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Is There a Trade-Off Between the Efficiency and Effectiveness Goals of Income Transfer Programs?

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Introduction

The research reported in this paper is part of a larger project which investigates the income transfer systems in ten OECD countries using the microdata set compiled by the Luxembourg Income Study Project.[1]

The study examined a number of theoretical and methodological issues pertaining to the conduct of research in a cross-national context, attempting to illuminate approaches that can be utilised in conjunction with the Luxembourg data. For example, it asks: on what basis can meaningful comparisons be made of highly diverse systems of transfers?; which characteristics and variables provide comparisons which reflect the diverse aims of policies in the LIS countries?; which methods are appropriate in measuring the outcomes of transfers?; what light do the empirical results shed on the 'conventional wisdoms' of comparative welfare state theory?

The discussion in this paper is necessarily limited to a small part of the project. A complete version of the findings is available from the Welfare State Program.

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[1] Australia, Canada, France, (West) Germany, Netherlands, Norway, Sweden, Switzerland, UK, USA.

1. The goals of income transfer policies.

The goals of income transfer policies vary considerably among the countries in this study. To give an example of this variation consider the following sample of statements of goals from respectively, Sweden, Germany and the United States:

> The aim of this section... is to evaluate the success of the Swedish Welfare State by its own standards ... improved social security among the total population; greater equality between social classes and between single persons and families, as well as between retired persons and the labour force; and an elimination of poverty.[2]

> Following the policy statements of various federal governments and the platforms of the major political parties, the German income maintenance schemes have three basic aims: to prevent poverty, to provide social security in the sense of helping people to preserve their social status in the case of lost earnings, and to reduce inequalities in living conditions.[3]

> The clearest statement of goals, which did not appear until the early 1970s, outlined eight:
> 1. Provision of a nominally adequate income level to those who cannot work and, in tandem with social insurance and employment programs, to those who can work.
> 2. Targeting benefits on those most in need.
> 3. Coordination and integration of programs to achieve administrative efficiency.
> 4. Similar treatment of similar individuals (horizontal equity) ...
> 5. Vertically equitable treatment ...
> 6. Encouragement of self-sufficiency by providing work incentives.
> 7. Reduction or elimination of incentives for family breakup.
> 8. Attention to making the system understandable, coherent, and subject to fiscal control.[4]

It is possible to detect some common themes in these goals, as well as substantial variations for example, different emphases on the balance of social and private responsibilities. To start with a basic theme, Ringen (1987:7) argues that redistribution policies in general have equality as their immediate goal, that the aim is to make the distribution of welfare more egalitarian or "fairer" than it would have been in the absence of such policies.

> That equality is a goal in the welfare state we know from what politicians say, from what we can read in policy documents, and from the existence of policies that cannot be understood independently of some redistributive intention.

Where welfare states diverge, according to Ringen (1987:8), is in the strength of their commitment to equality:

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[2] Flora (1986a:41).
[3] Flora (1986b:53).
[4] Haveman (1987:91).

The goal of equality can be given a weak or strong interpretation. In its weak interpretation, it implies a guaranteed *minimum standard* for all members of society ... In its strong formulation, the redistributive goal refers not only to the minimum standard but to the entire *structure of inequality*...

It is on the basis of this division of the goal of equality that the study examines the outcomes of income transfer policies. In the first instance, all the countries in this study have income transfer policies which are aimed at ensuring that a minimum standard of income is enjoyed by all. In this context it is reasonable to assume, as a first approximation, that this indicates a desire to ensure that poverty is avoided or alleviated. As Ringen (1987:141) argues:

To ask about poverty in the welfare state is to question the elementary effectiveness of social policy... While there is disagreement about the responsibility of government with regard to overall inequality, its responsibility in relation to poverty has been accepted for generations and is not seriously contested today.

In addition to this goal there are some countries, as the examples from Sweden and Germany illustrate, whose policies are aimed at decreasing the level of inequality in society. In this context, progress toward this goal would be reflected in the level of income redistribution achieved by transfer policies. Thus effectiveness of transfer policies in this paper will refer to: the alleviation or reduction of poverty and the reduction of income inequality.

In addition to the assessment of the effectiveness of these policy instruments, the study also examines their efficiency in producing the observed outcomes. In a number of countries in this study efficiency questions are an important aspect of transfer policy and this is demonstrated by the goals of transfer policy in the United States cited above. No less than five of the eight goals directly address the efficiency issue in its various guises: targeting, administrative efficiency, disincentive effects, fiscal control. Many of these goals are shared by other countries in this study such as Australia, Canada and the United Kingdom.

Efficiency in this study refers to: the extent to which each unit of social security expenditure and taxation transfer reduce poverty and inequality.

2. An efficiency-effectiveness trade-off?

Does the efficiency of a transfer system have any bearing on its effectiveness? On the one hand, for a given level of expenditure, those countries with a more efficient delivery system (with better targeting and appropriate levels of payment and taxation) will - by definition - be the more effective in reducing

poverty or inequality. In this case (where expenditure is given), we would expect to find a positive relationship between efficiency and effectiveness.

On the other hand, countries may only achieve efficiency by limiting their welfare payments to selected groups and to small amounts - achieving "efficiency through meanness". At the same time, countries which wish to be effective in reducing poverty and inequality may find it administratively and politically difficult to achieve these aims without spreading welfare payments more widely and generously. For instance, the middle classes might have to be "bought off" in order to gain their acceptance for an effective anti-poverty programme (Ringen,1987; Esping-Anderson,1990). In this case, we may expect to observe a negative relationship between efficiency and effectiveness.

The tension between efficiency and effectiveness issues is captured by Ringen's observation (1987:13):

> The large and/or universal welfare state may be seen as wasteful and as giving benefits to people who do not need them, at the cost of unnecessarily high taxes, and the small welfare state as more effective because selective and targeted policies give more bang for the buck.

In a recent survey of income maintenance policy in the OECD area Heidenheimer et al (1990:222) summarise the debate over transfer policies in the 1980s in this way:

> The emerging policy debate suspends income maintenance programs between two perspectives. One perspective stresses the smaller margin of resources, produced by slower economic growth, left to pay for transfer programs. Questions are also asked about the effects of public income maintenance on private savings, investment, and work effort ...
>
> The second, and opposing, perspective stresses the increased insecurity being produced by the rapid pace of economic and social change. Growing competitiveness in the international economy is seen to make workers and their dependents more vulnerable to impersonal economic forces. Changing family structures and increasing participation of women in the labor force are accompanied by calls for expanding, rather than cutting back, income maintenance programs.

To some extent Heidenheimer's observation is not solely a product of the economic circumstances of the 1980s but reflects a long-standing tension between these competing goals. [5]

In reviewing the record of changes to transfer policies among OECD countries in the 1980s, the same authors (1990:264) conclude that:

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[5] For example, the tension between these two aims is amply demonstrated by the underlying themes of debates over pros and cons of universality and selectivity. See also Haveman's (1987) review of income maintenance policy and policy research in the US.

... the general tendency in recent years has been an attempt to adjust or fine tune the inherited structures of income maintenance policy to new perceptions of economic scarcity. Contribution rates have been raised, projected benefit growth trimmed, eligibility tightened, politically vulnerable programs cut at the margins, employment emphasised over income support - especially for the younger working-age population. Nowhere in the developed OECD nations is it possible to find evidence of any major dismantling of the basic policy structures.

The various forms of fine-tuning which Heidenheimer et al describe can be read as adjustments in favour of the efficiency side of the policy trade-off and this has not been confined to those welfare states which are traditionally concerned with such matters (eg: Australia,UK,US).

The discussion below sets out: the methodology which has been adopted to measure the efficiency and effectiveness of transfer programs; the application of this methodology to a microdata set compiled by the Luxembourg Income Study (LIS) project; and examines whether there is evidence of a trade-off between efficiency and effectiveness concerns.

In an appendix to this paper I describe the LIS data and its advantages for comparative research of this nature; define the transfer programs which are the subject of the analysis; set out a model of the transfer process and use the model to illustrate how efficiency and effectiveness of transfer systems can be conceptualised in relation to the policy goals of poverty alleviation and reduction in income inequality.

3. The methodology.

Because of time and space constraints this paper does not go into the range of measures considered in the course of research, the sensitivity of the results to using various poverty lines, equivalence scales etc. A brief summary of the results is given in Section 4.

3.1. Poverty measures.

The potential range of approaches to measuring poverty and inequality is immense. The measures selected here have been chosen on the basis of: the conceptual appropriateness of different measures in the comparative context; the nature of the LIS data; and the extent to which they illuminate efficiency and effectiveness issues.

The basis of the poverty line measures to be used in the study is the Fuch's economic distance approach ie 50% of adjusted median family income. The

unit of analysis is the family and a poverty line for each family is calculated using the following steps:

1. Family disposable income (DPI) is divided by the equivalence scale to give adjusted family income.

2. Observations are sorted in ascending order and the median adjusted income observed.

3. A poverty line for all adult equivalent units (AEU) is set at 50% of this median. This is, in effect, the poverty line for a single person since the equivalence scale equals 1 for a single person.

4. Poverty lines for other family sizes are calculated by multiplying the AEU line by an equivalence scale devised by the OECD.[6]

Poverty estimates are frequently presented in the form of a *head-count* measure, that is, the proportion of the population below a given poverty line. The count itself may be based on persons, families or households. While the head-count is a useful presentational measure, by virtue of its simplicity, it does have a number of drawbacks which have been widely discussed in the poverty measurement literature.[7] Of these, there are three which most concern this study: first, the head-count is sensitive to where the poverty line is drawn; second, head-counts may be misleading in comparing the degree of poverty cross-nationally; and third, head-counts are insensitive to transfers from the poor to the non-poor.

These problems were handled in two ways by the study. First, to avoid clustering effects, three poverty intervals were used - in addition to setting the poverty line at 50% of median income, one line was set slightly lower (at 40% of median income) and another slightly higher (60% of median income). Poverty measures are reported here for the 50% interval. Second, the concept of the *poverty gap* was used in the study. The poverty gap is the difference between the income of the unit in question and the income that would be required to bring that unit up to its defined poverty line.

Earlier I discussed the ways in which efficiency can be considered in relation to the goals of income transfer policies. In the context of the poverty alleviation goal, I have narrowed the measurement of 'efficiency' to: *targeting efficiency* and *poverty reduction efficiency*. These measures attempt to provide answers to the following questions: what percentage of social security expenditure accrues to the pre-transfer poor (targeting efficiency)? How much poverty does

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[6] 1st adult =1; second and subsequent adults = 0.7; each child 0.5.

[7] See for example, Sen (1979) and Foster's survey (1984).

each unit of social security expenditure alleviate (poverty reduction efficiency)?

This approach implies that, in a highly efficient social security system, all expenditures would go to the poor. It should be noted however, that this underlying assumption may conflict with other objectives of the social security systems in this study. For example, the preservation of horizontal equity which motivates transfers to families with children may require "inefficient" transfers in order to be "effective". In many of the countries in this study, the status-preserving element of retirement benefits may also introduce desired inefficiencies to the social security system. For these reasons, the measures reported here must be tempered by such considerations. Beckerman (1979a,b;1982) provides a framework which formalises these concepts.[8] To illustrate Beckerman's approach, Diagram 1 shows the components of the analysis and the derivation of his efficiency measures.

Diagram 1. Beckerman's efficiency model post social security transfers.

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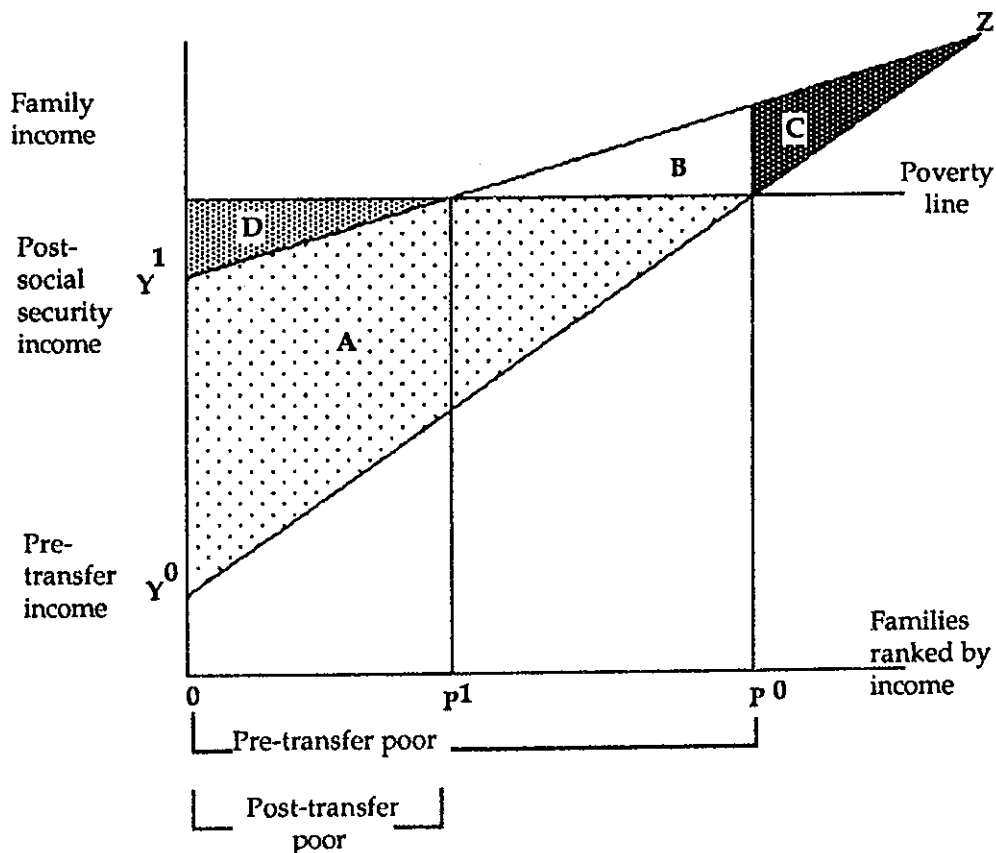
[8] Similar methodologies have been developed by several writers in the US, for example Weisbrod (1970), Plotnick and Skidmore (1975). Beckerman's approach is used here as it represents the most fully worked out model of these efficiency issues.

Families classified as poor, prior to transfers, are found in the range 0 to P^0; the size of their poverty gaps being the distance from the line Y^0Z to the poverty line. Thus the areas marked A and D represent the total pre-transfer poverty gap.

After transfers, the poor are found in the range 0 to P^1; the size of their poverty gaps being the distance between Y^1Z and the poverty line. The area D represents the total post-transfer poverty gap.

Families raised above the poverty line are those in the range P^1 to P^0; and their distance above the poverty line is the distance between Y^1Z and the poverty line. The area B represents the extent to which transfers have taken these families above the poverty line. If we were to assume that the most efficient way of directing expenditures was to take families to the poverty line but not beyond, the area B represents some level of inefficiency, that is, where expenditures spillover. A more telling measure of targeting efficiency however is the size of the area C - the sum of the transfers which accrue to the non-poor.

Using these concepts, Beckerman defines three targeting efficiency measures: vertical expenditure efficiency (VEE) or the proportion of transfers accruing to those who were poor prior to transfer; spillover (S); and poverty reduction efficiency (PRE) which combines the VEE and spillover measures.

To summarise, the areas defined in Diagram 1 correspond to the following magnitudes:

A + B + C =	total social security transfer expenditure
A + B =	total transfers received by the pre-transfer poor
A + D =	pre-transfer poverty gap
D =	post-transfer poverty gap

Beckerman's efficiency measures are given by:

VEE =	(A + B) / (A + B + C)
S =	B / (A + B)
PRE =	A / (A + B + C) = (1-S) x VEE

Beckerman's approach has previously been applied only in aggregate. Here it is disaggregated in two stages: first, targeting and poverty reduction efficiency are estimated post- social security; second, to allow for 'clawback' through the taxation system, these estimates are repeated post-tax. This approach allows the study to establish the overall efficiency of the income transfer system by observing the interaction of the social security and taxation systems in each country.

The importance of allowing for the clawback of social security transfers is highlighted in Table 1. The table shows that between 20-40% of social security expenditure is reclaimed through the taxation system and implies that the 'true' level of expenditure which is being utilised for poverty alleviation and inequality reduction is far less than aggregate expenditure comparisons would suggest (c.f. the welfare 'leaders' and 'laggards' literature, Wilensky, 1965).

Table 1. Clawback of social security transfers through the tax system, circa 1980.

	Clawback
Australia	26.5
Canada	33.3
France	11.7
Germany	19.3
Netherlands	43.3
Norway	28.5
Sweden	42.9
Switzerland	24.6
UK	36.9
USA	22.4

These estimates have been calculated for each family by subtracting taxes (payroll and mandatory social insurance contributions) from social security transfers to give a net transfer figure. If net transfers are negative then the net transfer variable has been set to zero, ie the model assumes that at the point where the taxation system has clawed back 100% of social security transfers, the negative amount represents the taxation of other income sources.

As would be expected, the more generous social security systems in Sweden and the Netherlands clawback a large percentage (around 43%) of social security payments through the tax system. The clawback in Canada and the UK is also considerable, at around one-third. Of the remaining countries Germany, the US, Switzerland, Australia and Norway clawback in increasing order 20% to 30% of transfers. France has the lowest clawback of all these countries. This is partly due to the structure of tax revenue raising in France.[9]

The next stage of the analysis modifies Beckerman's approach by substituting net transfers for total social security expenditure. In Diagram 2 the line Y^1Z bounds the post- social security income levels. After taxes, disposable income

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9 OECD revenue statistics show that personal income taxes in France comprise only 12% of total taxation revenues and Pechman (1987:88) estimated that, in 1983, the share of personal income tax revenue in the tax base in France was 20% less than the OECD average.

is pushed back to the area bounded by Y^2Z. As the diagram shows, the effect of clawback (darker shading) through the tax system is to reduce the percentage of transfers which spillover (B) and which accrue to the non-poor (C). In some countries, the tax system may even clawback transfers from those who are below the poverty line post- social security (D).

To summarise, the areas defined in Diagram 2 correspond to the following magnitudes:

(A+B+C) - Clawback=	net transfer expenditure
(A+ B) - Clawback =	net transfers received by the pre transfer poor
A+D =	pre-transfer poverty gap
D + Clawback =	post-tax poverty gap

The efficiency measures are calculated using the same formulae set out above with the proviso that net transfers, rather than total social security transfers, are used as the denominator.

Diagram 2. The extension of the transfer efficiency model post tax.
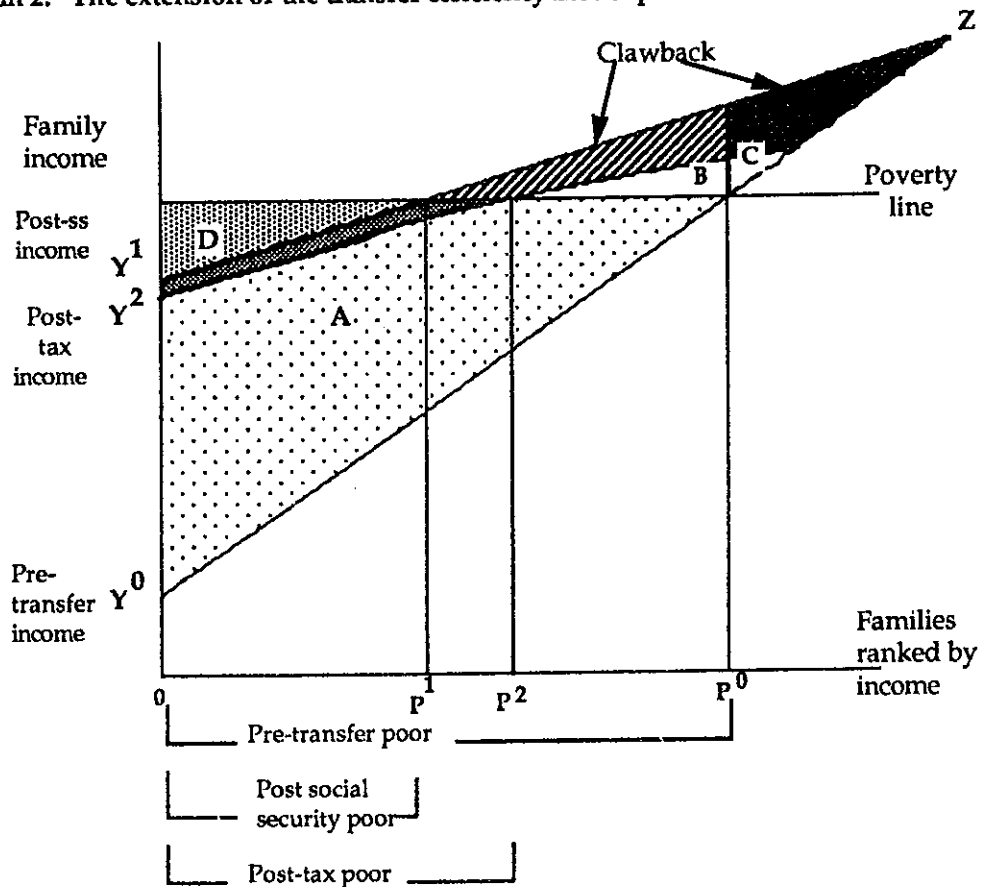
3.2. Inequality measures.

The methodology used to examine inequality is based on the work of Kakwani (1980;1986). His approach was chosen because it attempts to capture the intermediate processes by which one income distribution is transformed into another. These 'intermediate processes' are of course, social security and taxation transfers. The logic of Kakwani's approach is summarised below.

An initial distribution may be labelled A, representing the set of initial incomes a^i for each unit i (typically a person, family or household):

$A \equiv (\, a^1, a^2, a^3 \ldots\ldots a^n)$ *where n is the total number of units*

or $A \equiv \{a^i\}$ *i= 1 ... n*

The transfer system is a set of net transfers B, where each unit receives a net transfer b^i which may be positive or negative:

$B \equiv \{b^i\}$ *i= 1... n*

Each net transfer may be composed of a number of positive transfers (benefits) and negative transfers (taxes) indexed by j:

$b^i = \sum_j b^i_j$

where b^i_j represents the jth transfer paid to (or by) the ith unit:

$B = \{\sum b^i_j\}.$

After the transfers, each unit has income c^i:

$c^i = a^i + b^i$

and we can define the post-transfer income distribution as C:

$C = A + B.$

Kakwani's analysis focuses on the properties of B, *ie* how the reduction (or increase) in inequality is brought about by the transfer system. Moreover, Kakwani's approach enables the researcher to analyse separately the effects of the social security and taxation systems, as well as their net effects. If we have some inequality measure $I(x)$ which reduces any income distribution to a single-value index of inequality, the redistributive effect, R, of the transfer system can be measured as the proportional change in the index:

$$R(B) \equiv \frac{I(A) - I(B)}{I(A)}$$

Note that the redistributive effect is defined in proportional terms so as to make it independent of the scale of the inequality index. Thus R=0.2 measures, for instance, a 20% reduction in the inequality measure.

In principle, any inequality index could be used. If for example, we use an Atkinson inequality measure, the index might be $I^{At\ 0.5}$ (where 0.5 is a chosen value for the Atkinson inequality-aversion parameter) in which case we can define the Atkinson redistributive effect of a given transfer system as:

$$R^{At\ 0.5}\ (B) = \frac{I^{At\ 0.5}(A) - I^{At\ 0.5}(C)}{I^{At\ 0.5}(A)}$$

Kakwani uses a particular inequality index, the Gini coefficient (G). The Gini coefficient has two main limitations: it is relative insensitive to changes at the upper and lower ends of the distribution; and it cannot be decomposed simply across constituent groups of income units (whereas the Shorrocks' measure, for example, can be decomposed into inequality within each group, and inequality between groups).[10]

Kakwani's major contribution is to show that, despite the limitations of Gini as a base measure of inequality, its use in the analysis of redistribution makes possible a decomposition of redistribution into the effects of three key features of transfer systems: the progressivity of social security transfers and income taxes; the average rate of benefit received, or taxes extracted from, the income unit; and the inefficiencies introduced into the transfer system by the "leap-frogging" of equivalent income units.

Progressivity is defined as a "concentration" measure and is most easily understood when applied to analysing taxes. By superimposing on the Lorenz curve for the initial income distribution, the concentration curve of taxes, where each point on the concentration curve plots the cumulative proportion of total taxes paid by the bottom ith proportion of income units. It is, in effect, the Lorenz curve for tax payments, with the vital proviso that the units are ranked not by tax payments but by income.

In Diagram 3, the concentration curve for taxes has been plotted with the Lorenz curve for income. The diagram shows that the poorest 20% receive 10% of total income and pay no taxes, while the poorest 70% of income units receive 50% of total income and pay 30% of total taxes.

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[10] Although Kakwani (1986:94) describes the decomposition of G by *factor* components (eg: wage income, property income etc).

Diagram 3. The concentration curve for taxes.
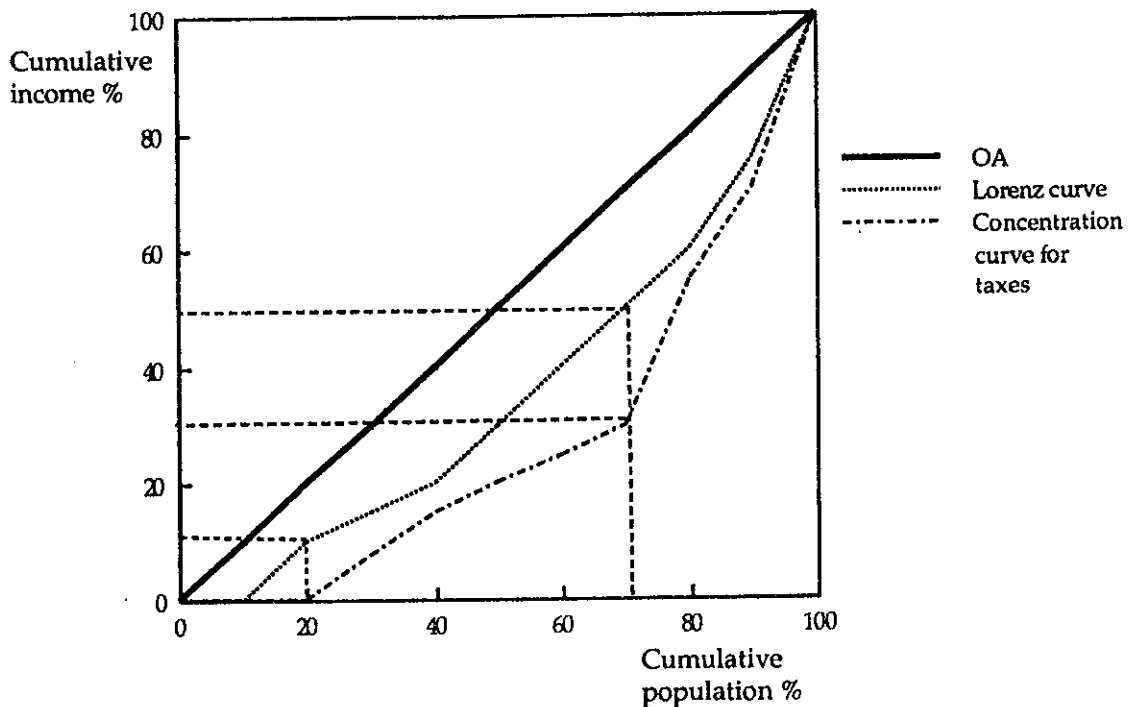
A tax system is defined as progressive (under the liability definition) if the average tax rate (the ratio of tax to income) rises with income. In other words, if income rises by a given proportion, tax rises by a greater proportion ie, the tax elasticity is greater than unity. Under a progressive tax system the concentration curve must lie below the Lorenz curve; under a proportional tax system, where everyone pays the same proportion of income in tax, the two curves must coincide; under a regressive system the tax concentration curve will lie above the Lorenz curve.

Kakwani's measure of progressivity (P) is twice the area between the two curves.[11] (The area is doubled to make it consistent with the Gini index which is twice the area between the diagonal and the Lorenz curve.) Thus: $P \equiv C\text{-}G$, where C is the concentration index of taxes, computed in the same way as the Gini coefficient, taking tax payments as the basic measure, and ranking by income.

From Diagram 3, it is obvious that the maximum value of P is (1-G), which occurs if all taxes are paid by the richest unit, and its minimum value is -(1+G) if all taxes are paid by the poorest. P is positive if the tax is progressive and negative if it is regressive.

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[11] More precisely, twice the area between the two curves where the concentration curve lies below the Lorenz curve, and minus twice the area where the concentration curve lies above.

Although Kakwani (1986) analyses only taxes, his formulae are extended in this study and applied to social security benefits, thus: $P \equiv G - C$. The application of this extension is illustrated in Diagram 4.

Diagram 4. The concentration curve for social security transfers.
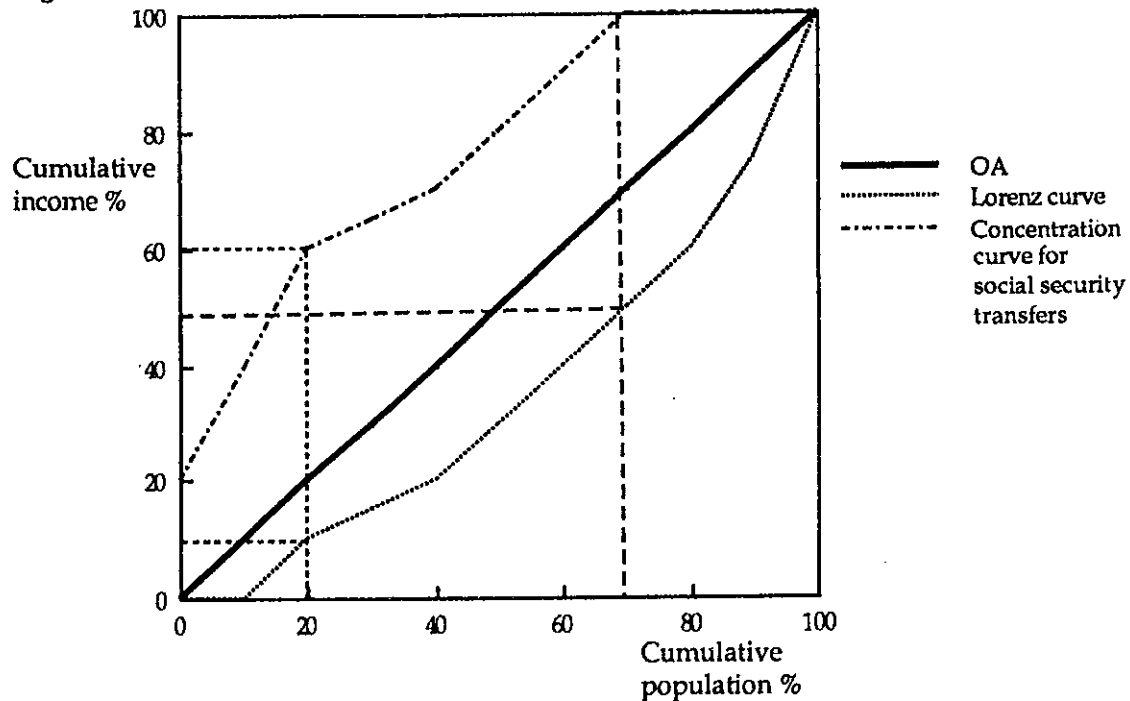
Here the poorest 20% receive 10% of pre-transfer income and 60% of benefits, whilst the poorest 70% receive 50% of income and all the benefits. A progressive benefit system, as shown, must have a concentration curve above the Lorenz curve. Again, the progressivity can be measured as twice the area between the curves - with a maximum value of G+1 (if all benefits go to the poorest individual) and a minimum value of G-1 (if all benefits go to the richest individual); as noted above, P is positive if the benefit is progressive and negative if it is regressive.

Knowing the progressivity of a tax or social security benefit does not in itself tell us how much redistribution will occur. A system might be highly progressive, taking taxes only from the rich and giving benefits only to the poor; but if the tax and benefit rates are small, little redistribution will occur. The average transfer rate 'E' (the ratio of total taxes or benefits to total income), is clearly an important element of redistribution. Thus Kakwani defines a measure of gross vertical redistribution 'V': $V \equiv PE/(1^{\pm}E)G$.[12] So as V

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[12] 1+E in the case of social security transfers and 1-E in the case of taxes.

increases the more progressive the redistribution and/or the greater the average tax or benefit rate.

Kakwani points out that, even though a transfer system may bring about significant vertical redistribution, it is possible that the Gini coefficient for the post-transfer distribution (G*) may still be close to the initial Gini coefficient (G). That is, the net redistribution R (=[G-G*]/G) may be smaller than the vertical redistribution. This will occur if the transfers result in some (equivalent) income units being re-ranked, which Kakwani refers to as "horizontal inequity." Kakwani's terminology should not be confused with the general concept of horizontal inequity used by taxation policy analysts to refer to the differential treatment of tax units. To avoid confusion, I will retain Kakwani's notation (H) but refer to this aspect of the transfer process as "leap-frogging" or "re-ranking" which is exactly what Kakwani's measure is capturing.[13] An extreme example of leap-frogging would occur if a highly progressive transfer system transfers £90 from a person with an initial income of £100 to a person with an initial income of £10; the vertical redistribution would be large, but the final income distribution would be just as unequal as the initial distribution, since the two households simply change places.

Kakwani measures leap-frogging (H) by comparing the post-distribution Gini coefficient (G*) with the concentration curve of the post-transfer distribution (Cd). Cd can be thought of as the post-transfer Gini coefficient based on pre-transfer rankings, thus: $H \equiv (Cd - G^*)/G$. If no re-ranking occurs, $Cd=G^*$ and $H=0$. In the example above, where the two households change places in the distribution, a positive vertical redistribution would be offset by a negative horizontal redistribution of equal magnitude. In this instance the net redistribution would be zero, so that $R=0$ and $G^*=G$. The implications of this result are discussed below.

Kakwani's crucial result is that the net redistribution R is the sum of the vertical and horizontal equity measures: $R=H+V$. That is, the net redistribution can be decomposed into the effects of progressivity (P) and tax or social security 'effort' (as measured by E), which together determine V; and the re-ranking of income units (as measured by H).

In the context of this study, the Kakwani approach offers a number of distinctive features. In particular, the ability to decompose the redistribution

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13   The phenomenon of "leap-frogging" was first discussed by Plotnick and Skidmore (1975: Chapter 6). Their approach to measuring the extent of "leap-frogging" is fairly similar to that of Kakwani. However Kakwani's approach has the advantage, for this study, of being able to provide a summary index.

process into its social security and taxation components supplements the picture of the effectiveness of the social security system presented in the poverty analysis; while the derivation of the progressivity and re-ranking indices allow the efficiency aspects of these systems to be addressed.

4. A brief summary of the results.

Table 2: Percentage of families in poverty, 50% poverty line, income adjusted by OECD scale.

WAVE 1, circa 1980	Pre-transfer head-count	Post-transfer head-count	Reduction in head-count
Australia	28.0	10.3	63
Canada	24.9	12.5	50
France	36.4	7.9	78
Germany	31.0	6.8	78
Netherlands	32.5	7.0	78
Norway	30.6	5.3	83
Sweden	36.5	5.6	· 85
Switzerland	24.3	11.0	55
United Kingdom	30.0	8.2	73
United States	27.1	17.0	37
WAVE 2, circa 1985			
Australia	28.0	10.3	63
Canada	24.9	12.5	50
Germany	31.0	6.8	78
Sweden	36.5	5.6	85
USA	27.1	17.0	37

Table 3: Poverty gap as a percentage of GDP for those families defined as poor in above table.

WAVE 1, circa 1980	Pre-transfer poverty gap/GDP (%)	Post-transfer poverty gap/GDP (%)	Reduction in poverty gap (%)
Australia	5.5	1.2	78
Canada	5.6	1.8	67
France	7.5	1.0	86
Germany	6.7	0.5	92
Netherlands	9.9	2.1	79
Norway	6.5	0.8	88
Sweden	4.6	0.3	93
Switzerland	7.2	1.9	73
United Kingdom	3.9	0.4	90
United States	7.0	2.9	59
WAVE 2, circa 1985			
Australia	6.3	1.4	78
Canada	5.8	1.6	73
Germany	7.1	0.6	91
Sweden	4.6	0.4	92
USA	7.9	3.5	56

Table 4: Beckerman's efficiency measures.

	Vertical expenditure efficiency		Spillover		Poverty reduction efficiency	
	Post social security %	Post tax %	Post social security %	Post tax %	Post social security %	Post tax %
WAVE 1						
Australia	68	90	24	23	51	69
Canada	52	74	25	23	38	57
France	69	75	50	48	34	38
Germany	65	78	44	43	36	44
Netherlands	64	86	57	45	27	47
Norway	67	86	44	40	37	51
Sweden	62	84	61	51	23	41
Switzerland	63	76	35	30	40	53
UK	44	67	27	25	32	50
USA	60	75	30	30	41	52
WAVE 2						
Australia	68	88	23	21	52	70
Canada	53	77	33	31	35	53
Germany	78	92	48	48	39	48
Sweden	60	84	63	49	23	43
USA	57	73	29	28	41	52

Table 5: Kakwani's inequality measures post - social security transfers.

WAVE 1	Pre-transfer Gini	Post-soc. security Gini	Progress-ivity index	Redist. accruing to ss	Re-ranking loss	Vertical redistrib. index	Soc. sec transfers % fam inc.
Australia	0.4143	0.3359	0.9456	0.1892	-0.0155	0.2047	0.0985
Canada	0.3865	0.3245	0.7717	0.1605	-0.0157	0.1762	0.0968
France	0.4707	0.3435	0.919	0.2703	-0.118	0.3883	0.2483
Germany	0.4066	0.2796	0.9188	0.3125	-0.0643	0.3767	0.2001
Netherlands	0.4672	0.3291	0.8963	0.2957	-0.0739	0.3696	0.2387
Norway	0.3848	0.2854	0.9059	0.2583	-0.0454	0.3037	0.1481
Sweden	0.4168	0.2407	0.8127	0.4225	-0.1185	0.5409	0.384
Switzerland	0.4142	0.3574	0.9374	0.1373	-0.0211	0.1584	0.0753
UK	0.3928	0.2933	0.6541	0.2532	-0.0276	0.2809	0.2029
US	0.4252	0.369	0.8596	0.1322	-0.0248	0.157	0.0842
WAVE 2							
Australia	0.4372	0.3576	0.9713	0.1821	-0.0133	0.1955	0.0965
Canada	0.4038	0.3289	0.8048	0.1854	-0.0229	0.2028	0.1167
Germany	0.4417	0.3011	0.9971	0.3184	-0.0694	0.3877	0.2074
Sweden	0.441	0.257	0.8237	0.4172	-0.13	0.5472	0.4143
US	0.4509	0.3942	0.858	0.1259	-0.022	0.148	0.0843

Table 6: Kakwani's inequality measures post-tax.

WAVE 1	Pre-tax Gini	Post- tax Gini	Progress-ivity index	Redist. accruing to taxes	Re-ranking loss	Vertical redistrib. index	Taxes % fam inc.
Australia	0.3349	0.2872	0.1802	0.1426	-0.0053	0.1479	0.2156
Canada	0.322	0.2931	0.1747	0.0899	-0.0075	0.0974	0.1522
France	0.3438	0.3065	0.3984	0.1085	-0.0023	0.1108	0.0873
Germany	0.278	0.2517	0.148	0.0946	-0.0719	0.1665	0.2383
Netherlands	0.3284	0.2932	0.0843	0.1074	-0.0233	0.1307	0.3373
Norway	0.2816	0.2342	0.1595	0.1682	-0.0248	0.193	0.2541
Sweden	0.2408	0.1967	0.1388	0.1829	-0.0598	0.2427	0.2963
Switzerland	0.3533	0.3355	0.1089	0.0504	-0.0165	0.0668	0.1781
UK	0.288	0.2638	0.1417	0.0841	-0.0158	0.0999	0.1687
US	0.3645	0.3168	0.1981	0.1307	-0.0133	0.144	0.2095
WAVE 2							
Australia	0.3549	0.3326	0.1273	0.0628	-0.0444	0.1072	0.23
Canada	0.3264	0.2913	0.1685	0.1075	-0.0115	0.1191	0.1875
Germany	0.298	0.2539	0.1632	0.1481	-0.0308	0.1789	0.2462
Sweden	0.2546	0.2152	0.1161	0.1548	-0.0531	0.2078	0.313
US	0.39	0.348	0.1751	0.1078	-0.0137	0.1214	0.2129

5. Is there a trade-off between efficiency and effectiveness?

To investigate this question I have compared the results of the efficiency and effectiveness measures described in the tables above using correlation coefficients, the results are reported in Tables 7 and 8.

In terms of the poverty alleviation goal, each of the effectiveness measures ie the post-transfer head-count and poverty gap and the reduction in the head-count and poverty gap have been compared with the three efficiency measures ie VEE, Spillover and PRE. Note that these measures relate to the combined effects of the social security and taxation systems.

Table 7: Correlation coefficients between poverty efficiency and effectiveness measures.

	Post-trans. head-count (r)		Red'n in head-count (r)
VEE	-0.50**	VEE	0.48**
Spillover	-0.68**	Spillover	0.72**
PRE	0.42	PRE	-0.48*
	Post-transfer gap (r)		Reduction in gap (r)
VEE	-0.38	VEE	0.40
Spillover	-0.46*	Spillover	0.63
PRE	0.29	PRE	-0.42

* significant at 10%
** significant at 5%

The evidence of a trade-off on the poverty measures is mixed. Beginning with the post-transfer head-count the negative sign indicates that low post-transfer

head-counts are associated with systems which have a high VEE; on the other hand countries which are "inefficient" in terms of the size of the spillover (less well targeted/more generous?) are those with the lowest post-transfer head-count. Overall, poverty reduction efficiency shows only a moderately positive relationship with the post-transfer head-count (significant at 12%).

The <u>reduction</u> in the head-count gives a much stronger picture of the efficiency-effectiveness trade-off. Diagrams 3 to 5 below show the scatter plots for these relationships.

Diagram 3: Reduction in head-count versus vertical expenditure efficiency.
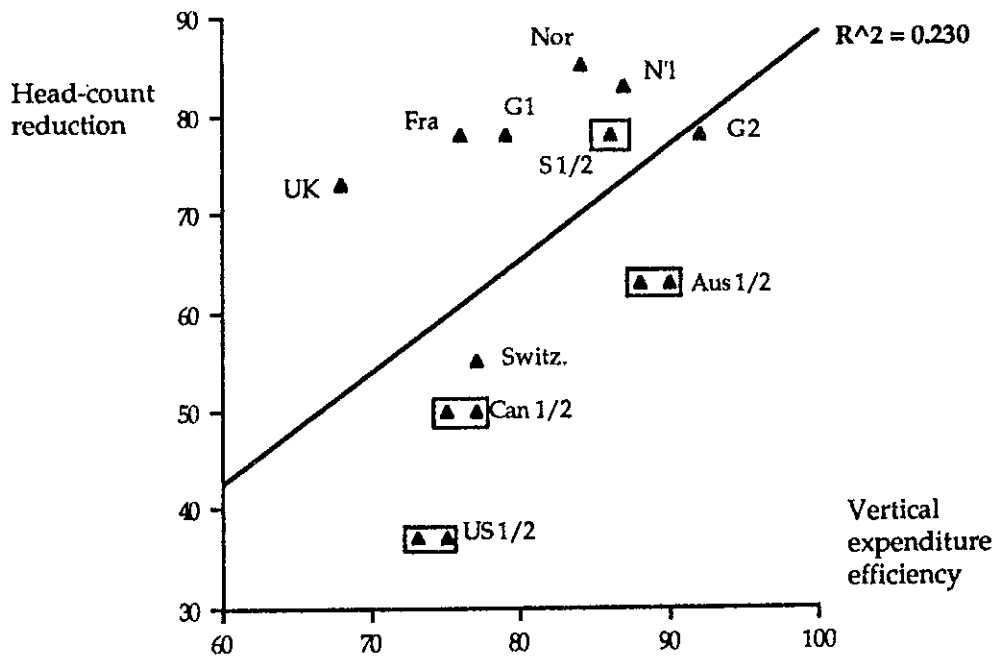
Diagram 3 shows that there is a weak positive relationship between VEE and the reduction in the head-count. The spread of countries above the regression line shows that effectiveness can be achieved by widely varying levels of VEE (cf. UK and Sweden).

Diagram 4 provides some interesting comparisons - here it is quite clear that the more generous and less targeted systems of the Northern European countries significantly reduce the head-count to a much larger extent than those systems with elements of income-testing and/or private social insurance.

In the diagram I have divided the axes by the mean levels of head-count reduction and size of the spillover. This produces some interesting groupings,

especially if we consider the various typologies (*eg* Titmuss; Furniss and Tilton; Esping-Andersen) which are used to differentiate welfare states. For example, in Esping-Andersen's recent work (1989,1990) Australia and the UK have been grouped with Canada and the US in his liberal category. The results here show that these two countries have outcomes quite different to others in the liberal category and I believe this indicates some fundamental mis-specification of his decommodification index. (Switzerland is also mis-specified by Esping-Andersen's index.)

Diagram 4: Reduction in head-count versus spillover.
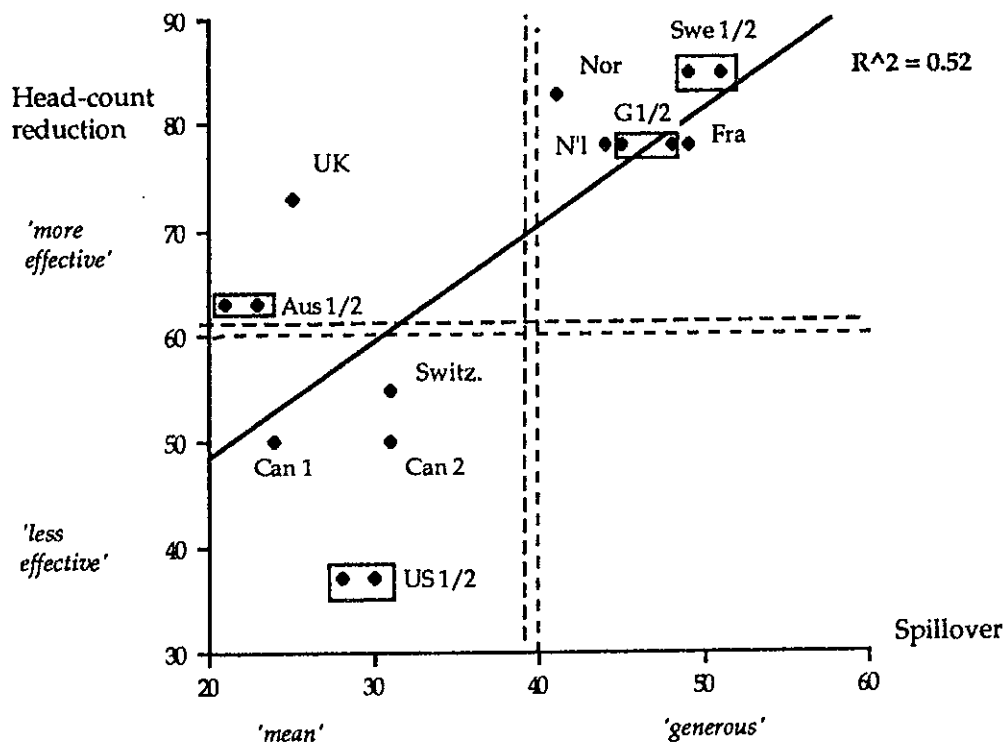
Diagram 4 shows that the UK and Australia achieve higher levels in the reduction of the head-count than the similarly 'mean' or targeted systems of countries below the regression line. If we compare the expenditure on social security as a percentage of GDP in this group of countries, Australia and the UK are in the bottom half of this group (UK ranks 7th and Australia, 10th) this may indicate that there is room for flat-rate income tested systems to produce an effective outcome.

Overall, Diagram 5 shows that there is a moderately strong trade-off between efficiency and effectiveness (significant at the 10% level). There are two distinct groupings of countries with Australia as a significant outlier.

In Group I we have the highly effective countries which achieve their outcomes with low to moderate PRE rates. Below the regression line are

countries with moderate to high efficiency rates but which are far less effective. Australia is the exception to both these tendencies, achieving a moderately effective outcome in a fairly efficient way.

**Diagram 5: Reduction in head-count versus poverty reduction efficiency.**
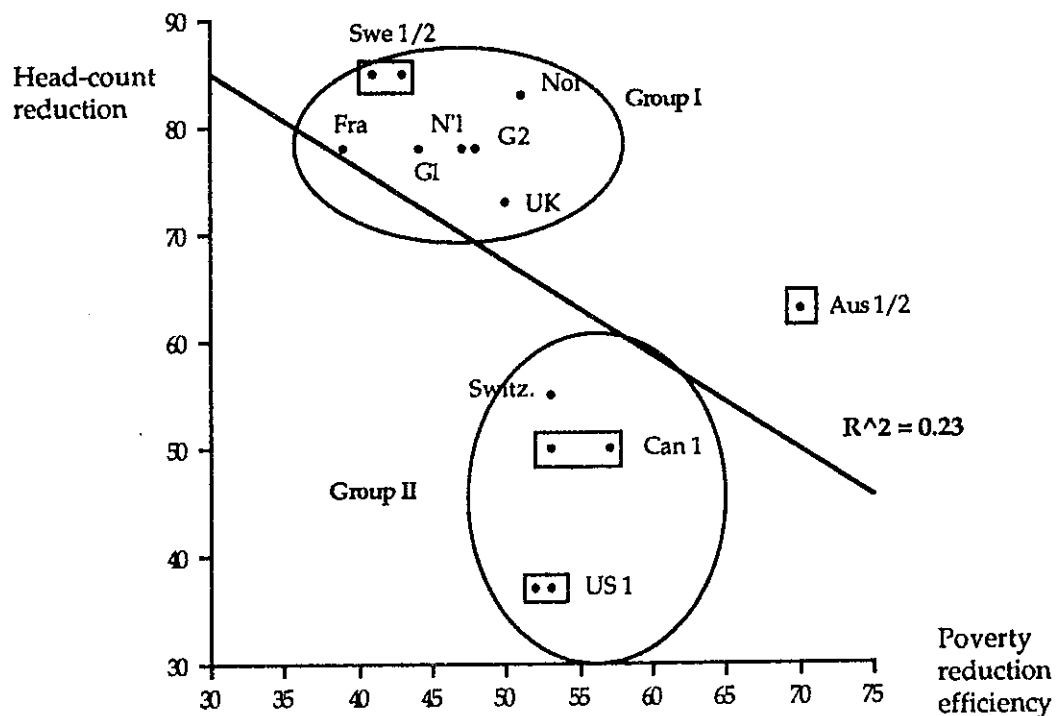
The post-transfer poverty gap presents a similar but much weaker picture to the head-count analysis. Diagram 6 compares overall PRE with reduction in the poverty gap. While the linear correlation between the variables is weak, there is some broad evidence for the existence of a trade-off between efficiency and effectiveness in relation to the goal of reducing the poverty gap. The most effective systems, the UK, Sweden, Germany, Norway and France do tend to have lower efficiency than the less effective systems. This implies some weak support for the 'buying off the middle class' hypothesis. The exceptions to this rule, however, are very significant. Those countries lying above the regression line shown in Diagram 6 are relatively efficient given their level of poverty reduction, whereas those countries lying below the line are relatively inefficient.

It is particularly interesting to compare Australia and the Netherlands. These countries both achieve an 80 percent reduction in the poverty gap, about average for the LIS countries, but they are widely differing in their levels of efficiency. Australia is far and away the most efficient whilst the Netherlands is one of the least efficient.

Again the implication we can draw from this analysis is that there is substantial room for a well-targeted system to combine efficiency with effectiveness. There is no 'iron law' requiring effectiveness to go hand in hand with universal welfare payments.

Diagram 6: Reduction in poverty gap versus poverty reduction efficiency.
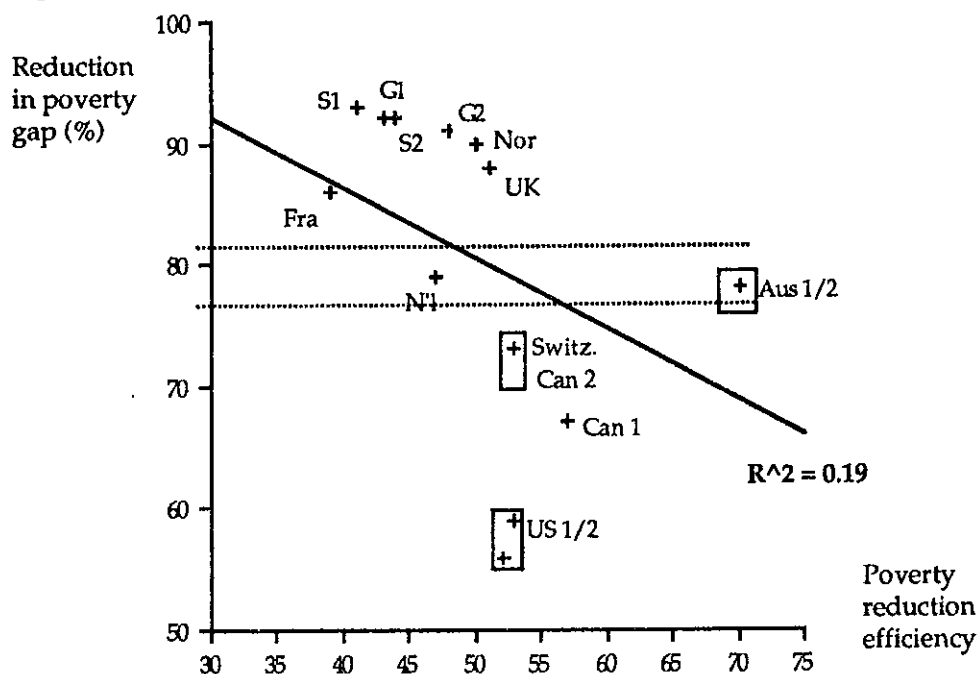
On the inequality side, the effectiveness measures, the post-transfer Gini coefficient (G^*) and the net redistribution (R_{net}) are compared with the progressivity and re-ranking measures for the social security system. (The efficiency measures in relation to the objective of reducing inequality were computed separately for social security and taxation). Table 8 shows the correlation coefficients for these measures. Both indicate that there is a strong relationship between net redistribution and the progressivity and re-ranking measures.

Table 8: Correlation coefficients between inequality efficiency and effectiveness measures.

|	Post-transfer Gini (G*)	Net redistribution (Rnet)
Progressivity of social security transfers	0.23	0.64*
Re-ranking losses	-0.06	-0.85***

* significant at 10%
*** significant at 1%

If we consider the efficiency-effectiveness trade-off for social security alone we find that there is a negative relationship. In other words, the more efficient systems, with less re-ranking and higher progressivity, tend to be those with lower proportional redistribution. The most significant relationship is

between re-ranking (H_{SS}) and proportional reduction in the Gini coefficient (R_{SS}). This relationship is illustrated in Diagram 7.

Diagram 7: Reduction in Gini coefficient versus inefficiency due to re-ranking for social security.
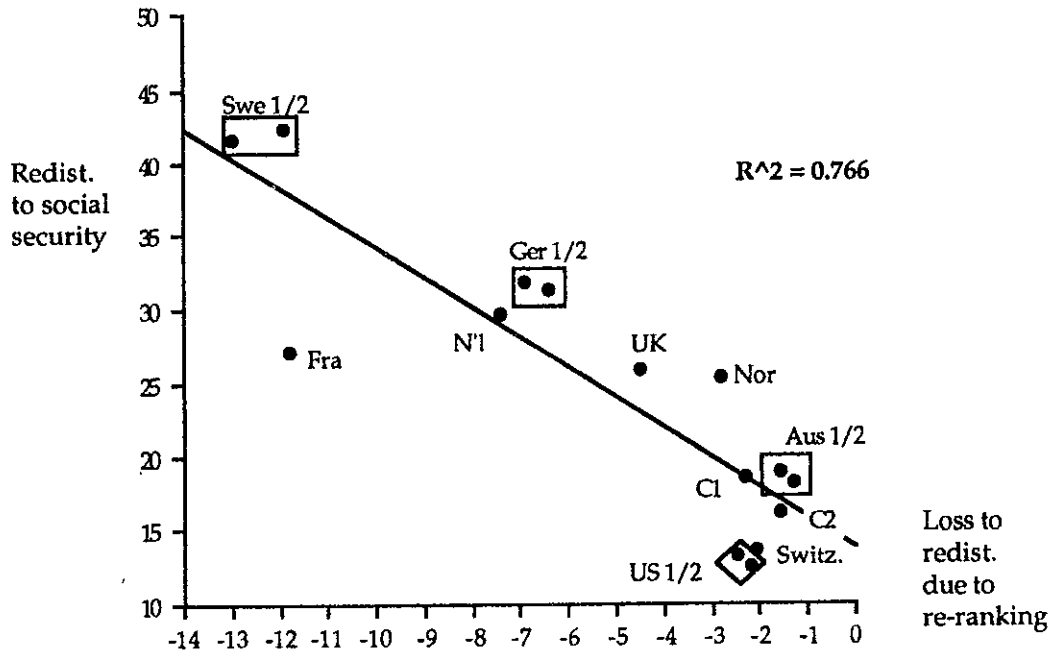
In the main, we observe a strong efficiency-effectiveness trade-off here in relation to inequality reduction through the social security system. This implies that the systems which are most effective in reducing inequality tend to be less progressive (although this tendency is weak) and they achieve their success through a high volume of transfers which have an almost inevitable consequence of a substantial degree of re-ranking. A notable exception is France which has an exceptionally high level of re-ranking but only achieves a moderate reduction in inequality.

On the taxation side the correlation analyses (not reported here) reveal no relationship at all between efficiency and effectiveness in relation to inequality reduction. This implies that redistribution through the tax system can be effected either through progressivity and targeting (ie efficiency) or through volume, but that there is no systematic relationship between these two approaches.

Summary

The evidence presented here points to different conclusions regarding an efficiency-effectiveness trade-off, depending on which goal of income transfers is being examined. From the perspective of poverty reduction, the most effective transfer systems (eg Sweden and Germany - wave 1) clearly forego

efficiency goals in producing their outcomes. On the other hand, as the comparison of Australia and the Netherlands (Diagram 6) suggests, a concern with efficiency does not necessarily preclude a less effective outcome.

From the inequality perspective however, there is clear evidence that there is a strong efficiency-effectiveness trade-off.

The difference in these results also point to differences in the weighting attached to the two goals of transfer programs and this may be illustrated by the polar tendencies of Sweden and Australia. Referring to Diagram 7, we see the greater emphasis placed on inequality reduction in the Swedish system provides a stark contrast to the poverty alleviation emphasis of the Australian system.

One final point which is of interest and has only been touched on marginally in this paper, concerns the relationship between the size of social security expenditures and outcomes. In the earliest comparisons of welfare states, welfare 'leaders' and laggards' were defined by the percentage of GDP devoted to social security transfers (a measure referred to as *welfare effort*). A critical finding of the larger research project was that welfare effort is a very poor predictor of outcomes, whether measured in terms of the head-count, poverty gap or inequality. The study found that welfare effort and pre-transfer 'need' (measured by the pre-transfer head-count, poverty gap, or Gini) explain around 60 percent of the variation in outcomes. The inclusion of efficiency factors, however, increased the explanatory power to around 90 percent. In other words, 'need', effort and efficiency (ie aggregate expenditure) all contribute approximately equally to explaining welfare outcomes.

APPENDIX

[i] The Luxembourg Income Study data and the problem of comparability.

The LIS database is comprised of microdata which have been gathered by government statistical agencies in the participating countries, in the course of regular income, expenditure or tax file surveys. At present, there are fourteen countries participating in the LIS project and two waves of data, collected *circa* 1980 and 1985, are available. The LIS database consists of approximately 60 income and demographic variables which have been coded according to a common set of criteria. Each of these variables is identified with the same variable name across the data sets and across the two waves of data. For example, income variable V1 *"Gross wage and salary income"* can be specified for each country and in each wave of the data without the user being familiar with the original data set.

The structuring of the microdata in this way assists researchers to identify the social security and taxation data relevant to a particular question and partly obviates the need for a detailed knowledge of the workings of each system. Thus researchers can be reasonably confident that they are using comparable demographic variables and definitions of income.

The ten countries which have been selected from the LIS database for this analysis are: Australia, Canada, France, (West) Germany, the Netherlands, Norway, Sweden, Switzerland, United Kingdom and United States. Data is available for all these countries in the first wave of LIS (*circa* 1980) and for five of these countries - Australia, Canada, Germany, Sweden and the US -there is data for the second wave (*circa* 1985).

While the LIS data represents a considerable advance in the ability of researchers to make comparisons between countries (c.f. the data Sawyer relied on his 1976 study of income inequality), there is no pretence that the level of comparability is perfect. There are some limitations (described in Smeeding et al 1985) in respect of unit of observation problems; under-reporting of income; and the variation in the years for which the data was gathered.

[ii] Income transfer programs.

In this study 'income transfer programs' refers to transfers through both the social security system <u>and</u> direct taxes in the form of income taxes and statutory social security contributions. The LIS data has sufficient detail for researchers to separately identify various components of income sources and

outgoings. In this paper three stages of income formation are used: **market income** (MI) - income from wages, property, private pensions, superannuation; **gross income** (GI) - market income plus direct social security transfers; **disposable income** (DPI) - gross income less taxes. Examining the changes which occur at each stage of the income formation process allows analysis of each set of distributional instruments. This is illustrated in Diagram 1.

Diagram 1. Analysing income transfers during the income formation process.
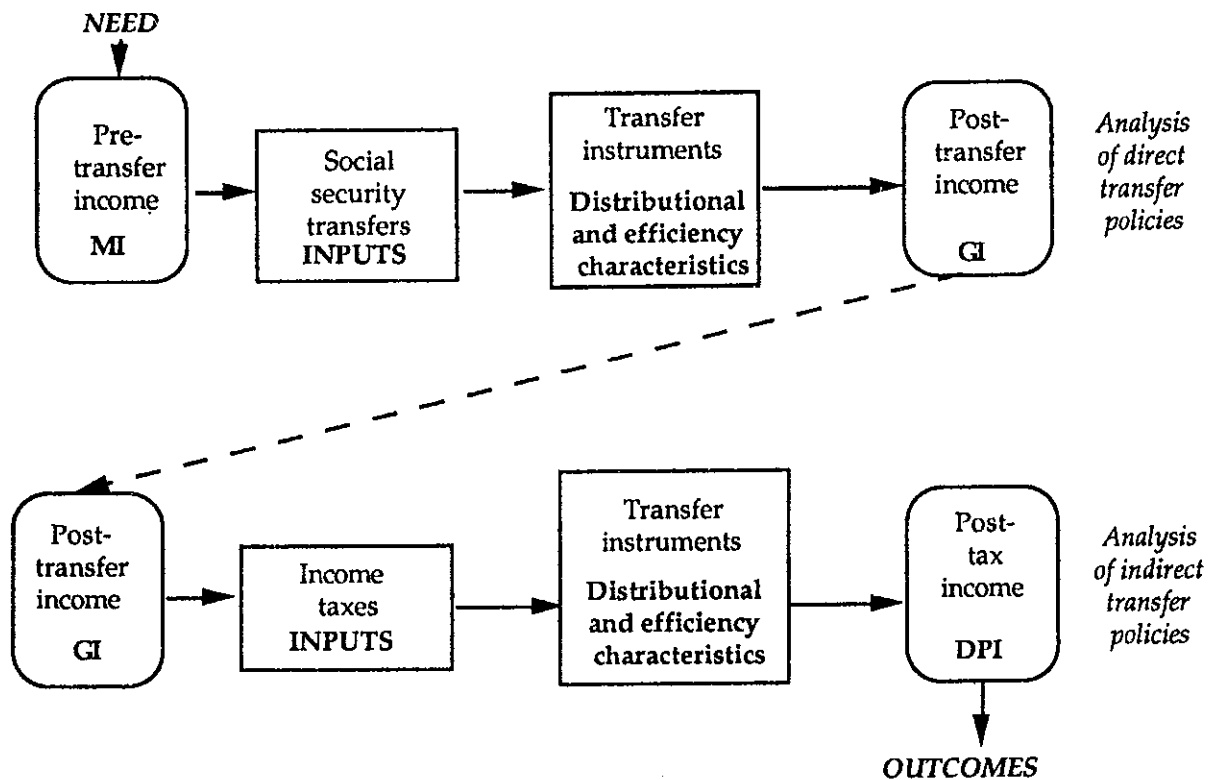
Some of the reasons for including taxation instruments in the analysis are fairly obvious: first, tax 'expenditures' (in the form of deductions, rebates and exemptions) may be used in place of, or in addition to, social security transfers to increase the disposable income of families or households. Second, in many of the countries to be studied, social security policy and policy instruments are specifically designed to interact with taxation policy to produce certain desired outcomes for example, progressive income taxes may 'clawback' universal transfers from high income families or households. Thus to neglect the effects of taxation (other than indirect observation of its effects through disposable income measures) may result in (a) underestimating income transfer expenditures designed to effect redistributive aims and (b) presenting an

incomplete view of those transfer systems which crucially depend on the interaction of social security and taxation policy instruments.

[iii] Transfer policies and their outcomes: a model.

The outcomes of transfer programs depend on the interaction of a complex set of factors for example, the level of 'need' being addressed by such programs, policy decisions on the level of resources devoted to these programs, the nature of the instruments designed to give effect to these policies etc. As I indicated earlier there is considerable variation in the goals of transfer programs across the countries in this study and this also applies to all these factors which operate to produce transfer outcomes. This increases the difficulty of comparing transfer programs and disentangling the effect on outcomes of variations of the size of expenditures, the nature of transfer instruments, demographic differences and so on.[14] Thus we need to sort out the relationships between these factors. One way of viewing this process is presented in Diagram 2 which has been adapted from a model of the 'production of welfare' developed by Hill and Bramley (1986:181).

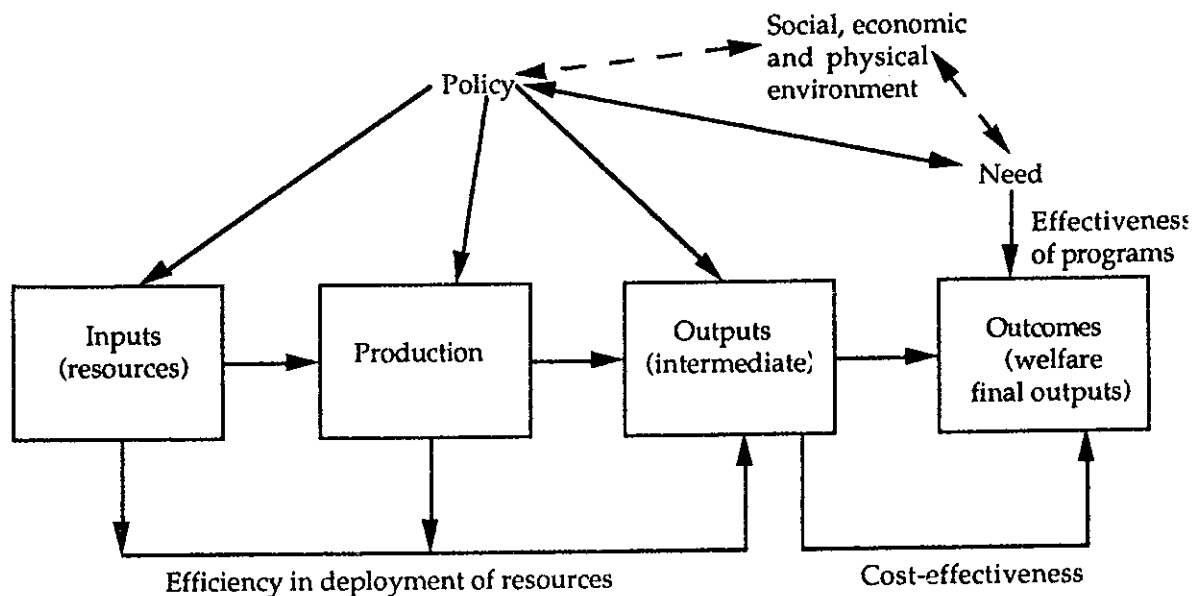**Diagram 2. A model of the production of welfare.**

Diagram 3 adapts the Hill and Bramley model in relation to the poverty alleviation goal. The inputs are defined as income transfer payments and

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income taxes. Production in this study refers to the transfer instrument (and its characteristics) which distributes the payments to, or deducts taxes from, the recipients. The outputs are the size and incidence of transfers and are determined by government policy on the level of payments, eligibility criteria (*ie* who should receive income support) and the operation of income-tests (*ie* how much income support). The assessment of outcomes is dependent on the relationship of the size and incidence of the payments to a defined poverty line. The specification of a poverty line allows us to assess welfare outcomes in terms of both a head-count, *ie* the number of individuals or families who are lifted out of poverty, and the size of the poverty gap before and after transfers.[15]

Diagram 3. The production of welfare: a view of poverty alleviation.
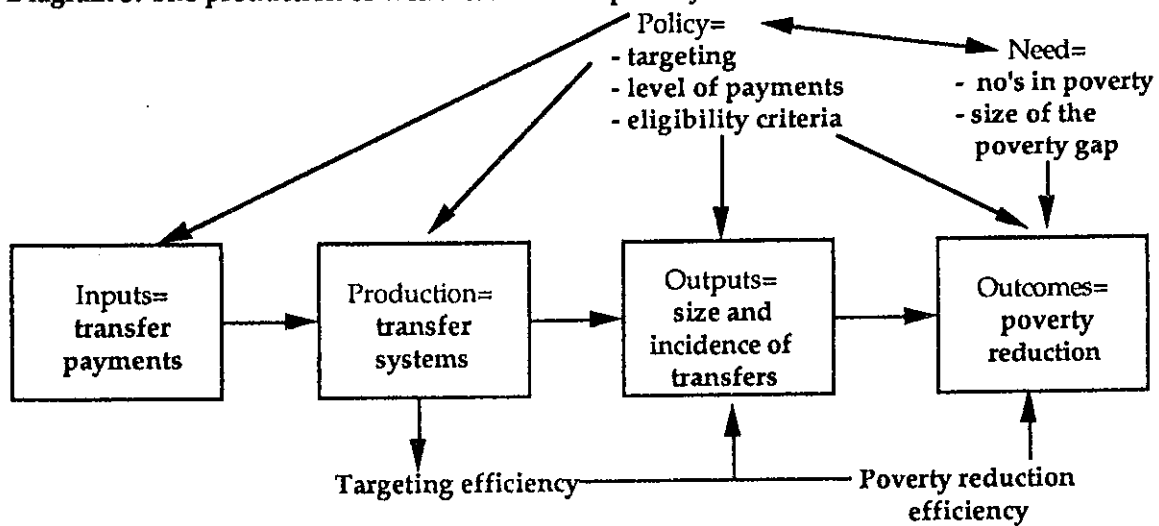

The efficiency of transfer policies in alleviating poverty may be measured by the extent to which the inputs (transfers) accrue to the pre-transfer poor, *ie* target efficiency and the amount by which each unit of input reduces the poverty gap, *ie* poverty reduction efficiency.

Referring to Diagram 3, we see that the link between inputs and outputs is the transfer instrument, so that the characteristics of this instrument (*eg*: whether it is a universal or selective transfer) will determine target efficiency. In turn, the level of output - the size and incidence of the transfers - in relation to the existing level of need, will determine the amount of poverty reduction achieved per unit of transfer.

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[15] The poverty gap refers to the difference between household or family income and the poverty line. This difference may be expressed in actual monetary terms eg $X required to bring the family up to the poverty line income; or expressed as a percentage of the poverty line rather than in monetary units. The latter approach is frequently adopted in cross-national comparisons to standardise comparisons.

Diagram 4 adapts the model in relation to the goal of reducing income inequality. The inputs are the average level of transfers received, or taxes paid, by the individual, family or household. Production again refers to the transfer instruments. The outputs are the size and incidence of transfers across the income distribution and are determined by the progressivity of taxes and social security payments. The assessment of welfare outcomes in this instance relies on measuring the level of beneficiaries' incomes relative to the incomes of non-beneficiaries, or post-transfer inequality to pre-transfer inequality. In other words, the assessment captures how much redistribution is achieved by the transfer process and identifies to whom this redistribution accrues.

Diagram 4. The production of welfare: a view of reducing income inequality.
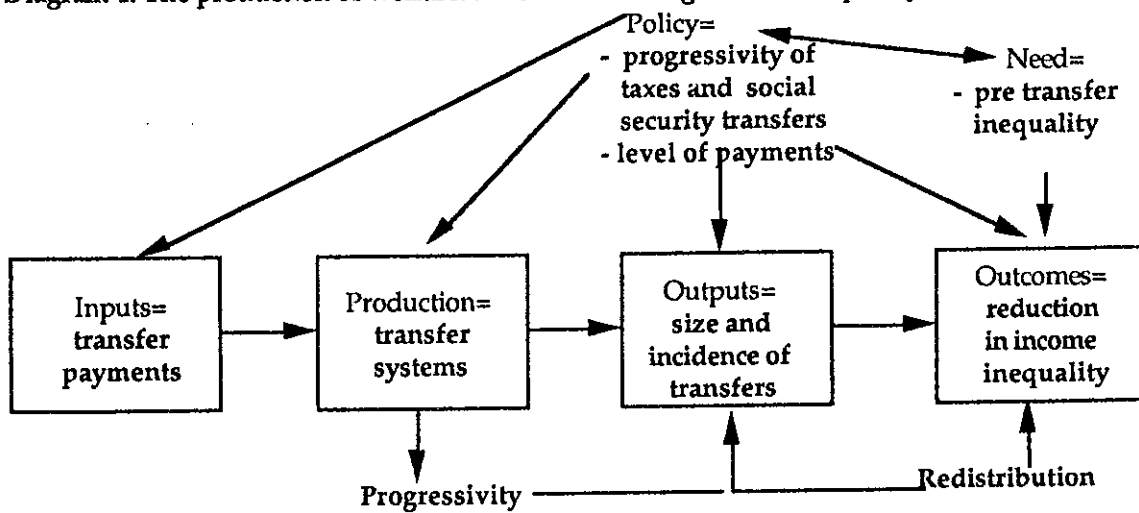
The effectiveness of transfer policies in reducing income inequality will be measured by the amount of redistribution achieved by transfers, ie a decrease (or increase) in income inequality and by the progressivity of the transfers.[16] The effectiveness of transfer policies in reducing income inequality may be measured by the extent to which indices of inequality such as the Gini coefficient fall during the income transfer process and therefore reflect the amount of redistribution achieved.

The efficiency of transfer policies in reducing income inequality may be measured by how progressive the transfer instruments are in distributing the transfer payments or taxes and by the amount of redistribution achieved for each unit of transfer payment or tax receipt.

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[16] Progressivity refers to the extent to which higher income earners pay taxes at a higher rate than low income earners; conversely, the extent to which lower income earners receive more generous social security payments than higher income earners.

Referring to Diagram 4, we see that it is the progressivity of the transfer instrument which determines how efficiently the inputs are distributed; so that an instrument with low progressivity will require a higher level of inputs to achieve the same output as a more progressive instrument. The final outcome is measured by the difference between the pre- and post- transfer levels of inequality and the inputs used to achieve this reduction.