

Should a Poverty-Averse Donor Always Increase the Share of Governance-Improving Countries?

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Abstract

In this paper we revisit the problem of inter-country aid allocation with a single donor and two recipient countries. The donor has a given amount of aid to distribute and is sensitive to both needs and governance considerations. Conventional wisdom, as articulated in a well-known paper of Collier and Dollar (2002), holds that when a country improves its governance, it should receive more aid for a given level of poverty. We challenge this view by showing that this conclusion is not necessarily warranted. If the donor has strong enough aversion to poverty, the aid share of a country whose governance has improved will be reduced, thereby punishing instead of rewarding that country for its better institutional environment. Yet, the aid that reaches the poor will have risen. In this framework, the allocation rules actually used by important international organizations appear as implicitly based on a preference pattern that privileges governance over need considerations.

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1 Introduction

A well-established fact is that countries most in need of external assistance tend to be the most badly governed (Collier, 2007, Chap. 5; Kanbur and Sumner, 2012). In other words, money is less effectively used when it flows to places where it is most necessary, thus creating a trade-off between needs and governance considerations. If the donor or transfer-maker is exclusively motivated by either governance or needs, the trade-off is ruled out and the optimal allocation is straightforward. The former position is illustrated by the “zero tolerance for corruption” approach, which has been adopted by some donors and organizations when massive frauds in using aid money were uncovered in some countries.¹ According to that view, aid to fragile states is extremely problematic (Temple, 2010: 4462-3). A representative of the latter position is Thirlwall (2011) for whom aid assistance should be distributed on a per capita basis according to some target level of per capita income. This principle “would operate rather like an international negative income tax” (p. 476). If, however, the donor wants to relieve poverty but is at the same time concerned that the available funds are used as effectively as possible, an interesting trade-off arises between needs and governance. In official programs of development cooperation, the problem is how to reconcile the objective of poverty alleviation, as reflected in the Millennium and then the Sustainable Development Goals (M/SDGs), for example, and the objective of aid effectiveness, as enshrined in the Paris Declaration and the Accra Agenda for Action.

The problem has wider relevance than may appear at first sight: it is not limited to poor countries and the so-called fragile states in the southern hemisphere

¹Thus, for example, the Global Fund against Aids, Tuberculosis and Malaria, one of the world’s biggest aid outfit which hands over all its money to national governments, has been confronted with the claim that up to two-thirds of some grants went astray, and that corruption using faked invoices, phoney training events and other abuses involved health ministries in some African countries on an “astonishing” scale. To the news, the executive director of the Global Fund reacted by asserting that the Fund has “zero tolerance for corruption” (The Economist, February 29th, 2012). Other examples of massive aid diversion in weak state countries are, unfortunately, frequently brought to light. For instance, a report in 2010 for the UN Security Council estimated that almost one-half of food aid to Somalia ended up in the hands of corrupt contractors, armed groups and even some local UN staff. In 2014, the Louis Berger Group, an engineering firm, pleaded guilty to charges of defrauding USAID, the US official aid agency, of billions of dollars by padding reconstruction contracts in Afghanistan, Iraq, and other countries over a period of 20 years (Economist, Nov. 25-Dec. 1, 2017: 59).

but may also exist in regard of poor areas of advanced countries (the mezzogiorno in Italy, or the Caucasus in Russia), poor countries of an advanced region (Greece, Bulgaria, and Romania in the European Union), or areas of a country (such as the United States) that fall victims of a natural disaster (Economist, Nov. 25-Dec. 1, 2017: 60). In all these cases, the poorer units tend to also be those where the quality of governance is lowest.

The first, and most influential paper to have explicitly addressed the issue of aid allocation in an effectiveness framework is the work of Collier and Dollar (2002). Up until then, the allocation process was considered as an aid selectivity issue from which the aspect of governance was totally absent (Dudley and Montmarquette, 1976). By contrast, Collier and Dollar looked at the allocation problem of a donor who must decide how to apportion a given volume of aid between several recipient countries which differ in terms of policy quality and poverty. In their setup, the quality of policies in each recipient country, which is equivalent to the quality of governance, is taken as given by the donor who maximizes poverty reduction. The central result of the model is at least *prima facie* according to intuition: holding the level of poverty constant, aid should increase with quality of policy and, holding policy quality constant, it should increase with poverty. The first statement implies that a country is always rewarded for a better institutional environment and, conversely, always punished for a worsened one.

Upon reflection, however, this conclusion is not as evident as may seem. There are actually two effects running in opposite directions. On the one hand, when governance improves in a country, the utility for the donor of a given amount of money transferred to that country increases, as more aid reaches the target beneficiaries. This should prompt the donor to transfer more money to it (a sort of substitution effect). Yet, on the other hand, as a consequence of the improved governance, the income level of the target beneficiaries has been raised and the extent of their needs correspondingly reduced. Some aid money gets «freed» for reallocation, and the donor may choose to redirect it toward the country whose governance has not improved (a sort of income effect). If the second effect outweighs the first, the donor will therefore reduce the amount of the transfer accruing to the country where the quality of governance has become higher. We may expect this case to arise if the marginal utility of the target beneficiaries'

income for the donor is very elastic, that is, if the donor has a strong poverty aversion. The intuition is thus that what appears as a solid result may hinge on some implicit assumption about the donor's aversion to poverty.

The present paper precisely aims at demonstrating the possibility of the counter-intuitive result according to which a country can be sanctioned for its improved governance or the higher quality of its institutions. This is done by providing a more general theoretical framework than the rather specific model used by Collier and Dollar (2002). We show that when the donor's poverty aversion is strong enough, the share of aid allocated to the country whose governance has improved will indeed be diminished rather than increased. Yet, we also show that, despite this, the aid reaching the target beneficiaries does increase.

The outline of the paper is as follows. In Section 2, we write a simple but rather general two-country model in which a single donor allocates a given amount of money between two recipient countries which differ in terms of both income and governance quality levels. We explore a benchmark case corresponding to a unitary poverty aversion coefficient: the elasticity of the marginal utility of the beneficiaries' income for the donor is equal to one. This exercise allows us to define the concept of "Need-Adjusted Aid Ineffectiveness" (NAAI) which is particularly appropriate to capture the trade-off between needs and governance at the heart of our endeavour. We obtain a number of clear-cut results, including the intuitive conclusion reached by Collier and Dollar (2002) regarding the effect of improved governance. In Section 3, we then move to the general model that allows for varying poverty aversion levels. When poverty aversion is strong enough, the expected effect of improved governance is reversed, although target beneficiaries keep receiving more. In Section 4, with the hindsight of knowledge acquired in the previous section, we examine the allocation rules officially used by prominent multilateral development agencies. We argue that these rules are implicitly based on preferences privileging quality of governance over intensity of needs, thus reflecting a low poverty aversion of the donors, or practical and political difficulties in making poverty considerations prevail. Section 5 concludes.

2 Aid allocation between two heterogeneous recipients: the benchmark

2.1 A general formulation of the problem

Let us consider the case of two beneficiary countries where the population targeted by aid have incomes of respectively w_1 and w_2 , and of sizes n_1 and n_2 . The donor, for instance a bilateral or multilateral development agency, has to allocate a given amount of aid, T , among the two countries. The quality of governance, that the donor can observe but not influence, is measured by the share of aid that effectively reaches the intended beneficiaries, Denoting by y_1 and y_2 , both in the $[0, 1]$ range, the shares embezzled, misappropriated or mismanaged by the elites of countries 1 and 2, the measures of quality governance are given by $1 - y_1$ and $1 - y_2$, respectively.

It must be clear that in all what follows the income variables w_1 and w_2 and demographic variables n_1 and n_2 refer to the beneficiaries targeted by the donor, i.e. the poorest part of the population. Implicitly, they thus include national poverty rates as n_i would be the national population in country i multiplied by the poverty headcount ratio with a poverty line defined by the donor. Likewise, w_i implicitly includes the poverty gap in country i . For the sake of simplicity, we may refer in what follows to w_i and n_i as the income and population of country i , but this must be interpreted as referring to the population targeted by aid.

The donor's problem is to apportion aid in order to maximize his objective function defined as the weighted sum of utilities obtained from transfers to the poor in each country. The weight used for a country is given by the size of its population. Letting s_1 and s_2 be the shares of total aid accruing to countries 1 and 2, a fairly general specification of this function is:

$$\text{Max}_{s_1+s_2=1} n_1 u \left[w_1, \frac{s_1 T (1 - y_1)}{n_1} \right] + n_2 u \left[w_2, \frac{s_2 T (1 - y_2)}{n_2} \right]$$

where the utility, $u()$, of aid to country i , increasing and concave, depends on the initial income of target beneficiaries in that country, and the amount of

per capita aid that actually reaches its population of beneficiaries.² For the sake of simplicity, we assume that the two arguments are perfect substitutes, and we write:

$$Max_{s_1+s_2=1} n_1 u \left[r w_1 + \frac{s_1 T(1-y_1)}{n_1} \right] + n_2 u \left[r w_2 + \frac{s_2 T(1-y_2)}{n_2} \right] \quad (1)$$

where $r \leq 1$ represents the donor's bias for the aid money, or the constant marginal rate of substitution between aid and initial income. Because of, say, the «warm glow» effect, the donor draws more utility from the well-being of the target group attributable to his own aid effort than to the well-being derived from other sources (see Bourguignon and Platteau, 2017). If $r = 1$, which we will assume implicitly throughout the paper until we resort to a numerical calibration in Subsection 3.2, the main argument in the donor's welfare function, $[w_i + s_i T(1-y_i)/n_i]$, is simply the level of post-transfer income per capita among the grassroots in country i . In order to conduct our analysis, we now need to choose a specification that explicitly allows for a role of poverty aversion. The following form satisfies this condition:

$$Max_{s_1, s_2} \left(\frac{n_1}{1-\varepsilon} \right) \left\{ w_1 + \frac{s_1 T(1-y_1)}{n_1} \right\}^{1-\varepsilon} + \left(\frac{n_2}{1-\varepsilon} \right) \left\{ w_2 + \frac{s_2 T(1-y_2)}{n_2} \right\}^{1-\varepsilon} \quad (2)$$

s.t. $s_1 + s_2 = 1$

where $\varepsilon (\geq 0)$ is interpreted as the donor's aversion towards poverty.³

2.2 The benchmark case where $\varepsilon = 1$

Before working out the analytics of this model, it is convenient to investigate the special case where $\varepsilon=1$. An interesting property attached to this case is the reduction of (2) to the logarithmic model:

²Note that the donor considers the share of aid going to members of the elite in recipient countries as pure waste.

³See Atkinson (1970) where ε is called inequality aversion. In the two country case, however, inequality and poverty are identical concepts.

$$\underset{s_1+s_2=1}{Max} W = n_1 \text{Log} \left[w_1 + \frac{s_1 T(1-y_1)}{n_1} \right] + n_2 \text{Log} \left[w_2 + \frac{s_2 T(1-y_2)}{n_2} \right] \quad (3)$$

Assuming that the donor's participation constraint is satisfied, that is, assuming $W \geq n_1 \text{Log}(w_1) + n_2 \text{Log}(w_2)$, maximization of (3) yields the following first-order condition for an interior solution: :

$$\frac{(1-y_1)}{w_1 + s_1 T(1-y_1)/n_1} = \frac{(1-y_2)}{w_2 + s_2 T(1-y_2)/n_2} \quad (4)$$

As is evident from (4), what the donor equalizes at equilibrium are not the post-transfer per capita incomes of the two countries but these incomes corrected by the corresponding measures of governance quality. Because of the concavity of the two components of the function W , the donor prefers to help the poorer country if other things are equal. But other things are not equal since the quality of governance varies between the two countries, determining different levels of aid effectiveness. In the ideal case where governance quality levels would be identical in the two countries, aid would be allocated in such a way that post-transfer incomes would be equalized (Thirlwall's proposition).

A convenient manner to define aid effectiveness, or aid ineffectiveness, in a framework depicting a trade-off between needs and governance, is suggested by the following expression, derived from (4) after inverting both sides and dividing the LHS by $(1-y_1)$ and the RHS by $(1-y_2)$:

$$\frac{s_1 T}{n_1} - \frac{s_2 T}{n_2} = \frac{w_2}{1-y_2} - \frac{w_1}{1-y_1} = \omega_2 - \omega_1, \quad (5)$$

where the country-specific composite variable $\omega_i = w_i/(1-y_i)$ is a measure of what we call the need-adjusted aid ineffectiveness (NAAI) of country i . The idea is that aid is more ineffective when it goes to a country that is richer (w_i is higher), or less able to direct it towards its (needy) citizens ($1-y_i$ is smaller). Therefore, the higher ω_i the less induced is the donor to allocate aid to country i . Since we assume that $w_2 > w_1$ and $y_2 < y_1$ (country 2, the richer country -or more exactly, the country where the target beneficiaries are less poor- is also the better governed one), the sign of the differential ($\omega_2 - \omega_1$) is a priori indeterminate. We

learn from (5) that the country that will obtain the higher aid amount per capita is the country whose NAAI is smaller. Moreover, the difference in the aid amounts received per capita precisely corresponds to the difference of NAAIs between the two countries.

Using the constraint $s_1 + s_2 = 1$, we get the optimal shares of aid:

$$\hat{s}_1 = \frac{n_1}{n_1 + n_2} + \frac{1}{T} (\omega_2 - \omega_1) \frac{n_1 n_2}{n_1 + n_2}, \quad (6)$$

which can also be written as:

$$\hat{s}_1 T = \frac{n_1}{n_1 + n_2} [T + (\omega_2 - \omega_1) n_2] \quad (7)$$

and symmetrically for \hat{s}_2 .

It can be seen from (7) that the optimal aid going to country 1 is its demographic share, among target beneficiaries in the two countries, of total aid with a corrective term that describes how much is taken away from the demographic allocation going to country 2 when the NAAI differential is in favor of country 1 ($\omega_2 > \omega_1$). The latter is proportional to the population in country 2.

An additional result is easily derived from (6), or (7) after dividing through by T : the lower the aggregate aid amount the higher the share allocated by the donor to the country more deserving in the sense of being less aid-ineffective in the need-adjusted sense. Conversely, when aid is more plentiful, it is the less deserving country that obtains a higher share.⁴ The role of aid availability also comes out of an examination of the corner solutions:

$$\hat{s}_1 = 1; \hat{s}_2 = 0 \iff \omega_2 > \omega_1 + \frac{T}{n_1}; \hat{s}_1 = 0; \hat{s}_2 = 1 \iff \omega_1 > \omega_2 + \frac{T}{n_2}$$

In words, the donor allocates the whole aid fund to one country if the NAAI of the excluded country exceeds the NAAI of the favoured country by a sufficiently wide margin. This margin depends on T in the following way: the larger the

⁴The underlying logic becomes clear once we understand that, because the marginal utility of aid per capita is the same for the two countries at the optimum, both countries receive the same absolute amount per capita out of any additional aid fund. Yet, this amount is larger relative to the initial aid received for the more ineffective country, because it received less, per capita, than the other country in the initial equilibrium.

availability of aid the less likely is the donor to exclude the more (need-adjusted) aid-inefficient country.

Finally, when we generalize the model to more than two countries, a new effect is obtained: as T increases the number of recipient countries rises (see Appendix A for the details).

Let us now summarize the central comparative-static results in a standard manner. The share of country 1 increases with its population of intended beneficiaries and the quality of its governance, but decreases with its initial income. On the other hand, it increases with the initial income of country 2 but decreases with that country's quality of governance and population size. These effects match the so-called «algorithm for the poverty-efficient allocation of aid» proposed by Collier and Dollar (2002).

Their approach is based on a econometric equation that relates in a non-linear way the growth rate of a country to the amount of aid received (relative to GNI) and the quality of its policy, p^i (as measured by the World Bank's Country Policy and Institutional Assessment indicators). World poverty reduction can be written as $\sum_i G^i \alpha^i h^i N^i$, where G^i is the rate of growth of country i , α^i is the elasticity of poverty reduction with respect to income, h^i is a measure of poverty (say, the headcount index), and N^i is the size of the population. Approximating growth rates by an estimated function of aid and policy, the allocation of aid that maximizes world poverty reduction is given by:

$$A^i = \text{Sup} \left\{ 0, 13.5 + 7.8p^i - \frac{\lambda}{0.04\alpha^i} \left(\frac{x^i}{h^i} \right) \right\},$$

where A^i is the aid received by country i , x^i is its level of income per capita, and λ is a constant that stands for the shadow value of aid. Clearly, A^i increases with p^i , which conveys the same information as $(1 - y_i)$ in our model, and with α^i , but it decreases with the ratio x^i/h^i , which plays the same role as w_i .

For a given level of poverty, a country should receive much aid if the quality of its policies is comparatively high and, analogously, for a given quality of policy, it should receive much aid if it is comparatively poor. Since Collier and Dollar's formula is rather similar to our allocation rule, except for the linear form which deviates from the NAAI concept underlying our model, it is not surprising that

the central results obtained are the same in both instances.

Two last remarks are in order. First, the C-D model includes an effect that is missing in our formulation: represented by the elasticity α^i , this effect measures the way in which income growth gets transformed into poverty reduction. In our model, by contrast, either aid reaches the poor or it does not. To allow for the aforementioned effect, a simple way would consist of replacing the variable $(1 - y_i)$ by the expression $(1 - y_i)^{\eta_i}$, where $\eta_i \leq 1$ would be a parameter reflecting the imperfect manner in which the portion of aid that is not misappropriated by the local elite actually helps to reduce poverty.

Second, and this is the most relevant point for the discussion that follows in Section 3, there is no role for poverty aversion in C-D model. In this model, indeed, the objective pursued by the donor is a maximum reduction of poverty across the world, in the absence of any weighting of the reduction occurring in each country according to initial poverty (one percentage point drop of poverty in Ethiopia is worth the same as a one percentage point drop in Mexico, once scaled by population size, despite Ethiopia being poorer than Mexico). It is thus implicitly assumed that aversion for (initial) poverty is identical for all countries. Also, focusing on poverty headcounts misses the intensity of poverty, as represented by the income variables w_1 and w_2 in the preceding framework.

3 Aid allocation between two heterogeneous recipients: the role of poverty aversion

3.1 A paradoxical general result

To allow for varying poverty aversion, we first return to the general problem (1). The interior solution is given by:

$$(1 - y_1)u'[w_1 + s_1T(1 - y_1)/n_1] - (1 - y_2)u'[w_2 + (1 - s_1)T(1 - y_2)/n_2] = 0 \quad (8)$$

Before deriving the solution of that equation when the utility function is of the constant poverty aversion type, we study its comparative static properties with

respect to the governance parameter $(1 - y_1)$.

Differentiating the preceding equation with respect to s_1 and y_1 yields:

$$\left\{ \frac{1}{n_1}(1 - y_1)^2 T u_1'' + \frac{1}{n_2}(1 - y_2)^2 T u_2'' \right\} ds_1 = - \left\{ u_1' + \frac{(1 - y_1)s_1 T}{n_1} u_1'' \right\} d(1 - y_1)$$

where u_i' stands for $u'[w_i + s_i T(1 - y_i)/n_i]$ for $i = 1, 2$ and similarly for u_i'' .

Given that the utility function is assumed to be concave, the sign of $\partial s_1 / \partial y_1$ is given by:

$$\text{sign}[\partial s_1 / \partial (1 - y_1)] = \text{sign}\left(u_1' + \frac{(1 - y_1)s_1 T}{n_1} u_1''\right) \quad (9)$$

It can be seen in that expression that, unlike in the benchmark case analyzed earlier, the aid share of a country does not necessarily increase with the quality of its governance. Two effects in opposite directions are at work in the general case. The first term on the RHS of (9) stands for the fact that an increase in $1 - y_1$ makes country 1 more attractive to the donor, as more of the aid is actually channelled to the poor. The second term conveys the idea that an improvement in governance also makes poor people in country 1 less poor for an amount that is proportional to the aid per capita that was initially reaching them, thus lessening the incentive of the donor to channel aid to their country.

That the aid share can fall when governance improves may seem paradoxical. This result can be interpreted as a kind of income effect. Because it now costs less to maintain poor people in country 1 at the same level of income as before the improvement in governance, some aid money has been 'freed' relative to the initial situation. The issue is then how to allocate it. Country 1 has become more attractive because its governance is better, which corresponds to a kind of substitution effect. On the other hand, giving more aid to that country would make poor people in country 1 less poor relatively to country 2, which induces a poverty-averse donor to redirect aid to country 2. Hence the indetermination of the effect of an improvement in the governance of one country upon the aid allocation.

Considering the case of a constant poverty aversion utility function permits to resolve this indetermination. After dividing the RHS of (9) by u_1' , that equation

may be rewritten as:

$$\text{sign}(\partial s_1/\partial(1-y_1)) = \text{sign}(1 + \lambda_1 E_{u'_1}) \quad (10)$$

where $E_{u'_1}$ is the elasticity of the marginal utility of the donor in country 1 and λ_1 the share of aid in the total income of the target beneficiaries in that country - i.e. $\lambda_1 = s_1 T(1-y_1)/n_1/[w_1 + s_1 T(1-y_1)/n_1]$. Under the assumption of constant poverty aversion utility, $E_{u'_1}$ is precisely the degree of poverty aversion of the donor, $-\varepsilon$. In that particular case, the sign of the effect of governance is thus given by the following set of conditions:

$$\partial s_1/\partial(1-y_1) <=> 0 \quad \text{if} \quad \varepsilon >=< 1/\lambda_1 \quad (11)$$

As λ_1 is less than unity, these conditions are consistent with the benchmark case $\varepsilon = 1$ for which it was seen earlier that the aid share was increasing with the quality of governance. Interpreting (11) intuitively, it seems that the latter result holds for low values of poverty aversion while the opposite result, i.e. the aid share decreases with the quality of governance, holds for high values of the poverty aversion. As λ_1 is itself a function of ε , however, this intuition is not granted.

Confirming it requires considering the closed form expression of s_1 when the donor's utility exhibits constant poverty aversion. It is shown in Appendix B that the aid share of country 1 is given in that case by:

$$\hat{s}_1 = \underbrace{\frac{n_1(1-y_1)^{\frac{1}{\varepsilon}-1}}{n_1(1-y_1)^{\frac{1}{\varepsilon}-1} + n_2(1-y_2)^{\frac{1}{\varepsilon}-1}}_A} \left[1 + \frac{n_2(1-y_2)^{\frac{1}{\varepsilon}-1}}{T} \underbrace{\left(\frac{w_2}{(1-y_2)^{\frac{1}{\varepsilon}}} - \frac{w_1}{(1-y_1)^{\frac{1}{\varepsilon}}} \right)}_B \right] \quad (12)$$

This expression is similar to (7) - and, of course, identical when $\varepsilon = 1$. The NAAI terms now take into account the poverty aversion by the donor and write: $w_i/(1-y_i)^{\frac{1}{\varepsilon}}$. As could be expected, the sensitivity of the NAAI to the quality of governance is thus a decreasing function of poverty aversion. The only thing that matters is the quality of governance if $\varepsilon = 0$, and needs -i.e. initial income - if $\varepsilon \rightarrow \infty$. Except for this, the difference with the benchmark case (7) lies in correcting

the demographic weights n_i by a factor that depends on the governance of country i in a way that depends again on poverty aversion. To understand the logic of that correction, it is sufficient to notice that, in the case where $w_1 = w_2 = 0$, the maximization of the donor's objective logically depends on the relative governance of the two countries.

It can be checked from (12) that, as in the benchmark case, an increase in the initial income of the target beneficiaries of a country causes its aid share to decline while an increase in the initial income of the other country has the opposite effect. A decrease in the availability of aid raises the share of the country with the lowest NAAI, that is, the country most aid effective in the need-adjusted sense. It is also evident that the indetermination of the way the aid share depends on the quality of the governance of a country comes from the A term in (12). Indeed this term is increasing or decreasing in $(1 - y_1)$ according to whether ε is smaller or greater than unity, whereas the NAAI differential in the B term is always increasing in $(1 - y_1)$. Indetermination therefore arises for high intensities of poverty aversion, in agreement with the general argument above - see (11). In particular, it can be seen that the aid share unambiguously declines with the quality of governance when the poverty aversion tends towards infinity.

A more thorough analysis of the way the derivative of the aid share in (12) depends on the quality of governance in country 1 shows that its sign goes from positive to negative as poverty aversion increases from low values, below unity and somewhat above, to infinity. More precisely, the following proposition is proved in Appendix B:

Proposition 1. *When (i) the objective function of a donor is of the form $W = \sum_{i=1}^2 \left(\frac{n_i}{1-\varepsilon}\right) \{w_i + s_i T(1 - y_i)/n_i\}^{1-\varepsilon}$, where ε is interpreted as a poverty aversion intensity, (ii) $w_2 > w_1$ and $y_2 < y_1$, and (iii) W is maximized under the constraint $s_1 + s_2 = 1$, the manner in which the donor adjusts the country aid shares in response to an improvement in the quality of governance of the poorer country varies depending on the intensity of his poverty aversion. When this intensity is below a critical level, E^* , the donor increases the share of country 1 while that share is lowered if the intensity of poverty aversion is above E^* . This critical level of poverty aversion is greater than unity.*

As it turns out, the intuition that the aid share of a country should be increasing with the quality of its governance, when the governance of that country is worse, and its needs higher, than in other countries, implicitly relies on an assumption about the poverty aversion of the donor. Poverty aversion must be below some threshold for this proposition to hold.

3.2 Numerical example

We have no reason to exclude a priori a Rawlsian donor who would systematically equalize the final outcome of the target beneficiaries in the two countries. For the sake of generality, however, we would like to be reassured that the critical value of the poverty aversion threshold, E^* , is not unrealistically large in comparison with the values currently used in the literature. To get an idea about the order of magnitude of that critical value, a simple numerical example has been designed by selecting plausible values for the various parameters of the model.

The initial income of target beneficiaries in the two countries is parametrized as a function of the mean income, \bar{w} , arbitrarily set to 100, and the relative difference, a , between the two countries: $\delta = (w_2 - w_1)/w_2$. The poor population in the two countries is assumed to be the same: $n_1 = n_2 = .5$. It turns out that the most important parameters, i.e. those that produce most variation in E^* are the volume of aid, T and the governance parameters $(1 - y_1)$ and $(1 - y_2)$. Table 1 below shows how E^* varies with these three parameters. The values that appear in that table are obtained from solving numerically for the value of ε that sets the expression of the sign of $\partial \hat{s}_1 / \partial (1 - y_1)$ to zero in equation (15) displayed in Appendix B.

Table 1: Values of the critical poverty aversion threshold when aid availability and relative governance levels vary

T/\bar{w}		.5	1	1.5	2
$(1 - y_2)$.8				
$(1 - y_1)$.75	2.8	2.0	1.7	1.6
$(1 - y_1)$.7	3.0	2.1	1.8	1.6
$(1 - y_1)$.6	3.3	2.3	1.9	1.7
$(1 - y_2)$.6				
$(1 - y_1)$.55	3.3	2.4	2.0	1.7
$(1 - y_1)$.5	3.6	2.5	2.1	1.8
$(1 - y_1)$.45	3.9	2.6	2.2	1.9

The values of the poverty aversion threshold are a bit high in comparison with the common use of the Atkinson inequality measures based on that parameter. Indeed, typical values used for ε are .5, 1 and 2, except when the volume of aid per capita is substantially higher than the average initial income of the poor.⁵ As a reference, official development assistance represented between 10 and 20 per cent of household consumption expenditures in a number of sub-Saharan African countries over the 2012-2017 period - e.g. Burkina Faso, Liberia, Mali Mozambique, Niger, Rwanda, Sierra Leone, Tanzania. If the target beneficiaries are the bottom 50 per cent of the population - i.e., the order of magnitude of the poverty headcount in those countries at the international USD 1.90 a day poverty line - their share in total consumption expenditures is around 20 per cent. For these countries the ratio T/\bar{w} would thus vary between 50 and 100 per cent, i.e. the first two columns of the preceding table.

A good reason to think that such relative volumes of aid are too small, however, has been pointed out earlier: donors are not likely to value the initial income of their target beneficiaries and their own contribution in the same way. Even when assuming perfect substitutability between these two arguments of their utility function, they may give more weight to their own support, or less weight to the initial income of poor people in the countries they help. This would be equivalent to scaling down the mean wage, \bar{w} , in the preceding analysis, and therefore to increasing the T/\bar{w} ratio. Giving twice more importance to the donor's contribu-

⁵If referring to the family of P_α or FGT poverty measures, the standard values used for the power function that describes the intensity of poverty are typically between 0 and 2 - see Foster et al. (1984).

tion than to the initial wage -i.e. $r = .5$ in (1) would then lead to T/\bar{w} between 100 and 200 per cent, i.e. the last two columns of Table 1. The critical value of poverty aversion then falls below 2, even for a rather low quality of governance.

Except for this dependence on the relative volume of aid, Table 1 shows that, as could be expected, the value of the poverty aversion threshold decreases with the quality of governance of country 1 for a given value of the governance in country 2, or even for a given ratio of the two governance parameters, $(1 - y_2)/(1 - y_1)$ - compare rows 4 and 8 of Table 1. From (15), it is also apparent that the critical poverty aversion is a decreasing function of the initial income differential, δ , and of the demographic ratio, n_2/n_1 .

3.3 Analogy with consumption theory and the resolution of the paradox

Reference to income and substitution effects to decode the impact of a change in governance on a country's aid share suggests an interesting analogy with basic consumer theory. Instead of choosing how to allocate a given amount of money between two distinct consumption goods, the agent has to allocate money between two countries with different characteristics. Denoting $\tau_i = s_i T(1 - y_i)/n_i$ the amount actually reaching the target beneficiaries in country i , the donor's objective function can then be written:

$$\begin{aligned} \text{Max} U &= n_1 U(w_1 + \tau_1) + n_2 U(w_2 + \tau_2) \\ \text{s.t. } T &= s_1 T + s_2 T = \left(\frac{\tau_1 n_1}{1 - y_1} \right) + \left(\frac{\tau_2 n_2}{1 - y_2} \right) \end{aligned}$$

In this setup, $(1 - y_i)$, which is the cost of making a transfer to country i , can be interpreted as the equivalent of the inverse of the price of good i . Standard substitution and income effects are at work, and because neither «good» has the property of an inferior good, both effects run in the same direction: a decrease in the price of the first «good», y_1 , will therefore always lead to an increase in its consumption, measured by τ_1 . This does not imply, however, that the budget share of the «good» that has become cheaper, s_1 , must necessarily go up. What

our results in the previous subsection show is indeed that s_1 may decrease as y_1 falls, if $\varepsilon > E^*$.

Returning to the language of the previous subsection, we can formulate a new proposition:

Proposition 2. *When the objective function of a donor is of the form $W = \sum_{i=1}^2 \left(\frac{n_i}{1-\varepsilon}\right) \{w_i + s_i T(1 - y_i)/n_i\}^{1-\varepsilon}$, where ε is interpreted as a poverty aversion coefficient, the amount of transfer effectively reaching the poor will always increase in the country whose governance has improved. This is true whether the share of the total transfer allocated to that country is being raised or reduced. And vice-versa: the amount of transfer effectively reaching the poor will always decrease in the country whose governance has worsened, even when the donor has a strong poverty aversion and decides to increase the share of that country.*

4 Comparing theory with practice

Let us now relate our theoretical allocation rule to the practice followed by international donors who use explicit allocation formulas. This is the case of the European Union (EU), the International Development Association (IDA) (the arm of the World Bank that specializes in managing multilateral aid to low income countries), and the African Development Bank (AfDB), for example. Thus, the EU uses a formula that combines, in a geometric model with equal weights, indicators of population size, extent of needs, quality of governance, human development, and vulnerability (Markova, 2013). Below we focus on rules known generically as 'Performance Based Allocation' or PBA rules, upon which organizations such as IDA base their aid allocation decisions.⁶ Compared to that used by the EU, the formula chosen by IDA is based on fewer indicators and on an unequal weighting of the various dimensions selected. It is given by:

$$A_i = CPR_i^5 \cdot (GNI_i/P_i)^{-.125} P_i$$

⁶Bourguignon and Gunning (2017) survey the literature dealing with the selectivity of aid through this kind of rule.

where A_i is proportional to the allocation for country i , CPR_i is the Country Performance Rating as judged by World Bank's local representatives, GNI_i/P_i is gross national income per capita (excluding aid), and P_i the population. CPR_i is a composite variable defined as:

$$CPR_i = .24.CPIA_{1i} + .68.CPIA_{2i} + .08.PPR_i$$

where $CPIA_1$ and $CPIA_2$ stand for the mean values of, respectively, the first three clusters of the Country Policy and Institutional Assessment (economic management, structural policies, policies for social inclusion) and the governance cluster of the same (public sector management and institutions). Finally, PPR_i reflects an assessment of the performances of the 'portfolio' of projects managed by IDA in country i .⁷

In terms of the model proposed in this paper, it would seem obvious that the PBA rule combines the three key characteristics of recipient countries: their governance, $1 - y_i$ proxied by CPR_i , the income of the poor, w_i proxied by GNI per capita and the number of poor, n_i proxied by the population. With this equivalence, the PBA rule would write:

$$S_1 = \frac{[v(1 - y_1)]^4 \cdot w_1^{-125} \cdot n_1}{[v(1 - y_1)]^4 \cdot w_1^{-125} \cdot n_1 + [v(1 - y_2)]^4 \cdot w_2^{-125} \cdot n_2},$$

and symmetrically for S_2 . In that expression, $v()$ is some transform of the governance variable since it is not clear in the PBA framework how CPR_i would translate into higher or lower shares of aid embezzled by country i 's leaders. If the same 'ingredients' are found in the PBA rule and in our own aid allocation formula, they are not combined in the same way. Interestingly, the PBA rule satisfies the comparative-static properties obtained with our logarithmic specification. In particular, the share going to country i declines with its initial level of income, and increases with both its population size and the quality of its governance. However, it does not depend on the total amount of aid available as in (6).

The equivalence postulated in the preceding expression is misleading, however. Indeed, GNI_i/P_i is not the same concept as w_i , nor P_i the same concept as n_i .

⁷For details on that formula and adjustments made on previous specifications, see IDA (2010). Adjustments can be seen in the Annex to the recent IDA agreements -i.e. 2016 for IDA 17.

Actually, the ratio n_i/P_i , is the poverty headcount ratio, whereas $n_i.w_i/GNI_i$ is the share of poor people in National Income, a ratio not independent from the poverty gap in the poverty measurement literature. To be consistent with the basic theoretical framework analyzed in the present paper, the aid allocation rule should refer explicitly to poverty. That the PBA does not do so reveals a low poverty aversion among its conceptors, or possibly the practical and political difficulty that would arise with a rule based on indicators whose precision is more debatable than GNI and population size.

With the latter conjecture in mind, a second issue arises. Within the framework used in this paper, an improvement in the governance of a country has two effects on its aid share. It makes aid more effective but, as it increases the income of the poor, it also makes aid less needed. With poverty aversion high enough, the second effect dominates the first and the aid share declines with governance. This cannot be the case with the PBA rule above, which means that, implicitly, the poverty aversion of its conceptors is below the threshold E^* featured in Proposition 1.

Clearly, the implicit aversion to poverty behind the IDA yardstick is rather low and the PBA rule seems much more oriented towards forcing recipient countries to improve on governance in a kind of independent manner. If there were not several «sweeteners» added to obtain the final allocation of aid, in particular in favour of so-called fragile countries - see IDA (2010) as well as more recent updates in the subsequent replenishment waves of this agreement ⁸- the weight of the governance indicator would be devastating. $CPIA_2$ is an index that practically varies between 2 and 3.7, with a standard deviation of .5. Based on the PBA formula above, a one standard deviation from the middle of the CPIA range implies a 50 percent drop in aid. In comparison, a drop in GNI per capita by a one standard deviation increases aid by less than 10 percent.

It is surely quite paradoxical that donors sitting on the board of IDA support an allocation rule and a need/governance trade-off that can be justified only by low, if not extremely low, poverty aversion.

⁸Given the multiplication of these ad hoc amendments to the rule, some observers even doubt whether the PBA concept is still relevant. See Guillaumont and Wagner (2015).

5 Conclusion

This paper puts forward an approach that combines needs and governance considerations in a rigorous theoretical framework, and whose spirit is close to the approach followed by big international donors such as the World Bank and the European Union. At its heart lies the concept of “Need-Adjusted Aid Ineffectiveness” (NAAI) which mitigates the measure of needs by the extent to which the donor is effective in getting aid to the poor.

According to common wisdom, an improvement in the governance quality of the poorer countries ought to be rewarded by higher shares of the total available aid fund. Since they have more needs and have become more deserving from an aid effectiveness perspective, this seems to be a foregone conclusion. Such common wisdom is actually reflected in the allocation formulae used by important multilateral aid organizations, and can be derived from influential models of aid allocation between multiple recipients (see Collier and Dollar, 2002, in particular).

The present paper has questioned the above policy implication on the basis of a rather general model that explicitly allows poverty aversion to play a role. The underlying intuition is that there are two distinct effects of an improvement in governance and they are not necessarily converging. If governance improves in a poor country, the utility for the donor of a given amount of money transferred to that country increases, and this should prompt the donor to transfer more money to it. Yet, as a consequence of the improved governance, the income level has been raised and the extent of needs is correspondingly reduced, so that the donor is induced to re-allocate aid away from the country whose governance has improved. If that second effect, which operates as an income effect, outweighs the first effect, which operates as a substitution effect, the donor will choose to diminish the share of the transfer allocated to the country whose governance has been enhanced.

We show that it is indeed possible that common wisdom is disproven. More precisely, when the donor’s aversion to poverty is strong enough, the donor is induced to reduce the share of aid allocated to the poorer (and worse-governed) country after it has actually succeeded in improving its governance. The fact of the matter is that such a donor is willing to use the opportunity created by higher

overall aid effectiveness to re-allocate aid toward countries whose incomes have not changed (since governance is constant there), and this willingness outweighs the motivation to reward the governance-improving country.

The poor in the latter country are thus gaining from the fact that a larger share of a given transfer now reaches them, but at the same time the transfer to their country has been reduced. Overall, as the second effect is dominated by the first, they derive a net benefit from improved governance. When we look at the converse situation of a deterioration in the quality of governance, assuming that the transfer-maker is strongly averse to poverty, the poor are compensated, yet only partly, for the more opportunistic behaviour of their elites. More precisely, the positive effect of a larger share of their country in the external transfer is outweighed by the negative effect of increased rent-capture. If the donor has only weak poverty aversion, however, the poor are doubly punished as a result of a decline in governance quality: not only do they get a smaller portion of any given transfer made to their country but the amount of transfer itself is being reduced by the donor.

It bears emphasis that the odd result that we find when the donor's poverty aversion is strong cannot be obtained with the aid allocation rules used by big donor agencies, the Performance-Based Allocation in particular. This situation reflects a low poverty aversion of these agencies or, at least, their acknowledgement of the difficulties in making more poverty-oriented rules accepted by recipient countries.

All our results, it must be emphasized, are obtained in a rather simple setup where governance levels are exogenously given. When the donor is allowed to endogenously set the level of governance -the donor imposes an optimal external discipline that combines with domestic governance to determine how effectively transfers are used in recipient countries-, the problem becomes much more intricate. It has been addressed in two companion papers (Bourguignon and Platteau, 2017, 2018). The main conclusion is that, in the presence of endogenous governance, it can never happen that a strongly poverty-averse donor reduces the aid share of a country whose governance has improved. In other words, the donor always chooses to reward better governance by raising the aid share of the country concerned. The poor living in a better-governed country are thus doubly rewarded

whereas those living in a worse-governed country are doubly punished, whichever the degree of the donor's poverty aversion. This modified conclusion follows from the fact that the donor now has a new instrument available in addition to country aid shares, namely external discipline. A cost effect is then added to the effects highlighted in the present paper: when a country improves its domestic governance, the donor can save money by relaxing the discipline imposed on it. This new effect induces the donor to raise the aid share of that more cost-effective recipient.

Appendix A. The case of $m > 2$ of recipients

The objective function of the donor is:

$$\text{Max} \sum_{i=1}^m n_i \text{Log} [w_i + s_i T(1 - y_i)/n_i] \quad \text{s.t.} \quad s_i \in [0, 1] \quad \forall i, \quad \sum_{i=1}^m s_i \leq 1$$

Straight resolution of the preceding program leads to the following allocation rule. Assuming that recipient countries are ranked by ascending ω_i , the first i^* countries receive an individual share given by:

$$s_i = \frac{n_i}{T} [\bar{\omega}(i^*) - \omega_i] + \frac{n_i}{N(i^*)}$$

with $N(i^*) = \sum_{j=1}^{i^*} n_j$ and $\bar{\omega}(i^*) = \frac{\sum_{j=1}^{i^*} n_j \omega_j}{N(i^*)}$, whereas the $m - i^*$ remaining countries receive nothing. The threshold i^* is given by the following condition:

$$\omega_{i^*+1} \geq \bar{\omega}(i^*) + \frac{T}{N(i^*)}$$

In these expressions, which appear as straight generalizations of the two country case, $\bar{\omega}(i^*)$ stands for the mean aid ineffectiveness among the i^* least aid-ineffective countries. At the same time, the critical role played by the size of total aid comes out clearly. When T increases, the number of beneficiaries (i^*) increases, whereas the share of those countries where aid is relatively ineffective in comparison with $\bar{\omega}(i^*)$ increases and the share of the relatively aid effective beneficiaries decreases. In other words, small donors should cater to fewer countries and allocate a higher share to the most aid effective countries among them.

Appendix B. Optimal aid share with constant poverty aversion utility function

An interior solution of (2) is given by:

$$\frac{1 - y_1}{[w_1 + s_1 T(1 - y_1)/n_1]^\varepsilon} = \frac{1 - y_2}{[w_2 + s_2 T(1 - y_2)/n_2]^\varepsilon}$$

The optimal aid share \hat{s}_1 is obtained by combining this equality with the budget

constraint $s_1 + s_2 = 1$:

$$\hat{s}_1 = \frac{(1-y_2)^{1-\frac{1}{\varepsilon}}/n_2}{(1-y_1)^{1-\frac{1}{\varepsilon}}/n_1 + (1-y_2)^{1-\frac{1}{\varepsilon}}/n_2} + \frac{w_2(1-y_2)^{-\frac{1}{\varepsilon}} - w_1(1-y_1)^{-\frac{1}{\varepsilon}}}{T \left[(1-y_1)^{1-\frac{1}{\varepsilon}}/n_1 + (1-y_2)^{1-\frac{1}{\varepsilon}}/n_2 \right]}$$

Multiplying numerators and denominators throughout by $(1-y_1)^{\frac{1}{\varepsilon}-1}(1-y_2)^{\frac{1}{\varepsilon}-1}n_1n_2$, we get

$$\hat{s}_1 = \frac{n_1(1-y_1)^{\frac{1}{\varepsilon}-1}}{n_1(1-y_1)^{\frac{1}{\varepsilon}-1} + n_2(1-y_2)^{\frac{1}{\varepsilon}-1}} + \frac{\frac{1}{T} \frac{n_1n_2(1-y_1)^{\frac{1}{\varepsilon}-1}(1-y_2)^{\frac{1}{\varepsilon}-1}}{n_1(1-y_1)^{\frac{1}{\varepsilon}-1} + n_2(1-y_2)^{\frac{1}{\varepsilon}-1}} \left[\frac{w_2}{(1-y_2)^{\frac{1}{\varepsilon}}} - \frac{w_1}{(1-y_1)^{\frac{1}{\varepsilon}}} \right]}$$

and to (12) in the text. This expression may be rewritten:

$$\hat{s}_1 = \frac{n_1}{n_1 + n_2 z^{\frac{1}{\varepsilon}-1}} \left[1 + a \left(w_2 - w_1 z^{\frac{1}{\varepsilon}} \right) \right] \quad (13)$$

where $z = (1-y_2)/(1-y_1)$ and $a = n_2(1-y_2)^{\frac{1}{\varepsilon}-1}/T$

For a given y_2 , it is thus the case that $\partial \hat{s}_1 / \partial (1-y_1) = -[(1-y_2)/(1-y_1)^2] \partial \hat{s}_1 / \partial z$. Differentiating (13) with respect to z leads to:

$$\frac{1}{\hat{s}_1} \frac{\partial \hat{s}_1}{\partial z} = -\frac{(\frac{1}{\varepsilon}-1)n_2 z^{\frac{1}{\varepsilon}-2}}{n_1 + n_2 z^{\frac{1}{\varepsilon}-1}} - \frac{a(1/\varepsilon)w_1 z^{\frac{1}{\varepsilon}-1}}{1 + a(w_2 - w_1 z^{\frac{1}{\varepsilon}})} \quad (14)$$

After some transformation this expression becomes:

$$\frac{1}{\hat{s}_1} \frac{\partial \hat{s}_1}{\partial z} = -\frac{1}{\varepsilon} z^{\frac{1}{\varepsilon}-2} \frac{1}{\Pi} \left[(1-\varepsilon)n_2(1+aw_2) + \varepsilon a n_2 w_1 z^{\frac{1}{\varepsilon}} + a n_1 w_1 z \right]$$

where Π is the product of the denominators of the two terms in (14). It follows that:

$$\text{sign}(\partial \hat{s}_1 / \partial z) = -\text{sign} \{ \varepsilon [a w_1 z^{\frac{1}{\varepsilon}} - (1+aw_2)] + (1+aw_2) + a n_1 w_1 z / n_2 \} \quad (15)$$

Denote $B(\varepsilon)$ the expression in the curly brackets and consider the case where country 1 has a worse governance than country 2, so that $z > 1$, and has more needs so that $w_2 > w_1$. Under these conditions, we now show that $B(\varepsilon)$ is a decreasing function. To do so, we analyze the sign of its derivative that is given by:

$$B'(\varepsilon) = aw_1 e^{\frac{\text{Log} z}{\varepsilon}} \left(1 - \frac{\text{Log} z}{\varepsilon}\right) - (1 + aw_2)$$

This function is negative for $\varepsilon < \text{Log} z$. It is also negative in the opposite case. To see this, it is sufficient to notice that $e^x(1-x) < 1$ as this is a decreasing function with a maximum of 1 for $x = 0$.

Noticing that $B(\varepsilon) \rightarrow +\infty$ as $\varepsilon \rightarrow 0$ and $B(\varepsilon) \rightarrow -\infty$ as $\varepsilon \rightarrow \infty$, we conclude that there is a critical value $E^*(> 1)$ such that:

$$\text{sign}[\partial \hat{s}_1 / \partial (1 - y_1)] = -\text{sign}(\partial \hat{s}_1 / \partial z) \geq < 0 \text{ if } \varepsilon \leq E^*$$

That $E^* > 1$ derives from $B(1) = an_2 w_1 z^{\frac{1}{\varepsilon}} + an_1 w_1 z > 0$.

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