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# Descriptive and Prescriptive Analyses of Aid Allocation

## Approaches, Issues and Consequences

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**Abstract**

Studies of the inter-recipient allocation of aid may be categorized threefold. First, there are those which attempt to explain the observed allocation of aid. Second, there are those which seek to describe or evaluate the allocation of aid against normative criteria. Third, there are those which seek to prescribe the inter-recipient allocation of aid by calculating the amounts of aid each country should receive, also based on normative criteria. This paper looks at the second and third categories of studies. It commences by looking at the different approaches or descriptive measures used, and then repeats this exercise for the prescriptive literature. It then compares the prescribed allocations of the different approaches used in the literature. These allocations are compared to actual allocations and then evaluated against various normative criteria. This reveals significant differences, both between prescribed and actual allocations and the evaluations of the different prescriptive approaches.

Keywords: aid allocation, relative needs, per capita income, performance index, poverty

JEL classification: F35, C43, D63, I32



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Sierra Leone and Israel were both classified as developing countries by the OECD's Development Assistance Committee (DAC) in 1995. Both were therefore eligible to receive official development assistance from DAC member countries. Sierra Leone had for many years been among the world's very poorest countries, often being assessed as the world's poorest country. Israel on the other hand was one of the wealthiest list members, often being assessed as the most wealthy, with quality of life indicators comparable to those of many DAC donor countries. In 1995 Israel's income per capita was 27 times that of Sierra Leone and the life expectancy of its citizens was 43 years longer. During the period from 1969 to 1995 Sierra Leone received an annual average of US$74 million in net disbursements of ODA from all sources. This might on the surface appear like a lot of money, possibly reflecting Sierra Leone's relative need. But reality is far more complex, as Israel received over the same period an annual average of US$937 million—roughly 13 times the amount allocated to Sierra Leone (OECD 2002 and UNDP 1998).[1]

There have been many studies which have sought to analyse outcomes such as these; the allocation of development aid is not only a complex but an intensively researched topic. The overwhelming majority of studies have sought to identify the determinants of inter-recipient aid allocation, and hence explain or model the allocation of aid among developing countries. Why do some poor countries receive so much aid and other so little? The explanations of most studies turn on the perceived motives of donor countries. Humanitarian, commercial, political and strategic motives are typically identified. This is consistent with donor policy statements, especially from the larger donors, which assert that aid is motivated by a humanitarian concern to promote development and alleviate need, especially in the most needy countries, but at the same time by commercial, political and strategic self-interests. The literature on this topic spans more than forty years of research, with some of the better known and more recent studies including Levitt (1967, 1968); Henderson (1971); McKinlay (1978); McKinlay and Little (1977, 1978a, 1978b, 1979); Dudley and Montmarquette (1976) Maizels and Nissanke (1984); Gulhati and Nallari (1988); Gang and Lehman (1990); McGillivray and Oczkowski (1992); Gounder (1994); Trumball and Wall (1994); Wall (1995); Katada (1997) and Alesina and Dollar (2000). An overview and critical review of this literature can be found in McGillivray and White (1993).

While the literature on aid allocation is dominated by these explanatory studies, there are also smaller bodies of normative research which seek to describe and prescribe, respectively, the allocation of aid among recipient countries (White and McGillivray 1995; Hjertholm and White 2000). Put differently, these studies seek to evaluate or describe how well aid is allocated among recipient countries, and prescribe or identify amounts which ought to be allocated among these countries, respectively. The results of these studies are potentially very useful for they can provide information on how well or optimally donors have being allocating aid. By highlighting mistakes or sub-optimalities in past aid allocations, they can assist in identifying where corrections are needed in future. A number of studies have carried out prescriptive (for example, McGillivray and White 1994; Llavador and Roemer 2001; Collier and Dollar 2002 and McGillivray *et al*. 2002) and descriptive analyses (for example, McGillivray 1989, 1992; Clarke 1992; Rao 1994, 1997 and White and McGillivray 1995) of aid allocation at the empirical level.

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1 In per capita terms, Israel receipts were 12 times those of Sierra Leone.

This paper surveys the descriptive and prescriptive literatures. It commences with a review of the different descriptive approaches, commencing with an examination of simple correlation and regression approaches and working up to donor performance indices. This review updates and extends the descriptive literature survey of White and McGillivray (1995). It then looks at prescriptive studies, paying special attention to the models of Collier and Dollar (2002); Llavador and Roemer (2001) and McGillivray and White (1994). The prescribed, or optimal, allocations of these models are compared among themselves and with Swedish and total DAC ODA allocations. Sweden is of special interest, as it usually rates highly in aid allocation evaluations. These allocations are also evaluated using various descriptive measures.

## 2 Descriptive studies of aid allocation

All descriptive studies of aid allocation can be interpreted as attempts to measure what McGillivray (1989) called 'donor performance' with respect to inter-recipient aid allocation. Donor performance is, in this context, an increasing function of the consistency of inter-recipient aid allocation with the relative needs of recipients. The greater the preference given to needy countries, the greater is donor performance. Need can of course be defined a number of ways, but it is generally accepted that poor countries, with low per capita incomes, are the most needy. Note that recipients can be actual or potential and may not necessary receive a positive amount of aid from the donor. Potential recipients are in practice usually those on the DAC list of aid recipients. It follows that donor performance can be, and in some cases actually is, assessed not only on the basis of those developing countries it gives aid to but to those to which it gives no aid.

Early attempts to describe aid allocation either used correlation or regression coefficients (Little and Clifford 1965; OECD 1969; Bhagwati 1972). The correlation coefficient as a measure of donor performance is that which is obtained from the regression equation:

$$A_{i,j} = \alpha + \beta Y_j + \mu_j \qquad j = 1, \ldots, n \tag{1}$$

where $A_{i,j}$ is some measure of aid from donor $i$ to recipient $j$, $Y_j$ is $j$'s per capita income and $\alpha$, $\beta$ and $\mu_j$ are a constant, slope (regression) coefficient and error term, respectively. The correlation coefficient is simply the ratio of explained to total variation in $A_{i,j}$. Donor performance is maximized when the coefficient equals minus one, which is achieved by any allocation among countries which satisfies:

$$A_{i,j} = \alpha - \beta Y_j . \tag{2}$$

That is, aid allocations must lie along a negatively sloped regression line. The estimated values of $\alpha$ and $\beta$ are irrelevant. This is not so in the case of the regression coefficient test, in which donor performance is higher the lower the value of $\beta$.

The DAC, UNDP, World Bank and most donor government agencies typically report what may be described as 'headcount' measures of donor performance. Such measures are simply the proportion of donor aid going to a particular group of countries. Donor

performance is an increasing function of the proportion of aid allocated to the target group. The DAC measures donor performance in terms of the proportion of donor GNP allocated to the least developed country (LLDC) group, in accordance with its adoption of the UN target of 0.15 percent of donor GNP to these countries (see, for example, DAC 2001). Other headcount measures are the proportion of ODA to low human development (LHD) and low-income groups (LIC), classified according to values of the UNDP's human development index (HDI) and World Bank estimates of GNP per capita, respectively (see, for example, UNDP 2002 and World Bank 2002). While these measures are not necessarily intended by the UNDP and World Bank as indicators of donor performance, they are still used reasonably widely for this purpose.

Mosley (1987) sought to gauge the redistributive impact of aid using what was termed as the 'Lorenz Adjustment'. This adjustment was reinterpreted as donor performance by White and McGillivray (1992). As is well known, the Lorenz curve is obtained by graphing cumulative shares of world income against cumulative shares of world population, ranked by income. If income shares are equal across all population groups, there is a perfectly equal distribution of world income and the resulting curve is a straight line with a gradient of 45 degrees. But world income is not perfectly distributed and the distance between this curve, the Lorenz curve, and the 45 degree line shows the extent of income inequality. The Gini coefficient gives a numerical value to the extent of inequality. It is the ratio of the area bounded by the Lorenz curve and the line of equality to the total area below this line. It follows that perfect equality yields a Gini coefficient of zero.

To assess donor performance, aid is treated as an income transfer from rich to poor countries, with no effect on income other than a simple additive one, increasing recipient income and reducing donor income by the value of the aid allocations. It therefore flattens the Lorenz curve, reducing the vertical distance between it and the line of equality. This is the adjustment, the numerical value of which is the change in the Gini coefficient resulting from aid. This absolute value of this change will be larger the greater the proportion of aid allocated to poorer countries, and as such it can be interpreted as a measure of donor performance.

White and McGillivray (1992, 1995) show that donor performance will according to the Lorenz adjustment not only be a increasing function of the proportion of aid allocated to the poorest countries but of the total volume of aid. It is not therefore scale neutral, a desirable property of an index of donor performance with respect to inter-recipient allocation. The Suit's index, first adapted to aid allocation by Clarke (1991, 1992), satisfies this property. It is very similar to the Gini coefficient, the only difference is that it is based on a slightly different Lorenz curve. This curve is obtained by graphing cumulative shares of world aid, and not income, against cumulative shares of world population, ranked by income. With world population divided into $m$ groups of equal size and $AS_{i,j}$ being the share of donor $i$'s total aid to country $j$, the Suit's index for donor $i$ is written as:

$$S_i = 1 - \left(\frac{2}{m}\right)\left(\sum_{i=1}^{m} AS_{i,j} - \frac{1}{2}\right). \qquad (3)$$

The formula for $S_i$ is the same as that for the Gini coefficient, the only difference is that the aid share terms is replaced by an one for income shares.

A number of indices have been designed specifically for the assessment of donor allocative performance, rather than having been adapted to this purpose. All of these indices have the following general form:

$$I_i = \sum_{i=1}^{n} w_j \frac{A_{i,j}}{A_j} \tag{4}$$

where $I_i$ is the performance index for donor $i$, $w_j$ is a weight relating to the developmental status of recipient $i$ and $A_j$ is total donor $i$ aid. McGillivray (1989) was the first study to propose and apply a performance index. That index, subsequently called the McGillivray index $M_j$ (White 1992; Rao 1994, 1997) is defined as follows

$$M_i = \sum_{i=1}^{n} 100 \frac{Y^{\max} - Y_j}{Y^{\max} - Y^{\min}} \frac{A_{i,j}}{A_j} \tag{5}$$

where $Y^{max}$ and $Y^{min}$ are the highest and lowest observed per capita GNPs among all developing countries irrespective of whether they receive aid from $i$ and the aid terms are measured in per capita terms (that is, per head of $j$'s population). The effect of this weighting system is to scale or standardize the per capita incomes of countries $i$ within the range of zero to one hundred, with a weight of 100 if $i$ is the poorest country in terms of per capita GNP and zero if $i$ is the richest country. The maximum value of the index is 100, which is observed if the donor in question allocates all of its aid to the poorest country. The minimum value is zero, which is observed is all aid is allocated to the richest country.

White (1992) showed that the use of per capita aid in the McGillivray index meant a regressive reallocation of aid, involving taking aid away from one country and allocating it to a richer country with a smaller population, could within certain income ranges increase the value of the index. McGillivray (1992) responded with a revised index *Mj* defined as follows:

$$M_i^{'} = \sum_{i=1}^{n} w_j^{'} \frac{A_{i,j}}{A_j} \tag{6}$$

where the aid variables are defined in absolute terms and

$$w_i^{'} = 100 \frac{(POP/Y)_j - (POP/Y)_j^{\min}}{(POP/Y)_j^{\max} - (POP/Y)_j^{\min}} \tag{7}$$

where *POP* is population.

There have been a number of extensions or modifications to the McGillivray index. Choudhry *et al.* (1997) changed the weight, replacing per capita income with the physical quality of life index (PQLI). The PQLI is a composite index, combining infant mortality, adult literacy and life expectancy. Rao (1994) proposed more substantial changes to the McGillivray index. Rao pointed out that the indices written in (5) and (6) do not recognize any effect of aid on per capita income. The income variable used in these indices, according to Rao, is realized income, in that it will include aid to *i* from all donors. Rao therefore proposed a new weighting system in which the weights vary additively with the amount of aid. The modified index is as follows:

$$I_i = \sum_{i=1}^{n} \left[ \left( \max_j (x_{i,j} + \frac{A_i}{2POP_j}) \right) - \left( X_{i,j} + \frac{a_{i,j}}{2} \right) \right] \left[ \frac{1}{\max_i \left( x_{i,j} + \frac{A_i}{2POP_j} \right)} \right] \frac{A_{i,j}}{A_j} \tag{8}$$

where $x_{i,j}$ is *j*'s per capita income net of or prior to aid from donor but inclusive of all aid from other donors *i*, $a_{i,j}$ is *j*'s per capita aid from *i* and all other aid variables are measured in absolute terms. More precisely, it follows that

$$x_{i,\,j} = Y_j - a_{i,\,j} \tag{9}$$

Rao notes that (8) is not aid scale neutral. That is, the weight is such that a donor can improve its performance simply by giving more aid to all countries, without altering its distribution among recipients. Recognizing this, Rao defines a donor specific maximum performance maximum attainable value of $I_i$. The rule for obtaining this value is as follows: for each donor, allocate aid so that aid inclusive income ($Y_i$) is equalized for the largest feasible number of poorer recipients of donor *i* aid ($L_i$), at the bottom end of the pre-aid income ($x_{i,j}$) hierarchy. This is the equivalent of raising post-aid incomes of as many of these countries as feasible to a common plateau. Rao defines this plateau, $y_t^*$ as follows:

$$y_i^* = \frac{\sum_{i=\ell}^{L_i} \left( x_{i,\,j}\, POP_j \right) + A_i}{\sum_{i=\ell}^{L_i} POP_j} \geq x_{i,\,j} \tag{10}$$

Countries at the upper end of the hierarchy are allocated no aid, except in the unlikely case in which all recipient incomes are equalized. The most equitable feasible allocation for any given $A_i$ is therefore specified as follows:

$$\begin{aligned} A_{i,j}^* &= POP_i \left( y_i^* - x_{i,j} \right) && \text{for } j = l \text{ to } L_i \\ A_{i,j}^* &= 0 && \text{for } j = L_{i+1} \text{ to } u \end{aligned} \tag{11}$$

where $l$ and $u$ are the poorest and richest recipients, respectively, in terms of pre-aid incomes. $A^*_{i,j}$ is then substituted into (8) to yield the maximum value of $I_i$, as follows:

$$\max I_i = \sum_{i=1}^{n} \left[ \left( \max_j (x_{i,j} + \frac{A_i}{2POP_j}) \right) - \left( x_{i,j} + \frac{a^*_{i,j}}{2} \right) \right] \left[ \frac{1}{\max_i \left( x_{i,j} + \frac{A_i}{2POP_j} \right)} \right] \frac{A^*_{i,j}}{A_j} \qquad i = 1,\ldots,n \tag{12}$$

Rao's 'Equity Index' is then finally defined as follows:

$$I^*_i = \frac{I_i}{\max I_j} \tag{13}$$

The maximum value of this index is also 100, which is obviously observed if the donor's actual aid index defined by (8) equals the maximum value of that index according to (12).[2]

White and McGillivray (1995) show that the correlation coefficient, regression coefficient, Lorenz Adjustment, Suit's Index, the headcount measure and the McGillivray indices do not provide either clear or feasible guidelines for precisely how donors should allocate aid among recipients. The same applies to Rao's Equity Index. In particular, most of these indices are maximized by providing all aid to the poorest country. As Sundrum (1990) points out with respect to indices of inequality, all such measures contain an implicit welfare or utility function which is maximized by a particular allocation of income. The same applies to all the measures discussed above, with the exception of the correlation coefficient, and it is readily apparent that any indicator which can be written in linear form is maximized by giving all aid to the with the highest weight ($w_j$). While such an allocation might well benefit this country, provided it has the capacity to absorb such an amount of aid, which it almost certainly will not, such an allocation is clearly not desirable. In particular, it would obviously mean that many very poor countries would be denied aid. A further weakness, or limitation, of the Lorenz Adjustment, Suit's Index and Rao Equity Index is that they cannot readily be applied to non-income based indicators of recipient need.

McGillivray and White (1994) and McGillivray *et al.* (2002) address both of the preceding issues and in so doing link the prescriptive and descriptive literatures. These studies defined donor performance in terms of the consistency of actual to prescribed allocations, where a given donor's rating is a decreasing function of the gap between these allocations. The index of donor performance, $\Phi_i$, is therefore given as follows:

2 Rao (1994) proposed a further extension, in which the equity index was calculated not with the actual total level of donor $i$ aid ($A_j$) but with a normatively defined level. In applying the index, Rao (1997) set this level at 0.7 percent of donor GNP, as per the well-known, but widely ignored, UN target.

$$\Phi_i = 1 - \sum_{j=1}^{n} \left| \frac{A_{i,j} - \tilde{A}_{i,j}}{A_i} \right| \tag{14}$$

where $A_{i,j}$ is a prescribed allocation derived from a non-linear optimization problem, taking into a range of variables, and $\tilde{A}_{i,i}$ is the actual amount of aid allocated to $j$. It follows that since the sum of $\tilde{A}_{i,j}$ equals $A_i$, the maximum value of (14) is one, which would occur if $\tilde{A}_i$ equals $A_i$ for all $i$. The minimum value of (14) approaches, but can never equal, minus one and would be observed if all actual aid goes to one country: that with the smallest $A_i$. If actual aid is allocated in such a manner, (14) will be closer to minus one the closer is this prescribed amount to zero. A value of minus one cannot be observed since all countries in the sample are prescribed a positive aid amount. The derivation of the prescribed allocations is discussed below. These in McGillivray and White (1994) they were obtained on the basis of developmental criteria only, whereas in McGillivray *et al.* they were obtained on the basis of these criteria and various donor self-interests.

## 3 Descriptive studies of aid allocation

A smaller number of prescriptive studies have appeared in the literature. They tend to be more sophisticated that their descriptive counterparts, usually involving the derivation of aid allocations from non-linear optimization problems and based on various properties which are perceived as being desirable in terms of inter-country allocation. The literature, as Collier and Dollar (2002) observe, is not unlike that which analyses the optimal allocation of an anti-poverty budget (Bourguignon and Fields 1990).

Collier and Dollar (2001, 2002) derive 'poverty efficient' aid allocations. Such an allocation is one which maximizes poverty reduction, pulling the largest possible number of people above the chosen poverty line. The corresponding optimization problem, in Collier and Dollar (2002), is to maximize the objective function

$$PR_i = \sum_{j=1}^{n} G_j \alpha_j h_j POP_j \tag{15}$$

subject to the budget constraint

$$\sum_{j=1}^{n} A_{i,j} Y_j POP_j = A_i, \quad A_{i,j} \geq 0 \tag{16}$$

where $PR_i$ is the poverty reducing impact of donor $i$'s aid, $G_j$ is income growth, $\alpha_j$ is the elasticity of poverty reduction with respect to income and $h_j$ is a measure of poverty such as the headcount measure. It follows that (15) is an identity for the change in the absolute number of poor people, for a sample of $n$ countries, if this poverty measure is used. From (15) and (16) the first order conditions for a maximum are:

$$G^{a}_{i,j}\,\alpha_j\,h_j\,POP_j = \lambda\,Y_j\,POP_j \tag{17}$$

where $G^{a}_{i,j}$ is the marginal impact of aid on growth and λ is the shadow value of aid. From (17) it follows that

$$G^{a}_{i,j} = \frac{\lambda\,Y_j}{\alpha_j\,h_j} \tag{18}$$

So that poverty efficient allocations can be derived for each recipient, Collier and Dollar estimate the following growth equation:

$$G_j = \beta_1 + \beta_2\,A_j + \beta_3\,P_j + \beta_4\left(A_j P_j\right) + \beta_5\,A_j^2 + \beta_6\,X_j + \varepsilon_j \tag{19}$$

where $P_j$ is an index of policy and $X_j$ is a vector of other relevant variables. As Collier and Dollar application was to total aid impact we drop the subscript *i*. The interactive term $A_jP_j$ allows the impact of aid on growth to vary according to the policy environment, which follows from the well-known, and controversial, study of Burnside and Dollar (2000). It follows from (19) that the marginal impact of aid is:

$$G^{a}_{j} = \beta_2\,A_j + \beta_4\left(A_j\,P_j\right) + 2\,\beta_5\,A_j \tag{20}$$

A poverty efficient allocation can then be obtained for each recipient by substituting (20) into (18). After estimating (19) using panel data and thus obtaining estimates of $\beta_2$, $\beta_4$ and $\beta_5$ (which was negative, indicating decreasing returns to aid), Collier and Dollar (2002) obtained the following poverty efficient aid equation:

$$A_j = 13.5 + 7.8\,P_j - \left(\frac{\lambda}{0.04\,\alpha_j}\right)\left(\frac{h_j}{y_j}\right)^{-1} \tag{21}$$

where $\alpha_j$ was assumed to be constant across all *j*.[3] Poverty efficient allocations are therefore an increasing function of the level of poverty, the level of the policy index and the poverty reduction elasticity and a decreasing function of the level of income.

Lensink and White (2000) provide a critique of the Collier-Dollar approach, arguing that it is not a sound guide for policy. Lensink and White argue that the approach is questionable on three respects: first, its implicit assumption that aid can only reduce poverty by increasing growth *per se*; second, its supposition that aid only stimulates

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3 Collier and Dollar (2001) arrived at the following prescribed aid amount

$$A_j = 2.6\,P_j - \left(\frac{\lambda}{0.04\,\alpha_j}\right)\left(\frac{h_j}{y_j}\right)^{-1} POP^{\beta}$$

where β indicates a degree of preference for small countries in aid allocation.

growth in countries with sound economic policies, and third; the supposition that there are diminishing returns to aid. Lensink and White point out that there are many more efficient ways of reducing poverty than growth *per se*, such as improved service provision and increasing the assets of the poor. As such aid-induced growth alone is an insufficient means of reducing poverty. Lensink and White's second reservation with the Collier-Dollar approach is largely based on the findings of Hansen and Tarp (2000), which suggest that the positive relationship between aid and growth is not dependent on the economic policies of recipients. Further support for these findings are provided in later studies by Hansen and Tarp (2001) and Dalgaard and Hansen (2001). If it is the case that policies are not important in determining the link between aid and growth, then in the context of the Collier-Dollar approach most aid, with a constant poverty elasticity, should simply go to countries with low per capita incomes and high levels of poverty.[4] Finally, with respect to the third point, Lensink and White correctly observe that with constant or non-diminishing returns to aid the Collier and Dollar maximization problem is not bounded, and the poverty-efficient allocation of aid cannot be determined using their model.

Lensink and White's criticisms of the Collier-Dollar approach are largely technical in orientation. A purely normative reservation is worth highlighting. Countries with bad policies are clearly penalized in this approach: a country with bad policies can get less aid than one with good policies even though it might be much poorer, in terms of per capita income, and have far more people living in poverty.[5] Yet it is not so much the countries which are penalized, but poor people living in them. If we accept that there is a link between aid effectiveness and policies, perhaps what donors ought to be doing is providing relatively large amounts of aid to these countries and at the same time find ways to make aid to these countries work better.[6]

Llavador and Roemer (2001) prescribe allocations according to equal opportunity and utilitarian approaches. The former seeks to allocate aid in such as way as to equalize opportunities for growth, and recognizes the efforts expended by countries in achieving growth, not just the outcomes of these efforts. The latter seeks to allocate aid in such a way as to maximize average income growth of countries or among specific classes of countries.

$$\max_{(b_j^k,\, c_k^k)} \sum_q \gamma^q \min_t v^t \left[ q, x_{i,j}\left(q, t; b^k, c_j^k\right) \right] \tag{22}$$

The equal opportunity approach utility function used by Llavador and Roemer is where $\upsilon^t$ times the contents in the square brackets is the growth rate of a country, representing the average of countries in effort quartile $q$ of type $t$, $\gamma$ is the fraction of total population of the target countries located in effort quartile $q$, $x_{i,j}$ is aid allocated to country $j$ relative

4 Note that in applying their model Collier and Dollar assume a constant poverty elasticity across countries.

5 For example, with a country with 30 million people living in poverty, a per capita income of $200 and a policy index of 10 gets just over half the amount of aid as one with 10 million in poverty, a per capita income of $400 but with a policy index of 20.

6 Benyon (2002) provides further comments on the Collier and Dollar approach.

to its GDP from $i$, $c_j^k$ is the $k$th circumstance of country $j$ and $b^k$ is sequence of numbers required to reach a maximum. Circumstances are defined as that portion of $j$'s growth not explained, in the context of a regression equation, by effort and aid. In essence, therefore, this variable is the effect of country-specific circumstances on $j$'s rate of growth picked-up by the country specific error term of this equation. Effort is equated by Llavador and Roemer with good economic management, which is measured by the weighted average of the budget surplus relative to GDP, inflation and trade openness.

The utilitarian utility function is:

$$\max_{\left(b_j^k, c_j^k\right)} \sum_{q,t} \varsigma^{q,t}\ \upsilon^t \left[q, x_{i,j}\left(q,t;b^k, c_j^k\right)\right] \tag{23}$$

where $\varsigma^{q,t}$ is the fraction of total GDP of target countries which is earned in countries of effort quartile $q$ of type $t$. The difference between the two functions is that according to (33) aid allocation gives preference to countries with the greatest potential to achieve growth, and as such is therefore distributed to maximize the growth rate of total GDP of the target countries. According to the equal opportunity approach aid, aid allocations recognize the both the efforts and individual circumstances they face, and seek to maximize opportunities for growth.

In calculating prescribed allocations Llavador and Roemer maximize (22) and (23) subject to constraint which in essence states the that the sum of $x_{i,j}$ multiplied by $i$'s total GDP (since aid terms are relative to GDP) must equal $A_i$. This requires use of a grid $b$s. Equation (22) reached a maximum with $b \cong 0.3$ and (23) at $b \cong 3$.The prescribed utilitarian allocations are particularly interesting. Only three countries receive positive aid: Botswana, South Korea and Thailand. All are relatively rich by developing country standards, especially South Korea. Ironically, this country is now an OECD member, largely due to its affluence, and as such is not eligible for official aid.

McGillivray and White (1994) commence their analysis by stating three simple attributes of what they consider a 'good' pattern of aid allocation among developing countries *First*, the amount of aid allocated to any given country ought to be primarily in proportion to its need, with the distribution of aid among countries positively reflecting their relative needs. *Second,* that, recipient need notwithstanding, some account ought be taken for the ability of the country to absorb aid inflows. From the perspective of alleviating need or, more generally, the promotion of development *per se*, McGillivray and White assert that it makes little sense to provide large amounts of aid to countries if they cannot make use of these funds. *Third*, that, *ceteris paribus*, the amount of aid allocated to each country ought be neutral with respect to population size; that is, with identical need and absorptive capacities, the total amount of aid allocated to each country ensures an equality in per capita aid. The concern for population scale neutrality reflects the subjective criterion that aid is essentially about people, thus the allocation of aid among countries should take explicit account of the number of people at the receiving end.

With these attributes in mind, McGillivray and White (1994) proceed to derive prescribed aid allocations consistent with their stated, developmental criteria. A compatible objective function is:

$$U = \sum_{j=1}^{n} \left\{ W_1 RN_j^s POP_j^\beta \left( \frac{A_j}{A_i} \right)^\alpha + W_2 AC_j^s POP_j^\beta \left( \frac{A_{i,j}}{A_i} \right)^\alpha \right\} \begin{matrix} 0 < \alpha < 1 \\ , 0 < \beta < 1 \\ W_1 > W_2 \end{matrix} \quad (24)$$

where $RN_j^s$ is a scaled composite indicator of developing country *j*'s relative need for aid, $POP_j$ is *j*'s population size, $AC_j^s$ is a scaled composite indicator of that country's absorptive capacity, $A_j$ is the amount of aid allocated to *j* and *A* is the total amount of aid available for distribution among *n* countries. $W_1$ and $W_2$ are weights reflecting the relative importance of need and absorptive capacity respectively. Finally, α is a coefficient indicating diminishing marginal returns from the developmental impact of aid and β indicates diseconomies in population scale. The use of these coefficients can be justified on a number of grounds: economic theory suggests that there are decreasing returns to scale with aid-financed activities. Notwithstanding, the use of these coefficients remains necessary if one wishes to avoid prescribing all aid to a single country: that with the greatest weighted sum of need and absorptive capacity.

$RN_j^s$ and $AC_j^s$ scaled within the range of zero and one as follows:

$$RN_i^s = \frac{RN_i - RN_{min}}{RN_{max} - RN_{min}} \text{ and} \quad (25)$$

$$AC_i^s = \frac{AC_i - AC_{min}}{AC_{max} - AC_{min}} \quad (26)$$

where $RN_j$ ($AC_j$) is the actual value of the composite indicator for country *j* prior to scaling, $RN_{min}$ ($AC_{min}$) is the minimum actual value of this variable observed across *n* countries and $RN_{max}$ ($AC_{max}$) is the maximum actual value observed across *n* countries. Necessary to ensure scale equivalence and that the value of (24) is independent of the components in $RN_j$ and $AC_j$, the scaling procedure sets $RN_j$ ($AC_j$) to one if $RN_j=RN_{max}$ ($AC_j=AC_{max}$), or to zero if $RN_j=RN_{min}$ ($AC_j=AC_{min}$). Since $\partial U/\partial RN_j$ and $\partial U/\partial AC_j > 0$, the contribution of $RN_j^s$ the value of (), for a given value of $W_1$, will be larger the greater is extent of clustering of $RN_j$ toward $RN_{max}$, and likewise for $AC_j^s$.

$RN_j$ and $AC_j$ are defined as follows:

$$RN_j = \sum_{k=1}^{m} w_k \; rn_{k,j}^s \quad (27)$$

$$AC_j = \sum_{q=1}^{m} w_q ac_{q,j}^s \tag{28}$$

where $rn_{k,j}^s$ and $ac_{q,j}^s$ are specific indicators of need and absorptive capacity respectively and $w_k$ and $w_q$ are weights reflecting the relative importance of variables. These variables are also scaled within the range of zero to one as follows:

$$rn_{k,j}^s = \frac{rn_{k,j} - rn_{k,min}}{rn_{k,max} - rn_{k,min}} \text{ if } \frac{\partial U}{\partial rn_{k,j}} > 0 \quad \text{or} \tag{29}$$

$$rn_{k,j}^s = 1 - \frac{rn_{k,j} - rn_{k,min}}{rn_{k,max} - rn_{k,min}} \text{ if } \frac{\partial U}{\partial rn_{k,j}} < 0, \tag{30}$$

and likewise for $ac_{q,j}^s$. The preceding comments regarding the contribution of $RN_j$ and $AC_j$ to (24) also apply to $rn_{k,j}$ and $ac_{q,j}$ provided that $\partial U/\partial rn_{k,j}$ and $\partial U/\partial ac_{k,j} > 0$. The reverse is the case if $\partial U/\partial rn_{k,j}$ or $\partial U/\partial ac_{k,j} < 0$.

The total amount of aid available for distribution, $A_i$, is treated as predetermined, as is typically the case in practice. Equation (24) was maximized, therefore, subject to the following budget constraint:

$$\sum_{j=1}^{n} A_{i,j} = A_j \quad . \tag{31}$$

Maximization of (24) subject to (28), via a Lagrangean, eventually yields:

$$\frac{A_j}{A_z} = \left( \frac{(W_1 RN_j + W_2 AC_j) POP_j^{\beta}}{(W_1 RN_z + W_2 AC_z) POP_z^{\beta}} \right)^{\frac{1}{1-\alpha}} \tag{32}$$

where $i = 1, ..., n$ and $z = 1, ..., n$. Substituting equation (29) into the budget constraint written in (28) yields:

$$\frac{A_{i,j}}{A_i} = \frac{\left\{(W_1 RN_j + W_2 AC_j) POP_j^{\beta}\right\}^{\frac{1}{1-\alpha}}}{\sum_{z=1}^{n} \left\{(W_1 RN_z + W_2 AC_z) POP_z^{\beta}\right\}^{\frac{1}{1-\alpha}}} \tag{33}$$

Aid allocations consistent with this share can then be obtained by multiplying (30) by $A_i$.

From (21), it is obvious that the first and second conditions identified above are satisfied since $\partial U/\partial RN_j$ and $\partial U/\partial AC_j > 0$. The third condition (population scale neutrality) may be formally written as:

$$\frac{A_{i,j}}{POP_j} = \frac{A_{i,z}}{POP_z} \quad \text{if } RN_{i,j} + AC_j = RN_z + AC_z. \tag{31}$$

The consistency of equation (21) with population scale neutrality according to McGillivray and White (1994) is obtained if $\beta = 1 - \alpha$.

A number of comments can be made regarding the McGillivray and White (1994) approach. Two are worth highlighting. The first is based on the recognition that many countries have high relative needs for aid due to bad domestic economic policies, corruption, the denial of political and civil rights and so on. Giving preference in aid allocation to these countries can be interpreted as a 'reward' for these activities, and even as a negative incentive to improve their records. The second comment is that no account is taken for the event to which need is alleviated or filled. Put differently, aid is equally effective across countries. This will clearly not be the case.

## 4 Applications

In this section we apply the Collier and Dollar (2002), McGillivray and White (1994) and Llavador and Roemer (2001) approaches to prescribe aid commitments. Total and Swedish aid commitments were prescribed for the sample of 59 countries used in Collier and Dollar based on 2000 aid budgets. This sample contains countries in Parts I and II of the DAC list, hence the commitments relate to ODA or OA. South Korea is also included in this sample, despite no longer being on the DAC list and thus being involved summing the actual ODA or OA commitments to these countries, and then redistributing these g ineligible for either ODA or OA (its inclusion was based on it being prescribed large amounts of aid by Llavador and Roemer (2001)). Essentially, therefore, this exercise amounts according to the different approaches. Parameter values, weightings, thresholds and so on are as per the original studies.[7] To sets of prescribed amounts based on the Collier and Dollar approach are provided—one for a poverty headcount based on proportion of the population living on less than US$1 per day and the other based on the proportion of the population living on less then US$2 per day.

Results are shown in Tables 1 and 2. A dominant feature of these results is that most countries would receive less aid than they actually do, and a relatively small number of countries would receive significantly more aid—there would be many losers and few winners, in a sense. According to approaches of Collier and Dollar, Honduras, Lesotho, and Uganda would receive far more aid than was actually the case in 2000. China, Indonesia, Poland and Russia are among the countries which would receive far less.

[7] As in the Collier and Dollar approach aid to India was held at its actual 1996 share of aid, and countries with low marginal productivities of aid in terms of income do not receive any aid at all, hence the zero amounts to many countries. A similar scheme operates in the Llavador and Roemer approach. As it was not possible to fully recalculate the Llavador and Roemer using the current data, prescribed allocations are only reported for those countries which appear in their sample. Further details of how these amounts were calculated can be obtained from the author.

Ethiopia, India, Nigeria and Pakistan would receive much more aid, and Poland, Russia, Malaysia, China and Colombia would receive much less, according to the McGillivray and White approach. Thailand and Korea would be the big winners under both the Equal Opportunity and Utilitarian approaches of Llavador and Roemer.

Correlation coefficients between each of the allocations, prescribed and actual are shown in Table 3. These coefficients indicate that the allocations are very different, statistically, with the exception of the Collier and Dollar allocations. Performance index values for the allocations are shown in Table 4. Calculations are based on the adjusted McGillivray index, but with different weights. This index was used given its ability to assess aid allocation on variables other than per capita income, by using non-income based weights. Collier and Dollar headcount US$2 allocations perform best when the weights are based on the poverty measures, not surprisingly. McGillivray and White allocations perform best when the weights are based on the HDI or GDP per capita.[8]

## 5 Conclusion

This paper surveyed two related strands of literature on the allocation of development aid among recipient countries. The first strand consists of those studies seeking to describe or evaluate the allocation of aid against normative criteria. The second strand there are those which seek to prescribe the inter-recipient allocation of aid by deriving the amounts of aid each country should receive, also based on normative criteria. A specific objective of the paper was to compare the allocations of different prescriptive approaches, not only among each other but also with actual aid allocations. This exercise revealed some interesting results. Without exception, actually implementing these approaches would see tremendous changes in the way aid is allocated, with some countries receiving much more aid than they actually do and others receiving far less. It should be emphasized, however, that literature is still a very young, emerging one. That to date only three studies have been conducted, it seems, emphasizes this. The useful of these studies can be gauged by their impact on actual donor behaviour, with them hopefully resulting in more developmentally-, and less politically-oriented, patterns of aid allocation. Much further work is required if this outcome is to be observed.

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8 Note that comparisons of a given allocation against different weights are not valid and are not therefore made in this paper.

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Table 1
Prescribed and actual allocations

| | Actual ODA or OA commitments 2000 | | Prescribed ODA or OA commitments | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Collier & Dollar | | | | McGillivray & White | | Llavador & Roemer | | | |
| | | | Headcount US$2 | | Headcount US$1 | | | | Equal opportunity | | Utilitarian | |
| | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA |
| Algeria | 259.96 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 89.41 | 0.88 | 176.80 | 1.30 | 0.00 | 0.00 |
| Belarus | 38.93 | 7.63 | 0.00 | 0.00 | 0.00 | 0.00 | 16.26 | 0.16 | | | | |
| Botswana | 31.18 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 1.22 | 0.01 | 16.90 | 0.12 | 40.33 | 0.30 |
| Brazil | 254.50 | 1.46 | 0.00 | 0.00 | 0.00 | 0.00 | 377.96 | 3.72 | | | | |
| Bulgaria | 429.57 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 16.26 | 0.16 | | | | |
| Chile | 69.09 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | 12.19 | 0.12 | 558.71 | 4.10 | 0.00 | 0.00 |
| China | 2977.49 | 4.78 | 0.00 | 0.00 | 0.00 | 0.00 | 1881.67 | 15.54 | | | | |
| Colombia | 1267.37 | 9.05 | 0.00 | 0.00 | 0.00 | 0.00 | 65.03 | 0.64 | 763.31 | 5.60 | 0.00 | 0.00 |
| Costa Rica | 84.10 | 1.81 | 0.00 | 0.00 | 0.00 | 0.00 | 1.63 | 0.02 | 532.27 | 3.91 | 0.00 | 0.00 |
| Côte d'Ivoire | 385.50 | 0.24 | 1357.95 | 13.38 | 0.00 | 0.00 | 170.69 | 1.68 | 41.05 | 0.30 | 0.00 | 0.00 |
| Czech Republic | 211.52 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.81 | 0.01 | | | | |
| Ecuador | 180.88 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 28.45 | 0.28 | 275.90 | 2.03 | 0.00 | 0.00 |
| Egypt. | 1779.37 | 1.33 | 0.00 | 0.00 | 0.00 | 0.00 | 422.67 | 4.16 | 126.05 | 0.93 | 0.00 | 0.00 |
| Estonia | 105.22 | 2.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.81 | 0.01 | | | | |
| Ethiopia | 561.53 | 10.80 | 1974.49 | 19.45 | 1702.02 | 16.77 | 2991.70 | 29.47 | 40.17 | 0.29 | 0.00 | 0.00 |
| Guatemala | 239.66 | 13.34 | 0.00 | 0.00 | 1972.12 | 19.43 | 65.03 | 0.64 | 119.97 | 0.88 | 0.00 | 0.00 |
| Guinea | 199.73 | 0.07 | 0.00 | 0.00 | 101.65 | 1.00 | 203.20 | 2.00 | | | | |
| Guinea-Bissau | 87.98 | 0.40 | 1324.85 | 13.05 | 1480.19 | 14.58 | 609.61 | 6.01 | | | | |
| Honduras | 511.59 | 11.80 | 2812.73 | 27.71 | 3777.62 | 37.22 | 24.38 | 0.24 | 28.37 | 0.21 | 0.00 | 0.00 |
| Hungary | 312.44 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.81 | 0.01 | | | | |
| India | 1587.61 | 7.40 | 78.38 | 0.77 | 66.08 | 0.65 | 11826.50 | 116.51 | | | | |
| Indonesia | 1986.33 | 0.87 | 0.00 | 0.00 | 0.00 | 0.00 | 3169.99 | 31.23 | 5184.12 | 38.05 | 0.00 | 0.00 |
| Jamaica | 144.31 | 1.22 | 0.00 | 0.00 | 0.00 | 0.00 | 406.00 | 0.04 | 3.09 | 0.02 | 0.00 | 0.00 |
| Jordan | 574.23 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 8.13 | 0.08 | | | | |
| Kazakhstan* | 302.80 | 0.86 | 0.00 | 0.00 | 0.00 | 0.00 | 32.51 | 0.32 | | | | |
| Kenya | 784.33 | 28.05 | 1053.16 | 10.38 | 1240.86 | 12.22 | 207.27 | 2.04 | 57.88 | 0.42 | 0.00 | 0.00 |
| Korea | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.03 | 0.02 | 9086.48 | 89.52 | 1056.67 | 77.52 |
| Kyrgyz Rep. | 276.05 | 0.82 | 2648.25 | 26.09 | 873.87 | 8.61 | 16.26 | 0.16 | | | | |
| Lesotho | 38.46 | 0.07 | 313299.00 | 30.87 | 3594.68 | 35.41 | 20.32 | 0.20 | | | | |

Table 1 continues

Table 1 (continued)
Prescribed and actual allocations

| | Actual ODA or OA commitments 2000 | | Prescribed ODA or OA commitments | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Collier & Dollar | | | | McGillivray & White | | Llavador & Roemer | | | |
| | | | Headcount US$2 | | Headcount US$1 | | | | Equal opportunity | | Utilitarian | |
| | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA |
| Lithuania | 237.46 | 19.96 | 0.00 | 0.00 | 0.00 | 0.00 | 81.00 | 0.01 | | | | |
| Madagascar | 383.80 | 0.22 | 1129.48 | 11.13 | 1201.40 | 11.84 | 300.74 | 2.96 | 23.16 | 0.17 | 0.00 | 0.00 |
| Malaysia | 1189.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.26 | 0.16 | 1186.73 | 8.71 | 0.00 | 0.00 |
| Mauritania | 240.09 | 0.21 | 1623.35 | 15.99 | 1482.26 | 14.60 | 81.28 | 0.80 | | | | |
| Mexico | 369.30 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 93.47 | 0.92 | 2634.19 | 19.33 | 0.00 | 0.00 |
| Moldova | 111.18 | 2.67 | 0.00 | 0.00 | 0.00 | 0.00 | 243.85 | 2.40 | | | | |
| Morocco | 693.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.44 | 0.02 | 376.86 | 2.77 | 0.00 | 0.00 |
| Nepal | 402.05 | 0.93 | 894.85 | 8.82 | 1004.85 | 9.90 | 556.78 | 5.49 | | | | |
| Nicaragua | 455.21 | 27.70 | 1994.39 | 19.65 | 2773.38 | 27.32 | 24.38 | 0.24 | | | | |
| Niger | 304.37 | 0.07 | 1113.14 | 10.97 | 1115.21 | 10.99 | 406.41 | 4.00 | 8.47 | 0.06 | 0.00 | 0.00 |
| Nigeria | 311.14 | 0.78 | 598.35 | 5.89 | 630.01 | 6.21 | 2970.85 | 29.27 | 301.50 | 2.21 | 0.00 | 0.00 |
| Pakistan | 1188.07 | 1.15 | 1646.60 | 16.22 | 0.00 | 0.00 | 3267.53 | 32.19 | 419.50 | 3.08 | 0.00 | 0.00 |
| Panama | 42.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.03 | 0.02 | | | | |
| Philippines | 1079.15 | 1.71 | 0.00 | 0.00 | 0.00 | 0.00 | 203.20 | 2.00 | 672.58 | 4.94 | 0.00 | 0.00 |
| Poland | 1606.05 | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 | 2.44 | 0.02 | | | | |
| Romania | 966.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 20.32 | 0.20 | | | | |
| Russia | 1550.12 | 22.14 | 0.00 | 0.00 | 0.00 | 0.00 | 365.77 | 3.60 | | | | |
| Rwanda | 385.11 | 9.83 | 1516.11 | 14.94 | 1376.14 | 13.56 | 231.65 | 2.28 | | | | |
| Senegal | 560.83 | 0.18 | 2228.06 | 21.95 | 2585.26 | 25.47 | 170.69 | 1.68 | 21.90 | 0.16 | 0.00 | 0.00 |
| Slovak Republic | 147.25 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 1.22 | 0.01 | | | | |
| South Africa | 430.64 | 13.61 | 0.00 | 0.00 | 0.00 | 0.00 | 36.58 | 0.36 | | | | |
| Sri Lanka | 467.98 | 26.39 | 0.00 | 0.00 | 0.00 | 0.00 | 36.58 | 0.36 | 214.71 | 1.58 | 0.00 | 0.00 |
| Tanzania | 1401.90 | 47.08 | 1023.33 | 10.08 | 441.24 | 4.35 | 1036.34 | 10.21 | 0.00 | 0.00 | 0.00 | 0.00 |
| Thailand | 1106.50 | 3.42 | 0.00 | 0.00 | 0.00 | 0.00 | 170.69 | 1.68 | 2966.45 | 21.77 | 7067.88 | 51.88 |
| Tunisia | 578.24 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 | 16.26 | 0.16 | 205.45 | 1.51 | 0.00 | 0.00 |
| Turkmenistan | 20.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.13 | 0.08 | | | | |
| Uganda | 848.19 | 31.35 | 3700.78 | 36.46 | 3472.35 | 34.21 | 621.81 | 6.13 | | | | |
| Venezuela | 114.84 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 20.32 | 0.20 | 693.86 | 5.09 | 0.00 | 0.00 |
| Vietnam | 1776.42 | 18.52 | 1740.70 | 17.15 | 2779.84 | 27.39 | 2357.17 | 23.22 | | | | |
| Zambia | 881.18 | 7.14 | 2094.83 | 20.64 | 2015.74 | 19.86 | 121.92 | 1.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zimbabwe | 156.08 | 7.01 | 0.00 | 0.00 | 0.00 | 0.00 | 32.51 | 0.32 | 19.78 | 0.15 | 0.00 | 0.00 |

Table 2
Differences between prescribed and actual allocations

| | Actual ODA or OA commitments 2000 | | Prescribed ODA or OA commitments | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Collier & Dollar | | | | McGillivray & White | | Llavador &Roemer | | | |
| | | | Headcount US$2 | | Headcount US$1 | | | | Equal opportunity | | Utilitarian | |
| | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA |
| Algeria | 259.96 | 0.39 | -259.96 | -0.39 | -259.96 | -0.39 | -170.55 | 0.49 | -83.16 | 0.91 | -259.96 | -0.39 |
| Belarus | 38.93 | 7.63 | -38.93 | -7.63 | -38.93 | -7.63 | -22.67 | -7.47 | | | | |
| Botswana | 31.18 | 0.25 | -31.18 | -0.25 | -31.18 | -0.25 | -29.96 | -0.24 | -14.28 | -0.13 | 9.15 | 0.05 |
| Brazil | 254.50 | 1.46 | -254.50 | -1.46 | -254.50 | -1.46 | 123.46 | 2.26 | | | | |
| Bulgaria | 429.57 | 0.10 | -429.57 | -0.10 | -429.57 | -0.10 | -413.31 | 0.06 | | | | |
| Chile | 69.09 | 0.85 | -69.09 | -0.85 | -69.09 | -0.85 | -56.90 | -0.73 | 489.62 | 3.25 | -69.09 | -0.85 |
| China | 2977.49 | 4.78 | -2977.49 | -4.78 | -2977.49 | -4.78 | -1095.82 | 13.76 | | | | |
| Colombia | 1267.37 | 9.05 | -1267.37 | -9.05 | -1267.37 | -9.05 | -1202.34 | -8.41 | -504.06 | -3.45 | -1267.37 | -9.05 |
| Costa Rica | 84.10 | 1.81 | -84.10 | -1.81 | -84.10 | -1.81 | -82.47 | -1.79 | 448.17 | 2.10 | -84.10 | -1.81 |
| Côe d'Ivoire | 385.50 | 0.24 | 972.45 | 13.14 | -385.50 | -0.24 | -214.81 | 1.44 | -344.45 | 0.06 | -385.50 | -0.24 |
| Czech Republic | 211.52 | 0.04 | -211.52 | -0.04 | -211.52 | -0.04 | -210.71 | -0.03 | | | | |
| Ecuador | 180.88 | 0.44 | -180.88 | -0.44 | -180.88 | -0.44 | -152.43 | -0.16 | 95.02 | 1.59 | -180.88 | -0.44 |
| Egypt. | 1779.37 | 1.33 | -1779.37 | -1.33 | -1779.37 | -1.33 | -1356.70 | 2.83 | -1653.32 | -0.40 | -1779.37 | -1.33 |
| Estonia | 105.22 | 2.75 | -105.22 | -2.75 | -105.22 | -2.75 | -104.41 | -2.74 | | | | |
| Ethiopia | 561.53 | 10.80 | 1412.96 | 8.65 | 1140.49 | 5.97 | 2429.64 | 18.67 | -521.36 | -10.51 | -561.53 | -10.80 |
| Guatemala | 239.66 | 13.34 | -239.66 | -13.34 | 1732.46 | 6.09 | -174.63 | -12.70 | -119.69 | -12.46 | -239.66 | -13.34 |
| Guinea | 199.73 | 0.07 | -199.73 | -0.07 | -98.08 | 0.93 | 3.47 | 1.93 | | | | |
| Guinea-Bissau | 87.98 | 0.40 | 1236.87 | 12.65 | 1392.21 | 14.18 | 521.63 | 5.61 | | | | |
| Honduras | 511.59 | 11.80 | 2301.14 | 15.91 | 3266.03 | 25.42 | -487.21 | -11.56 | -483.22 | -11.59 | -511.59 | -11.80 |
| Hungary | 312.44 | 0.21 | -312.44 | -0.21 | -312.44 | -0.21 | -311.63 | -0.20 | | | | |
| India | 1587.61 | 7.40 | -1509.23 | -6.63 | -1521.53 | -6.75 | 10238.89 | 109.11 | | | | |
| Indonesia | 1986.33 | 0.87 | -1986.33 | -0.87 | -1986.33 | -0.87 | 1183.66 | 30.36 | 3197.79 | 37.18 | -1986.33 | -0.87 |
| Jamaica | 144.31 | 1.22 | -144.31 | -1.22 | -144.31 | -1.22 | -140.25 | -1.18 | -141.22 | -1.20 | -144.31 | -1.22 |
| Jordan | 574.23 | 0.13 | -574.23 | -0.13 | -574.23 | -0.13 | -566.10 | -0.05 | | | | |
| Kazakhstan* | 302.80 | 0.86 | -302.80 | -0.86 | -302.80 | -0.86 | -270.29 | -0.54 | | | | |
| Kenya | 784.33 | 28.05 | 268.83 | -17.67 | 456.53 | -15.83 | -577.06 | -26.01 | -726.45 | -27.63 | -784.33 | -28.05 |
| Korea | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.03 | 0.02 | 9086.48 | 89.52 | 10561.67 | 77.52 |
| Kyrgyz Rep. | 276.05 | 0.82 | 2372.20 | 25.27 | 597.82 | 7.79 | -259.79 | -0.66 | | | | |
| Lesotho | 38.46 | 0.07 | 3094.54 | 30.80 | 3556.22 | 35.34 | -18.14 | 0.13 | | | | |

Table 2 continues

Table 2 (continued)
Differences between prescribed and actual allocations

| | Actual ODA or OA commitments 2000 | | Prescribed ODA or OA commitments | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Collier & Dollar | | | | McGillivray & White | | Llavador & Roemer | | | |
| | | | Headcount US$2 | | Headcount US$1 | | | | Equal opportunity | | Utilitarian | |
| | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA | Total ODA | Swedish ODA |
| Lithuania | 237.46 | 19.96 | -237.46 | -19.96 | -237.46 | -19.96 | -236.65 | -19.95 | | | | |
| Madagascar | 383.80 | 0.22 | 745.68 | 10.91 | 817.60 | 11.62 | -83.06 | 2.74 | -360.64 | -0.05 | -383.80 | -0.22 |
| Malaysia | 1189.92 | 0.00 | -1189.92 | 0.00 | -1189.92 | 0.00 | -1173.66 | 0.16 | -3.19 | 8.71 | -1189.92 | 0.00 |
| Mauritania | 240.09 | 0.21 | 1383.26 | 15.78 | 1242.17 | 14.39 | -158.81 | 0.59 | | | | |
| Mexico | 369.30 | 0.15 | -369.30 | -0.15 | -369.30 | -0.15 | -275.83 | 0.77 | 2264.89 | 19.18 | -369.30 | -0.15 |
| Moldova | 111.18 | 2.67 | -111.18 | -2.67 | -111.18 | -2.67 | 132.67 | -0.27 | | | | |
| Morocco | 693.12 | 0.00 | -693.12 | 0.00 | -693.12 | 0.00 | -690.68 | 0.02 | -316.26 | 2.77 | -693.12 | 0.00 |
| Nepal | 402.05 | 0.93 | 492.80 | 7.89 | 602.80 | 8.97 | 154.73 | 4.56 | | | | |
| Nicaragua | 455.21 | 27.70 | 1539.18 | -8.05 | 2318.17 | -0.38 | -430.83 | -27.46 | | | | |
| Niger | 304.37 | 0.07 | 808.77 | 10.90 | 810.84 | 10.92 | 102.04 | 3.93 | -295.90 | -0.01 | -304.37 | -0.07 |
| Nigeria | 311.14 | 0.78 | 287.21 | 5.11 | 318.87 | 5.43 | 2659.71 | 28.49 | -9.64 | 1.43 | -311.14 | -0.78 |
| Pakistan | 1188.07 | 1.15 | 458.53 | 15.07 | -1188.07 | -1.15 | 2079.46 | 31.04 | -768.57 | 1.93 | -1188.07 | -1.15 |
| Panama | 42.46 | 0.00 | -42.46 | 0.00 | -42.46 | 0.00 | -40.43 | 0.02 | | | | |
| Philippines | 1079.15 | 1.71 | -1079.15 | -1.71 | -1079.15 | -1.71 | -875.95 | 0.29 | -406.57 | 3.23 | -1079.15 | -1.71 |
| Poland | 1606.05 | 1.08 | -1606.05 | -1.08 | -1606.05 | -1.08 | -1603.61 | -1.06 | | | | |
| Romania | 966.08 | 0.00 | -966.08 | 0.00 | -966.08 | 0.00 | -945.76 | 0.20 | | | | |
| Russia | 1550.12 | 22.14 | -1550.12 | -22.14 | -1550.12 | -22.14 | -1184.35 | -18.54 | | | | |
| Rwanda | 385.11 | 9.83 | 1131.00 | 5.11 | 991.03 | 3.73 | -153.46 | -7.55 | | | | |
| Senegal | 560.83 | 0.18 | 1667.23 | 21.77 | 2024.43 | 25.29 | -390.14 | 1.50 | -538.93 | -0.02 | -560.83 | -0.18 |
| Slovak Republic | 147.25 | 0.09 | -147.25 | -0.09 | -147.25 | -0.09 | -146.03 | -0.08 | | | | |
| South Africa | 430.64 | 13.61 | -430.64 | -13.61 | -430.64 | -13.61 | -394.06 | -13.25 | | | | |
| Sri Lanka | 467.98 | 26.39 | -467.98 | -26.39 | -467.98 | -26.39 | -431.40 | -26.03 | -253.27 | -24.81 | -467.98 | -26.39 |
| Tanzania | 1401.90 | 47.08 | -378.57 | -37.00 | -960.66 | -42.73 | -365.56 | -36.87 | -1401.90 | -47.08 | -1401.90 | -47.08 |
| Thailand | 1106.50 | 3.42 | -1106.50 | -3.42 | -1106.50 | -3.42 | -935.81 | -1.74 | 1859.95 | 18.35 | 5961.38 | 48.46 |
| Tunisia | 578.24 | 0.38 | -578.24 | -0.38 | -578.24 | -0.38 | -561.98 | -0.22 | -372.79 | 1.13 | -578.24 | -0.38 |
| Turkmenistan | 20.31 | 0.00 | -20.31 | 0.00 | -20.31 | 0.00 | -12.18 | 0.08 | | | | |
| Uganda | 848.19 | 31.35 | 2852.59 | 5.11 | 2624.16 | 2.86 | -226.38 | -25.22 | | | | |
| Venezuela | 114.84 | 0.65 | -114.84 | -0.65 | -114.84 | -0.65 | -94.52 | -0.45 | 579.02 | 4.44 | -114.84 | -0.65 |
| Vietnam | 1776.42 | 18.52 | -35.72 | -1.37 | 1003.42 | 8.87 | 580.75 | 4.70 | | | | |
| Zambia | 881.18 | 7.14 | 1213.65 | 13.50 | 1134.56 | 12.72 | -759.26 | -5.94 | -881.18 | -7.14 | -881.18 | -7.14 |
| Zimbabwe | 156.08 | 7.01 | -156.08 | -7.01 | -156.08 | -7.01 | -123.57 | -6.69 | -136.30 | -6.86 | -156.08 | -7.01 |

Table 3
Correlation coefficient matrix

| | Collier & Dollar Headcount US$2 | Collier & Dollar Headcount US$1 | McGillivray & White | Llavador & Roemer Equal opportunity | Llavador & Roemer Utilitarian |
|---|---|---|---|---|---|
| Collier & Dollar Headcount US$2 | 1 | | | | |
| Collier & Dollar Headcount US$1 | 0.87 | 1 | | | |
| McGillivray & White | 0.04 | 0.002 | 1 | | |
| Llavador & Roemer Equal opportunity | 0.01 | 0.03 | 0.42 | 1 | |
| Llavador & Roemer Utilitarian | 0.3 | 0.34 | 0.07 | 0.25 | 1 |

Table 4
Performance index values

| | HDI | GDP per capita, US$PPP | Poverty headcount US$1 | Poverty headcount US$2 |
|---|---|---|---|---|
| Collier & Dollar Headcount US$2 | 3.27 | 5.22 | 99.29 | 99.17 |
| Collier & Dollar Headcount US$1 | 2.57 | 4.31 | 99.69 | 99.39 |
| McGillivray & White | 44.78 | 46.4 | 89.98 | 86.75 |
| Llavador & Roemer Equal opportunity | 6.54 | 4.86 | 81.25 | 62.78 |
| Llavador & Roemer Utilitarian | 3.59 | 1.24 | 65.11 | 37.95 |
| Total ODA | 17.17 | 15.57 | 87.75 | 91.44 |
| Swedish ODA | 6.78 | 8.2 | 91.2 | 95.84 |