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DESCRIPTIVE MEASURES OF THE ALLOCATION OF DEVELOPMENT AID

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I INTRODUCTION

In 1989 bilateral aid to Israel from members of the Development Assistance Committee (DAC) amounted to $263 for every man, woman and child, whereas India got less than $2 per person. Since the late 1960s a literature has emerged that examines figures such as these from two perspectives: "how well is aid allocated amongst different recipients?" and "why is aid allocated as it is?". This paper is concerned with the first of these questions, which we call the descriptive approach to aid allocation. A subsequent paper shall explore the explanatory approach, that is those studies that tackle the second question.

It is important to understand the distinction we are making between the descriptive and explanatory approaches. The descriptive approach is evaluative: it evaluates donor allocative performance against certain criteria. This evaluation is most usually by a comparison with the single criterion of recipient income. But this is not to claim that donors do allocate their aid solely (or at all) by reference to recipient income. It is simply an evaluation by this yardstick (with the fact that donors themselves pay scant regard to this measure resulting in some poor performances).

The methodological survey in Part II occupies the bulk of this paper. Most descriptive indicators we discuss have been recalculated on the basis of a common data set. This not only facilitates our discussion of the relative pros and cons of different approaches, but also provides a new and comprehensive analysis of the changing pattern of aid allocation.

Our intent is not merely to review, but also to criticise, modify and develop. Current methodologies are shown to have serious problems. We also argue that donors currently pay too little concern to the way in which their aid is allocated. Moreover, as discussed in Part III, a number of recent trends raise fears for the likelihood of allocative performance improving in the near future. It is suggested that this could be an issue that might be pursued by groups actively campaigning on aid issues.

II DESCRIPTIVE INDICATORS OF AID ALLOCATION

(a) Overview

Descriptive indicators seek to summarise aid allocation in a single number, providing a basis for comparing the allocative performance of different donors, or to see how that of a single donor changes across time. We are principally concerned here with the properties of these indicators and begin, in section II(b), by discussing general problems of definition and measurement.

The following three sections consider the various indicators that have been proposed within a three-fold classification: (i) statistical measures; (ii) welfare-function based approaches; and (iii) performance indices. In each case, examples of the application of the indicator are given and, in the light of the criteria discussed below, its properties examined. Section II(f) draws these three sections together in a comparison of the indicators based both on an examination of their properties and also the degree to which their empirical application concurs or differs with that of the other indices.

Part II is therefore a discussion of the choice of the most appropriate descriptive indicator, Part III considers what they tell us about the allocation of aid.

(b) Problems in the measurement and definition of descriptive indicators

Donor performance is a function of many factors. Some of these, such as the role of community participation in aid projects, are not readily quantifiable. There are, however, four aspects of donor performance that may be quantified: (i) aid volume; (ii) the financial conditions of aid; (iii) the extent to which aid is tied to purchases from the donor country; and (iv) the allocation of aid amongst recipients. Whilst some of these aspects can be meaningfully combined (for example, the grant equivalent of aid as a percentage of donor GNP capturing the first and second aspects) it is difficult in practice to define a non-arbitrary manner in which the allocative dimension may be unified with the others into a single indicator.[1] Therefore, in order to avoid such arbitrariness, a desirable property of measures of aid allocation is that they should be neutral with respect to the other aspects of donor performance.[2]

Next comes the trickier question of the criteria against which performance is to be judged. It must be made clear at the outset that we are discussing allocation between countries not people. In the end it is who receives aid that matters most and it is entirely possible that we may reach more poor people by giving aid to a relatively richer country (though this is unlikely to be a general rule). However, the neglect by donors of collecting data on the income status of the final recipients of their aid precludes such an analysis.[3] We therefore restrict ourselves to the issue of aid allocation between countries.

The construction of a descriptive indicator requires, an often implicit, assumption as to

what would constitute the "best" allocation of aid. With very few exceptions descriptive indicators have been based on a single criterion - the per capita income of the recipient. All such studies have further assumed that a progressive allocation of aid (i.e. more aid to poorer countries) is desirable - though, as we shall see, indicators differ as to the precise allocation amongst recipients that will maximise donor performance.[4]

There are many valid objections to this adoption of a sole criterion. It says nothing about how the aid will be used or the capacity to use such aid. Donors pay increasing attention to the economic and development policies of recipients and IDA attempts to assess the effort a government makes at alleviating poverty in making its allocations (World Bank, 1990). The 1960s literature that used programming models based on the dual gap hypothesis set aid targets for each country based on its trade and savings gap. For example, Rosenstein-Rodan (1961) explicitly rejected income per capita as the basis for aid allocation. His own calculated aid requirements are significantly positively related to per capita income (the correlation coefficient is 0.63; White, 1990).

However, since most the literature has adopted income per capita as a single criterion, we use it as a yardstick in much of what follows. The adoption of the income criterion is not to suggest that donors themselves use a country's income level in deciding how to allocate aid. We are simply interested in how their allocations, however they are arrived at, match up against this indicator. Having said this "helping poor countries" is, at least in rhetoric, a reason given by donors for the provision of aid and also the most widely supported motive amongst the general public of donor countries (eg Bowles, 1978). It might be felt that some other indicator of a country's welfare should be used other than income per capita. It is, however, a well established result that income is highly correlated to other welfare measures, such as infant mortality and literacy (see, for example, McGillivray, 1991).

Before continuing the analysis in this vein it is interesting to pause to consider an alternative criterion against which allocative performance might be judged. There is much talk these days of using aid to support human rights: the British government emphasises the importance of "good governance". Humana (1986) has proposed an index of human rights (the Human Freedom Index, HFI) based on a count of how many basic human rights a country has out of a list of forty. The results range from 0 for Iraq to 38 for Sweden and Denmark in 1985 (the only year for which the analysis is available). Figure 1(a) shows a scatter-plot of aid receipts per capita in 1985 against the HFI and the fitted simple regression line. The poor fit is explained by the outlier Israel, and the analysis is repeated in Figure 1(b) excluding Israel. In the latter case, no significant relationship emerges between aid receipts and HFI.

Returning to the income criterion, the difficulty remains of what is deemed to be the best allocation. Many low income countries have an absorptive capacity constraint; that is they are unable to spend all the aid allocated to them. Under such circumstances, it is difficult to

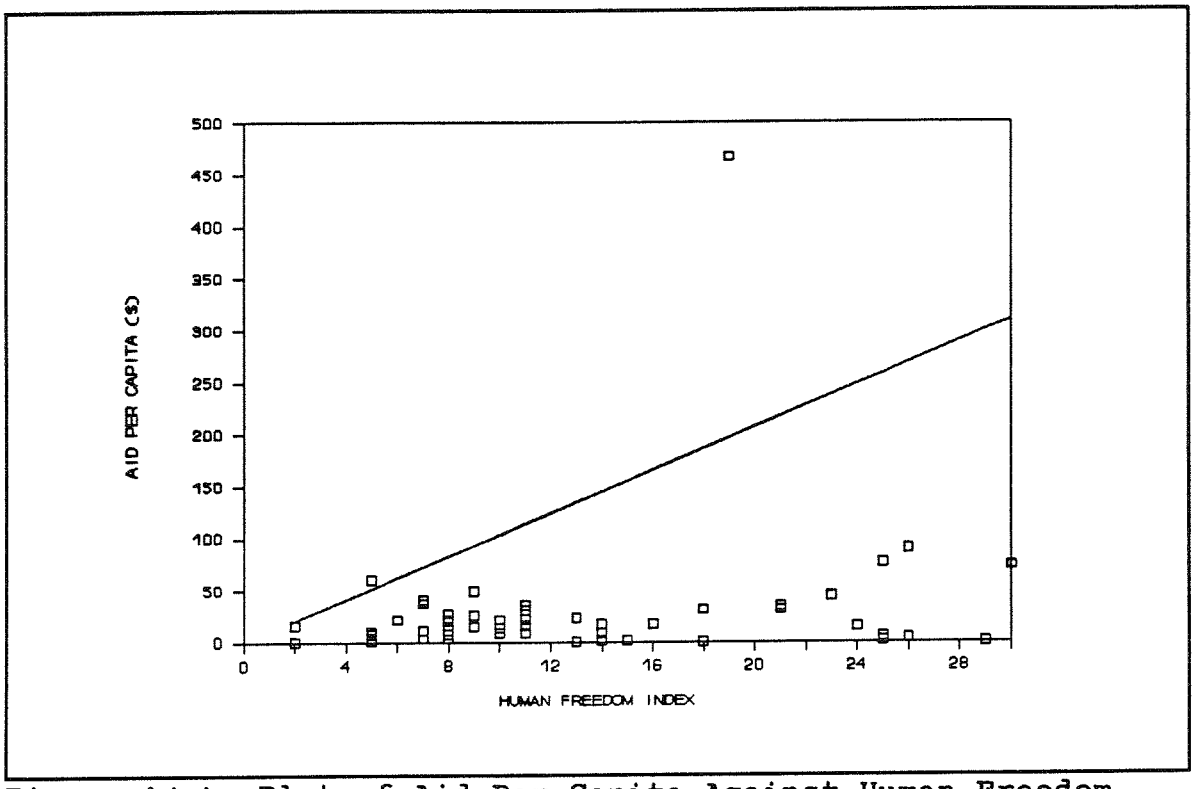

Figure 1(a): Plot of Aid Per Capita Against Human Freedom Index (1985)

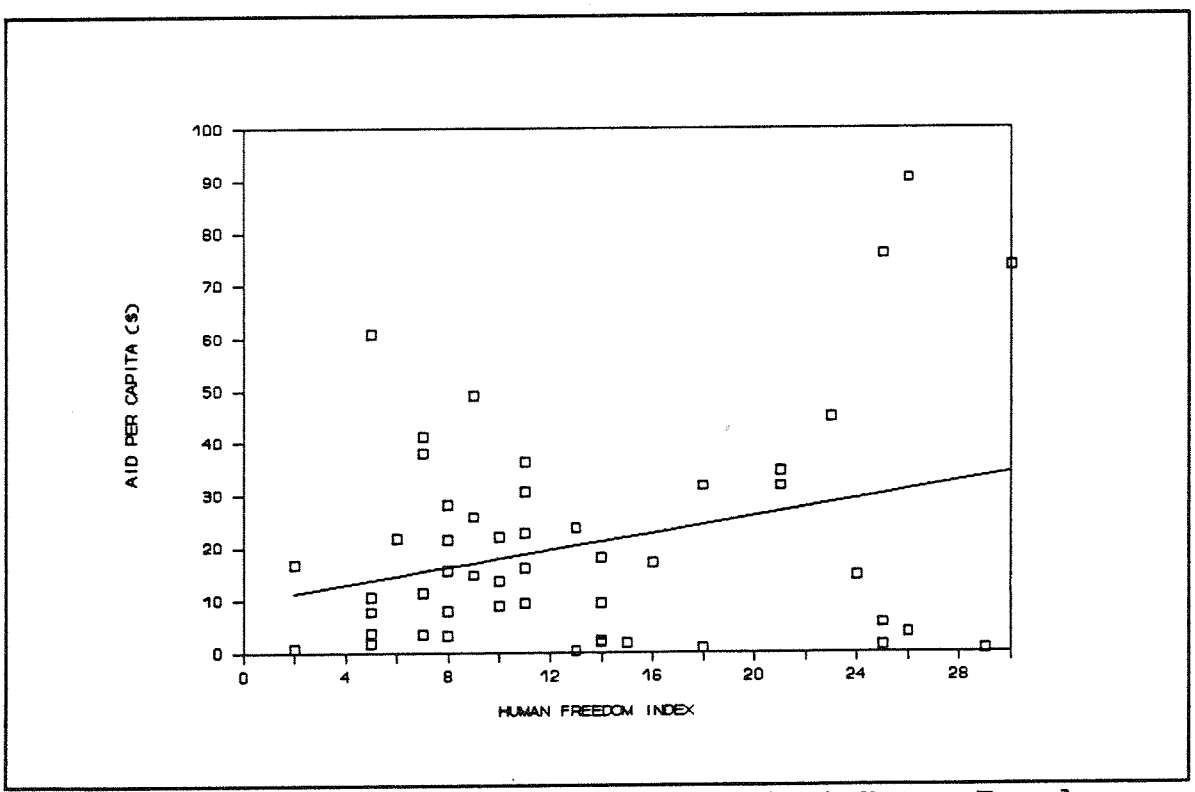

Figure 1(b): Plot of Aid Per Capita Against Human Freedom Index (Excluding Israel), 1985

call allocating further aid to them an improvement. It is not possible to objectively quantify this, but we might say that any indicator that puts undue weight on poorer countries is faulty. It in fact turns out that many indicators award their highest rating to a donor that gives all its aid to the poorest country or group of countries - yet few would argue that this is an optimal allocation.

A related difficulty is that many donors have chosen to concentrate their aid on a few recipients. Indeed, such a strategy has been recommended by writers examining means of raising aid effectiveness (e.g. Independent Group on British Aid, 1982). Donors adopting this practice will fair poorly on any comparison of their allocation against some ideal allocation amongst all recipient nations. A response is to consider their allocation only amongst the countries to which they give aid (or aid over a certain limit). This might be satisfactory, but is not accurately capturing allocation if the countries omitted from the donor's list of recipients are not evenly spread amongst potential recipients.[5] Where this problem does arise there is therefore no satisfactory resolution. Indicators that do not suffer from this property (which we label anti-concentration bias) are therefore to be preferred (subject to their other properties).

A further desirable property of a descriptive indicator is that a donor should not be able to improve their performance rating by making a regressive reallocation of aid (ie taking aid from one country and giving it to one that is richer).[6] This may sound obvious, but it will be shown that many of the indicators used in the literature do not have this property.

Figure 1 used aid per capita as the measure of aid. In fact, there are two key issues that need to be discussed in the appropriate definition of the aid variable: how to standardise the aid inflow and what measure of aid itself to take. Standardising the aid flow may be done in basically one of two ways: either with reference to the recipient country (eg aid per capita or as a percentage of an economic indicator such as GDP, GNP, imports, investment or government expenditure)[7] or as a percentage of all aid allocations (aid shares). Some indicators are defined so that they have to use a particular one of these two, whereas for other indicators either measure can be used. The degree of correlation between these variables differs between donors - being over 0.9 for Australia and zero for Austria; the average figure for DAC bilateral aid is 0.5.[8] The lower this correlation then the greater will be the disparity in measures of performance based on alternative methods of standardising aid.

Second is the definition of the aid variable. We are using bilateral ODA[9] but still need to decide between disbursements or commitments and net or gross or whether to take the grant equivalent.[10] As we are analysing donor intentions a case may be used for using commitments. However, studies invariably use disbursements. This issue becomes more critical when we seek to explain (rather than describe) aid flows, and in this paper we follow the tradition of using net disbursements.

To summarise, the desirable properties of an indicator as follows:

- it will be neutral with respect to the other aspects of donor performance;
- a regressive reallocation of aid will necessarily worsen donor allocative performance; and
- donors who concentrate their aid on selected recipients should not be penalised per se.

The aid allocation that maximises donor performance is also of relevance to comparing different indicators. We may now move onto a discussion of the various indicators.

(c) Statistical Indicators

The scatter plot of aid against income is a simple way of showing distribution. Mosley (1987, p.160) shows aid/GNP against per capita income. A feature of his presentation is that he includes the donor countries. Since these all have a relatively high income and negative aid ratios their inclusion serves to strengthen the negative relationship. This practice may be justified if the analysis is, as is Mosley's, of the redistributive impact of aid, but is less so if the concern is, as is ours, with donor allocation policy. Moreover, the inclusion of the donor is less sensible if only one donor is being considered. Donors are thus excluded in the following analysis.

Figure 2 shows a scatter plot of aid/capita against income/capita for four donors (Japan, the Netherlands, the UK and the US) for 1984.[11] Such plots give a good general impression of the relationship between the two variables: progressive in the case of Dutch aid, not so for the US. They also show up outliers: both large aid recipients (e.g. the US' generosity towards Israel) and those receiving little aid (e.g. the much remarked tendency for large countries, such as India, to receive less aid per capita).

Scatter plots soon become unwieldy if we wish to compare the performance of many donors or of a single donor across a long time period. How may we summarise the information contained in a plot? The correlation coefficient is the simplest was of doing this and has been a frequently cited measure (e.g. Little and Clifford, 1965; and Bhagwati, 1972). The coefficients for four plots shown in Figure 2 are 0.12, -0.20, -0.18 and 0.23 for Japan, the Netherlands, the UK and US respectively. Figure 3 plots how these have changed across time for and the first two columns of Table 1 summarise the performance of all donors by this measure. Only those for Denmark, the Netherlands, Switzerland and the UK are significantly progressive (at the 10% level) and the coefficients for New Zealand and the US significantly regressive. It is notable that Dutch aid allocation only became progressive (the correlation coefficient switched from positive to negative) in 1983. This coincides with the freezing of aid to Suriname for human rights violations.

The "best" correlation coefficient a donor can have is minus one. What allocation of aid achieves this? The answer is any allocation that satisfies:

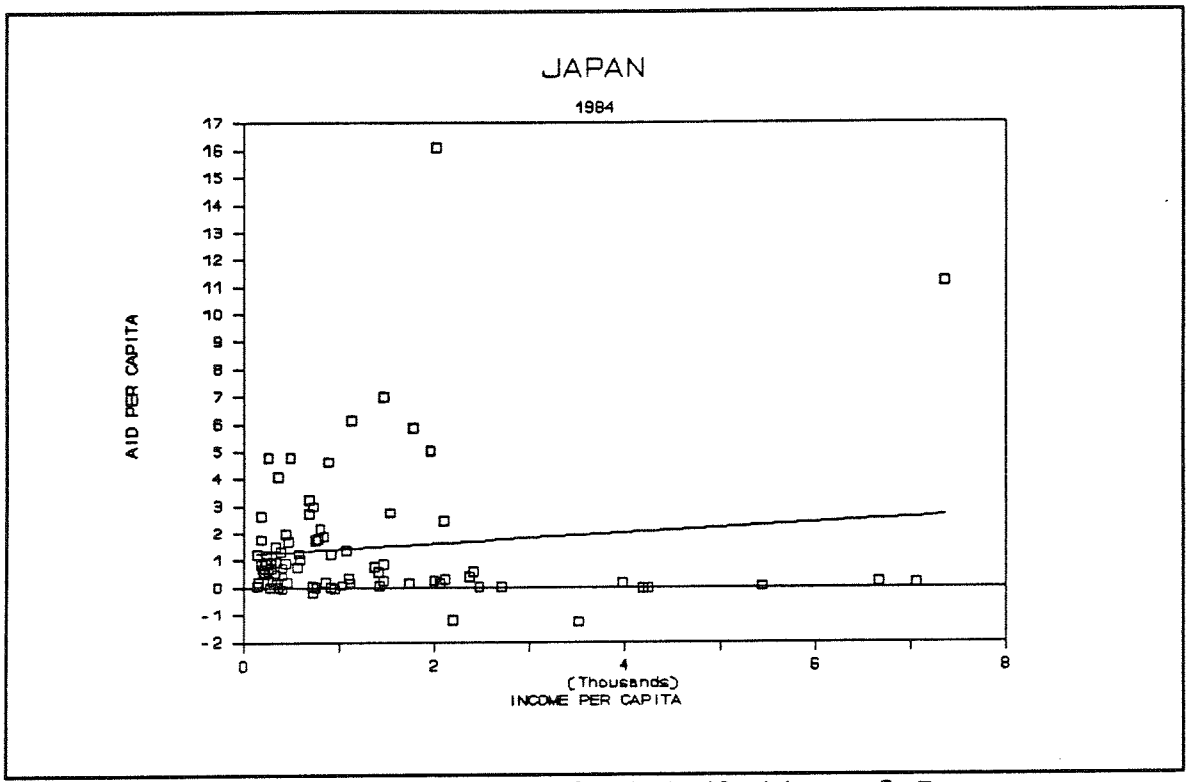

Figure 2(a): Scatter Plot of Distribution of Japanese Aid (1984)

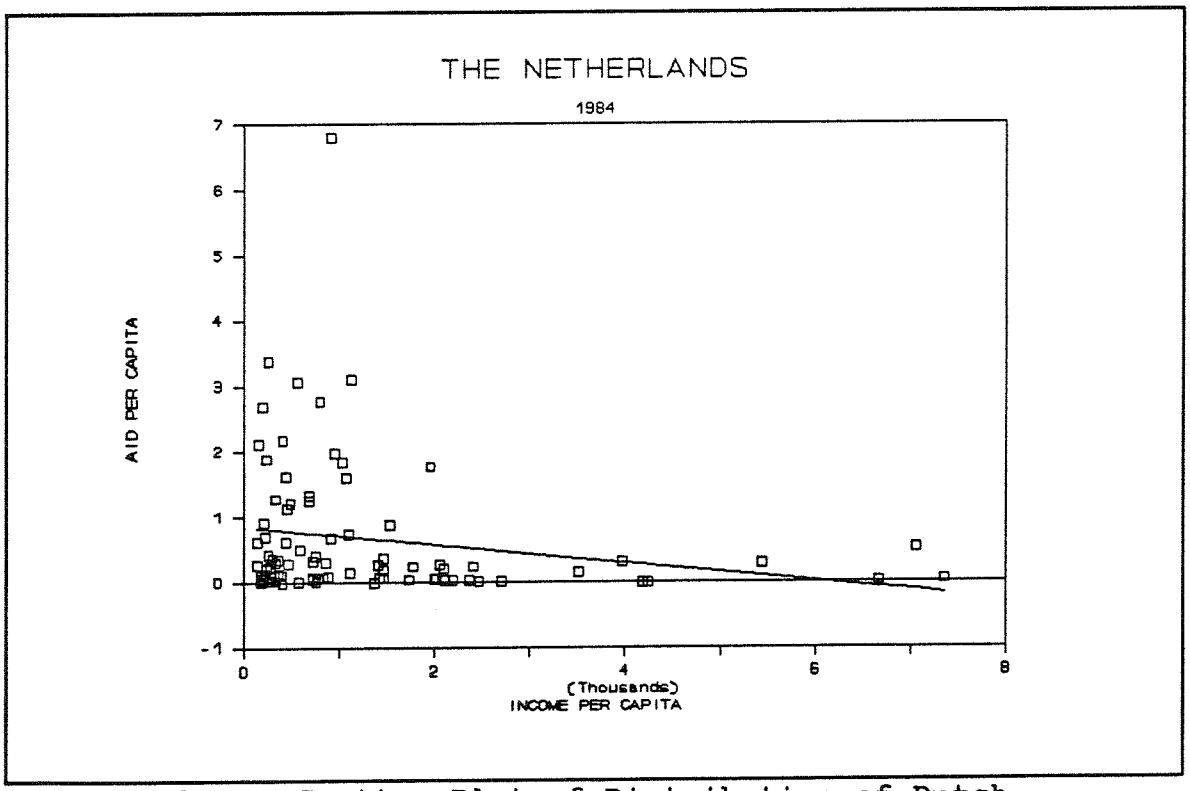

Figure 2(b): Scatter Plot of Distribution of Dutch Aid (1984)

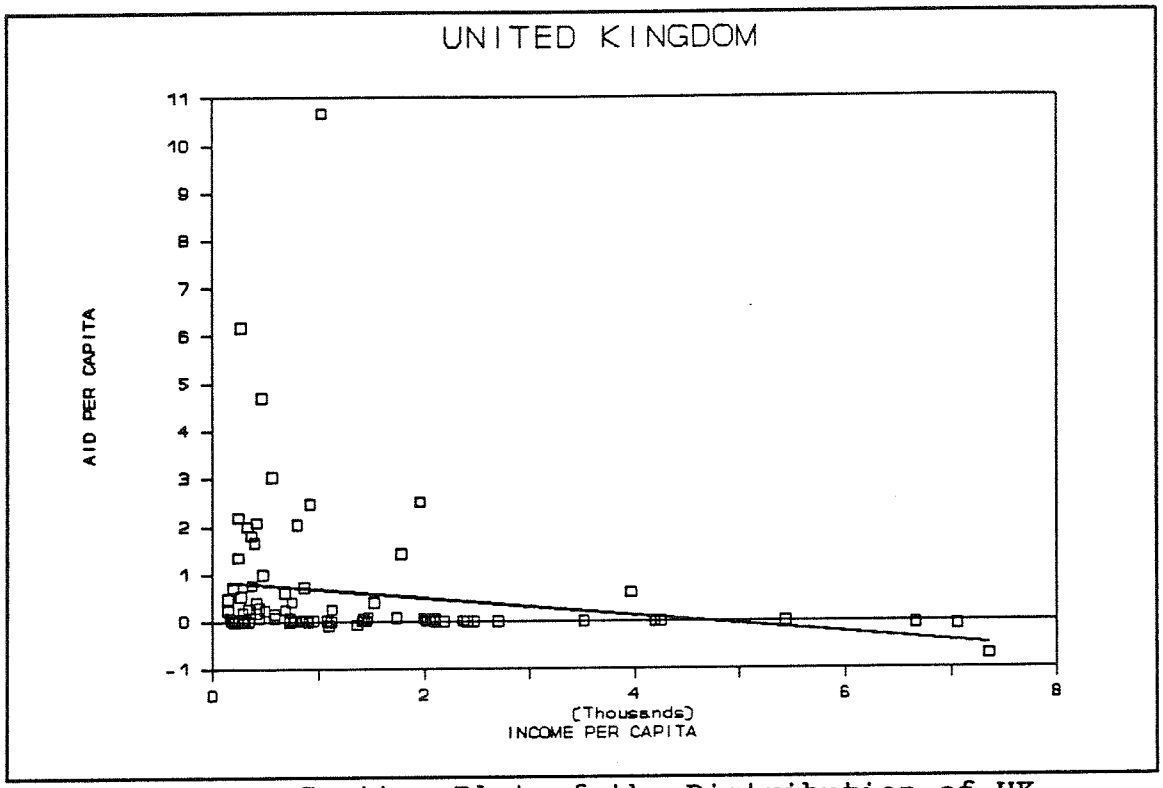

Figure 2(c): Scatter Plot of the Distribution of UK Aid (1984)

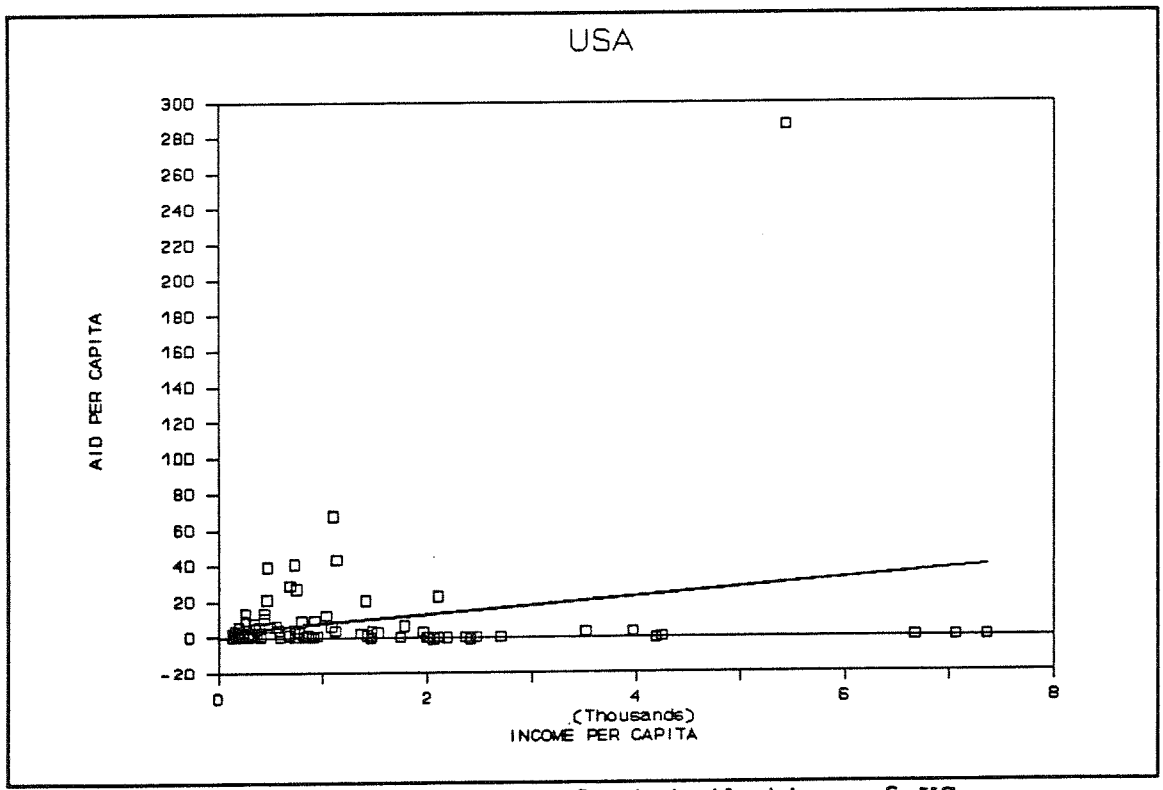

Figure 2(d): Scatter Plot of Distribution of US Aid (1984)

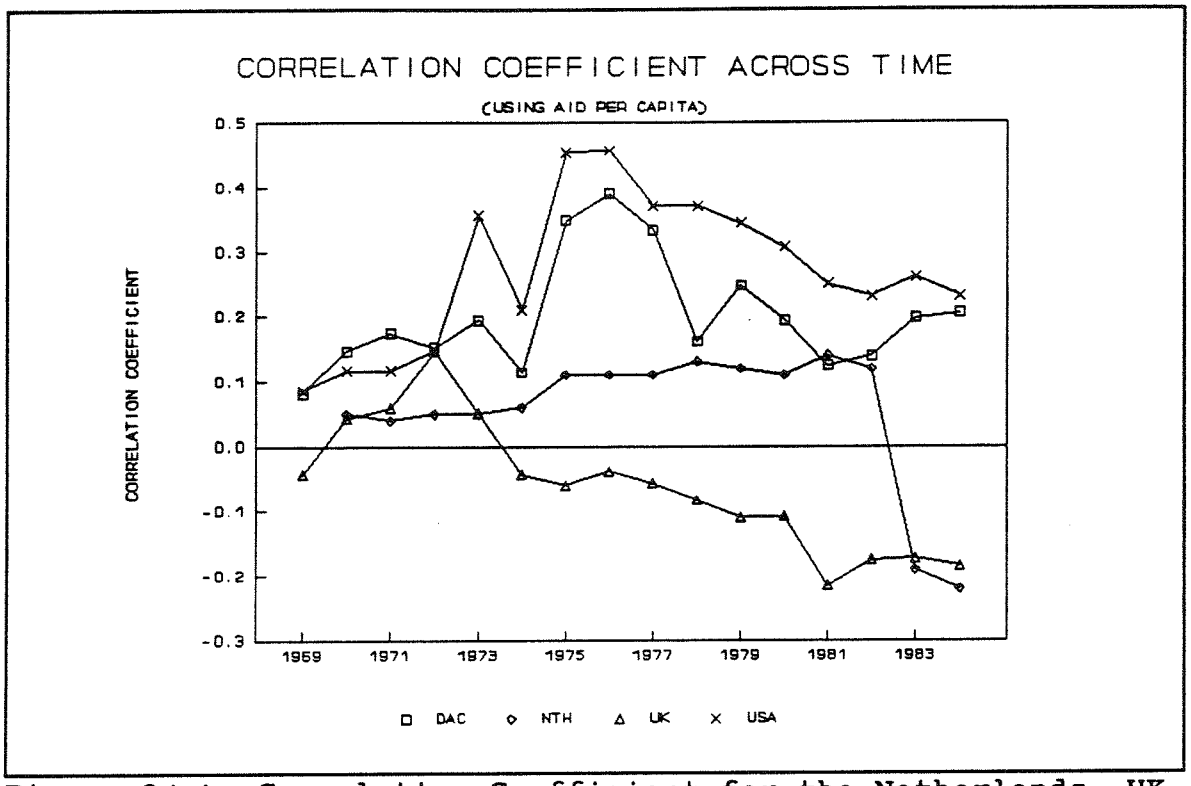

Figure 3(a): Correlation Coefficient for the Netherlands, UK and all DAC bilateral aid, 1969-84

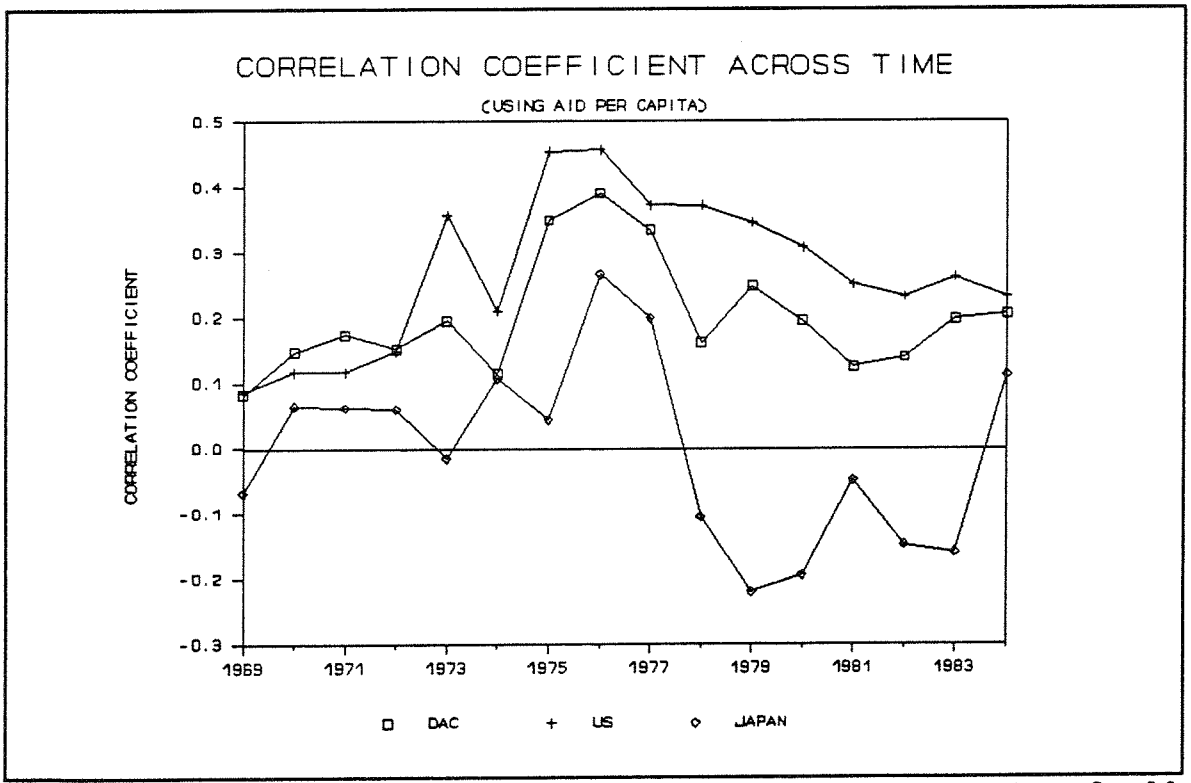

Figure 3(b): Correlation Coefficient for Japanese, US and all DAC bilateral aid, 1969-84

Table 1: Correlation and Slope Coefficients with Aid Per Capita as Dependent Variable (1984).

Donor	Correlation coefficient		Beta hat ($x10^{-3}$)		t-stat
	Value	Rank	Value	Rank	
Australia	-0.12	5	-0.08	6	-0.12
Austria	-0.04	10	-0.01	11	-0.39
Belgium	-0.09	8	-0.04	9	-0.78
Canada	0.14	15	0.35	14	1.27
Denmark	0.00	11	-0.06	7	-2.45
Finland	-0.18	4	-0.03	10	-1.65
France	0.07	13	0.50	15	0.66
Germany	-0.07	9	-0.11	4	-0.60
Italy	-0.12	6	-0.18	2	-1.07
Japan	0.12	14	0.19	13	1.07
Netherlands	-0.20	2	-0.14	3	-1.85
New Zealand	0.20	16	1.37	16	1.85
Norway	0.05	12	0.02	12	0.42
Sweden	-0.09	7	-0.08	5	-0.85
Switzerland	-0.30	1	-0.06	8	-2.88
UK	-0.18	3	-0.18	1	-1.71
US	0.23	17	4.96	17	2.17

$$(A/P)_i = \alpha - \beta (Y/P)_i \qquad (1)$$

where $(A/P)_i$ is aid per capita received by recipient i and $(Y/P)_i$ is that recipient's income per capita. That is, aid allocations must lie along a straight line with a negative slope. And that is all. The actual values of α and β are irrelevant. The correlation coefficient is unable to distinguish between that donor that almost (but not quite) gives the same amount of aid to all recipients, regardless of income, and that which gives a much higher multiple of aid to poorer countries than relatively better off ones. Consider the case shown in Figure 4(a). Donor 1 and 2 both give the equal amount of aid, with donor 2 having a far more progressive allocative profile. Yet both qualify as the best possible donor, with correlation coefficients of minus one.

Since donor performance is maximised by all points laying along a line, any

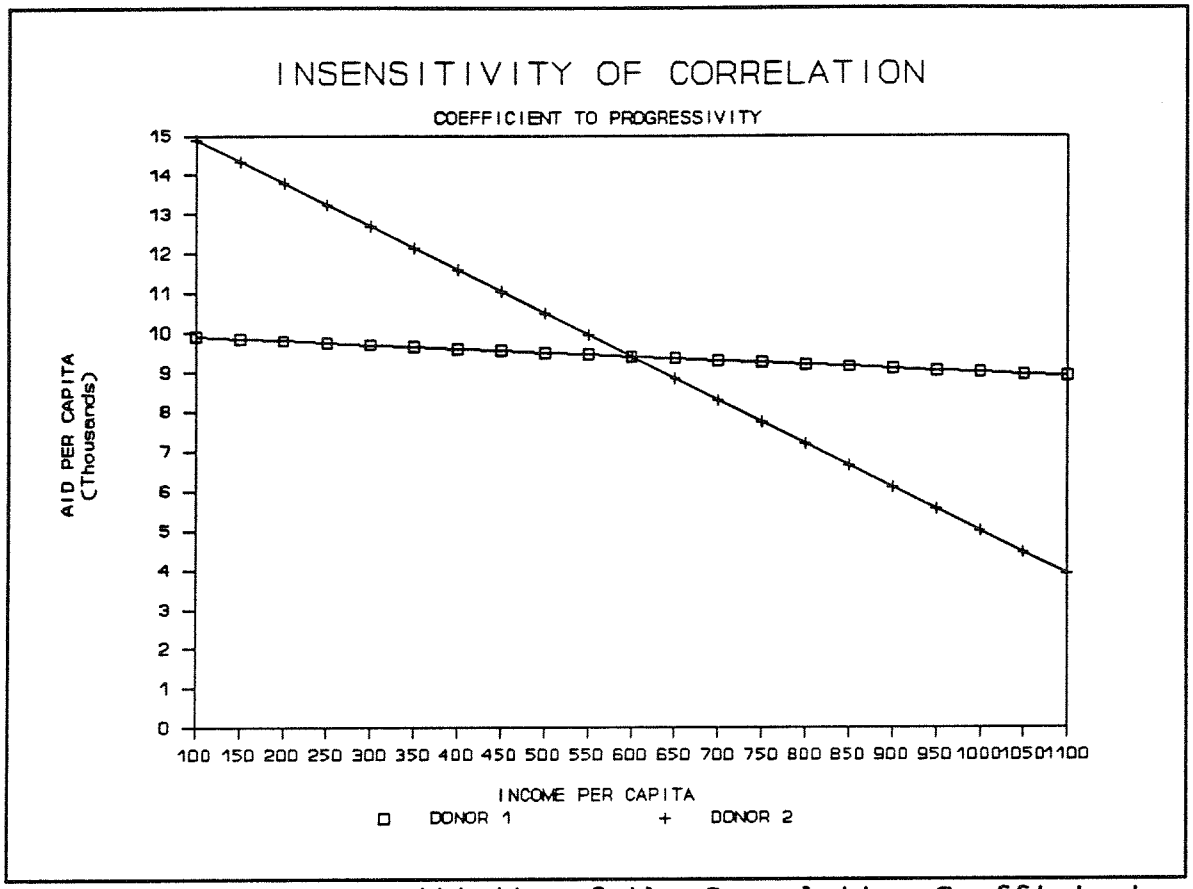

Figure 4(a): Insensitivity of the Correlation Coefficient to the Progressiveness of Aid Allocation

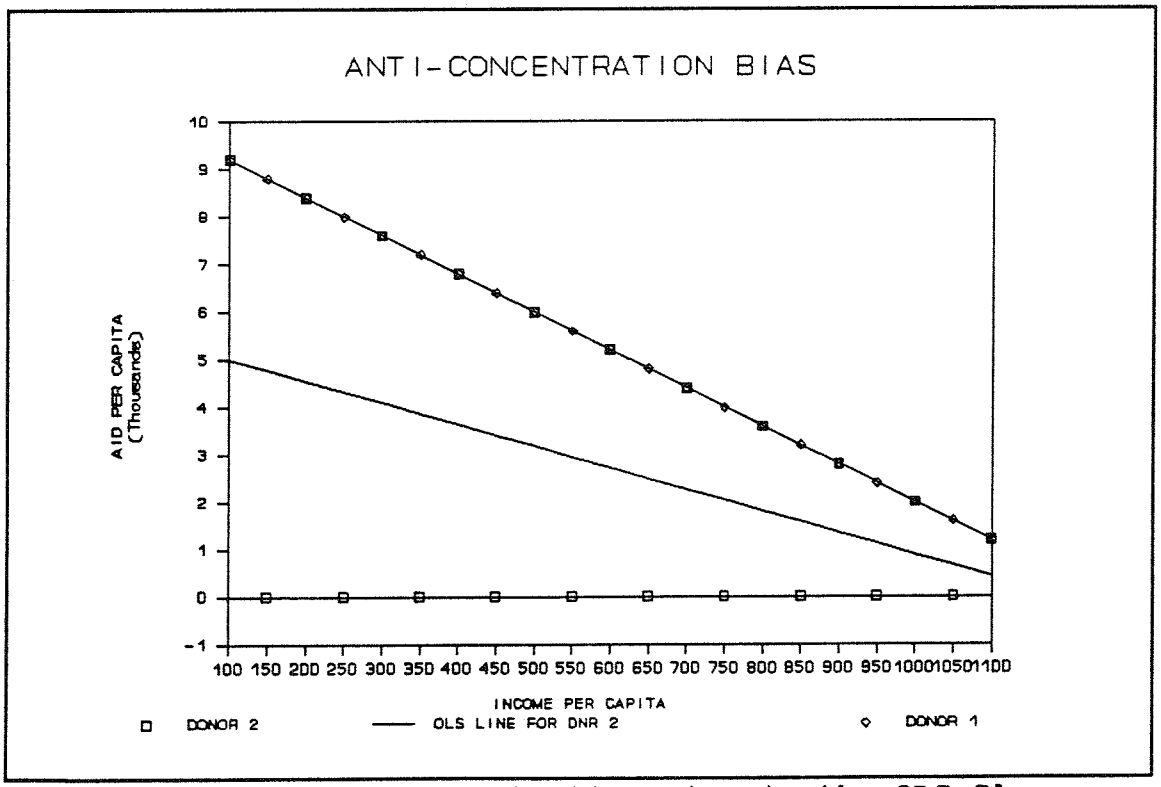

Figure 4(b): Anti-Concentration Bias in the OLS Slope Coefficient Measure

reallocation of aid that moves an observation nearer that line will improve performance. Suppose that the measure of aid is A/P. Giving aid to India will change its A/P considerably less than giving the same amount of aid to a recipient with a much smaller population, such as Sierra Leone. Now, we have said that the a correlation coefficient of -1 is achieved by all recipients laying along a line. For any donor, that line may be estimated as the OLS regression of (A/P) on (Y/P). This will shown whether any particular recipient receives "too much" aid or "too little" (in relation to their expected aid per capita given their per capita income). Clearly, taking aid from any recipient receiving too much aid and giving it to one that receives too little will, by moving both recipients nearer the line, improve the correlation coefficient. This is so even if the reallocation is from poorer to richer. It may with some justification be argued that, since the poorer recipient was receiving too much aid the reallocation, though regressive, should not be counted as a worsening of donor allocative performance. This is persuasive, and leads us to revise the condition that a regressive reallocation should always worsen performance. It becomes that, a regressive reallocation (or, where aid allocation is compared to some ideal, a regressive reallocation that moves the poorer recipient away from their ideal) should always result in a worsening of donor performance.

This qualification will be clearer by returning to our example of India and Sierra Leone. India in fact receives a very low aid well capita (US$ 0.90 in 1984) - well below that predicted by its income level. Any reduction of Indian aid is therefore moving it away not toward the least squares line. Despite this the regressive reallocation towards Sierra Leone - whose per capita income in 1984 was nearly $100 higher - will still improve performance (since Sierra Leone is also below the line). Using 1984 data, a reallocation of just over $40 million of aid away from India (which reduces its aid per capita to $0.80) will move Sierra Leone on to the least squares line - improving the correlation coefficient from 0.205 to 0.203. Clearly more substantial gains could be made with a more extensive programme of redistribution towards richer countries.

If we define aid by aid share, rather than per capita, then a reallocation will move both recipients by the same amount. However, it is still possible for a regressive reallocation between two recipients below the line to improve donor allocative performance. This is because the correlation coefficient uses the sum of squares - penalising more heavily large deviations from the norm. Therefore a regressive reallocation to a richer recipient who, before the reallocation is far from the line, can improve donor performance. It does seem that, in practice, this effect will be far weaker than it is in the case of aid per capita as the measure of aid. Finally, the correlation coefficient will penalise those donors who concentrate their aid.

From the above discussion, it seems then that we are interested in the slope of the line along which the observations fit: that is the fitted line from regressing (A/P) on (Y/P).[12] These are reported in the third column of Table 1. (The t-statistic in the third column tests

the significance of both the correlation and regression coefficients). The regression line is related to the correlation coefficient since the square of the correlation coefficient is equal to the R^2 from the simple regression. In doing a regression no new information is gained from looking at the R^2.[13] The slope of the line is also related to the correlation coefficient as follows:

$$\hat{\beta} = (S_y/S_x)r \tag{2}$$

where S_X and S_y are the standard deviation of x and y respectively. The standard deviation of income per capita is a constant as far as different donors are concerned - but their allocation will affect the standard deviation of (A/P). If all recipients get the same aid per head then the standard deviation is zero and the regression line is flat. A higher variation amongst recipients leads to a higher absolute value $\hat{\beta}$: this is the desired property.

Table 1 shows that, in practice, the ranking of donors is not greatly different (the Spearman's rank correlation coefficient is 0.80). Also, there are still problems. First, regressive reallocations can improve donor performance. Second, the coefficient is not independent of the amount of aid a donor gives. Finally, there is anti-concentration bias.

The case of anti-concentration bias is shown in Figure 4(b). Donor 1 allocates aid to all countries by an allocation rule that results in its allocations lying along a straight line relating aid and income. Donor 2 does the same, but only gives aid to every other country (ranked by income). We require a good indicator to judge these two allocative performances to be the same. Yet neither the slope nor correlation coefficients do this. Donor 2 gets a regression coefficient only half that of donor 1, and a correlation coefficient of only -0.44.

Now consider the case of two donors, the first having twice the GNP of the second. Both donors give the same percent of their national income in aid and both allocate this aid between recipients in an identical manner. Donor 1 therefore gives twice as much aid to each recipient, on account of donor 1 being a larger country. Allowing for this difference in country size, the two donors appear to have an identical performance and should be ranked equally. However, the absolute value of the slope coefficient for donor 1 will be twice that of donor 2: its appears to do "twice as well". In general, if $(A/P)_{i2} = \sigma(A/P)_{i1}$, where $(A/P)_{ij}$ is country i's per capita aid receipts from donor j, then

$$\hat{\beta}_2 = \sigma\hat{\beta}_1 \tag{3}$$

where β_j is the slope coefficient for donor j.

This latter deficiency can be circumvented by using the log regression of (A/P) on (Y/P) or by using aid <u>shares</u> as the dependent variable.[14] Neither of these solutions will overcome a further problem of how good a fit the regression line has. A single line may fit a variety of distributions (the problem of anti-concentration bias is an example of this). A

related problem is that of outliers.

We already encountered this in Figure 1 and some studies (e.g. Little and Clifford, 1965) report results that exclude Israel. If small island recipients are used for an aid per capita based calculation the problem will almost certainly be present. However, their very small share of aid means that they should perhaps be excluded. But in general there is no simple answer to this problem. Israel is a major aid recipient and so should probably be included, despite being such an obvious outlier and the reason, in the case of Figure 1, for observing a positive relationship.

We move now to two analyses that are based on the Lorenz curve of income distribution. As is well known, this curve plots population shares (ranked by income group) to income shares. A perfectly equal income distribution would result in a 45° line: anything less equal must lie below this line. Figure 5 shows world income distribution for 1984 in this way. A measure of inequality is the Gini coefficient, which is the ratio of area K to area (K+L). This is 0.678 in the case shown.

Mosley (1987) proposed using the Lorenz curve to analyse the redistributive impact of aid by comparing the Gini coefficients with and without aid. To do this aid is taken to be a transfer from rich countries to poor: the transfer is assumed to have no effect on income other than a simple additive one (in the case of recipients, and subtractive in the case of donors). The effect of the transfer will be to shift the Lorenz curve towards the diagonal "line of equality". Mosley calculated that total aid in the period 1970-1980 reduced the Gini coefficient from 0.461 to 0.453.[15] He notes that a redistribution of aid from countries in the fifth decile and up to countries to the bottom four deciles would reduce the Gini coefficient further to 0.43 (1987, p.161).

The striking conclusion from this analysis is the extremely limited impact of aid as a tool for the redistribution of international income. As Mosley notes, this redistributive impact would be increased by concentrating more aid on poorer countries. Allocative performance is maximised answer by giving all aid to the poorest country (or group of countries if the analysis has been aggregated or once the per capita income of the poorest catches up with that of the next poorest). Deducting aid from the current world income distribution gives a Gini of 0.680 i.e. virtually no change. Plotting the two Lorenz curves shows them to be indistinguishable from one another. Supposing instead that all aid were given to the bottom group of countries, the Gini would then be 0.677 - a fall of only 0.18 percent. Any reallocation of aid from this position will increase inequality.

The above analysis is for all aid. Performing the analysis across time or for different donors has two main problems. The first is that it is a very time-consuming index to calculate. This would be justifiable if it were shown to have desirable properties absent from other descriptive measures, but we can find none. The second disadvantage is that the

measure in sensitive to the total volume of aid, being biased in favour of larger donors. We argued above that measures of allocative performance should be neutral with respect to the size of the aid budget.

The non-neutrality with respect to aid volume is a serious problem with the Lorenz-adjustment procedure as a means of comparing donors. Indeed, calculating the measure shows that it ranks donors by size, with the US and Japan topping the list (see Appendix 1). As in the case of regression, it might be thought that we can get around the problem by using aid shares as the measure of aid. To do this means changing the vertical axis from population shares to aid shares. This is indeed precisely the measure applied by Clark (1991) to which we now turn.

Clark calculated Suits' Index for the allocation of ODA and trading preferences from the US and Japan. The horizontal axis for such an analysis is the same as for Figure 5. The vertical axis is now share in aid receipts. Unlike the Lorenz curve, the graph of these two variables is not constrained to lie below the diagonal. Indeed, if countries get a larger share of aid than they do of world income then the curve will lie above the diagonal.[16] This is shown in Figure 6 for four donors (Japan, the Netherlands, UK and US) and total DAC bilateral aid in 1984. All the figures display a substantial horizontal section. This is India, which accounts for more than twenty per cent of the total population of our sample, but receives a far smaller percentage of aid from all donors. The vertical section at the end of the US' curve shows that a large share of its aid going to one of the richest recipients (Israel).

The summary measure, Suit's index, is the ratio of the area under the diagonal minus the area between the aid-income curve and the horizontal, all divided by the area under the diagonal. A progressive allocation of aid will cause Suit's index to be negative. However, the value of the index for DAC bilateral aid is 0.13, showing the allocation of aid to be, on balance, regressive. Table 2 gives the index for all donors for 1984.

Suit's index and the Gini coefficient are closely related. In fact, they may both be calculated by the same formula. Assume that the population is divided into n groups of equal size (eg ten deciles) and that as_i is the cumulative share of the first i groups in income/aid. Then:

$$G = S = 1 - \left(\frac{2}{n}\right)\left(\sum_{i=1}^{n} as_i - \frac{1}{2}\right) \qquad (4)$$

Clark's application of Suit's index has two features in common with Mosley's measure: it is time-consuming to calculate and it is maximised by giving all aid to the poorest country/group (in which case it approaches -1, reaching this if all aid could be given to a country with zero income). It is not, however, sensitive to the size of the aid budget and so may be used to compare donors. Nor does it display anti-concentration bias and nor cam

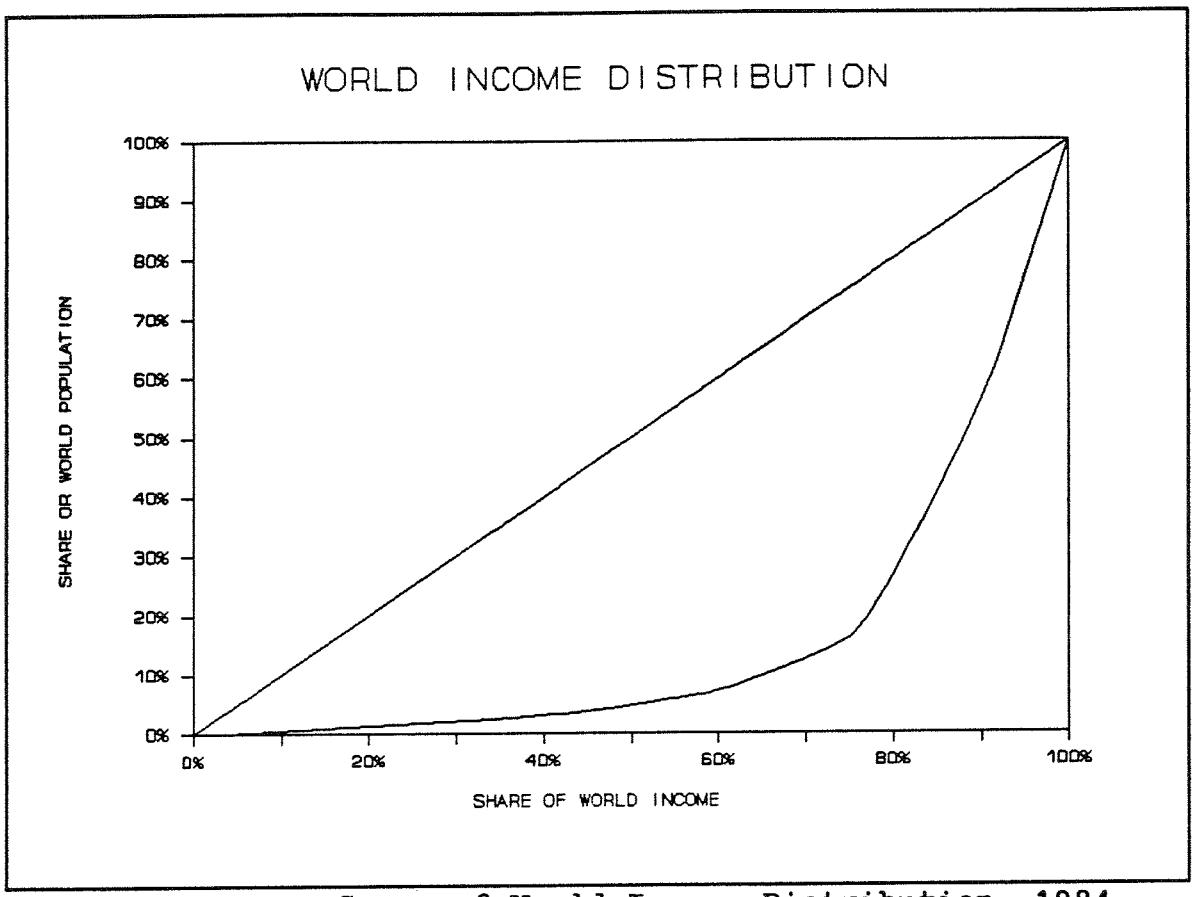

Figure 5: Lorenz Curve of World Income Distribution, 1984

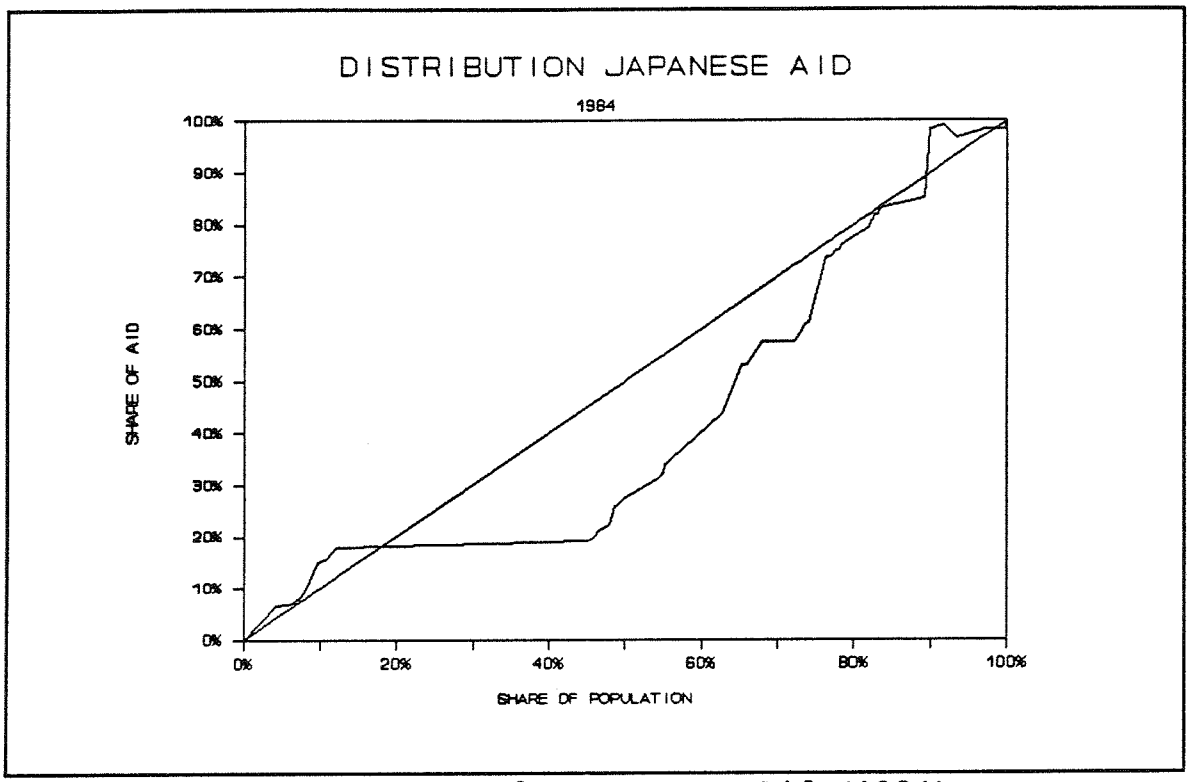

Figure 6(a): Lorenz Curve for Japanese Aid (1984)

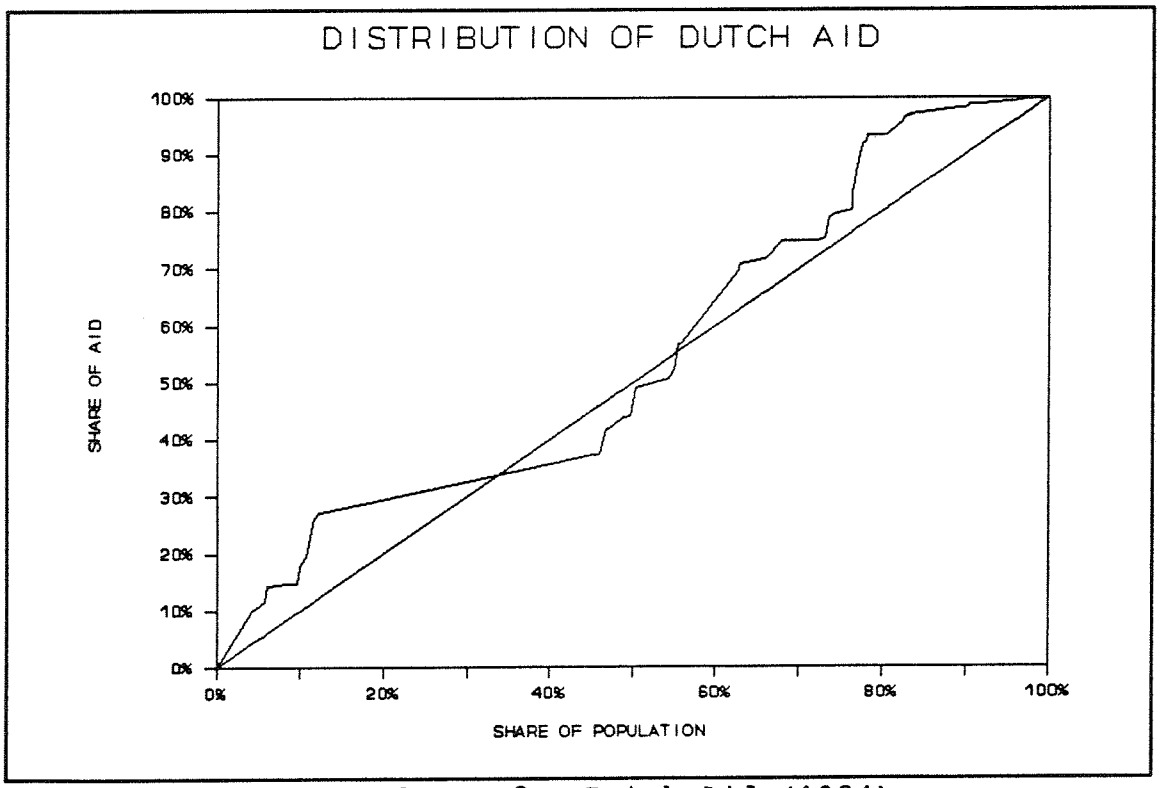

Figure 6(b): Lorenz Curve for Dutch Aid (1984)

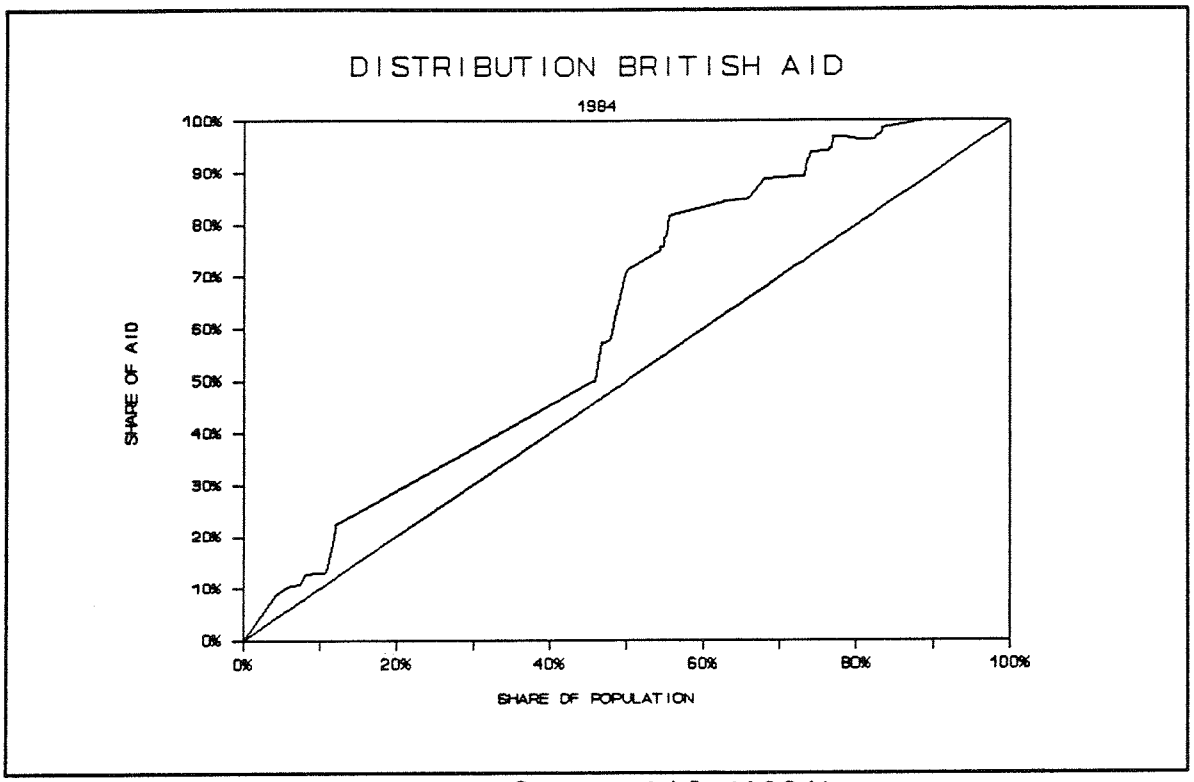

Figure 6(c): Lorenz Curve for UK Aid (1984)

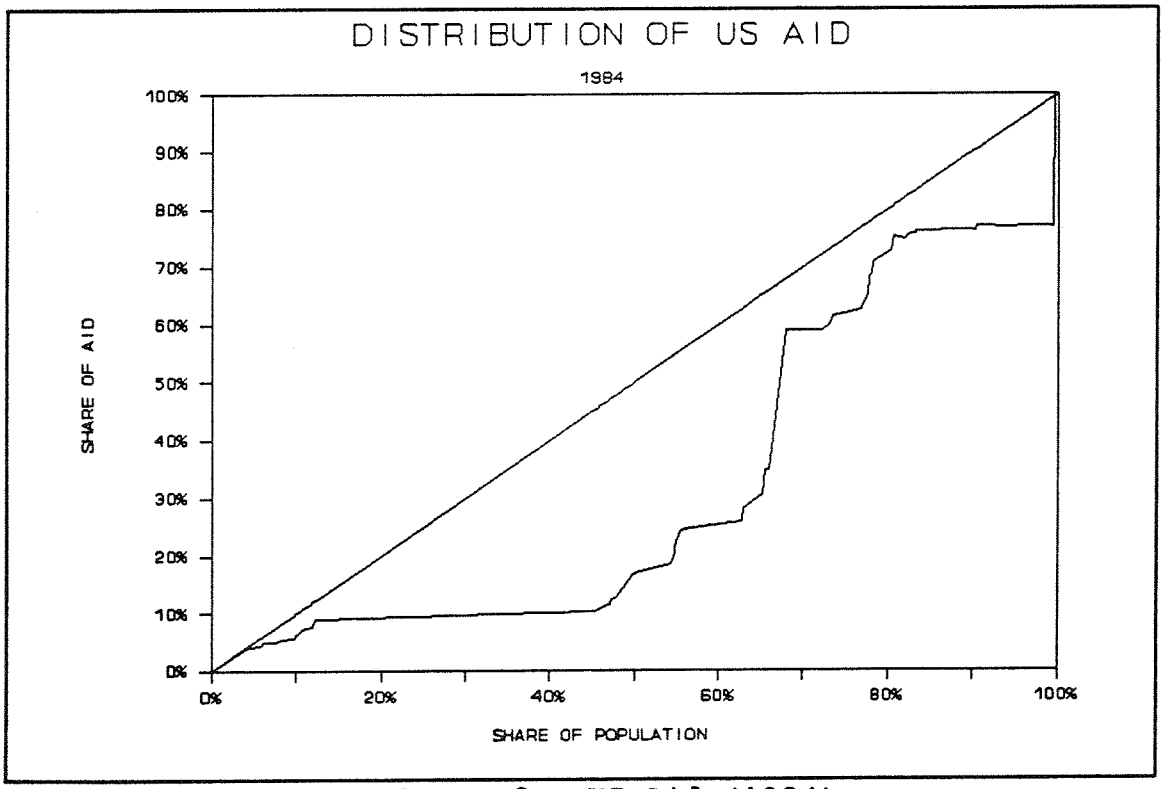

Figure 6(d): Lorenz Curve for US Aid (1984)

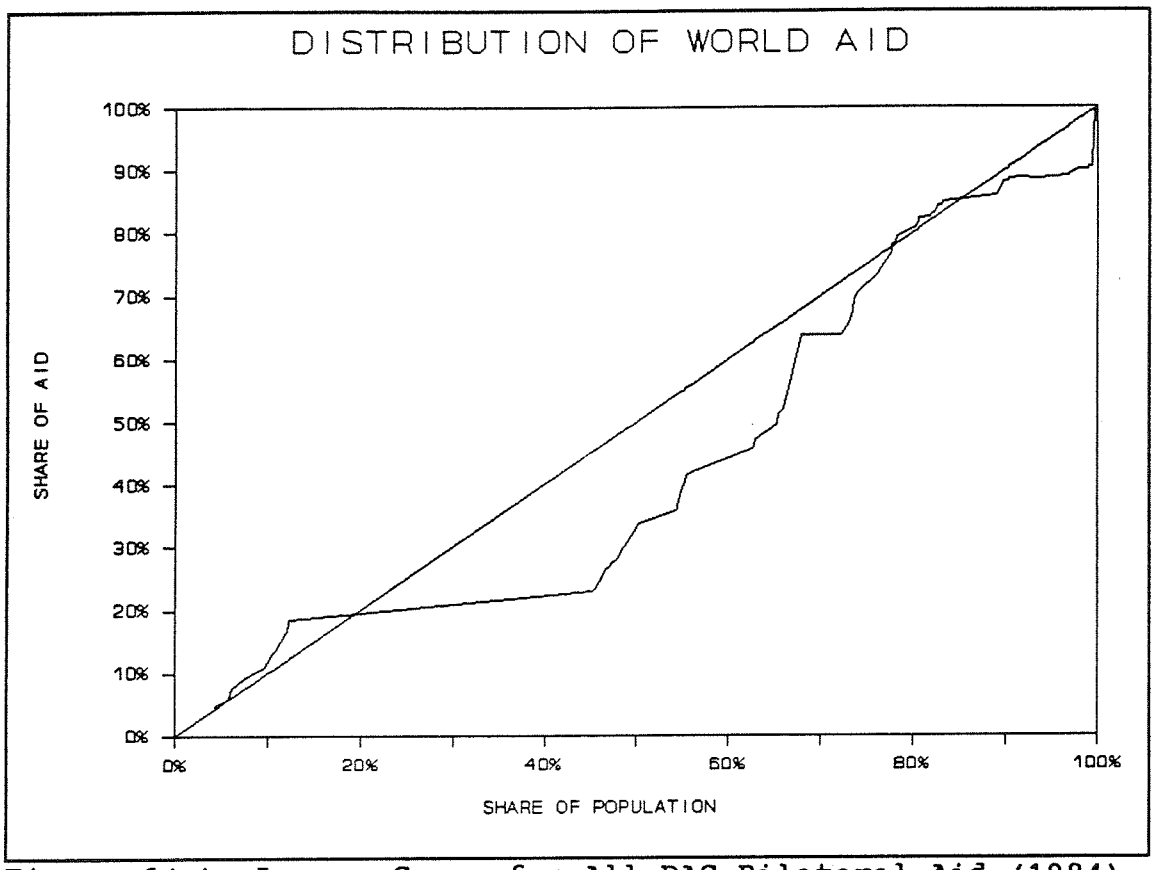

Figure 6(e): Lorenz Curve for All DAC Bilateral Aid (1984)

Table 2: Suit's Index for All Donors, 1984

	Value	Rank		Value	Rank
Australia	0.28	15	Japan	0.17	13
Austria	0.65	17	Netherlands	0.09	8
Belgium	-0.36	1	New Zealand	0.19	14
Canada	-0.10	7	Norway	-0.09	9
Denmark	-0.32	2	Sweden	0.06	11
Finland	-0.23	4	Switzerland	-0.21	5
France	0.08	12	UK	-0.23	3
Germany	0.04	10	US	0.36	16
Italy	-0.20	6	DAC	0.13	

regressive reallocations improve performance. Recipients are ranked by income per capita, so if recipient r is richer than recipient p, then r > p. The change in Suit's Index caused by a redistribution from r to p is:

$$\frac{dS}{dA} = -\frac{2(r-p)}{n} < 0 \tag{5}$$

where A is the absolute amount of aid reallocated from r to p. This change is unambiguously negative.

(d) Welfare Measures

The distinction between statistical and welfare measures of aid allocation is in one way arbitrary: as Sundrum (1990) points out (in a discussion of measures of inequality) all statistical measures contain an implicit welfare function that may be maximised by a particular allocation. Put another way, we may write a general measure of aid allocation as:

$$P = P\{w_1(A)_1 \ldots w_n(A)_n\} \tag{6}$$

where P is performance, $(A)_i$ is the chosen measure of aid given to country/group i and w_i is the weighting given to group i. It is useful to consider the measures discussed thus far in this framework. Any performance function that is linear and gives at least an equal weight to the poorest group may be optimised by giving all aid to that group.

Rearranging equation (4) to be in levels of aid rather than shares shows that the Gini and Suits' measures are indeed such functions:

$$G = S = 1 - (2/n)(nA_1 + (n-1)A_2 + \ldots + 2A_{n-1} + A_n - 1/2) \tag{7}$$

So that the lowest value of either index is obtained by giving, not just more but all aid to recipient 1.

The least squares regression line is a similar function:

$$b = \frac{(y_1 - \bar{y})(a_1 - \bar{a}) + (y_2 - \bar{y})(a_2 - \bar{a}) + \ldots + (y_n - \bar{y})(a_n - \bar{a})}{\left\{\sum_{i=1}^{n} (y_i - \bar{y})^2\right\}} \tag{8}$$

where y and a are income and aid per capita respectively. The greatest weight (i.e. lowest – as the best score is the most negative value) will attach to that country whose income is the farthest below the average per capita income i.e. the poorest country.

For another measure, if we set w_i in equation (6) equal to zero for all i other than the poorest group we have a Rawlsian welfare function, in which only an increase of aid to the poorest group can increase performance. This measure, with A in equation (6) representing aid share, is the most commonly applied by donors in their own assessment of their allocative performance. For example, the DAC's only regularly reported data on allocation are the

proportion of aid going to low income and the least developed countries. The UK's Overseas Development Administration annual reports carry a table showing the percentage of aid going to the poorest countries (now at over 80%). It is easy to see that this measure of allocative performance is also maximised by giving all aid to the poorest group.

This is a headcount measure. As Sen (1981) has pointed out, such measures are flawed by their failure to consider distribution within the lowest group. In 1989 performance could have been maximised by giving all aid to either Mozambique or Mauritania, even though the per capita income of the latter is over six times that of the former. The measure also clearly has nothing to say about the distribution of aid not going to the poorest group. Also problematic is the choice of group. Either an arbitrary cut-off point must be chosen, or a list of countries drawn up (e.g. the UN's list of least developed countries, LLDCs). The Independent Group on British Aid (1982) pointed out that the list used by the British ODA of "the poorest" contained countries not actually amongst the poorest at all.

(e) Performance Indicators

We turn now to alternative measures proposed by those concerned to describe the allocation of aid amongst countries. The first, that of Gulhati and Nallari (1988) is the first we encounter that does not use recipient per capita income as its sole criterion. In their study of donor lending to eighteen countries in sub-Saharan Africa their desired norm is the lending to those counties by IDA. IDA's criteria (population size, income per capita, recipient government policies and the unavailability of commercial credit) are seen to have a "transparent and convincing development rationale" (1988, p.1171). An index of deviations is calculated so that the best score, of zero, would be scored by a donor whose lending profile to these eighteen countries is identical to that of IDA. The index of deviations they derive is shown in Table 3. The value for some of the smaller donors, such as Sweden, are inflated by the fact that they do not lend at all to some of the countries; i.e. there is anti-concentration bias.

The problems with this measure relate to IDA's own lending practices, which do not conform identically to an index of the rationale behind IDA allocations. First, there are known cases of political considerations being introduced into the allocation of IDA credits. Second, IDA may commit aid by the above criteria, but its disbursement profile will be somewhat different. Moreover, another donor's disbursements could be negatively related to IDA's own if they are both active in the same sector in the same country. (A donor may, for example, suspend a new industrial line of credit if IDA is still disbursing a similar programme).

Cline and Sargan (1975) adopted a similar approach, except that by explicitly modelling the criteria by which aid should be allocated, they get away from the problems raised in the

Table 3. Donor Performance Rated by Deviation from IDA Lending (Eastern and Southern Africa)

Donor	Index
Multilateral (except IDA)	41
West Germany	58
United Kingdom	63
Canada	75
United States	77
Italy	77
Japan	82
France	86
Netherlands	89
Sweden	101
OPEC	115
Norway	116
Belgium	150

Source: Gulhati and Nallari (1988).

preceding paragraph. The basis for aid allocations was stated as a negatively sloped linear relationship between the grant equivalent of aid and income, both stated in per capita terms. This allocation was then modified according to five measures of recipient performance (as incentives to good policies and performance). These criteria were modelled on savings rates, export earnings, monetary policy, tax effort and efficiency of investment. Though they compared the lending profile of the World Bank to their ideal aid allocation, they stopped short of summarising this is a single number (though application of a mean squared deviation, or similar statistic, would be a simple step). Multi-dimensional measures such as these are suggestive of the direction in which prescriptive and descriptive models of aid allocation might move. However, we are concerned also to overcome the problems that have been identified in indicators that adopt a single criterion. This brings us to the next measure, that returns to the single criterion of income per capita.

This is McGillivray's (1989) performance index (MPI), which is defined as follows:

$$P_{it} - \sum_{j-1}^{n} W_{jt} \frac{a_{jit}}{a_{it}} \qquad (9)$$

where P_{it} is the value of the index for donor i at time t, and the j subscript refers to the jth developing country. The ratio $[a_{jit}/a_{it}]$is thus the value of aid per capita from donor i to recipient j over the sum of aid per capita given by donor i to each recipient in period t (ie the aid share calculated by aid per capita, rather than the absolute value of aid). This is weighted by:

$$W_{jt} = 100\left[\frac{Y_{jt} - Y_{max\,t}}{Y_{min\,t} - Y_{max\,t}}\right] \tag{10}$$

which gives the greatest weight to countries at the lower end of the scale of the per capita income scale, with a weight of 100 for the poorest country and 0 for the richest. Therefore the index, P_{jt}, will lie between 0 and 100 - a donor scoring 100 if all aid goes to the poorest country (so W_{jt}=100 and the aid ratio is unity) and 0 if all aid goes to the richest country.

As shown in White (1992), the use of the unweighted average of aid per capita in equation (7) means that the index displays a small-country bias,[17] so that performance can, under certain conditions, be improved by regressive reallocations (these conditions are stated in McGillivray, 1992). To overcome this it is proposed to weight by population so that the weights become:

$$W^{*}_{jt} = \left(\frac{POP_j}{\sum_{j=1}^{n} POP_j}\right) W_{jt} \tag{11}$$

where W_{jt}^{*} is the population-weighted performance index (PWPI) weight.[18]

Unfortunately such an index does not behave in the same way as McGillivray's, including the fact that it will no longer run from 0 to 100. To counter this it is possible to calculate a "standardised population weighted index", in which the figures from the row above have been indexed by value of the neutral allocation performance index. A donor whose country allocation was superior to the neutral allocation that equalises aid receipts per capita would receive over 100 on this index. In common with McGillivray's original formulation, both of White's measures will also be maximised by giving all aid to the poorest. Also White's proposal patches-up the problem in a fairly crude manner. In reply, McGillivray (1992) has suggested using absolute aid shares as the aid variable and the ratio of population to income per capita in constructing the weights. The adjusted performance index (API) is:

$$AP_{it} = \sum_{j=1}^{n} W^{**}_{jt} \frac{A_{jit}}{A_{it}} \tag{12}$$

where

$$W^{**}_{jt} = 100\left[1 - \frac{(POP/Y)_{jt} - (POP/Y)_{max\,t}}{(POP/Y)_{min\,t} - (POP/Y)_{max\,t}}\right] \tag{13}$$

By using population in the weights and aid shares in the aid measure, this measure combines aid share and aid population considerations in a single measure. It remains a linear function,

giving all aid to the country with the highest weight (W^{**}). In our sample this is India (though if China were included, this would claim the highest weight). Table 4 lists the performance of donors by these three measures.

(f) Comparison of the Indicators.

The first step in the comparison of the indicators is to explore how they each rank donors. Table 5 shows a matrix of the rank correlation coefficient between each of the indicators for their ranking of donor performance for 1984.[19] Regression and correlation coefficients based on the same dependent variable (aid per capita or aid shares) are highly correlated with each other (about 0.8), and reasonably so for indicators based on the alternative measure (0.4 to 0.5). Suit's Index also displays a reasonable degree of conformity with these measures. The Lorenz adjustment, which ranks donors by size, comes out as different (correlation coefficients of close to or less than zero) from other indicators, except for the regression coefficient based on the log of aid per capita.

We next move to a more general summary of the properties of the different indicators (Table 6). In addition to summarising any particular indicators degree of uniformity with the other indicators (column 5), the table shows whether the indicator has the properties listed as desirable at the start of this analysis. Ideally an index should read as Yes, No, No, No. Only the API satisfies these conditions and Suit's index comes the close by satisfying the first three. These two indicators are not particularly closely related (the rank correlation coefficient between them is 0.16).

The overall conclusion that we can draw from this analysis is that it does matter how we chose to measure donor allocative performance - different measures have different properties and rank donors in different (often very different) ways. No attention has, so far as we are aware, been paid to this issue in the official literature. Nor have campaign groups focussed much attention on the issue of aid allocation. We find both of these states of affairs a matter of some concern.

III CONCLUSION: THE CHANGING PATTERN OF AID ALLOCATION

What do the indicators tell us about patterns of aid allocation? Because the indicators do not agree with one another, no unambiguous story emerges. However, some statements about relative donor performance and changes over time may be made.

Some donors are fairly consistently among the top performers - notably the Scandinavian countries, the Netherlands and the UK. Others, especially the US, Austria and New Zealand, are consistently among the poorest performers. The UK's African links (meaning that it gives aid to a number of relatively small countries) means that it does particularly well on measures that are based on aid per capita - for example ranking top in the

Donor	MPI		PWPI		API	
	Value	Rank	Value	Rank	Value	Rank
Australia	85.9	10	0.18	16	3.9	13
Austria	61.9	17	0.70	1	0.5	17
Belgium	88.7	9	0.42	6	6.7	9
Canada	75.2	15	0.28	13	13.7	6
Denmark	94.2	1	0.53	3	21.2	2
Finland	93.4	2	0.46	4	3.8	14
France	79.3	12	0.19	15	4.7	11
Germany	85.6	11	0.34	12	9.7	8
Italy	91.9	5	0.35	10	4.3	12
Japan	78.4	13	0.56	2	5.5	10
Netherlands	90.9	7	0.44	5	15.1	5
New Zealand	93.0	4	0.35	11	12.9	7
Norway	76.1	14	0.07	17	3.1	16
Sweden	90.2	8	0.37	9	18.7	3
Switzerland	93.4	3	0.42	7	15.6	4
UK	91.6	6	0.41	8	30.7	1
US	66.7	16	0.22	14	3.5	15
DAC	77.0		0.28		7.4	

Table 4: McGillivray's Performance Index and its Derivatives

Table 5: Spearman's rank correlation coefficient of different descriptive indicators

		1	2	3	4	5	6	7	8	9	10	11	12
1	Suit's index												
2	CC (AP)	0.48											
3	Beta Hat (AP)	0.46	0.80										
4	Lorenz-adj	-0.28	-0.32	-0.07									
5	CC (AS)	0.68	0.45	0.43	0.05								
6	Beta Hat (AS)	0.89	0.53	0.47	-0.27	0.78							
7	Beta Hat (Ln)	-0.34	-0.03	-0.01	0.22	-0.21	-0.12						
8	CC (Ln)	-0.12	-0.09	-0.06	0.08	-0.14	0.75	0.88					
9	Headcount	0.88	0.37	0.36	-0.23	0.67	0.92	-0.26	-0.41				
10	MPI	-0.32	0.54	0.46	-0.32	0.54	0.78	-0.39	-0.39	0.78			
11	PWPI	-0.25	0.29	0.22	-0.25	0.20	0.34	0.38	0.24	0.30	0.32		
12	API	0.16	0.30	0.44	0.16	0.71	0.72	-0.23	-0.23	0.65	0.54	0.22	
	AVERAGE	0.20	0.30	0.32	-0.11	0.38	0.53	-0.01	0.05	0.28	0.44	0.18	0.31

Source: Calculated from Data in Appendix 1.

Table 6: Summary of Properties of Descriptive Indicators

Indicator	Properties				
	(1)	(2)	(3)	(4)	(5)
Correlation coefficient:					
Aid per capita	No	Yes	Yes	No	0.20
Aid share	No	Yes	Yes	No	0.38
Ln(Aid per capita)	Yes	Yes	Yes	No	0.05
OLS with regressand:					
Aid per capita	No	Yes	Yes	Yes	0.30
Ln(Aid per capita)	Yes	No	Yes	Yes	-0.01
Aid share	Yes	No	Yes	Yes	0.53
Lorenz adjustment	No	No	No	Yes	-0.11
Suit's Index	Yes	No	No	Yes	0.20
Headcount	Yes	No	No	Yes	0.28
IDA-comparison	Yes	n/a	Yes	No	-
McGillivray's PI	Yes	Yes	No	Yes	0.44
PWPI	Yes	No	No	Yes	0.18
API	Yes	No	No	No	0.31

Key to properties:
(1) Neutral with respect to other aspects of donor performance
(2) Can regressive re-allocations improve performance
(3) Anti-concentration bias
(4) Maximised by giving all aid to poorest country/group
(5) Degree of conformity with other indicators

regression coefficient of per capita aid on per capita income.

Figure 7 shows how performance has changed over time, as measured by three of the indicators: McGillivray's Performance Index, the correlation coefficient (using aid per capita) and Suit's Index. All three are indexed with 1980=100. For the first of these a downward movement is a deterioration in performance, whilst the reverse is the case for the latter two. Based on a log linear regression, there is no significant trend (at the 10% level) in either the correlation coefficient and Suit's Index. Using the MPI there has been a statistically significant worsening of performance over the period shown. All three indicators agree that performance took a dive in the second half of the seventies (thought the timings do not coincide) and recovered into the 1980s. The poor performance in the latter part of the 1970s is surprising, since this is a time when donors were beginning to be more vocal about directing aid towards the poor. It is possible that we are observing the lags involved for this policy to make itself felt - though the impact does not appear terribly great. The greater attention that donors have begun to pay to Africa should improve performance (especially by those measures based on income per capita). But against this are a number of factors that will put a downward pressure on allocative performance. These are the continued and rising use of mixed credits, the use of aid for debt relief and aid for Eastern Europe and the Soviet Union. Mixed credits (i.e. an aid package being tied to non-concessional finance, the whole lot of which is procurement tied) were introduced during the 1970s and, despite efforts by DAC, have increased in importance ever since. The nature of such "aid" (relatively sophisticated capital equipment) means that it has a built-in bias towards middle-income countries. The debt burden is, in volume terms, concentrated in middle income countries. This will create a tendency for aid as debt relief to have a bias towards these countries. (This need not necessarily be so, if such aid is given disproportionately to low income countries). Finally, growing assistance to Eastern Europe and the Soviet Union will, despite the claims of some donors, almost inevitably eat away at developing country receipts. The German government has already explicitly stated that this is the case.

Not only has donor allocative performance not improved over the last two decades (it may even have deteriorated) there are worrying signs that things may go from bad to worse. Discussion of the appropriate measure of aid impact will help draw attention to this issue. But we already have the evidence to made aid allocation a matter of concern - one that may possibly be taken up by pressure groups active in development issues.

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NOTES

1. Mosley (1985) proposes a measure of aid quality that combines three of these aspects, and also includes sectoral focus. See White (1991) for further discussion of this point.

2. Any overall assessment of donor performance should take account of all aspects, and this may be done in an inter-related manner. For example, meeting the DAC targets for concessionality is subject to satisfying a volume threshold.

3. The collection of such data is not impossible, as has been shown by low-income housing projects. The location of the beneficiary population in the income structure has been a controversial issue in these projects, and so data on income has become standard in project evaluations.

4. Some indicators should be minimised, not maximised, to qualify for the best possible allocation. To avoid confusion we speak of achieving the highest ranking, best result or maximising performance (and not minimising).

5. There is also the problem of how to treat a donor that omits a very large recipient, such as India.

6. This statement in fact needs to be qualified. The nature of this qualification will become clear below.

7. Nearly all studies use aid per capita (A/P), though some have used aid as a percent of recipient GNP (A/Y). OECD (1969) also reports aid/imports (A/M) (and argues that aid per capita is the least useful). Using the OECD data (which are annual averages for 1966-68 for 82 countries) the correlation between A/M and A/Y is high (0.82), so the choice between the two will make little difference. These are less well correlated with A/P (0.24 and 0.58 respectively) so that conclusions about allocation using this variable may differ substantially.

8. Owing to data constraints our data set does not contain many of the small island economies that have extremely high levels of aid per capita and tiny aid shares. Their inclusion would clearly weaken the relationship between aid per capita and aid share. Given their very low share of the total aid budget their exclusion is an assessment of allocative performance is not a major concern.

9. Since donors channel differing amounts of their aid through multilateral agencies and these agencies tend to have better allocative profiles than bilateral agencies it would be better if some account were taken of the allocation of a donor's donations to multilaterals. This is theoretically possible (and done by DAC in their reporting of donor allocative performance) but not been done.

10. The grant equivalent is the face value of aid minus the present value of repayments. It is double counting repayments to take the grant equivalent of net aid.

11. These figures are based on the data set which we use for recalculating the indicators discussed in this paper. It is a sample of 85 countries (based on data availability), which excludes the smallest developing countries and China. For the case of The Netherlands, Suriname (which is otherwise excluded) has been included in the data set.

12. It should be emphasised that we are here discussing regression only as a descriptive device. Its power as a method of explaining the allocation of aid inflows will be discussed in a subsequent paper.

13. Furthermore the F-test on the significance on the R^2 is equivalent to the test of the significance of the correlation coefficient.

14. Neither of these has, to our knowledge, ever been used in the literature.

15. Mosley's results are cited here despite methodological problems in his application, in particular the use of unweighted averages of income per capita, so that his deciles are in fact just groups of ten countries. We suspect that these problems account for the substantial discrepancy between his answers and ours.

16. OECD (1969) draws these curves for share of aid against share of population, GDP and imports. Cassen et al. (1986) analyse aid allocation on a similar principle by showing pie charts of share of aid and share of population, divided by income group.

17. White (1992) also lists some other properties of the indicator not explored in the original presentation.

18. As any chosen an index will be arbitrary it is more appropriate to generalise the double-weighted weights as:

$$W_{jt}^{*} = (POP_j/\Sigma POP_j)^k W_{jt}$$

where k is a constant that determines the importance attached to country size. In McGillivray's PI k=0 and in the weights used in the text k=1. The higher k than the more importance is attached to population size as against income/capita. With k=1 India's share of the weights is 92%, falling to 71% with k=0.5 and only 27% with k=0. It should be stressed again that there can be no objective criteria for choosing the value of k and unity is assumed in the text for clarity of exposition.

19. These have been recalculated with a common data for all the indicators with the exception of Gulhati and Nallari's IDA based index. Many of these results have been reported in the text. Appendix 1 lists the results for all measures.

APPENDIX 1: VALUES OF DESCRIPTIVE INDICATORS, 1984

Donor	Suit's Index		Corr. Coeff. (Aid/capita)		Beta Hat (Aid/capita)		(t-stat)	Lorenz Adjustment		Corr. Coeff. (Aid share)	
	Value	Rank	Value	Rank	Value	Rank		Value	Rank	Value	Rank
Australia	0.28	15	-0.12	5	-0.00008	6	-0.12	-0.006%	9	-0.05	15
Austria	0.65	17	-0.04	10	-0.00001	11	-0.39	-0.001%	16	0.06	16
Belgium	-0.36	1	-0.09	8	-0.00004	9	-0.78	-0.003%	13	-0.15	11
Canada	-0.10	7	0.14	15	0.00035	14	1.27	-0.012%	5	-0.29	2
Denmark	-0.32	2	0.00	11	-0.00006	7	-2.45	-0.003%	12	-0.22	4
Finland	-0.23	4	-0.18	4	-0.00003	10	-1.65	-0.001%	15	-0.20	7
France	0.08	12	0.07	13	0.00050	15	0.66	-0.015%	4	-0.17	9
Germany	0.04	10	-0.07	9	-0.00011	4	-0.60	-0.020%	3	-0.21	5
Italy	-0.20	6	-0.12	6	-0.00018	2	-1.07	-0.006%	8	-0.19	8
Japan	0.17	13	0.12	14	0.00019	13	1.07	-0.021%	2	-0.11	13
Nthlnds	-0.09	8	-0.20	2	-0.00014	3	-1.85	-0.008%	6	-0.24	3
N. Zlnd	0.19	14	0.20	16	0.00137	16	1.85	-0.004%	11	-0.14	12
Norway	-0.09	9	0.05	12	0.00002	12	0.42	-0.000%	17	-0.06	14
Sweden	0.06	11	-0.09	7	-0.00008	5	-0.85	-0.004%	10	-0.17	10
Swtzlnd	-0.21	5	-0.30	1	-0.00006	8	-2.88	-0.003%	14	-0.34	1
UK	-0.23	3	-0.18	3	-0.00018	1	-1.71	-0.007%	7	-0.21	6
US	0.36	16	0.23	17	0.00496	17	2.17	-0.065%	1	0.11	17
DAC	0.13		0.20								

Donor	Beta Hat (Aid share) Value	Rank	(t-stat)	Beta Hat (Ln A/P) Value	Rank	Corr. Coeff. (Ln A/P) Value	Rank	(t-stat)	Headcount Value	Rank
Australia	-0.00000197	13	-0.46	0.11	15	0.021	16	0.96	15.1%	16
Austria	0.00000231	16	0.53	-0.28	3	-0.148	3	-2.64	4.5%	17
Belgium	-0.00000408	5	-1.37	-0.33	2	-0.079	8	-3.21	65.3%	3
Canada	-0.00000366	6	-2.80	-0.20	6	-0.035	11	-1.85	51.5%	8
Denmark	-0.00000473	1	-2.08	0.12	17	0.067	17	1.06	69.2%	2
Finland	-0.00000441	3	-1.84	-0.16	8	-0.051	10	-1.48	62.6%	4
France	-0.00000211	12	-1.59	0.02	14	0.015	14	0.22	39.2%	12
Germany	-0.00000212	11	-1.95	-0.22	5	-0.101	5	-2.10	41.3%	10
Italy	-0.00000356	9	-1.78	-0.17	7	-0.081	7	-1.53	53.3%	7
Japan	-0.00000175	15	-0.96	-0.43	1	-0.084	6	-4.32	27.3%	14
Netherlands	-0.00000364	7	-2.25	-0.13	9	-0.124	4	-1.23	44.2%	9
New Zealand	-0.00000259	10	-1.24	-0.03	13	-0.020	13	-0.28	53.3%	6
Norway	-0.00000184	14	-0.57	-0.05	12	-0.022	12	-0.45	29.0%	13
Sweden	-0.00000361	8	-1.57	-0.27	4	-0.163	2	-2.52	41.2%	11
Switzerland	-0.00000427	4	-3.30	-0.10	11	-0.056	9	-0.87	62.4%	5
UK	-0.00000456	2	-1.94	0.11	16	0.017	15	1.02	70.6%	1
US	0.00000258	17	1.00	-0.13	10	-0.164	1	-1.18	16.7%	15
DAC									32.3%	

Donor	MPI		PWPI		API		IDA comparison	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Australia	85.9	10	0.18	16	3.9	13		
Austria	61.9	17	0.70	1	0.5	17		
Belgium	88.7	9	0.42	6	6.7	9	150	11
Canada	75.2	15	0.28	13	13.7	6	75	3
Denmark	94.2	1	0.53	3	21.2	2		
Finland	93.4	2	0.46	4	3.8	14		
France	79.3	12	0.19	15	4.7	11	86	7
Germany	85.6	11	0.34	12	9.7	8	58	1
Italy	91.9	5	0.35	10	4.3	12	77	4
Japan	78.4	13	0.56	2	5.5	10	82	6
Netherlands	90.9	7	0.44	5	15.1	5	89	8
New Zealand	93.0	4	0.35	11	12.9	7		
Norway	76.1	14	0.07	17	3.1	16	116	10
Sweden	90.2	8	0.37	9	18.7	3	101	9
Switzerland	93.4	3	0.42	7	15.6	4		
UK	91.6	6	0.41	8	30.7	1	63	2
US	66.7	16	0.22	14	3.5	15	77	5
DAC	76.96		0.28		7.49			