



# THE ECONOMIC AND SOCIAL RESEARCH INSTITUTE

## MEASURING TRENDS IN POVERTY OVER TIME: SOME ROBUST RESULTS FOR IRELAND 1980-87

**Brian Nolan and Tim Callan**

December 1988

Working Paper No. 7

---

Working Papers are not for publication  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

---

*Measuring Trends in Poverty Over Time:  
Some Robust Results for Ireland 1980-87*

*1. Introduction*

In order to be able to say whether "poverty" has gone up or down in a particular society between year 1 and year 2, we must first of all specify what we mean by the term. Having done so, a poverty line which allows us to distinguish the poor from the non-poor is customarily specified for each year. The extent of poverty based on these lines must then be measured, either simply through counting the number falling below the line or through more complex measures which also take into account the depth of poverty for these people.

Such measures will be discussed below, but the prior problem - what Sen (1979) terms the 'identification' of the poor rather than the subsequent 'aggregation' of their characteristics into a measure of poverty - relates to the specification of the poverty line. It appears to be widely accepted that poverty in developed economies is to be conceived in relative rather than purely absolute terms - that is, relative to the standard of living of the society in question rather than referring merely to the satisfaction of minimal needs of subsistence. Within this general framework, though, a variety of approaches to deriving a poverty line, based on alternative concepts of poverty, have been suggested. (These are reviewed in Callan and Nolan 1987.) As emphasised by Foster and Shorrocks (1988a), "a feature common to all proposed methods is a significant degree of

arbitrariness in the value assigned to the poverty standard" (p. 173).

The implications of this ambiguity for measuring trends in poverty over time are serious. If conclusions are drawn on the basis of a particular poverty standard but there is a considerable element of judgement in defining that standard, how much confidence can be placed in the result? The problem is compounded when we realise that a variety of poverty measures may be employed, not all of which may give the same result when comparing the two years.

In these circumstances, it has been argued that the diversity of possible judgements about both the specification of the poverty line and the choice of poverty measure should be explicitly recognised in the measurement procedures adopted (see, for example, Atkinson, 1987; Foster and Shorrocks, 1988a, b). Comparisons on this basis may not permit complete orderings in all situations, but where orderings are possible they can be much more strongly defended.

Thus, in comparing year 1 with year 2, a variety of poverty lines and poverty measures may be applied. If the ranking of the two years is the same for each plausible line and measure, then it is reasonable to conclude that one year has unambiguously more or less poverty than the other. If this is not the case - if the ranking by one poverty line/measure is reversed using an alternative but plausible line/measure - then we may be forced to acknowledge that the

comparison is inconclusive or ambiguous. As Atkinson (1987) points out, this approach leads to less all-embracing answers: it allows comparisons but does not provide a unique measure of the difference between two distributions, and may only lead to a partial rather than a complete ordering of a number of distributions. It does, however, offer the prospect of unambiguous conclusions in certain circumstances - and perhaps equally importantly, implies that ambiguity will be explicitly recognised and explored where it does exist.

The present paper examines trends in poverty in Ireland in the 1980s in the light of these considerations. Having briefly discussed trends in the 1970s, we concentrate on comparing the extent of poverty in 1980 (on the basis of the Household Budget Survey results for that year) with 1987 (on the basis of the results of the ESRI Survey of Lifestyles, Income Distribution and Usage of State Services). Rather than specifying a particular poverty line, we apply a range of poverty lines for each year, and a variety of aggregate measures of poverty are also used. These poverty lines and measures are described in detail in the next section.

Before doing so, one further element contributing to the complexity of the comparison must be noted - the way in which differences in needs across families/households of different composition are taken into account. Such differences are typically treated through the use of equivalence scales, but there exists a wide variety of such scales and little prospect of a consensus as to the appropriate ones to apply

to a particular situation. As emphasised by Atkinson (1988), the conclusions drawn about the extent of poverty may be quite sensitive to the scales chosen - if, for example, the fortunes of different types of family have been changing differentially over time. Again, he suggests that explicit account be taken of such different judgements about the needs of different families, even though this may limit the conclusions which can be reached. In this paper we take such differences into account by using a number of different sets of equivalence scales, also described in the next section. While this cannot cover the entire range of possible scales and thus provide definitive conclusions, it does allow conclusions holding over a considerable range to be reached, and illustrates the sensitivity or otherwise of the poverty measures to the scale chosen.

The rest of the paper is structured as follows. Section 2 describes the poverty lines, poverty measures and equivalence scales to be used. Section 3 describes the data on which the results are based. Section 4 looks briefly at earlier work on trends in poverty in the 1970s and in particular at the robustness or otherwise of the findings for this earlier period. Section 5 presents results for 1980 and 1987 using the simple "headcount" measure of poverty. Section 6 compares the two years using more complex aggregate poverty measures which also take the depth of poverty into account. Finally, Section 7 brings together the central conclusions which these results allow on the overall trend in poverty

during the 1980s.

## *2. Poverty Lines, Poverty Measures and Equivalence Scales*

### *2.1. Poverty Lines and Equivalence Scales*

Rather than attempting to justify a particular poverty line, we wish to apply a range of lines for the reasons discussed. One straightforward way of doing so is to define a set of relative poverty lines, based on average income in the distribution. Using a relative poverty line may be consistent with those conceptual approaches to defining poverty which emphasise the need for a minimum level of income relative to the society as a whole in order to make possible participation in the customary activities of that society. The selection of a particular relative line is still arbitrary, though, and the approach lends itself naturally to the application of a range of lines. Here we use three, namely 40 per cent, 50 per cent and 60 percent of mean disposable income<sup>1</sup>. As we will see, this encompasses a broad range of estimates of the extent of poverty.

In basing these relative poverty lines on mean income, that mean must however take account of differences in household composition, since otherwise we would be equating the needs of, for example, a single adult household with those of a couple with two children. As already outlined, there is no consensus on the appropriate set of equivalence scales, either for Ireland or elsewhere (and indeed different scales may be more suitable for different applications). We

therefore use four distinct sets of scales:

- (i) Scale A, where the household head is attributed a value of 1, all other adults a value of 0.7, and all children a value of 0.5. (This was the central set of scales used in a recent exercise for the EC Commission measuring poverty in Community countries, and is also used by, among others, the French Statistical Office INSEE).
- (ii) Scale B allows a smaller amount - relative to the household head - to both extra adults and to children: where the household head is 1, other adults are 0.6 and children 0.4. (This is broadly comparable with the scales implicit in the UK Supplementary Benefit/Income Support safety net scheme<sup>2</sup>, used in many poverty analyses there.)
- (iii) Scale C allows relatively more to additional adults but less to children than Scale B - where extra adults are attributed a value of 0.66 and children a value of 0.33. (This is closer to the scales implicit in Irish social welfare rates of support<sup>3</sup>.)
- (iv) Scale D is 'extreme' in the sense of attributing 0.7 to additional adults but only 0.3 to children.

Thus we have a combination of three relative poverty cut-offs together with four sets of equivalence scales, yielding twelve distinct poverty lines. Each is constructed

as follows. The number of equivalent adults is calculated for each household as

$$NEA_i = [1 + \alpha_a(1 - NA_i) + B_a NC_i]$$

where  $NEA_i$  = number of equivalent adults in household  $i$ .  
 $NA_i$  = number of adults in household  $i$ .  
 $NC_i$  = number of children in household  $i$ .  
 $\alpha_a$  = equivalence scale A (or B, etc.) for extra adult.  
 $B_a$  = Equivalence scale A (or B, etc.) for child.

Equivalent income for household  $i$  is

$$Y_i / NEA_i$$

so mean equivalent household income in the sample is

$$\frac{1}{n} \sum_{i=1}^n Y_i / NEA_i \quad (1)$$

where  $n$  is the number of households in sample.<sup>4</sup>

The relative poverty lines are then derived as

$$\begin{aligned} &0.4 * (1) \\ &0.5 * (1) \\ \text{and } &0.6 * (1), \end{aligned}$$

with four variants of each, one for each equivalence scale.

The poverty lines are thus expressed in terms of equivalent income, i.e., they represent the nominal income value applicable to a single-adult household. The income of other household types, converted to an equivalent basis, can then be compared directly to this standard.

Purely relative poverty lines constructed in this way will obviously have the characteristic in comparisons over time that rising average incomes will be fully reflected in an increase in the poverty standard. This may be considered



appropriate if it is assumed that, broadly speaking, perceived 'needs' and the 'customary' standard of living from which the poor are excluded rise *pari passu* with average income. However, as Sen (1982) emphasises, such measures suffer from the disadvantage that a fall in general prosperity will not be reflected in an increase in poverty if the relative distribution is unchanged<sup>5</sup>. We may not be happy to make the assumption that 'needs' automatically adjust downwards in such a manner, an asymmetric response to falling versus rising average incomes - at least in the short term - may be more plausible. This is particularly relevant to our application, since it turns out that Irish real mean disposable equivalent income actually fell between 1980 and 1987. We take this into account by also applying a set of poverty lines which represent the same real income to the two years - that is, the relative lines for 1980, updated to 1987 by the increase in prices over the period.

## 2.2 Poverty measures

Let  $y = (y_1, y_2, \dots, y_n)$

be a vector of household incomes in increasing order, and let  $Z > 0$  be 'the' poverty line. The most commonly used measure of poverty is then the number of households (or persons) with incomes falling below that poverty line, say  $q$ , usually expressed as a proportion of the total number of households (persons) in the population<sup>6</sup>. That is, where  $n = n(y)$  is the total number of households, the proportion in poverty is

$$F_1 = q/n \quad (2)$$

This is the *headcount* ratio, which has dominated poverty analysis for many years.

This measure has, however, been subjected to sustained criticism, notably since Sen (1976, 1979). In the first place, it ignores completely the extent to which 'the poor' fall below the poverty line, the depth of their poverty. Secondly, it has the perverse feature that a transfer of income from a poor person to one who is richer can never increase measured poverty - either poverty remains unchanged (if the richer person was either above the line both before and after the transfer or below both before and after) - or it actually falls (if the richer person is brought above the line by the transfer).

To overcome these limitations, measures based on the "poverty gap" of the poor have been developed. If  $g_i = (z - y_i)$  is the income shortfall of the  $i$ th household, the sum of these shortfalls

$$\sum_{i=1}^q g_i$$

is the aggregate poverty gap. This is, however, a money amount: to normalise, the gaps are expressed as a proportion of the poverty line to yield the average proportionate shortfall

$$\frac{1}{qz} \sum_{i=1}^q g_i \quad (3)$$

This measure, referred to by Sen as the "income gap ratio", concentrates, however, only on the aggregate

shortfall of the poor, it pays no attention to the number or proportion of poor people. This is not true of what Foster and Shorrocks (1988) call the "per capita income gap", i.e.,

$$P_2 = \frac{1}{nz} \sum_{i=1}^q g_i \quad (4)$$

which is a product of the headcount and the income gap ratio measures. This continues to have the feature though that it is insensitive to the distribution of income *among* the poor. A transfer from a poor person to a richer one when the latter is, and remains post-transfer, below the poverty line will leave the measure unchanged.

Foster, Greer and Thorbecke (1984) have proposed a measure

$$P_2 = \frac{1}{n z^2} \sum_{i=1}^q g_i^2 \quad (5)$$

which gets over this problem by *weighting* the shortfalls of the poor by those shortfalls themselves. This means that a more unequal distribution of income *among* the poor is reflected in higher measured poverty, those furthest below the poverty line receiving the highest weight. (Sen (1976) proposed a weighting scheme which, by contrast, is based on the *rank* of the household, and so the number of households between it and the poverty line).

Foster *et al.* have in fact set out a general class of poverty indices of the type.

$$P_\alpha = \frac{1}{n} \sum_{i=1}^q \left( \frac{g_i}{z} \right)^{\alpha-1} \quad (6)$$

Where  $\alpha = 1$ , this becomes  $F_1$ , the simple headcount. Where  $\alpha = 2$ ,  $F_\alpha = F_2$ , the per capita income gap, and where  $\alpha = 3$  the measure becomes  $F_3$ , the weighted income gap measure which they call "distribution sensitive". Foster and Shorrocks (1988a, b) explore the nature of the poverty orderings provided by these measures, and the connection between these orderings and social welfare rankings, illustrating some particularly desirable features. For example, they show that ranking by  $F_2$  over the entire range of possible poverty lines is equivalent to the generalised Lorenz dominance criterion developed in the inequality literature. They also show that for a particular class of welfare functions, the ordering of two distributions by  $F_3$  is equivalent to a welfare ordering<sup>7</sup>.

In this paper we therefore use not only the headcount measure of poverty  $F_1$ , but also the two more sophisticated measures  $F_2$  and  $F_3$ , to assess the change in the extent of poverty in Ireland between 1980 and 1987.

### 3. *The Data Base*

The results of the CSO's Household Budget Survey (HBS) for 1980 are used as the basis for measuring poverty in that year. The CSO co-operated fully in facilitating access to the data tapes (rather than having to rely on the published reports), subject to the strict maintenance of confidentiality. This allowed the range of poverty lines and measures to be calculated directly from the household level data. In briefly discussing trends in the 1970s we also make use of the only other national HBS, that for 1973. Here

detailed tabulations of households by income range and composition were kindly supplied by the CSO.

For 1987, the ESRI's Survey of Lifestyles, Income Distribution and Usage of State Services provided the data-base. This survey, like the HBS, gathered data on a national sample - responses were obtained from about 3,300 households and the effective response rate of 64 per cent was satisfactory, considering the complexity and sensitivity of the material<sup>9</sup>. Again, like the HBS, the responses were re-weighted to accord with known national aggregates. The income information gathered was designed to correspond closely to the HBS definitions to ensure comparability. The questionnaires, response rate and re-weighting procedures are outlined in Callan *et al.* (1988) and will not be detailed here.

The income concept which will be used here in measuring poverty is disposable income as defined in the HBS - that is, income from work and property plus state cash transfers less income tax and employee's PRSI contributions. The income recipient unit is the household. This has the well known implication that, since complete income-sharing within the household is assumed, poverty for certain members as a result of such sharing not actually taking place will be missed. While we have carried out some analyses of the 1987 data on the basis of the narrower family unit (see Callan *et al.* 1988), this was not possible for 1980.

Although the household is treated as the *recipient* unit, this does not mean that our results relate only to the number of households in poverty, etc. Indeed, as discussed below, it is if anything more relevant, to focus on *persons* rather than households, and we will present results for both. However, the point to be emphasised is that the standard of living of each person in a particular household is assumed to be identical.

#### 4. *Poverty in the 1970s*

Before presenting results for the trends in poverty in the 1980s, it is useful to briefly discuss the background against which these should be seen, in terms of developments up to the beginning of the 1980s. The only points of comparison for which suitable data are available are 1973 and 1980, the years when national Household Budget Surveys were carried out by the CSO. (Smaller-scale urban inquiries were carried out in the intervening years). While the 1973 data have been used to analysis the extent and nature of poverty in several studies, the only previous one to also use the 1980 data and draw conclusions about trends in poverty is Roche (1984).

Roche applied poverty lines in 1973 based on the rates payable in that year by the scheme providing the lowest level of support, the short-term rural Unemployment Assistance (UA) rate. (The rates paid in Supplementary Welfare Allowance, on the subsequent introduction of that scheme, were set at this rural UA rate). He used a range of lines, viz

- A) this rate,
- B) this rate plus 20%
- C) this rate plus 40%.

The equivalence scales used were also derived from the UA rates, with some rounding, and were as follows:

Household head	1
Other adult	0.75
Child	0.45.

For 1980, Roche's objective was to construct poverty lines which not only took into account price changes since 1973, but also reflected the view that "the poor should share at least proportionately" in the increase in real income over the period (p. 70). He, therefore, increased the three 1973 lines by 175 per cent to adjust for the use in the CPI (of about 155 per cent) and in real national income per head (of about 13 per cent) between 1973 and 1980.

Comparing the number of households and of persons below these lines in the two years, Roche found a substantial fall in poverty at each of his three poverty lines by 1980. The proportion of households in the sample below each line was about halved, while the proportion of persons fell by about 35-40 per cent. After some reweighting to estimate population totals (further to the reweighting carried out by the CSO), the overall extent of poverty in the population was estimated to have fallen by 27 per cent or more. This considerable reduction is partly attributed to public policy, in particular increases in coverage and real rates of payment in the social welfare system.

This strong finding - that even based on what is in effect a relative poverty line the numbers in poverty fell substantially over the period - is however called into question by an alternative analysis we have carried out. This applies relative poverty lines as defined in Section 2.1 above - that is, based purely on income in the sample itself - to both 1973 and 1980 HBS data. Using our equivalence scale A, which is not very different to those used by Roche, the 40 per cent, 50 per cent and 60 per cent relative poverty lines were calculated. The proportion of households and persons falling below each in 1973 and 1980 is shown in Table 1. Clearly a quite different picture to Roche's result is found: the percentage of households in poverty has declined only marginally between 1973 and 1980 while the corresponding percentage for persons has actually risen.

*Table 1: Percentage of Households and Persons Below Relative Poverty Lines, 1973 and 1980 HBS Samples*

	Relative Poverty Lines <sup>a</sup>		
	40%	50%	60%
a) households	%	%	%
1973	9.9	18.3	28.3
1980	8.5	17.2	27.9
b) persons			
1973	8.6	16.4	27.0
1980	10.4	19.2	29.7

<sup>a</sup> Equivalence scale 1 = HOH  
0.7 for other adults  
0.5 for child



The comparison with Roche's results is not exact because of the different equivalence scales used and because our 1973 results are based on detailed tabulations rather than the micro-data itself, but this would not contribute significantly to the major contrast in overall patterns found. This must be attributable to the basis on which the poverty lines were constructed. While Roche's objective was to take into account the increase in real income over the period in uprating the poverty line, he did this by using growth in national income per capita. He acknowledged that this may mask shifts in income, for example between individuals and corporations, and that personal income or personal disposable income might be a more valid measure of trends in command over personal consumption. However, national income he considered to be "the best measure of growth in total community resources" (p. 70).

It is difficult to see why this should be applied to the income of *households*, though. In fact, even income of the personal sector in the national accounts is not all attributable to households, and significant differences in definition and coverage exist for incomes from particular sources between the national accounts aggregates and income as measured in household surveys. (For a detailed examination of this issue using more comprehensive UK sources see Atkinson and Micklewright 1983). Further, of course, household survey results may not fully reflect the incomes which they try to measure, due for example to understatement

and any non-response bias.

Thus the difference between our results and Roche's for the 1973-80 period are due to the fact that the poverty lines we apply to 1980 are 217 per cent higher than those for 1973, whereas his are up-rated by only 175 per cent. Comparing the 1973 and 1980 HBS samples, mean household disposable income rose from £36 to £106, by 193 per cent. Mean equivalent household disposable income, using the equivalence scale A, rose by 217 per cent, and thus so did our purely relative sample-based poverty lines. Using real national income growth together with the CPI, as Roche did, does not adequately represent what is actually happening to household income. Using national accounts personal disposable income rather than overall national income per capita would in fact give a figure closer to that revealed by the comparison between the Budget Surveys for the two years. Given the conceptual and other differences between the two sources, it seems preferable in any case to rely on the within-sample information in specifying the poverty lines.

This brief discussion of 1973-80 has served primarily to place a question-mark over the finding that even using relative poverty lines a sharp fall in poverty over the period is revealed. Given the significant rise in real incomes which took place, *absolute* poverty lines - applying for example the 1973 lines uprated only by the change in prices to the 1980 sample - would reveal such a fall in poverty. One of the most interesting features of the 1980-87

period, on which the paper now concentrates, is that this turns out *not* the case.

##### 5. *The Trend in Numbers Below the Poverty Lines 1980-87*

We first present, in this section, results for the headcount measure  $P_1$  - that is, the percentage of households and persons below the various poverty lines. The results for the more sophisticated measures  $P_2$  and  $P_3$  are then examined in Section 6.

Mean disposable household income in the 1987 ESRI survey was £198 per week, compared with £106 in the 1980 HBS. The CPI rose by 91 per cent over the period, so the 1980 figure in 1987 prices would be £203 - mean real household income fell by  $2\frac{1}{2}$  per cent between the two years. However, there was also a decline in average household size. When equivalent income is calculated using the four sets of scales described in Section 2.1, mean equivalent disposable household income in 1980 was between £42 and £46, depending on the scales used, while the 1987 mean was between about £80 and £85 per week. In real terms, mean equivalent income in 1987 was about  $1\frac{1}{2}$  per cent lower than in 1980. Relative poverty lines derived from those mean disposable equivalent incomes thus also imply lower figures in real terms for 1987 than for 1980.

Using the 50 per cent line as an example, the poverty standard for a single adult in 1980 was thus about £21-£23 per week, and for 1987 was about £40-£43 per week, depending on the scale used. The choice of scale makes a significant

difference to the level of the poverty line for larger households. For example, using scale A, the 50 per cent line for a single adult household in 1987 is £40, for a three-adult household it is £95, and for two adults with three children it is £127. Using scale C, though, the line for a single adult is £42, for three adults with no children it is £98, and for a couple with three children it is only £112.

Looking first at households rather than persons, Table 2 shows the percentage falling below each of the three relative poverty lines, for each of the four sets of equivalence scales, for 1980 and 1987. Our primary concern here is with the trend between the two years rather than the absolute level, and we can see that for most of the relative line/equivalence scale combinations the percentage of households in poverty increased between 1980 and 1987. This is true of the 50 per cent and 60 per cent lines irrespective of the scale chosen, but for the 40 per cent line it is only the case when scales A and B are used. For this lowest line, using scales C and D - which allow a relatively small addition of 0.33 and 0.3, respectively for the 'needs' of a child - the percentage of households in poverty is seen to have fallen between 1980 and 1987.

While the results for households are of interest, they obviously attribute the same importance to a small as well as a large household. We therefore also want to consider the position of the persons within these households, attributing

equal importance to each person. The percentage of persons below each line (that is, in households below each line) for the two years is shown in Table 3. Comparing these with the corresponding figures for households in Table 2, we can see that for 1987 in each case there is a higher percentage of persons than households below the line. So for that year poor households are larger than average, irrespective of the line/scale chosen. This is not the case for 1980. For the earlier year the percentage of persons below the 40 per cent line for all scales, and below each line for Scale A, is greater than the percentage of households, but for all the other line/scale combinations the opposite is true.

Table 2: *Percentage of Households Below Relative Poverty Lines Using Different Equivalence Scales, 1980 and 1987*

Equivalence Scale <sup>a</sup>	Relative Poverty Line					
	40%		50%		60%	
	1980	1987	1980	1987	1980	1987
	%	%	%	%	%	%
A	8.5	10.0	17.2	18.9	27.9	29.0
B	8.6	8.9	17.6	18.5	27.9	30.5
C	8.0	7.5	16.8	17.5	27.6	30.0
D	7.7	7.5	16.5	17.4	27.6	29.5

- <sup>a</sup> Scale A = 1 for HOH, 0.7 for other adults, 0.5 for child  
 Scale B = 1 for HOH, 0.6 for other adults, 0.4 for child  
 Scale C = 1 for HOH, 0.66 for other adults, 0.33 for child  
 Scale D = 1 for HOH, 0.7 for other adults, 0.3 for child

Looking at the overall trend between the two years, we find exactly the same pattern as for households: at all the relative line/equivalence scale combinations except the 40 per cent line with scales C and D, the percentage of persons in poverty has risen. It is notable that the increase is considerably greater - or decline smaller in the two cases where it occurs - for persons than for households: poor households have become larger relative to the average between the two years in all cases.

Table 3: *Percentage of Persons Below Relative Poverty Lines Using Different Equivalence Scales, 1980 and 1987*

Equivalence Scales <sup>a</sup>	Relative Poverty Line					
	40%		50%		60%	
	1980	1987	1980	1987	1980	1987
A	10.4	12.8	19.2	22.9	29.7	33.5
B	9.3	10.5	17.4	21.2	27.6	32.2
C	8.5	8.2	16.2	19.8	26.7	31.4
D	8.1	8.0	16.0	19.5	26.3	31.1

<sup>a</sup> See footnote to Table 2.

Using the headcount measure, then, and applying purely relative poverty lines to each year, we cannot reach entirely consistent or robust conclusions on the trend in poverty between 1980 and 1987 that hold across all the equivalence scales used. As already noted, though, real mean equivalent income actually fell by about  $1\frac{1}{2}$  per cent between 1980 and

1987, so this procedure has applied lines to 1987 which are lower in real terms than those for 1980. To see the implications of this, we also applied a set of poverty lines to 1987 which represented the same real income as 1980. That is, rather than basing the lines on the actual mean equivalent incomes for 1987, we now take 40 per cent/50 per cent/60 per cent of 1980 mean equivalent incomes updated to 1987 prices - which obviously means using lines for 1987 which are now about  $1\frac{1}{2}$  per cent higher than the purely relative ones.

The number of persons under these lines is shown in Table 4. We can see that, compared with the 1987 figures in Table 3, between  $\frac{1}{2}$  per cent and  $1\frac{1}{2}$  per cent more of the population fall below these lines than below the corresponding purely relative lines. Compared with the 1980 figures also shown in Table 3, there is now a consistent and unambiguous increase in the percentage of persons in poverty between the two years. The same result holds if we consider the percentage of households.

In sum, then, a fully consistent and robust conclusion on the trend in poverty between the two years, on the basis of the range of poverty lines and equivalence scales used, is *not* forthcoming using the headcount measure and purely relative poverty lines. Such a conclusion is, however, possible on the basis of poverty lines fixed in real terms, which show a consistent increase in the percentage in poverty. We now turn to the other poverty measures outlined

in Section 2.2.

Table 4: *Percentage of Persons Below '1980 real poverty lines' using Different Equivalence Scales, 1987.*

Equivalence Scale <sup>a</sup>	'Real' Poverty Line <sup>b</sup>		
	40%	50%	60%
A	13.6	23.6	34.7
B	11.5	21.8	33.1
C	9.1	20.4	32.8
D	8.5	20.3	32.5

<sup>a</sup> Equivalence scales are defined in Table 2.

<sup>b</sup> 1980 relative poverty lines, updated to 1987 by increase in CPI.

#### 6. *Alternative Aggregate Poverty Measures*

We first look at the measure  $P_2$ , the 'per capita income gap'.

$$\frac{1}{n} \sum_{i=1}^n g_i \quad (3)$$

Reverting to purely relative poverty lines for each year,  $P_2$  was calculated for each poverty line and the results for households are shown in Table 5<sup>9</sup>. At each line these show somewhat less variation when the different equivalence scales are used than did the headcount. Between 1980 and 1987 there is now an unambiguous increase in poverty, as measured by  $P_2$ , at all the poverty line/equivalence scale combinations.

The corresponding results for persons - in effect weighting the household gaps by the number of persons in each



household - are shown in Table 6<sup>19</sup>. These are in general higher than the corresponding household figures, the exceptions for 1987 being the 40 per cent line with scales C and D. As with the household-based results, though, there is a consistent rise in the index between 1980 and 1987 for all lines/scales. There is no clear pattern in the relationship between the increases at different lines/scales, with, for example, the percentage change in the index being highest at the 50 per cent line for Scale A but at the 60 per cent line for Scale B.

Table 5: *Per Household Income Gaps Using Relative Poverty Lines and Different Equivalence Scales, 1980 and 1987*

Equivalence Scales <sup>a</sup>	Relative Poverty Line					
	40%		50%		60%	
	1980	1987	1980	1987	1980	1987
A	0.028	0.034	0.047	0.056	0.076	0.086
B	0.027	0.032	0.047	0.054	0.07	0.085
C	0.026	0.031	0.045	0.051	0.075	0.081
D	0.026	0.031	0.045	0.050	0.074	0.079

<sup>a</sup> See footnote to Table 2.

Table 6: *Per Person Income Gaps Using Relative Poverty Lines and Different Equivalence Scales, 1980 and 1987*

Equivalence Scale <sup>a</sup>	Relative Poverty Line					
	40%		50%		60%	
	1980	1987	1980	1987	1980	1987
A	0.031	0.036	0.054	0.065	0.085	0.010
B	0.029	0.033	0.049	0.058	0.078	0.093
C	0.027	0.030	0.046	0.054	0.074	0.087
D	0.026	0.030	0.045	0.052	0.073	0.085

<sup>a</sup> See footnote to Table 2.

As discussed in Section 2.2, the measure  $P_2$  takes no account of the distribution of income among the poor. What Foster and Shorrocks (1982a) term the "distributionally sensitive measure",  $P_3$  was therefore also calculated. The results for households are shown in Table 7 and those for persons in Table 8. These again show relatively little variation across different equivalence scales at each line. The consistent pattern is again a substantial increase between 1980 and 1987, at all lines/scales. Relative to the level of the index in 1980, the increase is of the order of 20%-30%, and is somewhat greater than that for  $P_2$  at each line. As for  $P_2$ , there is no consistent relationship across lines/scales between the increase for households and for persons.

These results for  $P_2$  and  $P_3$  are all on the basis of purely relative poverty lines applied to both 1980 and 1987.

Since applying the '1980 line in real terms' to 1987 means using a higher line for that year in all cases, and since the purely relative lines already show an unambiguous increase in both  $P_2$  and  $P_3$  across all lines/scales between the two years, a larger increase would be seen if the '1980 real line' was used for 1987 instead.<sup>11</sup>

Table 7: Poverty Index  $P_3$  for Households Using Relative Poverty Lines and Different Equivalence Scales, 1980 and 1987

Equivalence Scale <sup>a</sup>	Relative Poverty Line					
	40%		50%		60%	
	1980	1987	1980	1987	1980	1987
A	0.017	0.023	0.024	0.031	0.036	0.043
B	0.017	0.023	0.024	0.030	0.035	0.042
C	0.017	0.023	0.023	0.029	0.034	0.040
D	0.017	0.023	0.023	0.029	0.034	0.040

<sup>a</sup> See footnote to Table 2.

Table 8: Poverty Index  $P_3$  for Persons Using Relative Poverty Lines and Different Equivalence Scales, 1980 and 1987

Equivalence Scale <sup>a</sup>	Relative Poverty Line					
	40%		50%		60%	
	1980	1987	1980	1987	1980	1987
A	0.018	0.023	0.026	0.033	0.040	0.048
B	0.016	0.022	0.024	0.030	0.036	0.044
C	0.016	0.021	0.023	0.029	0.034	0.041
D	0.016	0.021	0.023	0.028	0.034	0.040

<sup>a</sup> See footnote to Table 2.

## 7. *Conclusions*

This paper has analysed the trend in poverty in Ireland between 1980 and 1987, using a variety of measures. The data base was the CSO's Household Budget Survey for 1980 and the ESRI Survey of Life-Styles, Income Distribution and Usage of State Services for 1987. The objective was to explore the extent to which conclusions which were robust with respect to the location of the poverty line could be reached.

Using three relative poverty lines and four different sets of equivalence scales, such uniform conclusions were not possible on the basis of the simple headcount measure of the percentage of households/persons in poverty. For most of the poverty lines used this showed an increase between 1980 and 1987. This was not the case, though, when the lowest relative line (40 per cent of mean equivalent income) together with the scales which were the least generous towards the needs of children relative to adults were used.

More sophisticated aggregate poverty measures were also applied. These were the 'per capita income gap' which takes into account the extent to which the poor fall below the poverty line, and the development of that measure by Foster *et al.* (1984) which is in addition sensitive to the distribution of income among the poor. Using the range of relative poverty lines and equivalence scales, these measures both showed an unambiguous increase in poverty between 1980 and 1987 in all cases.

The 1987 relative poverty lines are actually below the corresponding 1980 lines in real terms, because mean equivalent disposable income per household fell over the period. When, instead, the same lines in real terms are applied to both 1980 and 1987, an increase in the headcount measure between the two years at all the lines and for all of the equivalence scales is also seen.

These results serve to illustrate the value of the approach to the measurement of poverty put forward by Atkinson (1987, 1988) and Foster and Shorrocks (1988a, b) among others. This involves explicit acknowledgement of the difficulty of obtaining consensus on the appropriate location for the poverty line or the needs of families of different types. While our analysis has not, of course, covered the entire range of possible poverty lines and equivalence scales, it has shown that over a wide range of values for each, some robust conclusions with respect to the trend in poverty were none the less possible in this case.

## Footnotes

1. An alternative which has been used in some applications is to derive a relative poverty line as a proportion of median income. This would, for a given proportion, lead to a lower poverty line, since the median is almost invariably below the mean. However, where a range of lines rather than one particular line is being used to assess trends over time, the location of each is not intended to be given particular significance.
2. Supplementary Benefit short-term rates in 1986-87 implied a scale where if a single householder was 1, a married couple was 1.62 - so the spouse was 0.62 - and children under 16 were on average 0.4 (with differentiation by age). Additional other adults were however 0.8.
3. For example, the scales implied by current Supplementary Welfare Allowance rates (and including Child Benefit) are that if a single adult is 1, a dependent spouse is 1.67, the first two children are 0.35 each and third and further children are 0.31 each.
4. This obviously gives each household an equal weight in the calculation of mean equivalent income. An alternative would be to use

$$\frac{\sum_{i=1}^n Y_i}{\sum_{i=1}^n NEA_i}$$

which gives equal weight to each adult equivalent unit. While producing a slightly different level of mean income, this would not alter any of our conclusions with respect to changes over time.

5. Sen points out that the tendency of these measures "to look plausible in situations of growth, ignoring the possibility of contraction, betrays the timing of the birth of these measures in the balmy sixties, when the only possible direction seemed forward" (1982, p. ).
6. Sen (1976) and some of the other contributions to the literature on poverty measurement (for example, Foster and Shorrocks, 1988a, b) couch their formal discussion in terms of the number of households whose incomes *do not exceed*  $z$ , rather than falling below  $z$ . In the application of poverty lines - and in common usage - the latter is however more conventional.

7. The welfare functions in question are utilitarian in nature and satisfying monotonicity, equality-preference and transfer-sensitivity: see Foster and Shorrocks (1988b).
8. The 1980 HBS covers a larger sample - of over 7,000 households - and achieved an effective response rate of 56 per cent. The HBS is extremely onerous in requiring an expenditure diary to be kept over a two-week period, and also is somewhat more stringent in excluding cases where the questionnaire was not answered in full.
9. The headcount ratio is usually expressed as a percentage although the formula (2) calculates it as a proportion of all households/persons. No such convention appears to be followed for  $P_2$  and  $P_3$  (see the results presented by Foster *et al.* (1984), for example).
10. Since the data files are on a household rather than a person basis,  $P_2$  was actually computed by taking the mean across households of

$$\frac{1}{n} \sum_{i=1}^n g_i * P_i$$

where  $n$  = number of households in sample,  
 $P_i$  = number of persons in household  $i$

and dividing by the ratio of persons to households.

11. This would not necessarily be true of measures which focus on, for example, the average shortfall of the poor, since this could rise or fall when the poverty line is raised. The measures  $P_2$  and  $P_3$ , though, average the shortfalls of the poor over the whole population.

## References

- ATKINSON, A.B., 1987. "On the Measurement of Poverty", *Econometrica*, Vol. 55, No. 4, pp. 749-764.
- ATKINSON, A.B., 1988. *Measuring Poverty and Differences in Family Consumption*, ESRC Programme on Taxation, Incentives and the Distribution of Income, Discussion Paper 110, ST/ICERD, London School of Economics.
- 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.
- CALLAN, T., D.F. HANNAN, B. NOLAN, B.J. WHELAN and S. CREIGHTON. *Poverty and the Social Welfare System in Ireland*, Dublin: Combat Poverty Agency.
- FOSTER, J.E., J. GREER and E. THORBECKE, 1984. "A Class of Decomposable Poverty Measures", *Econometrica*, Vol. 52, pp. 761-766.
- FOSTER, J.E. and A.F. SHORROCKS, 1988a. "Poverty Orderings", *Econometrica*, Vol. 56, pp. 173-177.
- FOSTER, J.E. and A.F. SHORROCKS, 1988b. "Poverty Orderings and Welfare Dominance", mimeo, forthcoming.
- ROCHE, J., 1984. *Poverty and Income Maintenance Policies in Ireland 1973-80*, Dublin: IPA.
- SEN, A., 1976. "Poverty: An Ordinal Approach to Measurement", *Econometrica*, Vol. 44, pp. 219-231.
- SEN, A., 1979. "Issues in the Measurement of Poverty", *Scandinavian Journal of Economics*, Vol. 81, pp. 285-307.
- SEN, A., 1982. *Poor, Relatively Speaking*. Fifteenth Geary Lecture, Dublin: ESRI.