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INCENTIVES, INEQUALITY AND THE ALLOCATION OF AID WHEN CONDITIONALITY DOESN'T WORK: AN OPTIMAL NONLINEAR TAXATION APPROACH

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Abstract

This paper analyses the impact of aid, and its optimal allocation, when conditionality is ineffective. It is assumed that the recipient government will implement its own preferences no matter what. In this set up, aid can still affect the behavior of a recipient, not through conditionality but through changing resource constraints. We analyze the problem in the tradition of models of optimal non-linear income taxation. We find that unconditional aid increases national income and makes the poor better off in the recipient country, but that there is a crowding out effect as the recipient country reduces labor supply in response to increased aid. On optimal allocation of aid across countries, we find that poorer countries should get more aid, as should countries with governments that are more inequality averse, which conforms to intuition. However, a striking finding is that more unequal countries should get less aid.

JEL classification codes H21;O19

1.   INTRODUCTION

Dissatisfaction with aid has been growing by leaps and bounds. In sharp contrast to the optimism of earlier evaluations, those of the 1990s have been almost uniformly negative (e.g., Boone, 1996, World Bank, 1998, Kanbur, Sandler and Morrison, 1999, Burnside and Dollar, 2000). Much of the discussion has focused on the failure of aid conditionality (see Kanbur, 2000, Killick, 1995, Mosley, Harrigan and Toye, 1995, Svensson, 2000a, World Bank, 1992).   This literature has highlighted two inescapable facts. First, the record of aid in helping growth and poverty reduction is disappointing. And second, this poor record has been established despite aid conditionality, which was meant to channel resources to productive uses. On the latter, there is a growing realization that external donors cannot really change domestic political economy in the medium term (Devarajan, Dollar and Holmgren, 2001). Some have argued that donors should accept a basic truth—the impact of their aid will come mainly through the effects of relaxing the resource constraints facing the recipient governments. In light of this, aid should be allocated on the basis of observable indicators that predict the impact of additional resources (for example, The World Bank, 1998 and Burnside and Dollar, 2000).

This paper takes seriously the conditionality critique. While there is a developing literature on how conditionality could be "improved" (see for example Svensson, 2000b or Kanbur, 2000), this paper instead asks two questions. What would be the consequences of aid for a country if there were no conditionality at all (which many would argue to be the case de facto, despite de jure conditionality)? And what would the optimal allocation of unconditional aid across countries look like?

The central assumption of this paper is that the effects of aid come through the relaxation of the recipient government's budget constraint—all other attempts to "influence" the government are ineffective. Given this increase in its resources, the government chooses its policy instruments to satisfy its own preferences. These instruments and preferences can be modeled in as complex a fashion as possible and necessary for the analysis. In this paper we model the net effects of the array of policy instruments at the government's disposal (e.g., direct and indirect taxes, trade interventions, different patterns of public expenditure) simply as the choice of a non-linear income tax and transfer schedule to maximize a welfare function defined on the distribution on

incomes. This optimal non-linear income taxation approach, pioneered by James Mirrlees in his Nobel Prize winning paper (Mirrlees, 1971), captures the central features we are interested in highlighting: incentives, inequality, and the effects of different preferences over income distribution outcomes. It serves to shed new light on the literature on the consequences and optimal allocation of aid.

The plan of the paper is as follows. Section 2 introduces the basic model with a single recipient government and a single donor, with aid being modeled as an exogenous increase in the recipient government's budget constraint. In this framework, Section 3 considers the consequences of unconditional aid, including the possible "crowding out" effects of aid as relaxation of the resource constraint feeds through to incentive effects via the recipient government's (optimal choice) of the income tax and transfer schedule. It presents numerical simulations which give a quantitative handle on the magnitude and determinants of these effects. Section 4 turns to the case with two recipient governments which differ in their tastes and technologies, and characterizes the optimal allocation of aid where the donor is assumed to maximize a joint welfare function of the two countries in deciding on the allocation. Numerical simulations are presented on how inherent inequality in the two countries, and their tastes for inequality, affect the optimal allocation. Section 5 concludes the paper with a discussion of areas for further research.

2. THE BASIC MODEL

The simplest model in which incentives, inequality, preferences for equity, and aid without conditionality can be integrated in a coherent framework, and which can provide an engine of analysis for the questions we are interested in, turns out to be the Mirrlees (1971) model of optimal nonlinear income taxation. In this model there is inherent inequality because individuals differ in their labor productivities. The government chooses a nonlinear income tax and transfer schedule to maximize a welfare function which is in principle sensitive to inequality, but does so with the added constraint that individuals choose their labor supply in response to the tax function. The government must also satisfy the overall budget balance constraint, with tax revenues equal to outlays. Aid from the outside serves to relax this constraint, and therefore affects the whole equilibrium. Note that we view this model as the stylized representation of the myriad instruments the

government has at its disposal. Each instrument has incentive, revenue and distributional effects. We start by laying out the basic model.

There is a continuum of individuals, each having the same preference ordering, which is represented by a utility function u(x,y) defined over consumption x and hours worked y, with $u_x > 0$ and $u_y < 0$ (subscripts indicating partial derivatives). Individuals differ only in the pre-tax wage n they can earn. There is a distribution of n on the interval (l,h) represented by the density function f(n). Writing gross income as z = ny and defining

(1) $s(x,z;n) = -u_y(x,z/n)/nu_x(x,z/n) > 0$

preferences are taken to satisfy the further (standard) restriction that

(2) $\dfrac{\partial s}{\partial n} < 0.$

Condition (2) implies that indifference curves in (x,z)-space become flatter the higher is an individual's wage rate, which in turn ensures that both consumption and gross earnings increase with the wage rate.

Suppose that the aim of policy in a recipient country can be expressed as maximizing the following social welfare criterion

(3) $S = \displaystyle\int_l^h W(u(n))f(n)dn ,$

where W(.) is an increasing and concave function of utility. The government of a recipient country cannot observe individuals' productivities and thus is restricted to setting taxes and transfers as a function only of earnings, T[z(n)]. The government maximizes S subject to the revenue constraint

(4) $\displaystyle\int_l^h T(z(n))f(n)dn = R$

where in the Mirrlees tradition R is interpreted as the required revenue for essential public goods. The more aid a government receives from external sources, the lower is R. In addition to the revenue constraint, the government faces incentive compatibility constraints. These in turn state that each n individual maximizes utility by choice of hours worked, solving

$$(5) \quad \max_{x,y} u(x, y) \text{ subject to } x = ny - T(ny),$$

where T(.) is the tax/transfer schedule. The problem (5) implies that

$$(6) \quad u_x(1 - t(z)) + u_y = 0$$

where $t(z) = T'(z)$ denotes the marginal tax rate. Totally differentiating utility with respect to n, and making use of (6), we obtain the incentive compatibility constraints[1]

$$(7) \quad \frac{du}{dn} = -\frac{yu_y}{n}$$

Since T = ny-x, we can think of government as choosing schedules y(n) and x(n). In fact it is easier to think of it choosing a pair of functions, u(n) and y(n), which maximize welfare index (3) subject to the conditions of individual maximization (7) and the revenue requirement (4). Omitting details (for an exposition see Tuomala, 1990), the first order conditions of this problem imply a pattern of marginal rates satisfying

$$(8) \quad t(z(n)) = -\boldsymbol{a}(n)u_x s_n / \boldsymbol{l} f(n)$$

where λ is the multiplier on the revenue constraint and

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[1] (6) is only a necessary condition for the individual's choice to be optimal, but we assume here that it is sufficient as well. Assumptions that assure sufficiency are provided by Mirrlees (1976). Note also that while (6) presumes an internal solution for y, (7) remains valid even if individuals were bunched at y=0 since, for them, du/dn=0.

$$(9) \quad \boldsymbol{a}(n) = \int_{l}^{n} (W'u_x - \boldsymbol{1})(1/u_x)\exp(-\int_{p}^{n}(u_{nx}/u_x)dm)f(n)dp$$

is the multiplier on the incentive compatibility constraint. This latter satisfies the transversality conditions

$$(10) \quad \alpha(l) = \alpha(h) = 0.$$

Our object is to trace through the consequences of unconditional aid. In this model, unconditional aid increases the resource envelope of the government. It reduces the revenue that the government needs to raise from the population. In other words, an increase in aid decreases R. The consequences of unconditional aid can in principle therefore be analyzed through comparative static of the optimum characterized by (8), (9) and (10), with respect to variations in R.

Unfortunately, however, as is well recognized in the non-linear taxation literature, closed form analytical results are few and far between.[2] To see the complications that arise, consider equations (8) and (9), under the simplifying assumptions that $u_{xy} = 0$ and that the social welfare function is utilitarian i.e. W' = 1. Then (8) becomes

$$(11) \quad \frac{t}{1-t} = (e^{-1}+1)\boldsymbol{a}(n)u_x/\boldsymbol{1}nf(n)$$

$$\text{where} \quad \boldsymbol{a}(n) = \int_{l}^{n}((u_x - \boldsymbol{1})(1/u_x)f(p)dp.$$

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[2] Equations (8) - (10) lead to the few qualitative conclusions available in this framework (see Tuomala,1990). It can be shown that the marginal tax rate on income is nonnegative. This is more striking than it at first looks. It may very well be optimal to have the average tax rate less than zero, but it is never optimal to subsidize earnings at margin. An intuition is that it is cheaper to get people to given indifference curve by reducing average rate rather than by exacerbating deadweightloss through distorting their labour supply decisions. It can also be shown that the marginal tax rate is less than one. We also have the famous "end point" results. If wage distribution is bounded above, then the marginal tax rates at the top is zero. If it is optimal for least able individuals to work then the marginal tax rate on least able is zero. An intuition behind these endpoint results is that the only reason to have a marginal tax rate differing from zero is to raise an average tax rate above that point and lower it below i.e. equity considerations. But at the top is no one to take from and at the bottom there is no one to give to. So at the end points only efficiency considerations matter. Numerical solutions (Tuomala, 1990) have shown, however, that these results have very little practical relevance.

Now (11) does however provide some insight. First, the term $(1+e^{-1})$, reflecting also conventional wisdom, (11) says that, other things equal, the marginal tax rate should be lower the larger is the compensated elasticity of labour supply, e. Governments fearing that disincentive effects are large will tend to set lower marginal rates.

Consider now the shape of the optimal tax schedule. Will the tax and transfer system become more or less progressive as aid increases? Equation (11) suggests that, other things equal, the marginal tax rate should be lower the denser the population at that point, i.e. higher f(n). In other words the more people affected, the higher is deadweightloss. On the other hand for the typical distribution the density weighted by n, nf(n), (e.g., lognormal distribution) is likely to decline with n above some point suggesting a higher marginal tax rate on high earners. These two factors may be seen as reflecting the efficiency side of the problem. The term $\alpha(n)$ in turn incorporates distributional concerns. It measures the social welfare gain from slightly increasing the marginal tax rate at n and using that extra revenue to loosen the government 's budget constraint. This extra revenue can be used to soften the bite of the revenue requirement, and distributing as a lump sum subsidy to those below n. The implicit value of this loosening of the revenue constraint is just λ, the multiplier on the constraint. $\alpha(n)$ increases with n for low n and decreases with n for high n. The turning point depends on λ. The lower is λ, the higher is the n at which the turning point occurs. Thus as aid increases and the revenue requirement falls, and hence λ falls, the range over which $\alpha(n)$ is increasing stretches further. Since $\alpha(n)$ affects the marginal tax rate positively, this means that the range over which the latter increases also stretches further— at least for this reason. In this sense, therefore, more aid leads to a more progressive tax structure.

But this is about as far as we can get at this level of generality. And the above analysis says nothing about the consequences of increased aid for per capita income in the country, for pre tax and post tax income inequality, and for the well being of the poor. However, in the tradition of the non-linear taxation literature, we can provide better understanding of the form of optimal policy through numerical simulations. With these techniques, we can compute post tax income at each level of n, and thus calculate inequality of pre and post tax income as well as total income, for different values of key parameters. The next section takes up this task.

3. THE CONSEQUENCES OF UNCONDITIONAL AID

It should be clear from (11) that the variation of the optimal marginal tax rate with the level of income is a complex matter, and that comparative statics of inequality and averages as parameters vary will not be available in closed form. This is a general feature on the optimal nonlinear income taxation literature (see Tuomala, 1990) where, following the lead of Mirrlees (1971) numerical calculations have proved useful in generating useful results[3]. We follow this route here. Our focus is on the consequences of varying R and varying the standard deviation of n. How do the consequences of aid play out in societies of differing degrees of "inherent" inequality?

We assume n to be distributed lognormally with parameters μ and σ (see Atichison and Brown, 1957). This assumption is common in the literature, following Mirrlees (1971). For numerical simulations we choose $\sigma = 0.39$, 0.7 and 1 as a standard deviation of n and mean n = 0.4. The calculations were carried out for the following CES utility function

$$(12) \quad u = -\frac{1}{x} - \frac{1}{(1-y)}$$

where the elasticity of substitution between consumption and leisure, denoted by ε, is 0.5. The social welfare function of the recipient government is specified[4] as $W(u) = -\frac{1}{b}e^{-bu}$ so that ß measures the degree of inequality aversion in the social welfare function of the recipient government (in the case of ß = 0, we define W = u). R is specified as a fraction of national income, and is assumed to vary between -0.3 and 0.0. In other words, we consider external aid varying from zero to 30 percent of national income.

Tables 1-5 show comparative statics of the optimal tax schedule with respect to revenue requirement with different inherent inequality and inequality aversion. The Tables give net income, gross income and optimal marginal tax rates at various percentiles of the ability

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[3]Tuomala (1990) gives details of the computational procedure.
[4]For further discussion on the transformation of each individual's utility see Tuomala (1990).

distribution. Moreover they give the net income and welfare of the poorest[5] and "crowding out" effect of unconditional aid. With no incentive effects, national income should increase by the same amount as aid. With incentive effects, this increase may be less—this is what we call "crowding out".

Table 1 (base run)

Comparative Static with Respect to R with $s = 0.39$

$\varepsilon = 0.5$ $\beta = 0$ $\sigma = .39$

F(n)	R = 0.0	x_0=0.09	u_0=-11	R=-.1	x_0=0.09	u_0=-10	R=-.27	x_0=0.12	u_0=-8.3
	x	z	MTR%	x	z	MTR%	x	z	MTR%
0.10	0.16	0.12	44	0.17	0.12	41	0.19	0.11	37
0.50	0.21	0.20	41	0. 22	0.22	39	0.24	0.19	35
0.90	0.29	0.33	35	0.30	0.30	33	0.32	0.31	31
0.99	0.39	0.48	29	0.41	0.47	23	0.42	0.44	25
Average	0.22	0.22		0.23	0.21		0.25	0.20	
Crowding out					4.5%			4.8%	
Effect									

x_0 is the net income of the poorest person, u_0 is the welfare of poorest person

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[5] With the utility function we use, there is "bunching"—all those below a critical value of n choose not to work. Their pre tax income is thus zero and their post tax income is whatever the optimal tax and transfer regime gives them. This, then, is the net income of the poorest person, x_0, as shown in the Tables.

Table 2

Comparative Static with Respect to R with s = 0.7

$\varepsilon = 0.5$ $\beta = 0$ $\sigma = .7$

F(n)	R = 0.0	x_o=0.13	u_o=-8	R=-07	x_o=0.13	u_o=-7.7	R=-.17	x_o=0.15	u_o=-6.8
	x	z	MTR%	x	z	MTR%	x	z	MTR%
0.10	0.16	0.06	56	0.16	0.06	55	0.18	0.05	51
0.50	0.20	0.17	60	0.21	0.17	59	0.22	0.16	57
0.90	0.31	0.45	57	0.32	0.44	56	0.34	0.42	55
0.99	0.54	0.91	41	0.54	0.88	45	0.55	0.85	47
Average	0.22	0.22		0.23	0.22		0.25	0.21	
Crowding out					1.4%			3.7%	
Effect									

Table 3

Comparative Static with Respect to R with s = 1.0

$\varepsilon = 0.5$ $\beta = 0$ $\sigma = 1.0$

F(n)	R = 0.0	x_o=0.16	u_o=-6.2	R=-.1	x_o=0.17	u_o=-5.8	R=-.19	x_o=0.19	u_o=-5.4
	x	z	MTR%	x	z	MTR%	x	z	MTR%
0.10	0.17	0.02	55	0.18	0.02	53	0.19	0.02	50
0.50	0.21	0.14	68	0.23	0.13	67	0.24	0.12	65
0.90	0.35	0.55	71	0.36	0.58	69	0.39	0.56	68
0.99	0.70	1.61	58	0.75	1.60	52	0.75	1.54	55
average	0.24	0.24		0.26	0.23		0.27	0.23	
Crowding out					4.1%			3%	
effect									

Table 4

Comparative Static with Respect to R with ß = 1

ε = 0.5   ß = 1   σ=0.39

F(n)	R = 0.0 x_o=0.12 u_o=-8.3			R=-.1 x_o=0.13 u_o=-7.7			R=-.28 x_o=0.15 u_o=-6.7		
	x	Z	MTR%	x	z	MTR%	x	z	MTR%
0.10	0.16	0.10	65	0.17	0.09	62	0.19	0.09	56
0.50	0.19	0.19	59	0.20	0.18	56	0.23	0.17	52
0.90	0.26	0.33	47	0.27	0.32	45	0.29	0.30	43
0.99	0.36	0.50	29	0.38	0.49	28	0.39	0.46	32
average	0.20	0.20		0.21	0.19		0.24	0.19	
Crowding out effect					3%			2.6%	

Table 5

Comparative Static with Respect to R with ß = ¥ (maximin)

ε = 0.5   maximin   σ=0.39

F(n)	R = 0.0 x_o=0.14 u_o=-7.1			R=-.1 x_o=0.15 u_o=-6.7			R=-.19 x_o=0.15 u_o=-6.7		
	x	z	MTR%	x	z	MTR%	x	z	MTR%
0.10	0.14	0.05	85	0.15	0.04	84	0.16	0.03	83
0.50	0.17	0.18	69	0.19	0.17	67	0.20	0.17	66
0.90	0.24	0.24	51	0.25	0.33	50	0.26	0.32	48
0.99	0.34	0.51	32	0.35	0.50	30	0.37	0.49	26
average	0.19	0.19		0.20	0.18		0.21	0.17	
Crowding out Effect					5.2%			5.5%	

Tables 1-5 show that there is indeed a crowding out effect as increased unconditional aid reduces labor supply incentives in the recipient country. This effect is always greater than 1 percent of total income, but can be as large as 5 percent. However, despite this crowding out, total consumption in the recipient country does indeed increase with aid. Moreover, net income and welfare of the poorest also increase with aid.

Consider now the progressivity of the domestic tax structure as a function of aid. Tables 1-5 show that optimal tax/transfer systems become more progressive when inequality increases, $\sigma = 0.7$ and 1.0, and when R becomes more negative (i.e. aid increases). To understand this, we can combine the results of two earlier studies. Kanbur-Tuomala (1994) show that with greater inherent inequality optimal marginal tax rates increase with income over the majority of the population. On the other hand we know from Immonen-Kanbur-Keen-Tuomala (1998) that as the revenue requirement becomes negative so that for example foreign aid is available the minimum income requirement for the poor can be met without clawing back revenue with a high marginal tax rate. Thus we have low marginal tax rates on the poor. In other words, optimal progressivity, taking into account incentive effects, increases with higher inherent inequality and with additional aid resources.

4.   OPTIMAL AID ALLOCATION

The previous section analyzed the consequences of unconditional aid for a given recipient. Suppose now that the donor is faced with two potential recipients, countries A and B, with their own specific characteristics. Any given aid allocation between the two recipients leads to consequences in each country along the lines laid out in Section 2—each recipient government chooses its policies in light of its technology, tastes and aid allocation. The donor now has the task of choosing the aid allocation from a fixed pool of aid resources, to optimize the donor's own welfare function. This is the problem that is set up and solved in this section.

Let the donor's welfare function be

$$(13) \qquad S_D = \sum_i \boldsymbol{q}_i \int W_i(v_i(n)) f(n) dn \; ;$$

where S_D is the donor's valuation function which is not necessary the same as W_i and θ_i is a fraction of the world's population in country i (= A and B). Thus we assume that the donor's preferences in inequality aversion may differ from preferences of recipient countries. The simplest representation of the donor's problem is to find b_i maximizing (13) subject to $\sum_i \boldsymbol{q}_i b_i = b$. where b is a fixed pool of aid resources. Hence, the donor simply

chooses the optimal allocation of the aggregate aid, b, over the two countries. This requires equating across countries the marginal social cost of raising an additional unit of aid, so that

(14) $\lambda_A = \lambda_B = \lambda$,

where λ is the marginal social cost of donor funds.

We are interested in how the optimal allocation responds to key parameters of one the two countries, including (i) increase in the mean productivity, (ii) increase in inherent inequality and (iii) increase in inequality aversion. What will happen to the aid allocation? It should be clear from our discussion above that the comparative static are not available in closed form. Rather, we will have to rely on numerical calculations. The calculations are carried out using the same specification for the utility function, density function and social welfare as in section 3.

We start with the case where the two countries are identical. In this case optimal allocation of aid is to divide the total aid equally between the two countries A and B. This is shown in Table 6. Then we conduct a sequence of experiments, one at a time. The computations are shown in Tables 6, 7, 8a,b, 9 and 10a,b. The Tables give marginal and average tax rates at various percent points of the n-distribution, and the optimal distribution of aid across countries, for some variation from the base case of identical countries. To limit the number of variations, we keep population size of the two countries identical—it is in any case obvious that as the relative population size of one country increases, ceteris paribus its aid allocation should also increase.

Table 6

Identical Countries A and B

$\lambda_A = \lambda_B = 18$, $f_A = f_B$ ($\mu_i = -1.0$, $\sigma_i = 0.39$), $\beta_A = \beta_B = 0$

F(n)	ATR	MTR	Distribution of aid across countries	
			A	B
0.10	-47	42	0.50	0.50
0.50	-12	39		
0.90	7	34		
0.99	14	28		

Table 7

Decrease in the Mean Productivity of Country A

$\lambda_A = \lambda_B = 18$, $f_A(\mu_A = -1.2, \sigma_A = 0.39)$ $f_B(\mu_B = -1.0, \sigma_B = 0.39)$, $\beta_A = \beta_B = 0$

F(n)	ATR	MTR	Distribution of aid across countries	
			A	B
0.10	-100	34	0.82	0.18
0.50	-47	33		
0.90	-16	30		
0.99	-2	25		

Table 8a

Increase in the Inequality of Country A

$\lambda_A = \lambda_B = 18$, $f_A(\mu_A = -1.0, \sigma_A = 0.5)$ $f_B(\mu_B = -1.0, \sigma_B = 0.39)$, $\beta_A = \beta_B = 0$

F(n)	ATR	MTR	Distribution of aid across countries	
			A	B
0.10	-77	48	0.46	0.54
0.50	-14	48		
0.90	15	43		
0.99	24	36		

Table 8b

Increase in the Inequality of Country A

$\lambda_A = \lambda_B = 18$, $f_A(\mu_A = -1.0, \sigma_A = 0.7)$ f_B $(\mu_B = -1.0, \sigma_B = 0.39)$, $\beta_A = \beta_B = 0$

F(n)	ATR	MTR	Distribution of aid across countries	
			A	B
0.10	-100	56	0.02	0.98
0.50	-16	60		
0.90	30	58		
0.99	41	50		

Table 9

Increase in the Relative Inequality Aversion of Country A (maximin)

$\lambda_A = \lambda_B = 18$, f_A $(\mu_A = -1.0, \sigma_A = 0.39) = f_B$ $(\mu_B = -1.0, \sigma_B = 0.39)$, $\beta_B = 0$

F(n)	ATR	MTR	Distribution of aid across countries	
			A	B
0.10	-100	81	0.83	0.17
0.50	-45	63		
0.90	4	46		
0.99	16	32		

Table 10a

Decrease in the Mean Productivity and Increase in the Inequality of Country A

$\lambda_A = \lambda_B = 18$, $f_A(\mu_A = -1.2, \sigma_A = 0.5)$ f_B $(\mu_B = -1.0, \sigma_B = 0.39)$, $\beta_A = \beta_B = 0$

F(n)	ATR	MTR	Distribution of aid across countries	
			A	B
0.10	-100	41	0.82	0.18
0.50	-50	42		
0.90	-6	40		
0.99	9	35		

Table 10b

Increase in the Mean Productivity and Increase in the Inequality of Country A

$\lambda_A = \lambda_B = 18$, f_A ($\mu_A = -1.2, \sigma_A = 0.7$) f_B ($\mu_B = -1.0, \sigma_B = 0.39$), $\beta_A = \beta_B = 0$

F(n)	ATR	MTR	Distribution of aid across countries	
			A	B
0.10	-100	49	0.76	0.24
0.50	-56	55		
0.90	13	54		
0.99	30	48		

From table 7 we see that the optimal share of aid received by country A goes up when its mean productivity goes down. In other words the poorer country should get more aid This is something we might expect. But the impact of inherent inequality on optimal aid allocation is not quite so obvious. Our numerical calculations produce a striking result. For the parameter values used here, the country with the greater inherent inequality should get less in the way of unconditional aid (see Tables 8a and b). What might be an ex-planation of this result? There are two forces pulling in opposite directions. For any given mean income, greater inequality means the poor are poorer so the need of the country is greater. However, with greater inequality, less of any unconditional aid will get to the poor. These effects are further mediated by the fact that the recipient government is choosing a tax and transfer schedule. Our numerical calculations resolve these forces sharply—the more unequal country should get less aid. However, a country with greater inequality *aversion* should get more aid, as might be expected—this is shown in Table 9. Finally, Tables 10a and b show cases in which mean productivity decreases and inequality increases simultaneously in country A. We see that for the parameter values used here the former effects dominates, and its share of aid goes up.

5.   CONCLUSION

If aid conditionality worked, donors could influence recipients' use of funds to pursue more egalitarian objectives than they otherwise would. But aid conditionality does not seem to work, or at least does not work very well. Thus the only reliable lever donors have

is that of augmenting the total resource envelope of recipients and work through the effects of this on their behavior. This paper conducts an analysis of such unconditional aid in the framework of optimal nonlinear income taxation, which takes into account incentive effects on governments of recipient countries in choosing policies, and the incentive effects of their citizens in responding to these policies.

We find that unconditional aid increases overall welfare of the recipient country, which is not surprising. It also increases the welfare of the poorest in the recipient country. More aid induces more progressive tax and transfer systems to be optimally chosen by the recipient government. There is, however, a "crowding out" effect as the extra resources reduce incentives to supply labor in the recipient country—this effects ranges from 1 to 5 percent of GDP.

When there are two potential recipient countries for a given pool of aid, the optimal allocation of aid depends on their relative characteristics. The poorer country should get more aid, as should the country which has higher inequality aversion. What about the effect of inherent inequality? There are two forces pulling in opposite directions. For any given mean income, greater inequality means the poor are poorer so the need of the country is greater. However, with greater inequality, less of any unconditional aid will get to the poor. Our numerical calculations produce striking result. For the parameter values used here, the country with the greater inequality should get less in the way of unconditional aid.

Further research suggests itself in bridging the gap between our assumption of totally unconditional aid, and the opposite assumption of perfect conditionality. In the framework developed here, imperfect conditionality might mean, for example, that the donor could enforce a minimum income level for the poor but could not control the entire tax-transfer schedule. Or we could think of the aid received being split into two categories, one with perfect conditionality and the other with total non-conditionality. The relative proportion of resources going to each could then be varied parametrically. In any event, the brute facts of the failure of conditionality mean that at least some aspects of unconditional aid will have to be introduced into the analysis and design of development assistance.

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