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The Income Lever and the Allocation of Aid

LIDIA CERIANI & PAOLO VERME
The World Bank, Washington DC, USA

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ABSTRACT *The article develops a concept and a measure of the monetary capacity of a country to reduce its own poverty and shows how these tools can be used to guide budget allocations or the allocation of aid. The authors call this concept the income lever. Making use of tax and distributive theory, the article shows how different redistributive criteria correspond to the different normative criteria of the income lever. It then constructs various income lever indexes based on these criteria and uses such indexes to rank countries according to their own capacity to reduce poverty.*

1. Introduction

In many emerging economies today GDP growth turned into rapid accumulation of wealth, and it is not uncommon to see such wealth coexists with widespread poverty. India and China are two evident examples of this phenomenon, but other countries such as Brazil or South Africa also exhibit high levels of both wealth and poverty. Because of the new wealth and despite these high levels of domestic poverty, new geopolitical aspirations often induce these same countries to become aid donors and finance multilateral institutions as well as bilateral aid agencies as an extension to their traditional foreign policy instruments.

This new global phenomenon also raises a new challenge for rich countries. While emerging economies continue to be aid recipients because of the high levels of internal poverty, they are also endowed with increasing internal financial resources that are partly used to fight poverty abroad. Moreover, these new financial resources also coexist with emerging tax systems that have still large margins for improvements from an equity and distributional perspective. Moreover, in the light of the consequences of the recent global financial crisis, this new phenomenon has induced rich countries to reconsider the geography of aid and to call for more responsibility on the part of aid recipients to contribute in the fight of their own poverty.

Standard indicators used to rank countries for the purpose of aid allocation such as the poverty rate or GDP per capita are inadequate to capture the capacity of countries to fight their own poverty. The poverty rate focuses on the poor ignoring welfare above the poverty line, while GDP per capita is an average national accounts measure that does not necessarily reflect average income received by households. In many countries, and especially in the short-term, GDP growth does not trickle down to households, and one can observe at times a substantial gap between GDP growth and household income growth (especially in resource rich countries). GDP growth does not provide any information on the distribution of welfare, and neither the poverty rate nor GDP growth are able to capture the relation between income needs and income resources in a given country.

Correspondence Address: Paolo Verme, The World Bank, 1818 H St NW, 20433 Washington DC, USA.
Email: pverme@worldbank.org

The purpose of this article is to develop a measure of the monetary capacity of a country to reduce its own poverty, a concept that we call the 'income lever (IL)'. Two countries with identical poverty rates may exhibit very different income distributions above the poverty line, and this should matter for the allocation of aid, given that one country may have a lot more (taxable) income than the other country. Even if these two countries had identical GDP per capita, they may still have different distributions of incomes above the poverty line (for example, the same mean but different shapes), and this should have a consequence for the allocation of aid. The article proposes a class of income lever measures that can be used in conjunction with traditional welfare measures to rank countries and refine the allocation of aid. The article will also show the normative foundations of these measures and how they can be applied in the context of North–South transfers.

Similar measures have been proposed before by the literature. Kanbur and Mukherjee (2007) proposed a class of indexes to measure the poverty reduction failure (PRF) of countries based on the idea that poverty should be considered worse in countries where resources to fight poverty are greater. The authors characterise the PRF class of indexes using a set of desirable axioms, and find that the general formulation of the index can be expressed in terms of Foster–Greer–Thorbecke (FGT) poverty measures. Quiggin and Mahadevan (2010) propose to measure the resources available to fight poverty as the excess of incomes above the poverty line, and use the ratio between the poverty gap and these resources as a measure of the poverty burden of countries. As in our article, these two contributions consider the relation between the poverty gaps and the excess of incomes above the poverty line as a useful measure to assess the relative importance of poverty in different countries. Lind and Moene (2011) proposed a 'miser' index to capture the extent of 'poverty in the midst of wealth'. The index is an increasing function of poverty and of the distance between the average income of the poor and the average income of the entire society. Similarly to the previous two contributions, the miser index considers poverty in the light of existing wealth in a society, moving away from the idea that deprivation can be measured by looking at the deprived alone.

This article builds on and extends these ideas by providing a full set of indexes based on clear normative redistributive criteria that can be used efficiently for the purpose of aid allocation. We then test these indexes by ranking sub-Saharan countries for the purpose of aid allocation. We compare these rankings with the rankings provided by traditional measures, such as the poverty rate or GDP per capita, and with the actual distribution of aid funds to see which measure meets more closely the criteria used by donors in practice.

The findings indicate that the allocation of aid to sub-Saharan African countries does not seem to follow closely any of the rankings proposed. This suggests that the normative criteria for aid allocation to sub-Saharan countries are neither clear nor transparent, a finding largely consistent with the aid literature.

In the next section we review briefly the rationale for the allocation of aid, discussing guiding principles and empirical practices. Section 3 outlines the theoretical framework for the IL indexes proposed, while Section 4 describes a selection of indexes that respond to different normative criteria. Section 5 provides an application to sub-Saharan Africa (SSA) to illustrate the use of the indexes in the context of North–South transfers.

2. Principles and Practices behind the Allocation of Aid

The literature on the allocation of aid has polarised around two streams of literature: one that focuses on the discussion of what principles and criteria should be used to guide the allocation of aid (normative studies); and one that focuses on the reality of aid allocation trying to determine the criteria that are used by donors to allocate aid and the effectiveness of aid in achieving its objectives (positive studies). We briefly review these two strands of the literature in turn.

2.1 Normative Studies

Broadly speaking, aid allocation criteria include norms regarding effectiveness, equity and transparency (see, for example, Guillaumont 2008). Effectiveness relates to the capacity of aid to improve on target indicators such as poverty. Equity relates to the capacity of aid to treat equal countries equally, and transparency relates to the capacity to assess the equity and effectiveness of aid. Anderson and Waddington (2006) group contributions to the normative debate into three main allocation principles respectively based on poverty-efficiency, equal opportunity or structural indicators, roughly reflecting in this way the broader norms described.

The poverty-efficiency literature emphasises the importance of considering the poverty level in conjunction with the policy capacity of a country so as to maximise the poverty reduction capacity of aid at the global level, given a budget constraint. Collier and Dollar (2001, 2002), for example, promote a poverty-efficiency aid allocation criterion. Poverty being equal, aid should increase with the policy capacity of a country, because aid can have larger growth effect in a better policy environment. Similarly, the policy capacity being equal, aid should increase with the level of poverty because the growth-promoting effect of aid has more poverty reduction capacity in a very poor country. The poverty-efficiency position is supported by influential institutions such as the World Bank (Wolfensohn, Stern, Goldin, Rogers, & Karlsson, 2002) and the OECD (2003, 2006), although empirical evidence (Nunnenkamp & Thiele, 2006) suggests that the broader donors community rarely follows closely this criterion.

This position is also questioned by scholars arguing for transparency, who point out the necessity of predictable, or less volatile, flows of aid to individual countries (following Lensink and Morrissey 2000; see Bulir and Hamann 2003, 2006, Eifert and Gelb 2008 and Fielding and Mavrotas 2008). As the policy capacity of a country is hard to assess and also volatile, the poverty efficiency criteria would be difficult to implement and also subject to frequent changes. This speaks in favour of using standard statistics such as GDP per capita or poverty rates to rank countries and allocate aid so as to capture basic but well understood indicators. Guillaumont (2008) argues that the poverty-efficiency position is not backed by evidence and that a structural vulnerability approach, whereby countries are considered based on their structural and exogenous constraints, would be preferable, which is an argument for allocating more aid to the LDCs.

A different stream of the literature (Cogneau & Naudet, 2007; Llavador & Roemer, 2001) focuses instead on equal opportunities. These authors believe that the distribution of aid should equalise *opportunities* among recipient countries for achieving growth, controlling for the *effort* undertaken to turn aid into economic growth. This is based on the inequality of opportunities approach, where one should distinguish between circumstances and efforts and try to give a premium to efforts. This approach emphasises the role of equity and became very popular with the steady growth of the inequalities of opportunities literature over the past decade. However, the measurement of inequalities of opportunities mostly relies on household survey data and remains difficult to operationalise for the purpose of aid allocation.

For the sake of transparency and in order to comply with specific normative criteria, some organisations have tried to translate guiding principles into formulae used to rank countries for the purpose of the allocation of aid. The World Bank uses a performance-based allocation (PBA) formula including indicators such as GNI per capita, population size and a measure of the country performance. UNICEF uses a formula that includes the size of the child population and the under-five mortality rate. The European Commission (EC) uses several different formulae combined with various normative criteria to allocate aid funds. These are examples of attempts to operationalise normative criteria, but, in the overall panorama of aid, these criteria remain diverse and organisation specific.

2.2 Positive Studies

The empirical literature on aid allocation has tried to answer the question of what are the actual determinants and motivations of aid flows. Baulch (2003) analyses the distribution of international

development assistance using aid concentration curves. He finds that among the six most generous bilateral donors (United States, Japan, Germany, the United Kingdom, France and the Netherlands), only the United Kingdom and the Netherlands devolve the largest part of their aid budget to assistance to the poorest countries, while the other countries give large proportions of their aid budgets to relatively well-off middle income countries. Wealthy Arab countries tend to provide aid to less wealthy but middle-income Arab countries based on solidarity and cultural principles (Neumayer, 2003). The same bias is found in the analysis of the three main institutions providing multilateral development aid. The World Bank and other UN organisations show different degree of progressivity in aid allocation, while the European Union directs aid to middle-income countries where poor individuals account for the minor share of the world's absolute poor. Alesina and Dollar (2000) also find that donor countries are inspired more by their political-strategic interests rather than by the extent of poverty, or the institutional and political environment of recipients. One exception may be the allocation of food aid, which seems more closely related to the effective needs of countries (Neumayer, 2005).

Chauvet (2002) investigates how elite, violent and social instabilities influence aid allocation by donors. The author finds that the three different forms of socio-political instabilities have a different impact according to the type of aid (bilateral or multilateral) and the type of recipient countries (middle-income non-oil-exporting countries, low-income countries and oil-exporting countries). A more recent contribution by Dreher, Nunnenkamp, and Thiele (2011) focuses on the difference in bilateral aid allocation patterns between new donors not members of the Development Assistance Committee (DAC) of the OECD and DAC members. Their findings indicate that both types of donors share the same shortfalls by not taking into account bad policy behaviours of recipient countries and by being influenced by commercial interest. According to Koch, Dreher, Nunnenkamp, and Thiele (2009), economic interests do not influence non-governmental organisations (NGOs), although NGOs seem affected by the geographical choices of the donor countries in which the NGOs are based, by the presence of other NGOs in the recipient countries and by sharing the same religion with the recipient country.[1]

This brief overview of the normative and positive criteria used for aid allocation shows that there is still a substantial wedge between these two camps, that good intentions often clash with practical strategic interests and that the underlying normative criteria guiding aid are not always transparent or clear. For example, while poverty reduction has increased in importance among the overarching development priorities of bilateral and multilateral institutions, the actual allocation of aid responds to a multitude of objectives that is hard to reconcile with a clear normative intention.

The overview has also shown that neither the normative nor the positive literature discussed pay any attention to the question of capacity to fight their own poverty and whether this capacity should be considered for the allocation of aid. In the light of the increasing budget pressure faced by donors, this seems an important gap in the literature. The IL methodology that we propose combines poverty, inequality and wealth measurement in indexes that are equitable and based on clear and transparent normative criteria. These indexes can help improve the policy capacities of countries by highlighting the potential for redistributive policies, comply to equity principles by allocating aid according to the monetary capacity of a country to address its own poverty, and are transparent in that they respond to principles well established in the tax and distribution theory literature. Therefore, these are indexes that can be used ex-ante for the decision to allocate aid or ex-post to assess the underlying principles that has guided de facto a particular distribution of aid.

3. Framework

Let N be a population made of $i = 1, 2, \ldots, n$ individuals, $n \in \mathbb{N}$. Each i-th individual has an income level $y_i \in \mathbb{R}_+$, and let the poverty line be set at level z_N. Without loss of generality, let us assume that $y_1 \leq y_2 \leq \ldots y_i \leq \ldots \leq y_n$. The set of poor individuals in society N, Q_N^p, is defined as the set of individuals whose income falls below the poverty line: $Q_N^p = \{i \in \mathbb{N} : y_i < z_N\}$.

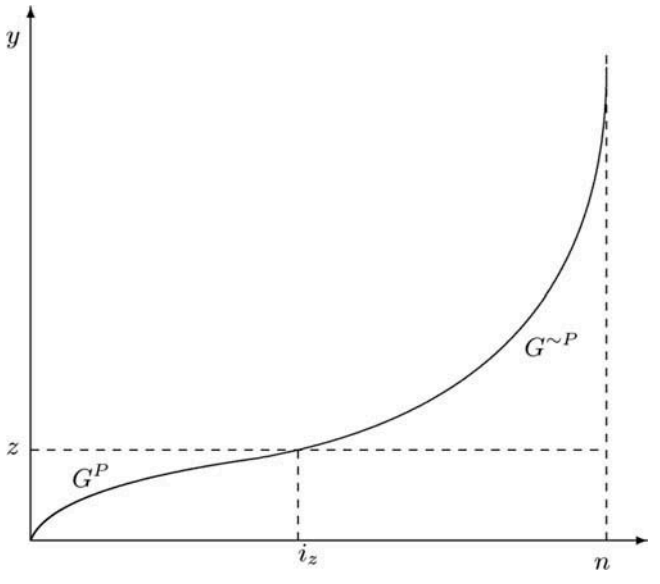

Figure 1. Poverty and excess-poverty gaps.

Symmetrically, the set of non-poor individuals in society is defined as the set of individuals whose income is greater or equal than the poverty line: $Q_N^{\sim P} = \{i \in \mathbb{N} : y_i \geq z_N\}$. To eradicate poverty, we should fill the gap between each poor individual's income and the poverty line. The total amount of income to eradicate poverty is therefore given by the sum of poverty gaps, defined as:

$$G_N^P = \sum\nolimits_{i \in Q_N^P} (z_N - y_i) \tag{1}$$

On the other hand, incomes in excess of the poverty line can be quantified by the sum of all the wealth gaps, defined as follows:

$$G_N^{\sim P} = \sum\nolimits_{i \in Q_N^{\sim P}} (y_i - z_N) \tag{2}$$

This quantity can be considered as the upper-bound budget for any redistributive policy aiming at keeping above (or at) the poverty line all non-poor individuals.

Figure 1 shows a simple illustration of the poverty and wealth gaps. On the x axis we plotted individuals ordered by income levels, and on the y axis we plotted income.[2] The poverty line z divides the poverty gap region from the wealth gap region so that the figure provides a first visual indication of the relative proportions of these two areas. The point i_z denotes the individual at the poverty line.

4. Alternative Income Lever Indexes

4.1 Proportional IL

As a first and simple index, we define the income lever as a measure of the relative proportions between the poverty gap and the wealth gap as follows:

$$IL_N^{prop} = \frac{G_N^P}{G_N^{\sim P}} \tag{3}$$

The index described in Equation (3) is increasing in the sum of poverty gaps, decreasing in the sum of wealth gaps, and it is scale invariant, which are all reasonable properties.[3] Moreover, it has a straightforward distributional implication. It can be considered as the proportional tax-rate α that has to be levied on the incomes of each non-poor individual to defeat poverty:

$$\sum_{i \in Q_N^{\sim P}} \alpha(y_i - z_N) = \sum_{i \in Q_N^P} (z_N - y_i) \tag{4}$$

Solving for α:

$$\alpha = \frac{\sum_{i \in Q_N^P} (z_N - y_i)}{\sum_{i \in Q_N^{\sim P}} (y_i - z_N)} = \frac{G_N^P}{G_N^{\sim P}} = IL_N^{prop} \tag{5}$$

If $G_N^P \leq G_N^{\sim P}$, then $\alpha \in [0, 1]$, whereas if $G_N^P > G_N^{\sim P}$, then $\alpha > 1$. Note that this interpretation of the index reveals the normative statement embedded in the index IL_N^{prop}: each non-poor individual should contribute to poverty reduction equally and in a proportional way to her wealth gap. This is a choice that a country could make and a normative statement. Note that we are not arguing here that this tax policy is better or worse than others. We are simply saying that some countries could find it 'fair' to tax their non-poor population proportionally to their wealth gap. Conversely, donors that would opt to use IL_N^{prop} as a means to rank countries for the distribution of aid would implicitly consider as *fair* this tax policy. That is because, as shown above, IL_N^{prop} implies a particular idea of tax policy. This particular choice may appeal to donors that provide aid to countries characterised by very unequal distributions of incomes above the poverty line and that are in favour of proportional tax systems. The tax policy implied by IL_N^{prop} would comply with proportionality principles while preserving rank and reducing income inequality above the poverty line.

As an example, imagine two populations, A and B, where $n = 5$, with the following income distributions sorted in ascending order of income: $A = (2, 5, 6, 15, 17)$; $B = (2, 5, 6, 9, 13)$; and let $z_A = z_B = 6$. It is evident that the two populations are equal in terms of poverty, given that standard poverty measures are subject to the focus axiom. However, from the perspective of the income lever as defined in Equation (3), the two populations have a different capacity to reduce poverty. Indeed, $IL_A = \frac{5}{20}$ is smaller than $IL_B = \frac{5}{10}$, which places society A in a better position than society B when it comes to poverty reduction, simply because society A can rely on a larger wealth gap than society B. We can therefore make an ordinal ranking of the two societies based on the income lever.

4.2 Absolute IL

We can now imagine that all people who can afford a transfer without falling into poverty contribute equally, in absolute terms, to poverty eradication. In other words, we want to find the lump sum transfer l_N that each non-poor individual in society N should provide to contribute to the eradication of poverty:

$$l_N || Q_N^{\sim P,l} || = G_N^P \tag{6}$$

where $Q_N^{\sim P,l}$ is the set of non-poor individuals who can bear the cost of the transfer and it is defined as:

$$Q_N^{\sim P,l} = \left\{ i \in Q_N^{\sim P} : (y_i - l_N) \geq z_N \right\} \tag{7}$$

Note that the set of non-poor individuals $Q_N^{\sim P,l}$ is endogenously defined, as it depends upon the magnitude of the sum of poverty gaps, the number of non-poor individuals and the distribution of incomes above the poverty line.

The level of l_N is equivalent to the average poverty gap to be levied on non-poor individuals who can bear the cost without crossing the poverty line, and it is a good measure of income lever because the smaller the lump sum, the lighter the income lever. In other words, the weight needed to lift all poor individuals out of poverty is small. Therefore, we define l_N as our second income lever index:

$$IL_N^{abs} = l_N = \frac{G_N^P}{Q_N^{\sim P,l}} \tag{8}$$

Consider, for instance, two societies A and B, where the distributions of incomes are $A = (2, 5, 6, 9, 13)$ and $B = (2, 5, 6, 7, 15)$. Let the poverty line $z = 6$. Using IL^{prop}, the two societies have the same income lever: $IL_A^{prop} = IL_B^{prop} = 0.5$. However, by using IL^{abs}, we find that $IL_A^{abs} = 2.5$ while $IL_B^{abs} = 5$. We then find that society B's effort to reduce poverty is higher than society A's, and therefore the income lever of society B is higher than the income lever of society A. In this case, donors may want to provide more resources to country B on the ground that this country has less resources on its own to fight poverty.

Note that this second scheme forces the definition of a *no-tax area*, a group of non-poor individuals who are not considered responsible for the eradication of poverty. The dimension of this no-tax area is positively correlated with the dimension of the sum of poverty gaps and the inequality of the distribution of income among non-poor individuals, and negatively correlated with the number of non-poor individuals. Above the no-tax area, instead, each individual should transfer the same fixed amount.

Figure 2 illustrates this new concept using the same coordinates as in Figure 1. All non-poor individuals are – in principle – called to contribute to the poverty eradication effort in equal amounts. However, to make sure that some of the non-poor will not fall into poverty as a consequence of the lump-sum tax, a no-tax area is derived based on the underlying distribution of incomes so that all individuals above the no-tax areas will be able to afford the lump-sum tax without falling below the poverty line.

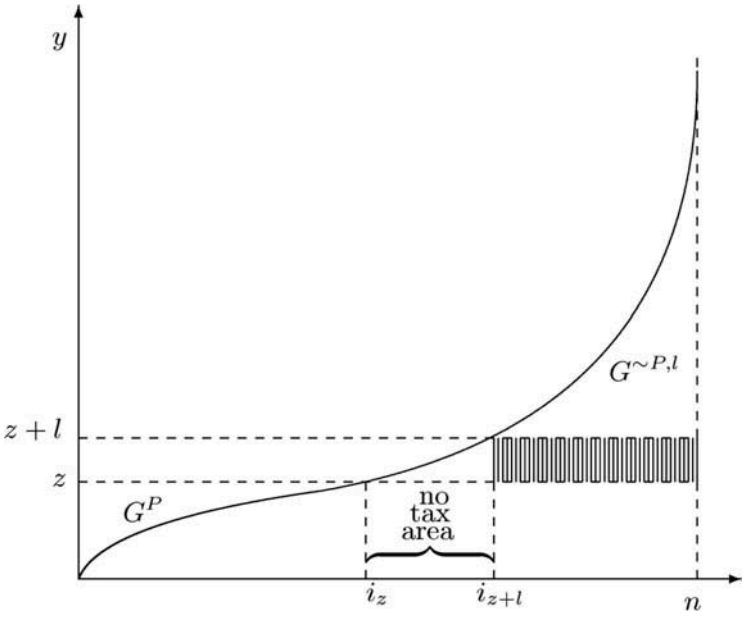

Figure 2. Lump-sum.

Note that a lump-sum tax is a regressive tax. Let us define $\bar{l}_i$ as the average transfer levied on the i-th non-poor individual:

$$\bar{l}_i = \frac{l_N}{y_i} \tag{9}$$

Then, it is straightforward to show that $\bar{f}_i$ is decreasing with incomes:

$$\frac{dl_N}{dy_i} = -\frac{l_N}{{y_i}^2} \leq 0 \tag{10}$$

Therefore, any ordering between countries based on Equation (7) relies implicitly on a regressive redistribution hypothesis: the marginal tax rate to be levied on non-poor individuals is decreasing with the wealth gaps. This is again a normative choice that the social planner is called to make.

IL_N^{abs} is not rank preserving,[4] it is regressive. This makes this index not particularly appealing for countries that have a preference for progressive and inequality reducing systems. However, at times, donors' countries themselves have resorted to lump-sum taxation. Two notorious examples are the UK council tax and the lump-sum levy applied to all bank accounts by the Italian government to meet the criteria for entering the euro at the end of the 1990s. The obvious advantage of such tax is that it is simple and quick to apply. Hence, we cannot exclude a priori that some donors may want to choose IL_N^{abs} as a means to rank countries for the purpose of aid allocation.

4.3 Marginal IL

The proportional IL measure defined in Equation (3) may be interpreted as the *average* tax rate to be levied on the sum of wealth gaps, therefore underlying a *proportional* redistribution scheme. The absolute IL measure defined in Equation (7) instead may be interpreted as the *lump-sum tax* to be levied on non-poor individuals, therefore underlying a *regressive* redistribution scheme. A different set of income lever measures can be defined starting from a *progressive* idea of redistributive scheme.

We can imagine that not all the individuals above the poverty line are to be considered responsible for transferring income to poor individuals, but just the *rich* individuals. We can define as *rich* the subset of non-poor individuals whose income is higher than a threshold r, the *richness line*.

Let $Q_N^{\sim P,r}$ be the set of all individuals whose income lies above r:

$$Q_N^{\sim P,r} = (i : y_i \geq r), \tag{11}$$

and let $G_N^{\sim P,r}$ be the sum of *richness* gaps g_i^r:

$$G_N^{\sim P,r} = \sum\nolimits_{i \in Q_N^{\sim P,r}} g_i^r = \sum\nolimits_{i \in Q_N^{\sim P,r}} (y_i - r) \tag{12}$$

The richness line can be determined in different ways, and the discussion about the topic is broad and largely beyond the scope of this article. Medeiros (2006) and Eisenhauer (2011), for example, define the richness line as a function of the poverty line. Other scholars define the richness line as a function of the median income (Brzezinski, 2010; Peichl, Schaefer, & Scheicher, 2010), while Peichl and Pestel (2011) define the richness threshold as the 80th percentile. The richness line may be found also endogenously, by levelling the income distribution from the top of the income scale until the point where enough revenues are collected to fill the poverty gap (Medeiros, 2006). Once the richness line is defined, then the income lever becomes:

$$IL_N^{marg} = \frac{G_N^P}{G_N^{\sim P,r}} \tag{13}$$

Note that IL_N^{marg} has a twofold interpretation. First, it may be seen as the proportional tax rate δ to be applied on all wealth gaps above a no-tax area defined by the richness line. Second, it may be interpreted as the marginal tax rate on the bracket of wealth gaps larger than r, the first bracket $(0 - r)$ being taxed with a marginal tax rate equal to zero. Differently from IL_N^{abs}, this new measure implies a progressive transfer scheme. For each non-poor individual exceeding the no-tax area, the average transfer $\bar{t}$ is increasing in incomes of non-poor individuals:

$$\frac{d\bar{t}}{dy_i} = \frac{d\left[\frac{\delta(y_i - r)}{y_i}\right]}{dy_i} = \frac{\delta r}{{y_i}^2} > 0 \tag{14}$$

Consider the two societies A and B with incomes $A = (3, 5, 6, 8, 9, 12, 15)$ and $B = (3, 5, 6, 7, 11, 13, 13)$. Let the poverty line be $z = 6$ and the richness line be $r = 8$. The two societies have the same proportional income lever, with $IL_A^{prop} = IL_B^{prop} = 0.2$. They also have the same absolute income lever as measured by $IL_A^{abs} = IL_B^{abs} = 0.05$. However, the two societies would appear different, with a progressive income lever scheme, since $IL_A^{marg} = \frac{4}{12} IL_B^{marg} = \frac{4}{13}$.

The progressive scheme described can be visualised in Figure 3 using the same axes as in Figures 1 and 2. As in Figure 2, we have a no-tax area, but unlike Figure 2 the no-tax area is defined by the choice of the richness line. In this case, it is the social planner who defines the richness line and the group of people thought to be liable for poverty reduction.

$\mathrm{IL}_\mathrm{N}^{\mathrm{marg}}$ may be appealing to donors who provide aid to countries where the distribution of income is very narrow, with a large part of the distribution located around the poverty line. This is a rather common phenomenon in very poor countries. In this case, the non-poor located close to the poverty line would easily fall below the poverty line if taxed, which would defeat the purpose of aid allocation.

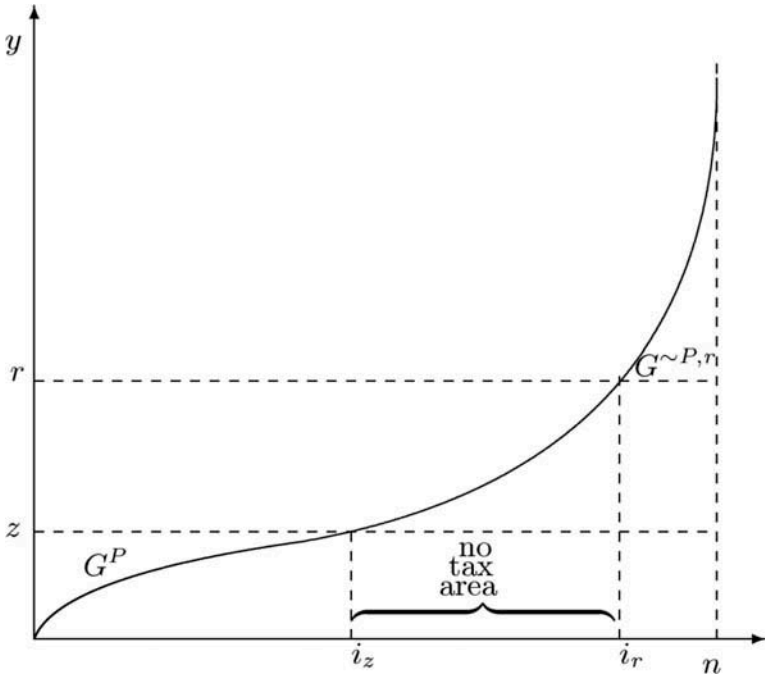

Figure 3. Progressive transfer.

Establishing a richness line as lower bound for taxation could address this problem, particularly if the richness line is determined endogenously using the actual distribution of incomes. This index should also be appealing to donors who have a preference for progressive tax systems, which is the majority of wealthy countries.

5. Empirical Illustration

As an illustration of the indexes developed in the previous section, we present here the results of the analysis for a sample of sub-Saharan African countries (Benin, Cote d'Ivoire, Cameroon, Ethiopia, Mali, Mauritania, Uganda and South Africa). We present figures for GDP per capita, poverty rates and income lever indexes developed in the previous sections to compare how different measures can provide different rankings of countries.

Table 1 summarises poverty and income lever indexes together with the country ranks obtained by computing each index for eight African countries based on the Global Income Distribution Database (GIDD). This is a database constructed by the World Bank that homogenised a number of standard variables including income and consumption across household consumption surveys worldwide.[5] The welfare variable used is household-equivalent consumption at purchasing power parity (PPP) in USD where the equivalence scale is the square root of household size. To compute the indexes, we define as poverty line z the World Bank official poverty line of 1.25 USD/day PPP. Similarly to what we have done with the selection of European countries, we set the richness line $r = 2z/0.6 = 4.16$ USD/day PPP.

Note that Mali and Uganda have the same headcount index ($P^0 = 0.5$). Nevertheless, in Uganda a proportional income tax of 30 per cent should be levied on the non-poor to solve poverty, while in Mali the proportional tax rate would be higher: 38 per cent (see IL^{prop}). We can therefore conclude that poverty is more burdensome in Mali, where the contribution effort of non-poor individuals would be higher.

The income lever index IL^{abs} stands for the average transfer paid by all non-poor individuals who would remain non-poor after the tax. The higher this lump-sum tax, the higher the income lever. Note, for instance, that Benin has a poverty incidence of 0.45, which is slightly higher than Ethiopia (0.40). On the other hand, the lump-sum tax that would eliminate poverty in Benin is almost three times higher than the one in Ethiopia, as the income lever index IL^{prop} indicates: 23.23 USD in Benin against 8.31 USD in Ethiopia.

The income lever index IL^{marg} may be interpreted as the proportional tax rate that has to be levied on individuals above the richness line r. A value greater than 1, as it is the case for Benin, Ethiopia, Mali and Uganda, means that there is no possibility of a poverty-solving redistribution by targeting individuals above r. On the other hand, even if Cote d'Ivoire and South Africa have the same poverty headcount ($P^0 = 0.25$), South Africa has a higher poverty reduction power than Cote d'Ivoire, since it

Table 1. Poverty and income lever indexes and ranks (1=higher to 8=lower) for a selection of African countries

	GDP_{pc}		P^0		IL^{prop}		IL^{abs}		IL^{marg}	
	Dollars	rank	index	rank	index	rank	index	rank	index	rank
Benin (2003)	1,287	4	0.45	3	0.315	2	23.13	3	2.319	3
Cote d'Ivoire (2002)	1,774	6	0.25	6	0.045	6	3.39	7	0.119	7
Cameroon (2001)	1,857	7	0.35	5	0.089	5	6.00	5	0.267	5
Ethiopia (2000)	524	1	0.40	4	0.235	4	8.31	4	4.599	1
Mali (2001)	910	3	0.50	1	0.376	1	28.42	2	3.070	2
Mauritania (2000)	1,728	5	0.20	8	0.043	7	2.97	8	0.150	6
Uganda (2002)	826	2	0.50	1	0.295	3	34.01	1	1.094	4
South Africa (2000)	7,641	8	0.25	6	0.030	8	4.88	6	0.046	8

Source: Our elaboration on Global Income Distribution Database (GIDD) and WB opendata for GDP per capita.

Table 2. Net ODA received, average 2000–2003, constant 2011 prices

	Million US$	Rank	% GNI	Rank	US$ per capita	Rank
Benin	410	1	9.77	5	35.6	6
Cameroon	920	6	4.33	7	34.8	5
Cote d'Ivoire	770	4	5.54	6	28.0	3
Ethiopia	1,800	8	14.67	2	17.0	2
Mali	640	3	13.33	4	37.6	7
Mauritania	450	2	20.17	1	99.5	8
South Africa	810	5	14.09	3	11.5	1
Uganda	1,300	7	0.4	8	33.3	4

Source: Our elaboration on WB opendata.

is sufficient to levy a proportional tax rate of less than 5 per cent to eradicate poverty versus a proportional tax rate of 12 per cent needed in Cote d'Ivoire (see IL^{marg} in Table 1).

As a final exercise, one may want to ask the question of whether the IL indexes proposed proxy any of the criteria currently used to allocate aid. In Table 2, we show the distribution of aid in terms of US dollars, percentage of gross national income (GNI) and US dollars per capita. As we have seen for the EU countries, using different criteria implies a different ranking of countries. For example, Mauritania is the first aid recipient in terms of percentage of GNI but the last in terms of US dollars per capita. It is also quite difficult to reconcile an IL index with the actual distribution of aid, whatever criteria one wants to use for ranking the distribution of aid. Therefore, we can conclude that aid allocation in the selected African countries does not follow any particular normative or positive criteria that can be attributed to GDP, poverty or any of the ethical criteria associated with the IL measures. In this case, the IL indexes help to reveal the lack of a clear ethical rationale.

6. Conclusion

In a global scenario where rich countries are facing increasing budget constraints, the debate on the optimal allocation of aid has become more important than ever. Exploiting new opportunities offered by the widespread availability of micro data, the article has developed a concept and a measure of the monetary capacity of a country to reduce its own poverty defined as the income lever (IL). We constructed various income lever indexes based on different distributive criteria and used such indexes to rank countries according to their own monetary poverty reduction capacity. As shown in the empirical application, this methodology can provide an efficient, equitable and transparent tool to rank countries or regions when it comes to aid allocations from rich to poor countries (North–South transfers).

The article has shown that different choices of income lever indexes imply different normative choices in terms of the donors' preferences for different tax policies. Each of the IL indexes presented has a plausible underlying choice of tax policy, and we provided some arguments for each index that would explain why governments may want to choose one option over another. It was also shown in the applied part that certain indexes are closer to the reality of aid allocation than others. Note that we did not want to prove that our indexes are better than others in capturing how aid is distributed. Rather, we wanted to show that the IL indexes can be used ex-ante as possible criteria to allocate aid according to different ethical views, or ex-post to reveal the implicit ethical choice made by donors when aid is distributed.

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Notes

1. For a recent analysis of aid effectiveness, see Mekasha and Tarp (2013).
2. In order to have a tractable visualisation, Figure 1 (and all the subsequent figures) is an oversimplified version of a true income distribution: first, we assume that no one has negative incomes; and second, that the richest individuals in the society are not too affluent.
3. See Quiggin and Mahadevan (2010) for a characterisation of this index.
4. In order to avoid the re-ranking of individuals above the poverty line, one possible alternative would be to move from a no-tax-area to a partial-tax area: anyone above the poverty line who cannot pay the full tax pays what they can so as to lower them to the poverty line, and the remaining contributions are collected from those who can afford it.
5. For a full description of the data, see Ackah, Bussolo, Hoynos, and Medvedev (2008).

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