

# Redistribution of Household Income in Ireland by Taxes and Benefits

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*Précis:* This study uses data published by the CSO based on the 1973 Household Budget Survey to look at the redistribution of income among households by taxes and benefits. The distribution of cash benefits, direct taxes, indirect taxes and non-cash benefits is discussed, with emphasis on the importance of household composition. Decile shares of direct, gross and disposable income are presented and compared with estimates for a number of other countries. Inequality in the distribution of direct income is disaggregated into that within and between households of different compositions. The progressivity of different taxes is examined. Finally, some methodological issues are discussed.

## I INTRODUCTION

The Central Statistics Office has recently published, for the first time, estimates of the redistributive effects of State taxes and benefits on the distribution of income among households. This publication<sup>1</sup> gives a detailed breakdown of the amount of direct and indirect tax paid, and cash and non-cash State benefits received, by households at different income levels, of different size and composition, social class and tenure. Taxes and benefits are broken down by major types. The estimates are based on the income and expenditure data collected in the 1973 Household Budget Survey, the only such survey so far to cover both urban and rural areas. This new publication

\*The author wishes to thank A. B. Atkinson and J. Sutton (LSE), K. Barry (Central Bank of Ireland) and a referee for comments. The views expressed are those of the author.

1 "Redistributive Effects of State Taxes and Benefits on Household Incomes in 1973", CSO, January 1980.

represents a major improvement in the data base for the study of income distribution and redistribution in Ireland.

This paper first outlines briefly, in Section II, the concepts and methods used in the CSO study. Section III presents some findings using the CSO data. Section IV looks at some methodological issues. Finally, the conclusions are summarised.

## II CONCEPTS AND METHODS IN THE CSO STUDY

The study uses the income and expenditure information collected in the large-scale 1973 Household Budget Survey to allocate between households:

direct tax – income tax and social insurance contributions,

indirect tax – VAT, fiscal duties, rates, motor tax and licences,

direct cash benefits – major items being children's allowances, social welfare pensions and unemployment compensation, and

non-cash benefits – major items being medical services, education and housing.

The information on direct taxes and on cash benefits was collected in the Budget Survey, most of the indirect taxes were imputed from the household expenditure information in the Survey, and the benefits from services such as housing and education were estimated from the average cost of providing these services to recipients (excluding central administration expenses and capital outlay), with the allocation between households estimated on the basis of the age, economic status, etc., of individual household members.

The study uses four income concepts in the presentation of its results.

- 1 Direct income: includes all money receipts of a recurring nature accruing directly to the household, plus the value of any free goods regularly received and the retail value of own garden or farm produce consumed, before the deduction of taxes or the addition of State benefits. This is the concept used for classification purposes in the analysis.
- 2 Gross income: direct income plus cash benefits.
- 3 Disposable income: gross income minus direct taxes.
- 4 Final income: disposable income plus the value of State benefits in kind minus indirect taxes.

### III SOME FINDINGS

It must be stressed at the outset that the CSO study contains a wealth of detailed information to be exploited, and this section merely looks at some of the more important general issues. The distribution of cash benefits, direct tax, indirect tax and non-cash benefits is discussed first (largely following the analysis contained in Part 2 of the CSO study itself). This is followed by an examination of the distributions of direct, gross and disposable income, with estimated decile shares and inequality measures, and some international comparisons in Section III.2. In Section III.3, the distribution of direct income among households of different composition is examined using a disaggregated inequality measure. Finally, the progressivity of different taxes is discussed in Section III.4.

#### III.1 *Distribution of Taxes and Benefits*

Table 1 below shows the average weekly income for the four income concepts, and the average weekly direct and indirect taxes and benefits for households classified by direct weekly household income. We can see from the table that direct cash benefits fall steadily with household direct income, direct taxes rise steadily with household direct income, non-cash benefits rise somewhat with household direct income, and indirect taxes rise steadily with household direct income. The overall effect is to transfer income from high income to low income households, as shown by the final income/direct income ratios for the various income groups.

However, the table also shows that household size rises steadily with household direct income. One of the clearest points to emerge from the CSO exercise is the vital importance of household composition in considering transfers between households. To facilitate analysis, taking household composition into account, tables giving average benefits and taxes of the various types allocated to households classified by direct income are presented separately in the CSO study for each of twelve different household composition types (see Tables 4A–4M of the report). Using this information, much more meaningful conclusions about the distribution of transfers of various types can be reached.

Cash benefits can be seen to benefit the lower (direct) income households more than upper income households for each household composition type (see Table E of the report). Within each direct income class, benefits generally rose with the number of persons in the household, as would be expected.

When household composition is taken into account in examining income tax paid, the same sort of conclusion emerges – households of all composition types paid more income tax as direct income rose. This does not hold with respect to social security payments because these vary with the number

Table 1: *Average weekly income, taxes and benefits of households classified by direct income 1973*

	<i>Direct weekly household income (£)</i>											<i>Total</i>
	<i>Under 7</i>	<i>7-15</i>	<i>15-20</i>	<i>20-25</i>	<i>25-30</i>	<i>30-35</i>	<i>35-40</i>	<i>40-50</i>	<i>50-60</i>	<i>60-80</i>	<i>80 and over</i>	
Number of households <sup>a</sup>	1,404	627	452	604	754	589	551	840	610	692	616	7,739
Persons per household	2.26	2.85	3.17	3.85	4.14	4.50	4.47	4.78	4.85	5.32	5.53	4.01
Direct income	1.55	10.90	17.52	22.50	27.40	32.26	37.37	44.61	54.64	68.85	112.61	36.00
+ Cash benefits	8.44	6.07	4.72	3.70	3.24	2.75	3.02	2.77	2.62	2.57	1.94	4.22
= Gross income	9.99	16.97	22.24	26.21	30.64	35.01	40.39	47.38	57.26	71.42	114.56	40.22
- Direct taxes	0.03	0.45	1.20	1.95	2.41	3.18	3.74	5.00	6.43	9.07	13.50	3.94
= Disposable income	9.96	16.52	21.04	24.25	28.22	31.83	36.65	42.39	50.84	62.35	101.05	36.28
+ Non-cash benefits	4.00	4.18	4.31	5.48	5.82	6.40	6.10	6.81	6.50	7.03	7.24	5.69
- Indirect Tax	2.79	4.28	5.00	5.62	6.67	7.69	8.69	8.94	10.44	11.73	14.75	7.45
= Final income	11.17	16.42	20.35	24.11	27.38	30.54	34.06	40.26	46.90	57.65	93.54	34.51
Final income/ direct income	7.22	1.51	1.16	1.07	0.99	0.95	0.91	0.90	0.86	0.84	0.83	0.96

a Adjusted number of households in sample after reweighting for differential response.

Source: "Redistributive Effects of State Taxes and Benefits on Household Incomes in 1973", CSO 1980, Table B.

of *employees* in each household. The results also show that households of all types paid *proportionately* more in income tax as their direct income rose — so income tax is progressive as measured by this approach<sup>2</sup> (see Table F in the report).

This was not the case, however, for non-cash benefits where the classification by household composition and direct income shows quite a different pattern to that shown in the classification by direct income alone in Table 1 above. The total value of non-cash benefits received was in fact quite stable over all income levels for each of the composition types, falling only marginally as income rose (see Table H of the report).

Indirect tax paid rose as direct income rose, both overall and for each household composition type. If disposable rather than direct income is used for classification purposes, it can be seen that indirect tax paid rose as disposable income rose for all households, but that higher income households paid proportionally less of their disposable income on indirect taxes than low income households — so indirect taxes are regressive (as measured by this approach) when taken over all households<sup>3</sup> (see Table K of the report).

Table 2: *Decile shares of direct, gross and disposable income 1973*

<i>Decile of households</i>	<i>Direct income share (%)</i>	<i>Gross income<sup>b</sup></i>	<i>Disposable income</i>
Bottom decile	} 1.19 <sup>a</sup>	1.52 } 4.54	1.67 } 4.95
2		3.02 }	3.28 }
3	3.78	4.80	5.02
4	6.07	6.40	6.53
5	7.65	7.67	7.83
6	9.26	9.15	9.21
7	11.26	10.88	10.86
8	13.84	13.15	13.01
9	17.70	16.61	16.16
Top decile	29.27	26.79	26.43

- a. Since the bottom direct income group contains 18 per cent of households, substantial interpolation error might be involved if decile shares were estimated.
- b. These shares are the same as those estimated in Nolan (1978), despite the exclusion of 9 households from the survey in the CSO redistribution exercise.

*Source:* Estimated from "Redistributive Effects of State Taxes and Benefits on Household Incomes in 1973", CSO, 1980, Tables 1, 10 and 11.

2 See also Section III.4, and note the qualifications in Section IV.

3 Sub-classification by disposable income and household composition is not presented, so we cannot say whether this is also true for each household composition type.

### III.2 *The Distribution of Direct, Gross and Disposable Income*

Although direct income is used as the income concept for classification purposes in most of the CSO study, the distribution of households by gross and disposable income groups is also given (Tables 10 and 11 respectively). This means that the distribution of the three income types among households can be compared by estimating decile shares of income from the published data. (Decile shares for gross income could be estimated from the previously published Survey Reports, see Nolan (1978), but not for direct and disposable income.) Since no classification by final income is given, no such comparison including indirect taxes and benefits is possible.

Table 2 presents the decile shares of direct, gross and disposable income estimated from the published grouped data by logarithmic interpolation. The Lorenz curves, showing the cumulative share of income going to the bottom 10, 20, 30, etc., per cent of households, are shown for the three income concepts in Figure 1.

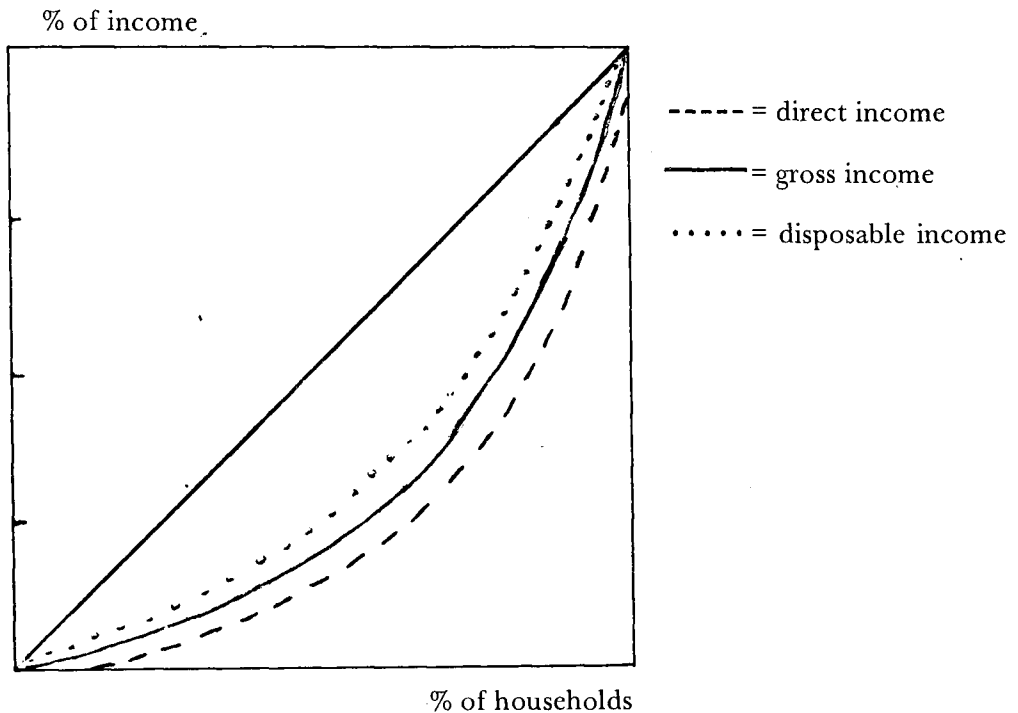


Figure 1: *Lorenz curves for direct, gross and disposable income*

Since the Lorenz curves do not intersect we can say unambiguously that direct income is less equally distributed than gross income, which in turn is

less equally distributed than disposable income<sup>4</sup>. Clearly the distribution of gross income is considerably closer to that of disposable income than that of direct income – so cash transfers make more difference to the distribution than direct tax.

We can also illustrate the comparison using inequality measures. The Gini coefficient – the ratio of the area between the Lorenz curve and the 45° line to the total area under the 45° line – is one measure used here. It is the measure traditionally used in income distribution studies and is, therefore, particularly useful for comparative purposes, but like all inequality measures it involves a set of value judgements by which inequality at different points in the distribution is weighted<sup>5</sup>. Since one might not necessarily agree with these value judgements it is useful to use other inequality measures which involve different value judgements also. Here Theil's inequality measure is used, both as a supplement to the Gini coefficient and because it has much more satisfactory properties in decomposition, which will be discussed and used later in the paper. The Theil measure, derived from the concept of entropy, is defined as:

$$T = \frac{1}{n} \sum_{i=1}^n y_i / \bar{y} \cdot \log y_i / \bar{y}$$

where  $n$  = the number of income recipient units,

$y_i$  = the income going to the  $i$ th unit,

and  $\bar{y}$  = the mean income.

Gini coefficients and Theil measures for direct, gross and disposable<sup>6</sup> income are:

	<i>Direct income</i>	<i>Gross income</i>	<i>Disposable income</i>
Gini	.448	.380	.370
Theil	.153	.103	.099

These two measures clearly show the same picture as the Lorenz curves.

4 And since mean gross income is greater than mean direct income, we can use Atkinson's (1970) result that these two distributions would also be ranked in the same order in terms of social welfare by a broad class of social welfare functions. This does not apply to the comparison of gross and disposable income, since mean gross income is greater than mean disposable income but disposable income "Lorenz dominates" gross income, and the social welfare ordering might not be independent of mean income. However, the comparison of Lorenz curves may still tell us that disposable income is "more equal" than gross income in a descriptive sense, without implying welfare judgements (on this see also Sen (1973)).

5 Usually the value judgements are implicit in the measure, but Atkinson's measure allows them to be made explicitly.

6 Calculated from the original grouped data in "Redistributive Effects of State Taxes and Benefits on Household Incomes in 1973", CSO, 1980, Tables 1, 10 and 11.

The degree of redistribution from direct to disposable income can be quantified in one way by the percentage reduction in the Gini coefficient — what Stark (1977, p. 21) calls the “redistributive factor”. This coefficient,  $\frac{G_1 - G_2}{G_1} \cdot 100$  where  $G_1$  is a direct (or original) income and  $G_2$  is disposable (or net) income, is 17.4 per cent using the Gini coefficients above. This, of course, only includes redistribution through cash benefits and direct taxes — redistribution through non-cash benefits and indirect taxes could be taken into account in this way only if we knew the distribution of final income among households, though the evidence would suggest that the effect may not be very great.

We can now compare these results with those from a number of other countries for which similar studies are available. The closest comparison in terms of concepts and methods, and perhaps also the most interesting comparison, is with the studies carried out by the UK Central Statistics Office based on the Family Expenditure Survey<sup>7</sup>. These studies, available annually from 1961, are based on very similar methodology to the Irish CSO exercise, and the Family Expenditure Survey is very similar in concepts and structure to the Irish Household Budget Survey. So for comparative purposes we will first concentrate on the UK, since the comparison can be made with some degree of confidence<sup>8</sup>.

Table 3 shows decile shares in direct, gross and disposable income, and Gini coefficients, for the UK in 1973 compared with the estimates for Ireland outlined above. For the UK, the distribution of final income is also given.

From the cumulative income shares — i.e., the income share of the bottom 10, 20, 30, etc., per cent of households — of the distributions, we can see that the Lorenz curve for the UK lies inside the Irish curve for each of the three income concepts,<sup>9</sup> there is no intersection. We can, therefore, state unambiguously that the distribution in the UK was more equal in each case.<sup>10</sup> The Gini coefficients indicate the same conclusion. The difference between direct and gross income distribution (cash benefits) in the UK is considerably greater than that between gross and disposable income distribution (direct

7 See *Economic Trends*, various issues.

8 One difference in income concepts to be noted is that income includes imputed rent from owner-occupation in the UK case but not in the Irish data. However, the Royal Commission on the Distribution of Income and Wealth concluded that imputed rent had little impact on the distribution of income in the FES, (see Stark, p. 21).

9 Though this might not be the case for direct income if we had a reliable estimate of the share of the bottom decile for Ireland.

10 And since mean income in the UK was higher in each case, we can also appeal to Atkinson's result with reference to social welfare rankings (see footnote 4, p. 65).



Table 3: Decile shares of direct, gross and disposable income for Ireland and the UK, 1973

Decile	Direct income		Gross income		Disposable income		Final income
	Ireland	UK	Ireland	UK	Ireland	UK	UK
Bottom	1.2	0.1	1.5	2.2	1.7	2.5	2.7
2		1.2	3.0	3.3	3.3	3.8	4.2
3	3.8	3.9	4.8	5.1	5.0	5.4	5.5
4	6.1	6.5	6.4	6.9	6.5	7.0	6.9
5	7.6	8.3	7.7	8.3	7.8	8.3	8.3
6	9.3	9.9	9.2	9.8	9.2	9.7	9.6
7	11.3	11.9	10.9	11.2	10.9	10.9	11.1
8	13.8	13.7	13.2	12.9	13.0	13.2	12.9
9	17.7	16.6	16.6	15.6	16.2	15.4	15.4
Top	29.3	27.9	26.8	24.7	26.4	23.9	23.4
Gini	.448	.434	.380	.350	.370	.333	.323

Sources: Ireland: Table 2 above;

UK: Royal Commission on the Distribution of Income and Wealth (1977), Tables D 12, D 9, D 14 and D 16.

tax) as in the Irish case. The redistributive factor from direct to disposable income in the UK is 23.3 per cent, compared with the Irish figure of 17.4 per cent.

As mentioned above, no classification of households by final income group is given in the CSO report for Ireland, so we are unable to compare decile shares of final income with those for direct, gross and disposable income, or with final income for the UK. We can see for the UK, however, that the difference between disposable and final income (indirect taxes and benefits) is much less than that between direct and gross income, and is similar to, but slightly less than, the difference between gross and disposable income. The redistributive coefficient between direct and final income is 25.6 per cent compared to the 23.3 per cent coefficient for direct to disposable income. This should give some idea of the likely magnitude of the impact for Ireland.

Stark (1977) contains a detailed description of the income distribution studies and estimates available in eight countries including Ireland, and compares these with the UK studies. He concludes that two of these countries — Australia and Sweden — have redistribution studies which are comparable to the UK study<sup>11</sup>, and that the US has a number of studies of redistribution

<sup>11</sup> Stark states that in the Australian study the methodology employed is similar to that used in the British CSO studies, and the definitions of the various income concepts are approximate but not quite identical. For Sweden, he states that the FES and the Swedish Survey on Relative Income Differences are similar to each other.

which are not, however, strictly comparable to the UK. Given that the Irish exercise is so similar to the UK study, we may take these conclusions as applying also to the former.

The Irish estimates are compared to those for Australia in Table 4 in terms of the shares of the quintiles and the top 10 per cent, and to those for Sweden in Table 5 in terms of deciles. The estimates refer to different years – the Australian results refer to 1966-67, while the Swedish refer to 1972.

The distribution of each income concept in Australia is more equal than in Ireland – the cumulative share of income going to each percentage of households is greater, as households are cumulated from the bottom quintile up. The redistributive factor is 17.1 per cent, very close to that for Ireland.

In the case of Sweden, however, there is a sharp contrast between comparisons of direct and of disposable income – as Stark noted in the comparison between Sweden and the UK. The Lorenz curves for the distribution of direct income intersect at the top of the distribution, as can be seen from the cumulative income shares, but the lower deciles clearly have a considerably greater share of direct income in Ireland than in Sweden. The distribution of disposable income, on the other hand, is more equal in Sweden, with the Lorenz curve lying inside the Irish curve at every point. This contrast is emphasised by the large redistributive factor for Sweden of 37.1 per cent.

It must be noted that since these income distributions refer to households, household size will be one of the many factors which contribute to the differences between countries. Average household size in the Irish CSO sample was 4.01, which compares with, in the studies quoted, 2.82 in the UK FES for 1973, 3.43 in the Australian study and 2.24 in the Swedish study. There is, however, no clear relationship between household size and the level of inequality. (Stark notes evidence for a number of countries showing that the level of inequality among households decreases as household size increases, but states that due to other factors having a greater influence on distribution, household size “does not give any insight into the possible causes of differences in the inequality in household income either between countries or over time” (1977 p. 228.)

A number of studies of redistribution in the US – those by Pechman and Okner (1974) and by Musgrave *et al.*, (1974) – used concepts and methods which differ significantly from those used in the studies dealt with so far, so no comparison will be made between the results. However, their methodology is of considerable interest, and will be mentioned in Section IV.

Finally, it is important to remember that as well as affecting the overall distribution of income among households, taxes and benefits also affect the ranking of households within the distribution. Thus the bottom decile of households as ranked by direct income will not consist of the same households as the bottom decile when ranked by gross or disposable income. King

Table 4: *Redistribution in Ireland (1973) and Australia (1966-67)*

Quintile	Direct income		Gross income		Disposable income	
	Ireland	Australia	Ireland	Australia	Ireland	Australia <sup>a</sup>
Bottom	1.2	2.9	4.5	6.3	5.0	6.8
20 – 40	9.8	13.7	11.2	13.6	11.6	14.1
40 – 60	16.9	18.3	16.8	17.9	17.0	18.2
60 – 80	25.1	24.0	24.0	23.3	23.9	23.3
80 – 100	47.0	41.0	43.4	38.9	42.6	37.7
Top 10%	29.3	25.4	26.8	23.9	26.4	23.0
Gini	.448	.368	.380	.321	.370	.305

a Excluding imputed rent, since this is not included in the Irish figures.

Source: Table 2 above, and Stark (1977) Tables 10 and 13.

Table 5: *Redistribution in Ireland (1972) and Sweden<sup>a</sup> (1972)*

Decile	Direct income		Disposable income	
	Ireland	Sweden	Ireland	Sweden
Bottom	} 1.2	-0.2 } 0.1 0.3 }	1.7	2.2
2			3.3	4.4
3	3.8	1.9	5.0	5.9
4	6.1	5.3	6.5	7.2
5	7.6	8.1	7.8	8.5
6	9.3	10.2	9.2	10.0
7	11.3	12.3	10.9	11.5
8	13.8	14.7	13.0	13.3
9	17.7	18.4	16.2	15.7
Top	29.3	28.8	26.4	21.3
Gini	.448	.480	.370	.302

a The distribution of gross income in Sweden is only available for 1966 and from a different source and so is not given here.

Source: Table 2 above and Stark (1977) Table 102.

(1980) quotes the finding by the UK Royal Commission on the Distribution of Income and Wealth that in 1977 only 31 per cent of households in the

distribution of original (i.e., direct) income were in the corresponding decile of final income, while 27.5 per cent of households moved more than one decile. What we require to give a more complete picture, therefore, may be viewed as a transition matrix mapping pre-tax positions into post-tax positions, as Atkinson and Stiglitz (1980) put it. (On this issue see also Atkinson (1979)).

The re-ranking of households also arises if we consider making some adjustment for household size by looking at household income *per capita* or per adult equivalent unit. Datta and Meerman (1980) have compared the distributions of household income and household income *per capita* for a sample of Malaysian households, and found the rankings of households to be very different. This also has important implications for the measurement of the impact of taxes and transfers, which may be very different if household income *per capita*, for example, is used rather than household income. We cannot at present compare, for Ireland, the distributions of direct, gross, disposable and final incomes adjusted for family size, since we have detailed information on income by household composition only for households classified by direct income. We can, however, get some idea from this information of the importance of household size and composition for taxes and transfers, as discussed briefly in Section III.1. We can also look at the distribution of direct income for different household composition groups, which we do in the following section.

### III.3 *Distribution Among Households of Different Composition*

As already mentioned, the CSO study of redistribution contains a detailed breakdown of the distribution of households into direct income classes for twelve different household composition types – one adult, two adults, two adults plus one child, etc. These detailed tables may be analysed by the use of the decomposition of the Theil measure of inequality.

Recent papers by Shorrocks (1980) and Bourguignon (1979) examine the properties required of an inequality measure if it is to be “additively decomposable” – that is, if the population is divided into a number of disjoint subgroups, total inequality as quantified by the measure can be expressed as the sum of a “within-group” inequality term and a “between-group” term, where the within-group term is a weighted sum of the sub-group inequality measures. If this and a number of other desirable requirements<sup>12</sup> are imposed, the Theil measure is shown to be one of the narrow range of measures which have the necessary properties. (There have been decomposition methods suggested for the Gini coefficient, notably by Pyatt (1975), but

<sup>12</sup> Which differ slightly between the two papers.

it does not have the required properties as outlined by Shorrocks and Bourguignon.)

The Theil measure may be decomposed as follows (see Theil (1967)):

$$\text{if the overall index } T = \frac{1}{n} \sum_{i=1}^n \frac{y_i}{\bar{y}} \cdot \log \frac{y_i}{\bar{y}} \quad (1)$$

where  $y_i$  = the income going to recipient  $i$ ,

$\bar{y}$  = mean income,

and  $n$  = the number of income units,

then, if the population is divided into  $G$  disjoint subgroups, total inequality can be expressed as:

$$T = \sum_{g=1}^G \frac{n_g \bar{y}_g}{n \bar{y}} T_g + \frac{1}{n} \sum_{g=1}^G n_g \frac{\bar{y}_g}{\bar{y}} \cdot \log \frac{\bar{y}_g}{\bar{y}} \quad (2)$$

where  $g = 1 \dots G =$  one of  $G$  population subgroups,

$n_g$  = the number of income units in subgroup  $g$ ,

$\bar{y}_g$  = the mean income of the income units in subgroup  $g$ ,

and  $T_g$  = the Theil measure of inequality within subgroup  $g$ .

So total inequality is expressed as the sum of the inequality within each group ( $T_g$ ) weighted by the share of that group in total income  $\left(\frac{n_g \bar{y}_g}{n \bar{y}}\right)$  plus the inequality between the groups (the right-hand term in (2)).

Table 6 shows the Theil coefficient calculated for the distribution of direct income within each of the 12 household composition types, the coefficient weighted by the group's income share, and the between-groups inequality coefficient, and the percentage contribution of each to total inequality.

We can consider these measures as telling us something about two different aspects of inequality — “vertical”, i.e., between households of the same composition, and “horizontal”, between households of different composition when we would want to take differing needs into account. Looking first at vertical inequality, at the within-groups coefficients, it is noticeable that those for one-adult, two-adult and to a lesser extent three-adult households are larger than those for other household types. When the coefficients are weighted by income shares, these again are groups which make a major contribution to the total. The coefficient for between-group inequality comprises 25 per cent of the total inequality coefficient. This between-group coefficient obviously takes no account of the differences between household types in comparing their income levels across groups. The result is nevertheless very

Table 6: *Decomposition of inequality of direct income by household composition*

<i>Group</i>	(1) <i>Theil coefficient<sup>a</sup></i>	(2) <i>Weighted coefficient</i>	(3) <i>(2) as % of total coefficient</i>
1 Adult	0.32530	0.013298	8.711
2 Adults	0.20520	0.028703	18.802
2 Adults + 1 child	0.11196	0.005634	3.691
2 Adults + 2 children	0.06264	0.004646	3.043
2 Adults + 3 children	0.07758	0.004390	2.876
2 Adults + 4 children	0.09991	0.008372	5.484
3 Adults	0.12925	0.013028	8.534
3 Adults + children	0.09029	0.008420	5.516
4 Adults	0.07886	0.006697	4.387
4 Adults + children	0.06529	0.005279	3.458
Other without children	0.06787	0.004364	2.859
Other with children	0.08328	0.010846	7.105
Sub total (= weighted within-group inequality)		0.113677	
Between groups		0.038980	25.534
<i>Total</i>		0.152657	100.000

a In a very small number of cases, no mean direct income for an income group was given because less than 10 households were in that group (and of the particular composition). In these cases an estimate of the mean income was used, from the information in other tables.

*Source:* Calculated from "Redistributive Effects of State Taxes and Benefits on Household Incomes in 1973", Tables 4A-4M.

interesting, in that it tells us that if we measure inequality of direct income among households using the Theil measure, and make no adjustment for differences in household composition, then 75 per cent of the measured

inequality for 1973 is between households of the same composition.

It would be interesting to know how this breakdown would look if we did make some adjustment for differences in household composition in measuring between-group inequality. In order to do so, we must make use of equivalence scales – scales which are designed to adjust the income of households (or families) for the effects of different composition and bring them to a common basis for purposes of comparison. These scales set out the ratio of incomes required by different household types to achieve similar standards of living, taking into account economies of scale and differing needs. The standard of living of a married couple is normally used as the base for comparison, so that if a married couple is equal to 1, the equivalent scale for a single adult may be 0.6 – i.e., a single adult required 0.6 of the income of a married couple to reach the same standard of living. The equivalent income of a household is, therefore, its actual income divided by its equivalent scale.

However, the difficulty which arises if one attempts to implement this approach is that there is no generally accepted method for designing or estimating these equivalence scales. The difficulties involved are briefly described in an Appendix to this paper. In the light of these difficulties the approach taken is to use a number of different sets of scales, and examine the sensitivity of the results to the scale used. Four different sets of scales are used, and it is found that for the purposes of this paper, the results are not significantly affected by the choice of scale. One of these scales is derived from the judgements implicit in the schedule of Unemployment Benefit payments in Ireland. The second is derived from similar administrative scales set out in the Beveridge Report (1942), which laid the foundations of the UK social security system. The other two scales are taken from empirical studies of UK household expenditure data. These scales and their construction are described in detail in the Appendix.

These scales can be used in the calculation of a new Theil coefficient for between-group inequality, in which the average income of each household composition type is first divided by the relevant equivalent scale. The between-group coefficient is then calculated on the basis of these adjusted incomes, and the results are shown in Table 7, with the new coefficient of total inequality got by adding the adjusted between-groups coefficient to the sum of the weighted within-group coefficients from Table 6.

It is clear from the results that the choice of equivalent scale does not make a significant difference to the conclusion – which is that between-group inequality is greatly reduced when adjustment is made for differing household composition. This results in a reduction of total measured inequality to about 78 per cent of the unadjusted total, with adjusted between-group inequality now accounting for 5.6 per cent of total inequality. (The result is also an interesting illustration of Nicholson's point that "to be useful, [an

Table 7: *Adjusted between-group and total inequality Theil coefficients for direct incomes using different equivalence scales, 1973*

<i>Equivalence scale<sup>a</sup></i>	(1) <i>Adjusted between-group coefficient</i>	(2) <i>Adjusted total coefficient</i>	(3) <i>(1) as % of (2)</i>	(4) <i>Adjusted total as % of unadjusted total</i>
1	0.00650	0.11576	5.62	78.09
2	0.00666	0.11592	5.75	78.20
3	0.00667	0.11593	5.75	78.21
4	0.00589	0.11515	5.12	77.68

a. Scales defined in Appendix.

Source: Calculated from "Redistributive Effects of State Taxes and Benefits", Table 3 and Table 6 above.

equivalent] scale need not satisfy every stringent theoretical condition which could be imposed . . . for some purposes complete accuracy or sensitivity to change may not be demanded" (1976, p. 9). This must be borne in mind when faced with the present uncertainty about the construction of these scales.)

A similar analysis of the distribution of gross and disposable income would also be of interest, given the data.

It must also be emphasised that the results dealt with here refer only to household income in a particular year. It would clearly be very interesting if we could consider redistribution in a lifetime context. Tax paid and benefits received will often have a marked age profile, with tax being high when earnings are high, and being counterbalanced by benefits received in childhood and old age. Redistribution by the government is, therefore, partly a rearrangement over time of the income stream of an individual, and only partly a redistribution between different individuals. This is an area of great interest, particularly in the context of redistribution between social classes<sup>13</sup>. However, the analysis of annual income remains very important, since "need" is largely related to an individual's or household's present circumstances rather than lifetime income, with imperfect capital markets not allowing sufficient smoothing-out to make lifetime rather than short-term income the determinant of consumption.

<sup>13</sup> The report of the UK CSO redistribution exercise results for 1977, which includes an examination of life-cycle factors, is contained in *Economic Trends*, November 1978. Households are divided into categories which approximate to stages of the life-cycle, and the pattern of taxes and benefits for each category examined.



### III.4 *Progressivity of Various Taxes*

In Section III.2 we discussed briefly the distribution of direct and indirect tax paid, and in Section III.2 we looked at the redistributive effects of direct taxes by comparing the distributions of gross and disposable income. In this section we compare the degree of progressivity or regressivity of the categories of direct and indirect tax on which details are given in the CSO report. This report gives a breakdown of direct tax paid by households into income tax and social insurance contributions, and of indirect tax into rates on dwellings, motor tax, VAT, fiscal duties and other indirect taxes (for example, licences).

A comparison of these taxes in terms of progressivity is complicated by the fact that, while the broad distinction between a progressive, proportional or regressive tax is generally appreciated, there is no such general agreement on methods of measuring the *degree* of progression or regression. A tax is said to be progressive if the ratio of tax paid to income rises as income rises, proportional if the ratio is constant, and regressive if the ratio falls as income rises. However, within this broad definition a number of measures have been suggested to provide an index of the degree of progressivity or regressivity. Musgrave and Musgrave (1980) state that there is no one "correct" way to measure the degree of progressivity, and go on to suggest three measures which might be used. Some of these measures use average tax rates at various income levels – Musgrave's "average-rate progression" – or average and marginal tax rates – Musgrave's "liability progression" or Slitor's measure. The third measure mentioned by Musgrave, the Musgrave-Thin measure, compares the inequality of post-tax income distribution with that of pre-tax income, using the Gini coefficient to measure inequality<sup>14</sup>.

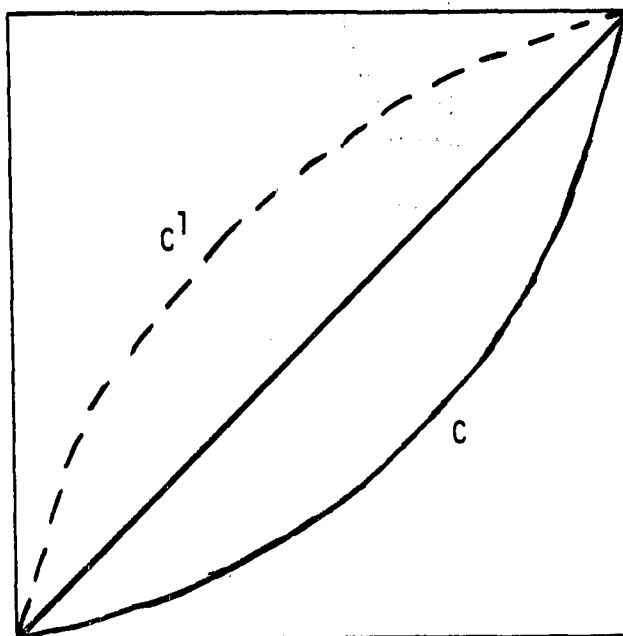
Recently, measures of progressivity have been put forward by Kakwani (1977) and by Suits (1977), each related to the Gini concentration ratio. Here we outline the Suits' measure and calculate it for the Irish data – not because it is felt to be the "correct" measure, but rather because it has a clear and intuitively appealing construction and convenient properties. (For comments on the Suits and Kakwani measures see a number of papers in the *Economic Journal* September 1979 and the *American Economic Review*, March 1980.)

The measure suggested by Suits is based on a construction similar to the Lorenz curve and the Gini coefficient which is related to it. The Lorenz curve, as already described in Section III.2, relates income units cumulated in order of income (on the horizontal axis) to the corresponding cumulative share of total income (on the vertical axis). Suits outlines a similar curve, but

<sup>14</sup> This measure was used in Section III.2 – the "redistributive coefficient" – to measure the impact of taxes and benefits on distribution.

with accumulated per cent of income on the horizontal axis and accumulated per cent of tax burden – i.e., the percentage of the total tax paid which is paid by the households receiving the relevant percentage of income – on the vertical axis. Two such curves are shown in Figure 2 below, and are referred to by Suits as “Lorenz curves for taxes”<sup>15</sup>.

accumulated  
% of total  
tax burden



accumulated % of total income

Figure 2: *Lorenz Curves for Taxes*

In the figure, the tax represented by curve C is progressive – the proportion of the tax burden borne by the poorest X per cent of households is less than the proportion of income going to these households – while the tax represented by curve C<sup>1</sup> is regressive. Clearly the curve for a proportional tax would lie along the 45° line.

<sup>15</sup> Though Kakwani's (1977) "concentration curve for taxes", which plots the cumulative tax burden against percentage of income recipients rather than income, could also be called a Lorenz curve for taxes.

The Gini coefficient is defined in terms of the ratio of the area between the Lorenz curve and the 45° line to the total area under the 45° line. Analogously, Suits' measure of progressivity is defined as the ratio of the difference between the area under the 45° line and the area under the tax curve to the area under the 45° line — in the examples of Figure 2, the ratio

$$\frac{OAB - OABC}{OAB} \quad \text{or} \quad \frac{OAB - OABC^1}{OAB}$$

So where the tax is proportional,  $OABC = OAB$  and the index is zero; where the tax is progressive  $OABC < OAB$  and the index is positive; and where the tax is regressive  $OABC > OAB$  and the index is negative. In the limiting cases, the index is -1 for a perfectly regressive tax (all tax paid by the lowest income recipient) and +1 for a perfectly progressive tax (all tax paid by the highest income recipient).

If we have data on income recipients classified by income group, the percentage of total income going to each group, and the percentage of total tax paid by each group, we can calculate the index as follows:

$$S = \sum_{i=1}^n \frac{1}{2} \left[ T_x(y_i) + T_x(y_{i-1}) \right] (y_i - y_{i-1})$$

- where  $y_i$  = cumulated per cent of income going to groups up to group  $i$ ,  
 $T_x$  = cumulated per cent of tax burden for tax  $x$  paid by groups up to group  $i$ ,  
 $i$  = 1 . . .  $n$  income recipient groups (e.g., deciles).

The necessary information is contained in Table 10 of the CSO report, which classifies households by gross income group<sup>16</sup> and gives average gross income and average tax of each type paid for each group. The shares of income and of the tax burden for each tax type, for each income group, calculated from these data are shown in Table 8 below.

From these shares we can calculate the cumulative shares of income and

<sup>16</sup> It should be noted that the income concept available for Ireland — gross income — is not as comprehensive as the Adjusted Gross Income concept used by Suits. This concept, which was introduced by Pechman and Okner (1974) and for which they estimated the US distribution for a number of years, is a broader income concept which includes, for example, estimated capital gains. Gross income is the broadest income concept available for the present exercise, but it should be noted that the income variable used may influence the results.

Table 8: *Shares of gross income and of tax paid by income groups (per cent)*

<i>Gross income group</i>	<i>Gross income</i>	<i>Income tax</i>	<i>Social insurance</i>	<i>Total direct tax</i>	<i>Rates</i>	<i>Motor tax</i>	<i>VAT</i>	<i>Fiscal duty</i>	<i>Licences</i>	<i>Total indirect tax</i>	<i>Total direct and indirect tax</i>
£s											
< 7	0.869	0.030	0.139	0.053	2.769	1.119	1.659	1.370	2.161	1.634	1.087
7-15	3.430	0.319	0.872	0.435	8.457	2.822	4.772	5.292	6.337	5.458	3.720
15-20	2.779	0.563	2.175	0.900	4.070	2.906	3.289	3.583	4.834	3.555	2.636
20-25	4.301	2.213	5.836	2.970	5.728	5.271	5.282	5.495	6.707	5.475	4.608
25-30	6.870	3.603	9.388	4.812	8.881	7.709	7.453	8.270	9.943	8.112	6.970
30-35	7.206	5.210	9.706	6.148	8.538	9.143	7.862	8.730	9.897	8.484	7.676
35-40	6.804	5.757	7.862	6.199	9.647	8.676	7.442	7.679	8.294	7.894	7.307
40-50	14.086	13.619	16.543	14.233	13.912	15.667	15.140	14.513	14.969	14.675	14.522
50-60	12.015	13.542	12.622	13.349	10.358	12.683	12.225	12.039	11.166	11.896	12.399
60-80	17.264	22.679	18.556	21.818	12.848	15.960	16.054	16.282	13.233	15.727	17.835
80 or over	24.377	32.465	16.301	29.083	14.790	18.043	18.823	16.746	12.459	17.091	21.241

Source: CSO "Redistributive Effects", Table 10.

of the burden of the various taxes. These are shown as the tax curves in Figure 3.

% of tax  
burden

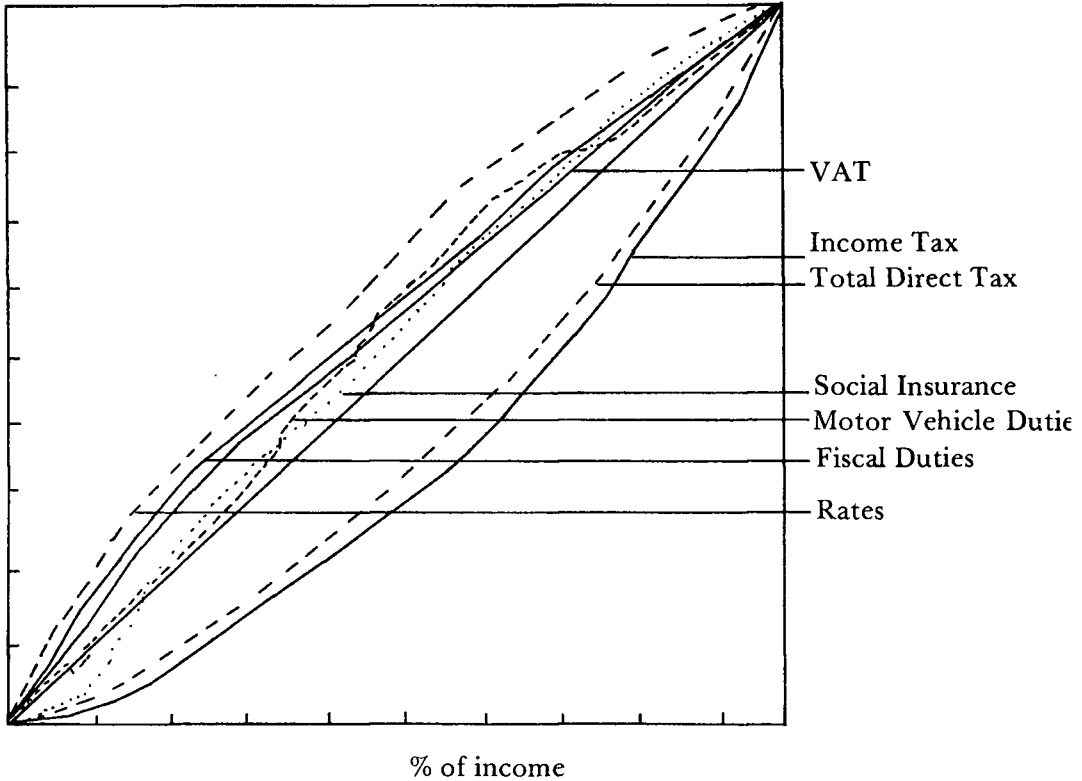


Figure 3: *Curves from Various Taxes, Ireland 1973*

The index of progressivity calculated from these taxes is shown in Table 9 below.

One of the convenient properties of the Suits index is that the index for a system of two or more taxes is the weighted average of the indices for the individual taxes, the weights being the average tax rates for the individual taxes. The average tax rate is defined for this purpose as total revenue from the tax divided by total income. The index of progressivity of two taxes, x and z, taken together is therefore,

$$S_{xz} = (R_x S_x + R_z S_z) / (R_x + R_z)$$

where S = the index of progressivity, and  
R = the average tax rate.

Table 9: *Progressivity and average rate of various Irish taxes, 1973*

<i>Tax</i>	<i>Index X</i>	<i>Average tax rate<sup>a</sup></i>
Income tax	0.194	0.078
Social insurance	-0.074	0.020
Total direct tax	0.138	0.098
Rates on dwellings	-0.211	0.023
Motor tax	-0.067	0.006
VAT	-0.092	0.055
Fiscal duties	-0.124	0.098
Other (e.g., licences)	-0.227	0.003
Total indirect tax	-0.125	0.185
Total direct and indirect tax	-0.034	0.283

a Average tax rate = total revenue from tax/total household income.

Source: Calculated from data based on Table 8 above.

This property can be confirmed from the taxes shown in Table 9 – for example, from direct tax as the sum of income tax and social insurance contributions, or total tax as the sum of direct and indirect tax – using the average tax rates which are also shown.

The tax curves and indices show that income tax was the only progressive tax, with social insurance contributions and all the indirect taxes regressive. The total of direct taxes was progressive, while the total of all the taxes considered here was slightly regressive.

It must be stressed that this conclusion applies only to the total of the taxes considered here. Suits, for example, found the US tax system as a whole to be slightly progressive, with highly progressive taxes, such as income, corporate and property taxes averaging with regressive indirect and payroll taxes to produce a “very nearly proportional” system. The Irish taxes shown in Table 9 do not represent the Irish tax system as a whole, and are not as complete as those in Suits’ exercise – corporation tax, for example, is not allocated to households, nor are capital taxes. The allocation of these taxes, on however tentative a basis, will have to be attempted before we can get a picture of the progressivity of the tax system as a whole<sup>17</sup>. (Given that the impact of a tax on the overall index will depend on its average rate, as well as its progressivity, a consideration of average rates for particular

17 The caveats with regard to the incidence of taxation as measured by the approach used by the CSO report which are discussed in Section IV, must also be borne in mind – the allocation of taxes by Pechman and Okner, used by Suits, is based on a more complete methodology which is also mentioned briefly in Section IV.

taxes might be a useful first step – clearly a tax with a very low rate will have little impact on the overall index, even if highly progressive or regressive.)

The importance of the income unit being used, the household (whereas Suits uses the family), must also be remembered. As pointed out in Section III.1, the distribution of taxes among households of the same composition may look quite different to that of taxes among all households, which is what we have been dealing with here, as in Section III.2. It would be of great interest to look at the distribution of the tax burden among households of the same composition, and analyse the impact of household composition. To do this we would like to have the kind of detailed information on income and taxes, for each household composition type separately, which is contained in Tables 4A–4M of the CSO report, but with households classified by gross rather than direct income<sup>18</sup>.

These results refer to the tax system operating in 1973, and the major changes in the system since then must be remembered. Among these changes were the abolition of domestic rates and most motor registration taxes, extension of income tax to some farmers and of current-year PAYE to civil servants, and the replacement of flat rate by partially earnings-related social insurance contributions.

#### IV METHODOLOGICAL ISSUES

The comments in this section relate to the methodology used in the CSO study, the same as that used in most empirical studies of the redistributive effects of taxes and benefits. The emphasis is on the care with which the results must be interpreted, given the limitations of the methodology.

The first point to be made is that, as noted in Section II, the total non-cash benefits from public expenditure, such as those on housing, education and medical services, are taken to be the cost of providing these services (net of administration costs and capital outlay), which are then allocated among households in various ways. However, it is the value which the household imputes to these benefits, rather than the cost of provision, in which we are really interested. Although there have been theoretical attempts to develop a procedure by which assumptions about individual utility functions can lead to a valuation and allocation of public goods supplied (see Aaron and McGuire

<sup>18</sup> With information on benefits as well as taxes, such classification would also enable the effects of household composition on the level of non-cash benefits received to be examined in detail. As noted in Section III.1, the classification of total non-cash benefits received by household composition and by household direct income suggests that household composition is of great importance. The detailed distribution of the individual benefits, classified by gross rather than direct income and by household composition, would allow this to be explored further.

(1970)), these have not been successful at a theoretical level (see Brennan (1976)) much less at an empirical one.

The second point is that the picture of redistribution through government expenditure and revenue is incomplete – as previously noted. The taxes allocated in the CSO exercise covered 76 per cent of public authorities income from tax for 1973-74, while the benefits allocated covered about 56 per cent of public authority current expenditure in that year. This means that average taxes over all households exceeded average benefits in the study, and so the final/direct income ratio for the average household, shown in Table 1 above, is less than one.

Among the items not allocated on the tax side are taxes on intermediate goods and services<sup>19</sup>, corporation tax, and capital taxes.

On the government expenditure side, a large part of the current expenditure which is unallocated, is on items such as law and order, defence and administration, from which an obvious benefit to households may not flow. So even with greater information it might be conceptually impossible to allocate benefits between households. However, with both unallocated taxes and benefits, it may be interesting to allocate them on the basis of some simple assumptions to get some impression of the full extent of redistribution through government<sup>20</sup>. We must also point to the implicit assumptions used in the CSO study and similar studies about the incidence of taxes which *have* been allocated. For example, income tax is assumed to be borne fully by the income recipient, not passed on to the employer, while indirect tax is assumed to be borne fully by the consumer, not by the producer, or his employees, etc.<sup>21</sup>

The general, and fundamental, point which must be emphasised is that consideration of the impact of a particular tax or benefit or of the system of taxes and benefits as a whole depends, as King (1980) puts it, “on a counterfactual assumption about the distribution which would be observed in the absence of taxes and benefits” (p. 72). Clearly, in the case of the system as a whole, we do not believe that, in the absence of all taxes and benefits, the distribution of income would correspond to the existing observed pre-tax and pre-benefits distribution. Not only would relative prices, supply and demand for goods and for factors of production be different, but so would

19 These are allocated in the UK CSO exercises using input-output information on the relationship between intermediate production and final demand, and some assumptions about incidence.

20 Musgrave *et al.* (1974) examine the impact of a number of different assumptions about incidence of corporation tax on dividend recipients or consumers in the US, and they and Nicholson and Britton (1975) look at the allocation of usually unallocated taxes and benefits, for example, on the basis of household income.

21 Prest (1968) has claimed that these assumptions are contradictory, while they have been defended by, among others, Nicholson and Britton (1975).



household formation – the households with little or no observed direct income could not survive. So we cannot see the overall *impact* of taxes and benefits, as a whole, on distribution using these results alone.

The use of a “no government counterfactual” has itself been heavily criticised as unrealistic and unworkable (see, for example, Bird (1980), Meerman (1978)), but even if we look only at a particular tax or benefit it is clear that we require knowledge about behavioural relationships between tax or benefit and economic agents’ reactions. There may be cases where the results of the “standard” approach can be used directly to see the impact of *marginal* changes in taxes and benefits, but this will only be the case where the implicit assumptions of the approach are borne out by empirical studies. Even in these cases the results will be valid only in a partial equilibrium framework, whereas we would be concerned with the general equilibrium implications. This would clearly be of much greater significance if we were considering the tax and benefit system as a whole<sup>22</sup>.

To see the *impact* of a particular tax or benefit, or of the tax and benefit system as a whole, we must compare the situation with the tax, benefit or system in existence with that which would hold without the tax, benefit or system. The approach used in the CSO study, and in other such exercises, obviously does not provide this comparison, and the results presented in the study, and in this paper, must be seen in this light. The distribution of direct income, for example, is the distribution of observed pre-tax and pre-benefit income in the presence of taxes and benefits, not income as it would be in the absence of taxes and benefits.

So what do such studies tell us? In the first place, they give us essential information on the *flows* of taxes and benefits to and from particular groups of households in a given year – a “snapshot”, as Nicholson and Britton (1975) put it, of the tax and transfer system in operation. The analogy used by the UK CSO in describing their exercise is instructive: “In the sense that they use a set of accounting conventions recording the outcome of the circumstance prevailing in a given year, the estimates are closely analogous to Blue Book estimates of national income and expenditure”<sup>23</sup>. Secondly, they give us an idea of the size of first-round effects of changes in taxes or benefits: this information must be used in conjunction with research on behavioural relationships if we are to go further, but if these limitations are taken into account, they can be of great use.

22 Some interesting comparisons of some results of the standard approach with those from two possible general equilibrium models are contained in Musgrave, Devarajan and Fullerton (1980).

23 *Economic Trends*, December 1976, p. 96.

## V CONCLUSIONS

The CSO study of redistribution in 1973 allocates direct and indirect taxes paid, and cash and non-cash benefits received, among households. Not all government revenue or expenditure is included, since it may not all be readily allocated among households. The results show the importance of household composition in looking at taxes paid and benefits received. Cash benefits fell steadily as direct (i.e., pre-tax and pre-benefits) income rose within each household composition type, while income tax rose as direct income rose. Non-cash benefits were quite stable over all direct income levels for each household type. While indirect tax paid rose as disposable (i.e., after direct taxes and benefits) income rose for all households taken together, higher income households paid proportionately less of their disposable income.

Decile shares of direct, gross (i.e., after cash benefits) and disposable income showed that disposable income was distributed more equally among households than gross income, which in turn was more equally distributed than direct income. All three income concepts were less equally distributed in Ireland than in the UK in the same year, as estimated in a similar UK CSO study. The Irish estimates were also compared with those for Sweden and Australia.

Using a disaggregation of the Theil inequality measure, inequality within and between households of different compositions was examined. When inequality in the distribution of direct income among households is measured, making no adjustment for household composition, about 75 per cent of the Theil inequality coefficient was accounted for by inequality among households of the same composition. When adjustment for differing needs among households of different composition was made, using equivalence scales, this percentage rose to 94-95 per cent.

The progressivity of various taxes and of the total of the taxes included in the CSO report was also examined, using the index devised by Suits. Income tax was seen to be progressive, all the indirect taxes included were regressive, and the total of all the taxes included (which is not the total tax system) was slightly regressive, on the basis of the distribution of gross income among households.

Finally, some methodological issues were discussed which affect the interpretation of the results. In particular, it was stressed that the results represent the flow of taxes and benefits to and from households, and need to be supplemented by behavioural relationships if the impact of these taxes and benefits is to be estimated.

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## APPENDIX

### *Equivalence Scales*

Equivalence scales were defined and used in Section III.3, but without going into detail on the problems which arise in the construction of these scales or describing the scales actually used. This appendix deals with these two areas.

A number of different methods of deriving equivalence scales has been suggested and used. These have been categorised by Muellbauer (1980) as belonging to one of four types:

- (1) Nutritional or physiological standards may be used (as for example, by Rowntree in his pioneering study of poverty in York);
- (2) The scales implicit in public social security provisions can be derived – these in turn may be based at least partly on (1);
- (3) Households may be asked directly their feelings about income and standards of living – an approach developed recently by Kapteyn and Van Praag (1976); and
- (4) Information on the actual expenditure behaviour of households may be used to estimate scales.

The first approach is unsatisfactory for a number of reasons – households do not in fact use their income to maximum nutritional advantage, for example, and in any case "need" or "standard of living" is a social rather than a physiological concept. The second approach has often been used on

the justification that the scales implicit in social security provisions in some sense represent society's judgement of what "fair" scales are. This, however, is reading a great deal into what are, in Muellbauer's words, the result, of "the haphazard interaction of pressure group politics, voting, administrative conventions, etc." (1980, p. 153). The survey approach is subject to well-known problems of interpretation of responses, and has not been widely used. It is the fourth approach, the analysis of actual household expenditure data, which has attracted most attention.

This approach has been used by, for example, Fiegehen *et al.*, (1977) and McClements (1978). However, there are severe theoretical problems, discussed by Muellbauer in a number of papers (see Muellbauer (1980) for references), in particular because of the identification problem which arises. There are also practical data problems, especially with the Nicholson method which is based on household consumption of commodities which are known to be measured poorly in budget surveys – alcohol and tobacco.

Given the theoretical and practical uncertainties, it was felt that for the purposes of this paper the most useful approach would be to present results using a number of different equivalence scales, so that the impact of differences in scales could be seen. Four sets of scales were used. Two were based on approach (2), that is they were derived from social security payment scales. The first is based on the rates of Unemployment Benefit payable in Ireland in 1973 (though the use of a different year, for example, the current year, would make little difference). This is the only one of the four scales derived from Irish data. The use of different social security rates – for example, the Unemployment Assistance rates – would give a slightly different scale. Scale (2) is that recommended by the Beveridge Report, on which the UK social security system was based, which tends to be used as a standard of comparison for UK scales.

The other two scales are taken from empirical studies using the UK Family Expenditure Survey data. Scale (3) is taken from the study by McClements mentioned above, using the Prais-Houthakker method. Scale (4) takes the scales for children estimated by the NIESR study also mentioned above, using Nicholson's method. This study deals only with scales for children, so the adult scales are the same as in scale (3). (The scales for children derived by Muellbauer (1980) are close to those in scale (1) and for this reason are not included separately.) The expenditure patterns on which these studies are based refer to the UK, not Ireland<sup>24</sup>, and they are subject to the theoret-

<sup>24</sup> Fitzgerald (1979) in her study of low income households in Ireland uses the scales estimated by McClements, and states that "given fairly comparable spending patterns and a common price level for a wide range of commodities, (McClements') results should approximate fairly well to those of a study on Irish data. An examination, family type by family type, of spending patterns in the UK FES for 1973 and the Irish Household Budget Survey for the same year showed a close similarity" (p. 4).

tical problems mentioned. The problems about the use of scales derived from administrative rates have also been mentioned. For these reasons these scales can only be seen as examples of what reasonable equivalence scales might look like, and the impact of using different scales can then be examined.

The four sets of scales for the household composition types used in the CSO "Redistributive Effects" report are shown in Appendix Table 1. The notes to the table outline the assumptions which had to be made to derive scales for these particular categories from the sources described above.

Appendix Table 1: *Equivalence scales used*

<i>Household composition type</i>	<i>Scale (1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
1 Adult	0.61	0.59	0.61	0.61
2 Adults <sup>a</sup>	1.00	1.00	1.00	1.00
2 Adults + 1 Child	1.17	1.24	1.20 <sup>h</sup>	1.23
2 Adults + 2 Children	1.34	1.48	1.40	1.41
2 Adults + 3 Children	1.48	1.72	1.60	1.54
2 Adults + 4 or more Children <sup>b</sup>	1.90	2.20	2.00	1.77 <sup>i</sup>
3 Adults	1.39 <sup>g</sup>	1.41 <sup>g</sup>	1.42	1.42
3 Adults + Children <sup>c</sup>	1.88 <sup>g</sup>	2.13 <sup>g</sup>	2.02	1.96
4 Adults	1.79 <sup>g</sup>	1.82 <sup>g</sup>	1.78	1.78
4 Adults + children <sup>d</sup>	2.13 <sup>g</sup>	2.30 <sup>g</sup>	2.18	2.19
Other Households without Children <sup>e</sup>	2.18 <sup>g</sup>	2.23 <sup>g</sup>	2.10	2.10
Other Households with Children <sup>f</sup>	2.66 <sup>g</sup>	2.95 <sup>g</sup>	2.70	2.64

- Notes:*
- a Taken as = a married couple.
  - b Taken as 2 adults + 5 children (average number of persons in this household type = 7).
  - c Taken as 3 adults + 3 children (average number of persons = 5.8).
  - d Taken as 4 adults + 2 children (average number of persons = 6.5).
  - e Taken as 5 adults (average number of persons = 5.6).
  - f Taken as 5 adults + 3 children (average number of persons = 8.1).
  - g Each additional adult is taken as = (married couple scale minus single adult scale).
  - h Using average of 0-15 year old, which is = 0.20, rather than the overall average for 0-18 year old which is = 0.23, because "children" in the CSO report are those under 14 years of age.
  - i Fourth child assumed to be = 0.12, fifth to be = 0.11.

*Sources:* Budget 1973 (scale (1)), McClements (1978) (scales (2) and (3)), and Fiegehen, Lansley and Smith (1977) (scale (4)).