity of the measured poverty in each to shifting the poverty line be assessed, but we can also see whether one distribution consistently has more poverty than the other, no matter which of the lines is used. This may then allow a much more confident ranking of the two distributions to be made, which is not dependent on a particular level for the poverty line.

Purely relative poverty lines *per se* may find some basis

in those conceptual approaches to defining poverty which emphasise the need for a minimum level of income relative to the rest of society in order to make possible participation in the customary activities of that society. The selection of a particular relative poverty line is still subject to all the difficulties and the degree of arbitrariness already mentioned, though. The application of a number of different lines in the present paper is therefore intended to show what general conclusions can be reached when the poverty line is allowed to vary over a range, rather than justifying reliance on purely relative poverty lines.

A major advantage of purely relative lines compared, for example, with 'official' poverty lines, based usually on social security rates, is that when used for international comparisons, they give transparent, easily interpreted results. When a comparison is made between two countries using 'official' poverty lines, the fact that country A has 10 per cent poor while country B has only 5 per cent, may reflect merely the fact that social security rates are much higher in A. This problem is avoided if purely relative poverty lines are used: to say that country A has 10 per cent with incomes of less than half its national average whereas country B has only 5 per cent below half its own national average, does tell us something useful about the two countries.

For this reason, purely relative poverty lines have been used in several studies involving international comparisons

(OECD 1976, Beckerman 1979), and by the EEC in attempting to bring together information on poverty in the various Community countries. It is as part of an updated EEC-wide exercise that the estimates for Ireland for 1973 and 1980 reported in the present paper were constructed. While the comparison of these Irish figures with those for the other countries, to be presented by the EEC, will be of great interest, the exercise also provides some insights into the nature of such poverty lines and the extent and composition of low income households in Ireland in the two years in question, which we focus on here.

Related to the absence of a commonly accepted method for specifying 'the' poverty line for a particular type of household, is the lack of consensus on the adjustments to be made to take differences in family/household composition into account. A wide range of adult equivalence scales may be put forward for this purpose, derived from a variety of conceptual approaches. The precise scale used may play a significant role in comparisons of the extent of poverty at different points in time or between two countries. Again, Atkinson (1987a, b) has argued in favour of taking explicit account of the existence of different judgements about the needs of different families, focusing on conditions where definite statements about poverty in two distributions can still be made even in these circumstances. Here, some indication of the sensitivity of the results to the equivalence scale used will be provided by the use of three

quite different sets of scales. The extent to which unambiguous rankings of distributions can be made covering all three scales is then of considerable interest, as are the differences in the extent of measured poverty from one scale to another.

The actual poverty lines used and the way they were applied to Irish data are described in the next section. Section 3 then presents the results of the analysis of the 1980 HBS data. Section 4 looks at the 1973 data and the major differences revealed between the two years. Section 4 brings together the conclusions.

2. The Construction of Relative Poverty Lines for 1973 and 1980.

The years 1973 and 1980 are used because national Household Budget Surveys were carried out in those years by the CSO. Most studies estimating the extent of poverty in Ireland are also based on this HBS data, and their results - surveyed in our Working Paper 1 (Nolan, 1987) - may be compared with those produced by purely relative poverty lines.

A variety of poverty lines were set out by the EEC and applied to the Irish data. First, the (necessarily arbitrary) proportions of average income, namely 40 per cent, 50 per cent, and 60 per cent were specified. Second, three different sets of equivalence scales to adjust for differences in household size and composition were specified. Third, a number of different methods of calculating average income

were set out. This means that, though a wide range of estimates of the numbers 'in poverty' rather than a single estimate are produced, the application of different approaches highlights a number of interesting features.

Disposable household income is the basis for all the calculations, and the information used all comes from the HBS samples rather than from any external source.¹ The average disposable income on which the poverty lines are based is not the average per household or per capita but per adult equivalent unit. The three adult equivalence scales used are:

Scale A: 1 for the household head, 0.7 for each other individual in the household.

Scale B: 1 for the household head, 0.5 for each other individual in the household.

Scale C: 1 for the household head, 0.7 for each other adult, 0.5 for each child.

Since the average equivalent disposable income in the sample will vary depending on the equivalence scale used, this means that three different averages are calculated. For each, there are then three poverty lines:

40 per cent of average equivalent income, termed P1.

50 per cent of average equivalent income, termed P2.

60 per cent of average equivalent income, termed P3.

So a total of nine different relative poverty lines is to be calculated.

Ideally, micro-data on individuals in the sample would be used to calculate an equivalent income for each household, the average for the sample, and the poverty lines, using each of the three sets of equivalence scales in turn. The actual equivalent income of each household could then be compared

with the poverty lines and the numbers beneath each derived. This was not possible in the time available, but the CSO very kindly provided detailed tabulations from the HBS for each year showing the distribution of households by disposable income category, separately for twelve different household composition types.² Quite narrow income ranges were used, with 60 income classes for 1980 and 20 for 1973, so a high degree of accuracy was possible in interpolating to estimate the numbers under particular income levels. The twelve household composition types and the composition of the sample across these types in each of the years is shown in Table 1.

Table 1: *Composition of 1973 and 1980 HBS samples by Household Type*

<i>Household Category</i>	<i>% of Total in Sample</i>	
	1973	1980
1 adult	14.1	16.4
2 adults	20.0	20.2
2 adults and one child	4.8	6.2
2 adults and two children	6.6	10.2
2 adults and three children	5.0	7.4
2 adults and four or more children	7.5	6.4
3 adults without children	10.1	7.2
3 adults with children	8.1	7.0
4 adults without children	5.9	4.1
4 adults with children	6.4	4.3
Other households without children	3.6	3.3
Other households with children	8.0	7.3

Given this detailed data by household composition type, average equivalent disposable income in the sample can be calculated as the weighted average of the category mean equivalent incomes:

$$\sum_i W_i (Y_i/n_i \cdot F_i)$$

where Y_i = total disposable income of the households in category i ,

n_i = number of households in category i ,

N = total number of households in sample,

W_i = n_i/N

and F_i = the equivalence factor for households of that category.

The equivalence factors are straightforward for most household types, where the composition is defined unambiguously: for a 2-adult household, for example, the equivalence factor is 1.7 using scale A, 1.5 using scale B, and 1.7 using scale C. For a 2-adult plus 2 child household, similarly, the factor is 3.1 using scale A, 2.5 using scale B, and 2.7 using scale C. For the categories such as "3 adults with children", "others without children", etc., where the exact composition is not defined by the category, the actual average composition of the households in that category (as shown in the published HBS reports) is used to derive the equivalence factor.

The mean equivalent disposable income for each household type category in 1980, using the three sets of equivalence scales, and the (weighted) average equivalent disposable income in the sample calculated from these, are shown in Table 2. The different equivalence scales clearly have a significant effect both on the relative incomes of the different household types and on the overall average, which will influence both the number and the composition of those

below the relative poverty lines based on that average. Contrasting the scales, scale B assumes that extra household members add less to needs than does scale A - 0.5 compared with 0.7 is added to the equivalent factor - so the equivalent incomes of all households with more than 1 adult are higher, and the overall average is therefore considerably higher. Scale C distinguishes between the 'needs' of adults and children^s, adding 0.7 for adults but 0.5 for children, so all adult-only households are treated in the same way as scale A. Those with children, though, have lower equivalent factors and therefore higher equivalent incomes than scale A, but higher factor/lower income than B. Overall average income is therefore between those produced by A and B.

While the different scales produce somewhat different average incomes across groups, which will be very useful in allowing us to assess the sensitivity of results to the scales used, one important common feature may be noted in Table 2. The larger household size types, in general, have relatively low average equivalent incomes. Thus, no matter what scale is used, the first three categories have equivalent incomes above the overall average, while the households with 2 adults and 2, 3 or 4 or more children, 3 and 4 adults with children and 'others with children' all have incomes below average.

Table 2: Average Equivalent Disposable Income by Household type, 198HB5

Household type	Average equivalent disposable		
	A	B	C
1 adult	45.01	45.01	45.01
2 adults	48.46	54.92	48.46
2 adults and 1 child	42.80	51.36	46.69
2 adults and 2 children	36.16	44.84	41.52
2 adults and 3 children	30.20	38.25	35.86
2 adults and 4 or more ch.	22.64	29.33	27.87
3 adults	46.86	56.23	46.86
3 adults with children	29.04	37.09	33.04
3 adults	51.59	63.97	51.59
4 adults with children	29.04	37.49	32.23
Others without children	50.75	64.93	50.75
Others with children	32.43	42.28	35.36
Weighted average in sample	39.98	47.02	42.16

This will obviously have a major bearing on the composition of households 'in poverty' by the relative poverty lines, as we will see. It also leads to an important potential source of error in specifying relative poverty lines which is worth highlighting. If only data at an aggregate level, on the total disposable income of the sample and the total numbers of household heads, other adults and children, were available, then an overall average equivalent income figure could still be calculated. Using scale A, for example, this would be

$$\frac{\sum Y}{N + 0.7(M-N)}$$

where Y is the total disposable income in the sample,

M is the total number of persons,

and N is the total number of households (and therefore household heads).

The overall average thus derived could then be used as a basis for relative poverty lines, and the numbers below these lines estimated from data on the distribution of households by equivalent income category or decile. Such an overall average might alternatively be calculated from another source, such as personal disposable income in the National Accounts for instance, which is the approach adopted in a number of studies. However, this procedure may significantly bias the overall average equivalent income, and this bias is likely to be in a downward direction, thus leading to an underestimate of the numbers in poverty when relative poverty lines are derived.

The downward bias arises when, as is the case in both our HBS samples, the larger households have relatively low equivalent incomes. Appendix 1 explores this in more detail, but here it may be sufficient to illustrate how substantial the effect may be. Table 2 shows that the weighted average equivalent disposable income across categories in the 1980 HBS sample, using scale A, was £40 per week. Calculating the overall average on the basis of total disposable income divided by the total number of 'equivalent units' in the sample produces a figure of only £36.7. Setting a poverty line of 50 per cent of the weighted average shows, as we will see, 17.6 per cent of households to be in poverty: using the lower biased figure, though, only 14 per cent of households are below the 50 per cent line. So the extent of error introduced by the use of the aggregate data only is certainly

significant.

The corollary to this is that even the weighted average equivalent income in the sample may be biased if, within the household category types which accommodate a number of household sizes, larger households have lower equivalent incomes than smaller households. Ideally, the 'true' average equivalent income would be calculated from each individual household's equivalent income. Where this is not possible, the more household type categories which can be distinguished the better. With a twelve-group classification as available here, the extent of the bias should be very considerably reduced.

The poverty lines used here, then, are 40 per cent, 50 per cent and 60 per cent of the weighted average equivalent disposable income figures shown in Table 2. The following section presents the results of applying these poverty lines to the 1980 HBS data.

3. "Relative Poverty" in the 1980 HBS

3.1 Poverty Among Households

Using the detailed 60-income category tabulations provided by the CSO for 1980 for each household type, the number of households under the different poverty lines can be estimated by interpolation.⁴ Table 3 shows the percentage of households estimated to be under each of the nine lines. While the different equivalence scales do produce somewhat different results, the general order of magnitude is that about $9-9\frac{1}{2}$ per cent of households are under the 40 per cent

line, 17-18 per cent are under the 50 per cent line, and 28-29 per cent are under the 60 per cent line. While relative poverty lines offer no basis on which to choose between these, they give a very useful indication of the extent to which households fall well below the average: the results also allow us to put other estimates of the percentage in poverty in an interesting perspective. If we know that the percentage in poverty has been estimated at 30 per cent, for example (see FitzGerald, 1981), then a poverty line of about 60 per cent of average income is being used, whereas an estimate of 12 per cent (see Roche, 1984) is implicitly using a relative poverty line of perhaps about 43 per cent (see our Working Paper¹ for a review of these and other studies).

Table 3: *Relative Poverty Among Households in the 1980 HBS*

% of households	Relative Poverty Line*		
	40%	50%	60%
Equivalence scale			
A	9.7	17.6	28.8
B	9.6	18.2	28.4
C	8.8	16.6	27.8

*Percentage of average equivalent disposable income in sample (from Table 2)

3.2 *Composition of Poor Households*

With most of the previous estimates of the extent of poverty being within the range produced by these relative poverty lines, they allow us to look at the composition of

the poor and the difference made by the use of the different poverty lines and equivalence scales. The use of scale C produces the lowest estimate of the numbers of households in poverty for each poverty line, while those for A and B are quite similar. Looking at the composition by household type, we can first compare in Table 4 the make-up of the households under the 50 per cent poverty line for each of the three equivalence scales.

Comparing first scales A and B, we can see that although the overall percentage of households in poverty was similar, there are significant differences in composition. Scale A, making greater allowance for needs of additional household members and thus showing lower equivalent incomes for larger households, has a much lower percentage of 1-adult

Table 4: *Composition of Households in the 1980 HBS under 50 per cent Poverty Line*

Household Type	Equivalence Scale		
	A	B	C
1 adult	15.8	28.9	21.4
2 adults	11.7	12.8	14.9
2 adults and 1 child	2.6	2.5	2.7
2 adults and 2 children	8.1	6.8	7.2
2 adults and 3 children	9.8	7.5	7.1
2 adults and 4 or more ch.	17.5	14.1	12.9
3 adults	4.7	4.3	5.8
3 adults with children	12.0	8.9	10.0
4 adults	1.4	1.2	1.6
4 adults with children	6.5	5.0	6.1
Others without children	1.4	1.0	1.7
Others with children	8.6	7.0	8.6
Total	100	100	100

households, a slightly smaller one for 2 adults, and a higher percentage of all the other categories among its total poor than has scale B. Scale C, on the other hand, assumes the same scale for adults as A but for children uses the lower B addition. This leads to a relatively high proportion of large adult-only households among the poor, while large households with children are more important than for B but less than A, as are 1-adult households. The pattern across equivalence scales produced by the 40 per and 60 per cent poverty lines also reflected these differences.

Most commonly used scales would follow C in making a smaller allowance for additional children than adults. The equivalence scales used in Irish studies have mostly been derived from social security rates, and have in fact been quite close to the 0.7 allowance for additional adults used in scale C. As far as children are concerned, the allowance has generally been less generous than the extra 0.5 used in scale C (see Nolan, 1987, Table 2, p.20). This reflects the relatively low child additions in Unemployment Benefit and Unemployment Assistance/Supplementary Welfare Allowance schemes, which provide an extra .25-.30 approximately. When Child Benefit is also taken into account in calculating the implicit equivalence scales, as Roche (1984) does, this rises to .3-.4, though, bringing it closer to scale C.⁵ Equivalence scales used elsewhere also tend to be more generous to children, with the Royal Commission on the Distribution of Income and Wealth in the UK, for example,

using additions of 0.44 per child.⁶ So scale C may be taken as a reasonably satisfactory working basis for adjusting for differences in household size and composition. (The other two sets of scales are also useful in that they indicate the difference made by adjusting only for household size without distinguishing between adults and children - which may sometimes be all that is possible with the data available).

While showing some interesting differences between the results produced by different equivalence scales, Table 4 also reveals important common features. Compared with their proportions in the overall sample - shown in Table 1 - certain household types are consistently over- or under-represented among the poor, using the 50 per cent poverty line. Large households with children consistently form a higher proportion of the poor than of all households, no matter which equivalence scale is used.⁷ Two adult households with 2 children or less are consistently under-represented among the poor, by contrast, as are larger households without children. One-adult households form a relatively high proportion of the poor using scales B or C but not A.

While this is true of the 50 per cent poverty line, is it also true of the 40 per cent and 60 per cent lines, and how much difference would using these lines make to the composition of the poor? Rather than present a mass of data for each equivalence scale and poverty line, we will concentrate on equivalence scale C for this comparison,

looking at the composition of those under the three poverty lines in Table 5. This shows some interesting differences between the three poverty lines. As the poverty line increases, the importance of one- and two-adult households among the poor rises and the percentage of households with children generally falls. (This pattern is also evident for the other two equivalence scales.) However, it remains the case even at the 60 per cent poverty line that large households with children are over-represented among the poor, while those with 2 adults and two children or less remain significantly underrepresented.

So this analysis illustrates that useful conclusions can be reached even without agreement on a specific poverty line or on a set of equivalence scales. Focusing on the *degree* of poverty of the different household types, by concentrating on the poorest - those under the 40 per cent line - we see that large families with children form a substantially higher proportion of this group than they do of the population as a whole. The categories 2 adults with 4 or more children, 3 and 4 adults with children, and 'others with children' comprise only 25 per cent of all households in the sample but account for 42 per cent of the households below the 40 per cent poverty line. Two-adult families with only 2 children or less (including none) by contrast, form 37 per cent of all households but only 25 per cent of 'very poor' households under the 40 per cent line.

Table 5: *Composition of Households in the 1980 HBS under 40 per, 50 per cent and 60 per cent Poverty Lines (Equivalence Scale C)*

Household Type	% of 'poor' households		
	40%	50%	60
1 adult	17.9	21.4	23.1
2 adults	12.8	14.9	17.2
2 adults and 1 child	2.8	2.7	2.3
2 adults and 2 children	9.4	7.2	6.9
2 adults and 3 children	6.6	7.1	7.3
2 adults and 4 or more ch.	13.5	12.9	11.7
3 adults	5.7	5.8	5.1
3 adults with children	10.3	10.0	9.6
4 adults	1.8	1.6	1.9
4 adults with children	6.0	6.1	5.6
Others without children	1.5	1.7	1.4
Others with children	11.7	8.6	7.8
Total	100	100	100

While the risk of poverty, particularly severe poverty, appears to be highest for large families with children, then, this is not to say that the problem is exclusively one of child poverty or of poverty among such households. Table 5 also shows that 40 per cent of the 'very poor' households have no children. Despite a relatively low risk of poverty, since these households make up over half of all households, the proportion poor still constitute a substantial element in poverty.

We now turn to the incidence of poverty among persons rather than households in the 1980 HBS.

3.2 *Relative Poverty among Persons in the 1980 HBS*

In addition to calculating the number of households below given equivalent income poverty lines, it is of obvious interest to quantify the number of people and proportion of the total population involved. This can be estimated from the

data provided by the CSO which shows not only the number of households of different types in the various disposable income classes but also the average size of the households in each class.⁹ (For some household types this is obviously already defined and fixed - one-adult households, for example - but this is not the case for five of the twelve categories used.)

Table 6 shows the estimated number of persons under each of the three poverty lines for each of the three equivalence scales. These can be compared with the percentage of households under each line, shown in Table 3. For scale A the percentage of persons is higher than that of households for each line, while for B the opposite is the case. For scale C, which for the reasons outlined above is probably the most satisfactory of the three, there is little difference between the persons and households figures, the former being slightly higher.

Table 6: *Relative Poverty among Persons in the 1980 HBS*

<i>% of persons</i>	<i>Relative Poverty Line</i>		
	40%	50%	60%
Equivalence scale			
A	11.1	20.2	31.6
B	9.5	17.5	27.8
C	9.1	16.9	28.0

Although the overall percentage of households and of persons in poverty may not be very different, obviously the distribution of poor persons over the various household type categories will be quite different to the underlying distribution of poor households, due to differences in the size of the households. Table 7 shows the distribution of persons under the 40 per cent, 50 per cent and 60 per cent poverty lines among the different household types, using equivalence scale C. Compared with the proportions for the households under each line (Table 5), a relatively low proportion of the poor persons are in one or two adult households, while a relatively high proportion are of course in the larger households, notably the "2 adults with four or more children" category which contains about 22 per cent of

Table 7: *Distribution of Persons under Relative Poverty Lines in the 1980 HBS by Household Type (equivalence scale c)*

Household type	Relative Poverty Line		
	40%	50%	60%
1 adult	4.6	5.6	6.2
2 adults	6.6	7.8	9.2
2 adults and one child	2.2	2.1	1.8
2 adults and 2 children	9.7	7.5	7.4
2 adults and 3 children	8.6	9.4	9.8
2 adults and 4 or more ch.	23.2	22.8	20.9
3 adults	4.4	4.5	4.1
3 adults with children	13.7	14.0	14.1
4 adults	1.9	1.7	2.0
4 adults with children	10.0	10.5	10.0
Others without children	2.1	2.3	2.0
Others with children	13.0	11.6	12.4
Total	100	100	100

all poor persons. It is also notable that the spread of persons over the household types is not very different whether the 40 per cent, 50 per cent or 60 per cent poverty line is used.

4. *Relative Poverty in the 1973 HBS*

Turning to the results of the application of similar relative poverty lines to the 1973 HBS sample, the only other such national sample currently available, rather than repeat all the material presented for 1980, we will focus on the changes between the two years and some interesting differences in the pattern revealed. Looking first at the overall extent of relative poverty in 1973, Table 8 shows the number of households and of persons under each of the three poverty lines for each of the three equivalence scales.⁹

Comparing the percentage of households below each line with the corresponding figures for 1980, shown in Table 3, we see that there was a considerable fall between 1973 and 1980 for each poverty line/equivalence scale. This fall ranged from 0.5 to 2.6 depending on the line used. Looking at persons in poverty, though, comparison with the 1980 figures in Table 6 reveals that the opposite is true: for all the poverty line/equivalence scales combinations except one, the percentage of persons below the line rose between 1973 and 1980, generally by about 0.4-0.8.

Table 8: *Relative Poverty among Households and Persons in the 1973 HBS*

<i>Households</i>		<i>Relative Poverty Line</i>		

% of households				
Equivalence Scale	40%	50%	60%	
A	10.4	19.2	30.3	
B	11.0	19.2	29.2	
C	9.9	18.3	28.3	
 <i>Persons</i>				
% of persons				
A	10.2	19.2	31.1	
B	9.0	16.7	27.4	
C	8.6	16.4	27.0	

Obviously this contrast must be the product of a significant change in the size and composition of relatively low income households between the two years. This is easily confirmed by the fact that whereas the average number of persons per household in the sample as a whole fell from 4.01 in the 1973 sample to 3.72 in the 1980 sample, the average size of 'poor' households either rose or fell only marginally (depending on the poverty line used) between the two years. The average size of the households under each poverty line are shown in Table 9 for both years, and for both the 40 per cent and 50 per cent poverty lines the average size of poor households rose no matter which equivalence scale is used. For the 60 per cent poverty line there was a small fall in average size for each of the equivalence scales.

Table 9 shows the expected relationship between average household size for the three equivalence scales: when scale A is used, 'poor' households are on average bigger than when scale C is used which in turn is bigger than scale B, for each poverty line and in both years (since scale A assumes larger households 'need' more income than scale C, etc.). It is also interesting that in 1973 the average size of poor households increases as the poverty line is raised from 40 per cent to 50 per cent and then 60 per cent, which was not the case for 1980. In 1980, as we have seen, as the poverty line was raised, the number of one- and two-adult households in poverty rose markedly while the percentage of the poor made up by household with children fell, so average household size of the poor falls rather than rises. In 1973, by contrast, as Table 10 shows, the proportion of one-adult households among the poor falls as the poverty line rises, while that of '2 adults with 4 or more children', '3 adults with children', and '4 adults with children' increases, bringing about the rise in average household size.¹⁰

This different pattern reflects some important variations between the two years in the actual make-up of the poor at each poverty line. Comparing first the 'most poor', under the 40 per cent poverty line, Table 10 shows that in 1973 one- and two-adult only households formed 46.4 per cent of all poor households (using equivalence scale C), while all households without children formed 57.7 per cent. In 1980, the corresponding figures (from Table 5) were 30.7 per cent

Table 9: Average Size of Households under Each Relative Poverty Line, 1973 and 1980 HBS

Relative Poverty Line			
1973			
Equivalence Scale	40%	50%	60%
A	3.94	4.01	4.12
B	3.27	3.50	3.76
C	3.47	3.60	3.83
1980			
A	4.26	4.26	4.08
B	3.68	3.58	3.64
C	3.85	3.80	3.74

and 39.7 per cent. This denotes a remarkable reduction in the importance of households without children, offset largely by an increase in the importance of 2-adult families with 2 or more children and 3 adults with children, among the poor.¹⁰

This contrast remains valid, though less pronounced, at the 50 per cent poverty line. At the 60 per cent poverty line, though, the difference between the two years in the composition of 'the poor' is much less, with those without children falling only from 53 per cent to 49 per cent of all poor households. The proportion of 2-adult households with two or three children has risen by 1980 and that of 2-adult households with no children and most of the larger household types, whether with or without children, has fallen, but the changes are not dramatic. Those below the 60 per cent poverty line thus show the same general trend as those in the sample

as a whole, shown in Table 1. (The fall in the proportion of larger households is not quite as pronounced, though, which explains why average household size among 'the poor' even using this line does not fall as rapidly as that in the overall sample.)

Underlying these differences between the two years, and the varying pattern depending on which poverty line is used, are some very important changes in relative incomes. As noted in studies such as Roche (1984), the improvement in the position of those relying on social welfare pensions *vis-a-vis* other groups was substantial. Between the two years, he estimates, the old age contributory pension for a married couple rose by 247 per cent, while average take-home

Table 10: *Composition of Households in the 1973 HBS under 40 per cent, 50 per cent and 60 per cent Poverty Lines (Equivalence Scale C)*

Household Type	% of 'poor' households		
	40%	50%	60%
1 adult	29.0	27.6	22.6
2 adults	17.4	18.1	18.8
2 adults and 1 child	3.2	2.7	3.0
2 adults and 2 children	2.6	2.5	3.2
2 adults and 3 children	3.8	3.5	3.8
2 adults and 4 or more ch.	9.3	11.1	12.0
3 adults	7.6	7.2	6.8
3 adults with children	7.0	7.9	8.7
4 adults	2.0	2.0	2.8
4 adults with children	5.6	5.8	7.1
Others without children	1.7	1.9	2.1
Others with children	10.7	9.8	9.1
Total	100	100	100

pay in manufacturing (male) rose by 206 per cent.¹¹ For short-term social welfare payments, basic rates rose approximately in line with take-home pay but the introduction of Pay-Related Benefit in 1974 would have increased some receipts by more. Children's Allowances, however, only rose by 125 per cent. All this produced a significant shift among the 'very poor' away from pensioners and towards families with children, with those headed by an employed male assuming increasing importance.

While the data analysed here does not allow labour force status to be taken into account, the changes in household composition alone are quite revealing about the increased importance of households with children among the 'very poor', and therefore of 'child poverty', between the two years. Of all households under the 40 per cent poverty line in 1980 (using equivalence scale C), 60 per cent contained children, and these households contained 80 per cent of all 'very poor' persons. The corresponding figures for 1973 were only 42 per cent and 70 per cent respectively. The fact that the 60 per cent poverty line shows a much less stark contrast must indicate that while the position of, for example, social welfare pensioners has improved, most are still in the bottom third of the distribution. The use of relative poverty lines alone has thus enabled us to pinpoint some critical features of the composition of the poor and of the changes between 1973 and 1980.

5. Conclusions

Applying three different relative poverty lines combined with three different sets of equivalence scales, leading to nine different poverty lines, the analysis has revealed that some valuable conclusions may none the less be reached which apply across this entire range. Focusing first on 1980, the HBS data for that year showed, for example, that certain household types were consistently under- or over-represented among 'the poor', no matter which line was used. Those which formed a higher proportion of the households in poverty than of all households in the sample were the 2-adult households with only 2 or fewer children and the larger households - 3, 4 or more adults - without children. Those consistently forming a higher proportion of the poor, on the other hand, were the larger households with children - 2 adults with 4 or more children and 3 or 4 adults with children. For the other household types, the assessment varied depending on the poverty line/equivalence scale used.

In terms of the 1973-1980 comparison, some unambiguous conclusions can also be reached. The number of households under each poverty line fell between the two years. However, since the average size of poor households did not show the same substantial fall as that in the population as a whole, this was not reflected in a similar reduction in the number of persons in poverty. For all but one of the nine poverty line/equivalence scale combinations, indeed, the number of persons in poverty actually rose between the two years. This

reflects the increasing importance of households with children among the poor.

The results are also revealing in pointing to the areas where unambiguous conclusions cannot be reached, where the precise location of the poverty line or the equivalence scale used leads to different results. By using a range of lines/scales, the sensitivity of both the extent and the composition of 'the poor' to these variations can be assessed. As far as the three relative poverty lines are concerned, at 40 per cent, 50 per cent and 60 per cent of average disposable income, the extent of measured poverty in 1980 varies from about 9 per cent up to about 28 per cent, depending on which scale is used. These poverty lines and estimates encompass most of those which have been produced by studies of poverty in Ireland, and the results highlight the great sensitivity of the extent of measured poverty to the exact location of the poverty line chosen within this relatively narrow range. To illustrate just how narrow this is, for a 1-adult household each of the three relative poverty lines is separated by only about £4-5 (in 1980 terms) a week.

The sensitivity of the measured extent of poverty to the equivalence scale used is not substantial, with a variation of at most about 10 per cent from lowest to highest in the number of households in poverty at each of the three relative poverty lines. The scale used does have a significant effect on the composition of the poor, though, with, for example,

the proportion of 1-adult households varying from 16 per cent to 28 per cent of those under the 50 per cent poverty line in 1980, depending on which scale is used. Even so, if we hold the relative poverty line fixed, some useful general conclusions about the composition of the poor at each level can be drawn: Concentrating on the 'very poor', for example, those under the 40 per cent poverty line, households with children account for a considerably higher proportion of poor households than of the total 1980 sample, no matter which equivalence scale is used. This is particularly true of larger households with children (taken to be 2 adults and 3 or more children, 3 and 4 adults with children and 'others with children'), which account for between 46 per cent and 57 per cent of households below that line depending on the scale used, but for only 32 per cent of all households.

Allowing the relative poverty line to vary while holding the equivalence scale fixed, interesting differences in the composition of the poor depending on the line chosen can also be seen. Focusing on equivalence scale C, probably the most generally acceptable of the three, as the 1980 relative poverty line is raised, one- and two-adult households without children become progressively more important, while larger families with children form a decreasing proportion of the poor.

The application of purely relative poverty lines to Irish data presented in this paper has highlighted the fact that firm conclusions about, for example, whether poverty has

increased from one year to another or about the composition of 'the poor' in a given year are sometimes possible even when a range of both poverty lines and equivalence scales is allowed. It has also illustrated, however, that the extent of measured poverty is extremely sensitive, at least in the Irish case but probably also more generally, to the precise poverty line specified. This is in itself an argument in favour of explicitly allowing for legitimate differences in the location of poverty lines in analysis and presentation of results.

Footnotes

1. Thus it is average disposable income in the sample, not personal disposable income from the National Accounts as used by the OECD (1976) and Beckerman (1979), which is the basis for the relative poverty lines.
2. Most of the published data from the HBS, either in the HBS reports themselves or in the reports on the redistribution exercises carried out by the CSO based on the HBS (CSO, 1980, 1983), are classified by direct (pre-transfer and pre-tax) or gross incomes rather than disposable income. The redistribution reports do show the distribution of all households by disposable income (see, for example, CSO (1980), Table 11) but this does not allow households to be distinguished by size, so equivalent incomes cannot be estimated.
3. Children here, as in the HBS, are defined as under 14 years of age.
4. In practice, rather than converting the income boundaries of the ranges to an equivalent basis for each household type, it was more convenient to calculate different poverty lines for each household type, by multiplying the poverty line for a single adult by the relevant equivalence factor. The number of households under this nominal rather than equivalent income level was then estimated.
5. Currently, the implicit equivalence scales in the UB rates provide additions of about 0.65 for an adult dependant and about 0.24 for children (varying with the number of children). The UA/SWA rates provide additions of 0.73 and 0.22-0.28, respectively. When Child Benefit is included, the additions for children rise to 0.30-0.34 for UB and 0.32-0.39 for UA/SWA.
6. See RCDIW (1978), Appendix E.
7. This is the case for 2 adults with four or more children, for 3 and 4 adults with children, and for "others with children".
8. This is seen to be required, rather than merely the overall average size of each household type, because the data show that within a particular household type the average size varies significantly across income classes.
9. These are estimated from material provided by the CSO showing the distribution of households by twenty disposable income categories, for each of the twelve household types.

10. While Table 10 illustrates this only for equivalence scale C, it is also true for the other two sets of scales.
11. See Roche, Table 3.2, p.39. The earnings figure is average gross weekly earnings for a male in manufacturing industry less income tax which would be paid by a married man, and less PRSI.

Appendix: Bias in the Calculation of Average Equivalent Income from Aggregate Data.

Section 2 of the paper highlighted the fact that the calculation of average equivalent disposable income in the sample purely on the basis of aggregate data on total disposable income and the total number of equivalent units in the sample may result in a significant bias. In the case where equivalent incomes tend to be lower for larger households, this bias will be in a downward direction, leading to lower relative poverty lines and numbers in poverty. This appendix shows how this bias operates.

Calculated from aggregate data, average equivalent income is

$$\frac{\sum Y_i}{N + A_F(M-N-C) + C_F(C)} \quad (1)$$

where $\sum Y_i$ is total income in the sample,
 N is the total number of households/household heads,
 M is the total number of persons,
 C is the total number of children,
 A_F is the 'equivalent factor' for additional adults in the household, i.e., adults who are not household heads,
 and C_F is the 'equivalent factor' for children.

So the average equivalent income calculated in this way is total income divided by the total number of equivalent units in the sample, or

$$\frac{\sum Y_i}{\sum F_i} \quad (2)$$

where F_i = the equivalent factor for household i.

The correct average equivalent household income in the sample, calculated from micro-data on individual households,

is

$$\frac{1}{N} \sum \frac{Y_i}{F_i} \dots \dots \dots (3)$$

where Y_i = income of household i
and F_i = the equivalent factor for household i .

The difference which can arise between (2) and (3) may be illustrated by a simple example. Suppose there are only two households, one consisting of one adult and the other of two adults, each household having an income of £100. Total income in the 'sample' is £200, the first household has an 'equivalent factor' of 1 and the second has a factor of, say, 1.7. Average equivalent income calculated purely from aggregate data as

$$\frac{\sum Y_i}{\sum F_i} \quad \text{is then} \quad \frac{200}{2.7} = \text{£}74.1$$

The true average calculated on the basis of the equivalent income of each household, however, is

$$\frac{1}{2} \left[\frac{100}{1} + \frac{100}{1.7} \right] = \text{£}79.4$$

In this example, as in our actual sample, the equivalent income of the larger household is lower than the overall average. This leads to the result that the bias in the aggregate calculation is in a downward direction. Where the opposite is true, on the other hand, if, for example, the income of our one-adult household was £50 and of the 2-adult household was £150, then average equivalent income calculated with aggregate data would be unchanged but the true average would be

$$\frac{1}{2} \left[\frac{50}{1} + \frac{150}{1.7} \right] = £69.1 \setminus$$

The bias is thus in an upward direction, though this seems less likely to occur in practice.

The aggregate calculation will not contain any bias only when either all households have identical equivalent incomes, or when by coincidence the biases in different directions happen to cancel each other out.

Where full household micro-data is not available, average disposable income may be calculated as a weighted average of those for a number of different household size/composition categories, which is what was possible in the present paper. Clearly, where not all the household size/composition types are covered as a separate category, some possibility of bias still remains. With twelve different categories, scope for bias is very much reduced: however, this is clearly an argument for maximising the number of categories available.

References

- Atkinson, A. B. (1987a). "On the Measurement of Poverty", *Econometrica*, Vol. 55, No.4, pp. 749-764.
- Atkinson, A. B. (1987b). "Measuring Poverty and Differences in Family Consumption", *ESRC Programme on Taxation, Incentives and the Distribution of Income*, forthcoming.
- Beckerman, W. (1979). *Poverty and the Impact of Income Maintenance Programmes*, ILO, Geneva.
- Callan, T. and B. Nolan (1987). "Concepts of Poverty and the Poverty Line", *ESRI Project on Income Distribution, Poverty, and Usage of State Services*, Working Paper 2, June.
- Central Statistics Office (1980). *Redistributive Effects of State Taxes and Benefits on Household Incomes in 1973*, Dublin: Stationery Office, Prl. 8628, January.
- Central Statistics Office (1983). *Redistributive Effects of State Taxes and Benefits on Household Incomes in 1980*, Dublin: Stationery Office, Prl.
- Foster, J. E. and A. F. Shorrocks (1987a). "Poverty Orderings", *Econometrica*, forthcoming.
- Foster, J. E. and A. F. Shorrocks (1987b). "Poverty Orderings and Welfare Dominance", *Purdue University Discussion Paper No. 878*.
- Nolan, B. (1987). *Research on the Extent of Poverty in the Republic of Ireland: A Survey*, *ESRI Project on Income Distribution, Poverty and Usage of State Services*, Working Paper 1, June.