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Some Simple Analytics of Poverty Redress through Direct Income Transfers and Wage Employment Programmes

A Review and Commentary

S. Subramanian

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Abstract

This paper is a review and commentary, from both ethical and informational perspectives, of some known results in optimal anti-poverty budgetary rules for two kinds of intervention, direct income transfers and wage employment programmes.

Keywords: poverty, income distribution, employment

JEL classification: I32, I38, D63

* Madras Institute of Development Studies, Tamil Nadu, India; email: subbu@mids.ac.in

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UNU World Institute for Development Economics Research (UNU-WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

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1 Introduction

Direct income transfers and wage employment programmes are two specific instruments available for the redress of poverty. Two issues which are central to an assessment of these anti-poverty interventions are: (a) what is an optimal transfer/wage schedule? and (b) once the target population and the level of benefits to each member of the target population have been determined, how (informationally) demanding is it to ensure that the benefits reach only the target population? The answer to the first question would depend on precisely how one chooses to measure poverty, and the answer to the second question would depend on such properties of 'self-selection' as alternative forms of intervention may possess. Either or both sorts of questions have been addressed analytically by, among others, Basu (1981, 1991), Bourguignon and Fields (1990), Ravallion (2001, 1990), and Gangopadhyay and Subramanian (1992). In this note, the issues outlined above are investigated further. The results reported here on optimal anti-poverty rules are mainly known results which draw considerably on the papers cited above, but they have nevertheless been dealt with for two reasons: (a) these results are an integral part of the paper; and (b) it may be independently useful to have a quick review of the relevant results, all in one place.

The paper is organized as follows. Section 2 deals with preliminary formalities of poverty measurement. Section 3 reviews optimal anti-poverty policy, corresponding to different members of the Foster, Greer and Thorbecke (1984) P_α family of poverty measures, for both transfer and employment programmes, under conditions of presumed complete knowledge regarding the personal distribution of incomes. Section 4 compares the cost effectiveness of transfer and employment programmes under assumptions of full and partial knowledge of the income distribution curve. In section 5, Basu's (1991) arguments in favour of a 'low' wage in wage employment programmes are reviewed from both normative and informational perspectives. Section 6 advances the cause of a modified wage employment programme as a form of disguised transfer payment to the poor which promotes investment in human capital. Section 7 concludes.

2 Poverty measures: a quick review

We begin with some preliminary formalities: x is a random variable signifying income and is distributed over the interval $[0,m] \equiv U$. $F(x)$ is the cumulative density function of x. The *poverty line* z is a positive level of income such that units with income less than z are declared to be poor. The interval $[0,z)$ will be designated Z. A *poverty index* P is a function which measures the extent of poverty by assigning a real number to every pair of cumulative distribution function $F(x)$ defined on U, and poverty line z, in its domain. A class of poverty indices which has been much used in the literature, and is particularly helpful in facilitating policy analysis, is the so-called P_α class of measures, due to Foster, Greer and Thorbecke (1984), and which can be written as

$$(1) \qquad P_\alpha = \int_Z [(z-x)/z]^\alpha dF(x)$$

As is well known, for $\alpha = 0$, the index P_α becomes just the *headcount ratio* (or proportion of the population in poverty) $F(z)$; for $\alpha = 1$, P_α becomes the *per capita income-gap ratio* R, which is the product of the *headcount ratio* H and the *income-gap ratio* I, where the latter is the proportionate shortfall of the average income of the poor

μ^P from the poverty line ($I = (1 - \mu^P/z)$); for $\alpha = 2$, P_α becomes the distributionally sensitive index $H[I^2 + (1 - I)^2]C^2_P$, where C^2_P is the squared coefficient of variation in the distribution of poor incomes; and, as α increases, P_α becomes more and more distributionally sensitive until, in the limit, as $\alpha \to \infty$, we obtain a sort of 'Rawlsian' measure which ranks distributions solely according to the size of the lowest income. A poverty index P will be said to satisfy the *monotonicity axiom* if, given a poverty line z, P is greater for the distribution F(x) than for the distribution G(x) whenever $F(x) \geq G(x)\ \forall x \in U$ and $F(x) > G(x)$ for some $x \in Z$. The index P will be said to satisfy the *transfer axiom* if, given a poverty line z, P is greater for the distribution F(x) than for the distribution G(x) whenever $\int_0^x [F(s) - G(s)]ds \geq 0\ \forall x \in U$, $F(x) - G(x) > 0$ for some $x \in Z$, and $\int_U [F(x) - G(x)]dx = 0$, that is, whenever G(.) is derived from F(.) through a sequence of mean-preserving progressive transfers of which some benefit the poor (see Shorrocks and Subramanian 1994). The indices in the P_α family satisfy the monotonicity axiom for all $\alpha > 0$, and the transfer axiom for all $\alpha > 1$. These properties play a crucial role in determining optimal anti-poverty allocations: this will become evident from a consideration of budgetary rules designed to minimize poverty as measured by different members of the P_α family of indices.

3 The P_α indices and optimal anti-poverty policy: another quick review

3.1 Direct income transfers

We consider first the case of direct income transfers. The budget available for transfers is designated by B, and it is assumed that the budget is not large enough to raise the entire population in poverty out of it, viz. $B < \int_Z (z - x)dF(x)$. The policymaker's problem is to select a schedule of transfers $<t(x)>$ which will minimize the chosen poverty measure in the P_α family, subject to the requirements (a) that the sum of transfers will not exceed the budgetary outlay, (b) that no transfer will exceed the poverty gap, and (c) that the poor will not be taxed. Formally, the optimization problem—which will be called problem 1—can be written as follows:

Problem 1

Minimize $P_\alpha = \int_Z [(z - x - t(x))/z]^\alpha dF(x)$
$<t(x)>$

subject to: (a) $\int_Z t(x)dF(x) \leq B$; (b) $t(x) \leq z - x\ \forall x \in Z$; and (c) $t(x) \geq 0\ \forall x \in Z$

The solutions (i.e. optimal transfer schedules $<t^*(x)>$) to this problem, for distinguished values of α, are provided below (see Bourguignon and Fields 1990, and Gangopadhyay and Subramanian 1992, for elaboration).

$\alpha = 0$

$t^*(x) = z - x\ \forall x \in T^*$, where $T^* \equiv [x_0, z)$ and $\int_{T^*}(z - x)dF(x) = B$

$= 0\ \forall x \in Z \backslash T^*$

$\alpha = 1$

Any feasible transfer schedule <t(x)> which exhausts the budget is also optimal.

$\alpha > 1$

$t^*(x) = x^* - x \ \forall x \in T^{**}$, where $T^{**} \equiv [0,x^*)$ and $\int_{T^{**}}(x^* - x)dF(x) = B$;

$= 0 \ \forall x \in Z \backslash T^{**}$.

When $\alpha = 0$, minimization of the headcount index requires allocating the entire budget to the richest of the poor: the poverty gaps of the richest are bridged till the budget is exhausted. When $\alpha = 1$, minimization of the per capita income-gap index admits an infinite number of solutions, and this is scarcely a useful guide to policy. When $\alpha > 1$, minimization of a distributionally sensitive index requires allocating the entire budget to the poorest of the poor: the incomes of the poorest are all raised to the highest level x^* ($< z$) which is compatible with the size of the budget—this is a sort of 'lexicographic maximin' solution.

3.2 Wage employment programmes

We consider next the case of wage employment programmes. The relevant constrained optimization problem here will be called problem 2, which can be written, in analogy with problem 1, as follows (notice, first, that <w(x)> is a wage schedule; second, that it is assumed nobody will participate in the wage programme if their income x is at least as much as the wage on offer w(x); and third, that the budget is not large enough to ensure that poverty can be eradicated through the programme, viz. $B < zF(z)$.

Problem 2

Minimize $P_\alpha = \int_Z [(z - \max\{x,w\})/z]^\alpha dF(x)$
<w(x)>

subject to: (a) $\int_Z w(x)dF(x) \leq B$; (b) $w(x) \leq z \ \forall x \in Z$; and (c) $w(x) \geq 0 \ \forall x \in Z$.

As earlier, we consider the optimal solutions to this problem for different members of the P_α family of poverty measures. (A more elaborate account can be found in Gangopadhyay and Subramanian 1992.)

$\alpha = 0$

$w^*(x) = z \ \forall x \in T, \ \forall T \subset Z: \int_T z dF(x) = B$

$\alpha = 1$

$w^*(x) = z \ \forall x \in T1$, where $T1 \equiv [0,x_1)$ and $zF(x_1) = B$

$\alpha = 2$

$w^*(x) = w_2 \ (< z) \ \forall x \in T2$, where $T2 \equiv [0,x_2)$ and $w_2F(x_2) = B$

$\alpha \to \infty$

$w^*(x) = w_\infty \ \forall x \in T^\infty$, where $T^\infty \equiv [0,w_\infty)$ and $w_\infty F(w_\infty) = B$

For both $\alpha = 0$ and $\alpha = 1$, the optimal wage is pitched at the high level of the poverty line income z; while the target population in the first case can be *any* subset of the poor population, in the second case, the target population (T1) is confined to the poorest $F(x_1)$ proportion of the population. For $\alpha = 2$, the wage is pitched lower, at w_2, and this enables a larger target population (T2), consisting of the poorest $F(x_2)$ proportion, to participate in the wage employment programme. Indeed, as α increases (that is, the poverty measure becomes more distributionally sensitive), the optimal wage declines and coverage increases, until, in the limit, as $\alpha \to \infty$, the wage is pitched as low (i.e. at w_∞) as is compatible with everybody, who is willing to work at the wage on offer, being able to participate, which in this case is the poorest $F(w_\infty)$ proportion of the population.

Basu (1991) has a helpful diagrammatic representation of what, essentially, is the solution for the $P_{\alpha \to \infty}$ case, and his approach can be employed to illustrate also the solutions for the other cases we have considered. In Figure 1, we represent the wage rate on the horizontal axis and the amount of labour on the vertical axis (this inverts the axes as Basu draws them), and two curves are plotted. The first is a rectangular hyperbola (labelled 'potential employment' as in Basu) which, given that the budget is of size B,

Figure 1

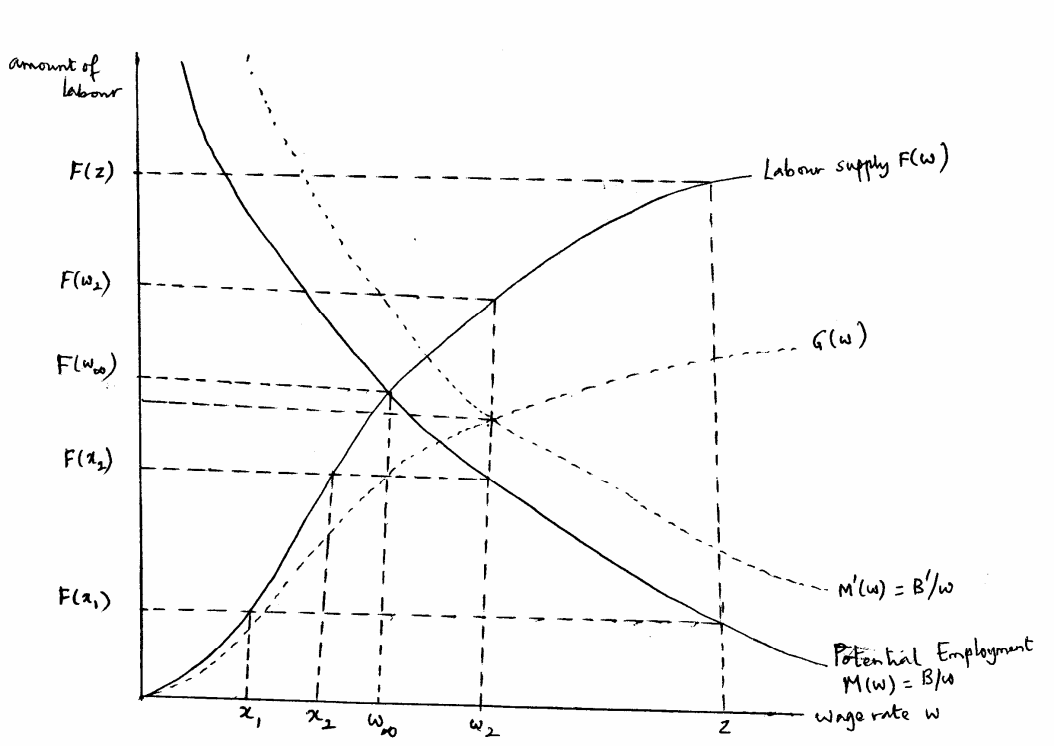

Figure 1 : Wage-setting in an employment programme

indicates, for any wage rate w, the maximum labour M(w) that can be employed, namely B/w. The second curve is the labour supply curve, which is just the cumulative density function F(w). Basu recommends that the wage rate should be chosen in such a way that the number of persons willing to work at this wage coincides exactly with the

maximum labour—given that the budget is B—which can be hired at this wage. The wage in question is clearly determined by the point of intersection of the two curves, and is, precisely, what we have earlier called w_∞—the solution to the $P_{\alpha \to \infty}$—minimization problem—corresponding to which the employment coverage is the poorest $F(w_\infty)$ proportion of the population (see Figure 1). Similarly, if we wish to minimize the index P_1, the wage rate should be fixed at the poverty line level of income z, and the employment coverage should be targeted at the poorest $F(x_1)$ proportion of the population, while if it is P_2 that is sought to be minimized, the optimal wage is w_2 and the targeted coverage is the poorest $F(x_2)$ proportion of the population. As can be easily seen from Figure 1, as the poverty measure which is minimized changes from P_1 to P_2 … to $P_{\alpha \to \infty}$, the optimum wage declines from z to w_2 … to w_∞, at the same time that the targeted coverage increases from the poorest $F(x_1)$ proportion of the population to the poorest $F(x_2)$ proportion … to the poorest $F(w_\infty)$ proportion.

3.3 A simple illustration

To illustrate the results presented in section 3.2, we employ a simple numerical example wherein the cumulative density function is specialized to the linear form $F(x) = x/m \ \forall x \in U$, m is taken to be 20, z is taken to be 10, and B is taken to be 1. The level of benefits and the target population, for each type of intervention (direct transfers and employment programmes), and for parametric variation of α in the P_α family of poverty indices, are specified below.

Direct income transfers

$\alpha = 0$

The target population is the interval $T^* \equiv [8.94,10)$; the optimal transfer is $(10 - x) \ \forall x \in T^*$; and the beneficiaries are the richest 10.6 per cent of the poor population, while the poorest 89.4 per cent are excluded.

$\alpha = 1$

Any budget-exhausting feasible transfer schedule is also optimal.

$\alpha > 1$

The target population is the interval $T^{**} \equiv [0,6.32)$; the optimal transfer is $(6.32 - x) \ \forall x \in T^{**}$; and the beneficiaries are the poorest 63.25 per cent of the poor population, while the richest 36.75 per cent are excluded.

Wage employment programme

$\alpha = 0$

The optimum wage is z (= 10), and the target population is *any* 20 per cent of the poor population.

$\alpha = 1$

The optimum wage is again z (= 10); the target population is the interval $T1 \equiv [0,2)$; and the beneficiaries are the poorest 20 per cent of the poor population.

$\alpha = 2$

It may be instructive to actually work through the solution to the problem. With a wage schedule of $<w(x)>$, the value of the poverty index P_2 is given by:

$$P_2 = \int_Z [(z - \max\{x, w(x)\})/z]^2.$$

At the optimum, let T2 be the target population. It is clear that $\forall x \in T2$: $w(x) = w$ (say). For suppose not. Then $\exists\ x, x' \in T2$: $w(x) > w(x')$ or $w(x) < w(x')$—which, however, cannot be an optimal outcome since, because P_2 satisfies the transfer axiom, equalizing $w(x)$ and $w(x')$ will reduce poverty. Further, again since P_2 is transfer-preferring, the target population must be the poorest of the poor, namely $T2 = [0,x_2)$ where x_2, out of deference to the budget constraint, must satisfy $F(x_2) = B/w$. Given this, the problem becomes one of choosing w so as to minimize

$$P_2 = \int_{T2} [(z - w)/z]^2 dF(x) + \int_{Z \setminus T2} [(z - x)/z]^2 dF(x)$$

Recalling that $F(x) = x/m\ \forall x \in U$, $m = 20$, $z = 10$, $B = 1$, and $F(x_2) = B/w$, some simple manipulation will show that the problem reduces to choosing w so as to minimize

$$P_2 = (373/300) + (w/100) + (2/w^2) - (4/3w^3).$$

The first order condition for a minimum ($\partial P_2/\partial w = 0$) yields an optimal wage rate—call it w_2—of 7. (It can be verified that the second order condition is also satisfied.) Since $F(x_2) = B/w$, one obtains (after plugging in the relevant values): $x_2 = 2.86$, and $F(x_2) = 0.1429$ (or, since $F(z) = 0.5$, $F(x_2)/F(z) = 0.2857$). To summarize:

When $\alpha = 2$, the optimum wage w_2 is 7; the target population is the interval $T2 \equiv [0,2.86)$; and the beneficiaries are the poorest 28.57 per cent of the poor population.

$\alpha \to \infty$

The optimum wage w_∞ is 4.47; the target population is the interval $T^\infty \equiv [0,4.47)$; and the beneficiaries are the poorest 44.72 per cent of the poor population.

Table 1 conveniently summarizes all these results.

Table 1. Summary of optimal solutions

Poverty index	Target population	Optimal transfer schedule	Coverage (% of poor population that benefit)
1 **Direct income transfer**			
P_0	T* = [8.94,10]	$t^*(x) = 10-x \ \forall x \in T^*$; $= 0 \ \forall x \notin T^*$.	10.6
P_1	Variable	Any feasible schedule which exhausts the budget	Variable
$P_{\alpha>1}$	T** = [0,6.32]	$t^*(x) = 6.32-x \ \forall x \in T^{**}$; $= 0 \ \forall x \notin T^{**}$.	63.25
Poverty index	Target population	Optimal wage	Coverage (% of poor population that benefit)
2 **Wage employment programme**			
P_0	Any 20% of poor population	z (=10)	20
P_1	T1 = [0,2]	z (=10)	20
P_2	T2 = [0,2.86]	7	28.57
$P_{\alpha\to\infty}$	T^{∞} = [0,4.47]	4.47	44.72

4 Direct income transfers and wage employment programmes: a comparison

In comparing the cost effectiveness of the two modes of anti-poverty intervention we have considered, we can either compare the post-intervention values of the poverty index for a given budgetary outlay, or the budgetary outlays required to secure a given post-intervention value of the poverty index (see Ravallion 2001 [1990]). In the context of the simple numerical example worked out in section 3.3, it can be verified that if, for specificity, we choose to minimize the $P_{\alpha \to \infty}$ index, then, for a budgetary outlay of B = 1, the value of the poverty index in the direct transfers (respectively, employment programme) case is 0.0511 (respectively, 0.0965). Alternatively, if the post-intervention target value of the poverty index is 0.0965, then this target—it can be checked—can be achieved in the direct transfers (respectively, employment programme) case with a budgetary outlay of 0.5 (respectively, 1.0). Direct transfers are clearly more cost effective than employment programmes—*under the assumption of perfect knowledge regarding the personal distribution of incomes*. If, however, the policymaker only has knowledge of the *shape* of the cumulative density function F(x), without knowledge of *who has what income*, then that would suffice to implement the optimal wage schedule, but not the optimal transfer schedule. To achieve perfect targeting of income transfers to the intended beneficiaries would require investment in collecting the necessary data on who has what income. Let the cost of collecting such data (assuming this is feasible at all) be c. Let b be the difference in budgetary outlays needed under the two schemes to secure a given post-intervention target value of the poverty index (in the numerical example just considered, where the objective was to reduce $P_{\alpha \to \infty}$ to a value of 0.0965, b = 1.0 – 0.5 = 0.5). One could say that transfers are more effective than employment schemes if c < b, and the other way around if c > b (see Gangopadhyay and Subramanian 1992).

But how do we compare alternative wage allocation strategies *within* the overall employment approach to poverty redress? Some elements of this problem are discussed in the following section.

5 Employment programmes and alternative wage patterns

5.1 On an 'ethical' wage

Basu (1981, 1991) was among the first to explicitly address the question of what constitutes an 'ethical' wage in wage employment programmes. Responding to criticisms (for example Dandekar and Sathe 1980) that wages were often set very low in public employment programmes, Basu argues that from both intrinsic (ethical) and instrumental ('self-selection') points of view, there is a case for keeping wages low in a specific sense. This 'specific sense' is constituted by what we have called the w_∞ wage rate, whose derivation Basu explains in terms of the diagrammatic representation of Figure 1 (reviewed in section 3.2). Basu's ethical argument for setting the wage at w_∞ is best expressed in his own words (Basu 1991: 366-7):

> [Dandekar and Sathe 1980] found that 90 per cent of the people working on [the Employment Guarantee Scheme in Maharashtra] continue to be below the poverty line despite such work. From this they went on to conclude that wages should be raised. In the case of Bangladesh, Ahmed and Hussain (1985: 80) observed that wages paid to FFW [Food For Work] workers were substantially below the officially stipulated wage rate. 'It has been shown that about 56 per cent of the workers did not know about the stipulated wage rate. Those who know do not bargain lest they do not get the jobs at all as *there are many others who are unemployed and would be too willing to take them up on the offered terms and conditions*'(my [Basu's] italics). It is the italicized part which suggests why underpayment need not be unethical, since that will make it possible to employ a large number of people who are needy enough to be willing to work for a low wage.
>
> Suppose we subscribe to a headcount view of poverty and try to minimize this. Then, given a total stock of foodgrain X, which is to be disbursed through the FFW, we would try to heap it on people so as to ensure that the maximum number of people cross the poverty line. But clearly our more intuitive normative penchant (as opposed to one formally derived from trying to minimize the headcount index) would be to spread out X over the poorest people, even if that leaves the numbers on the two sides of the poverty line the same. Fortunately, according to some more sophisticated measures, this will register a decline in poverty…. [w_∞], it is being argued here, is the wage that we should aim to offer…. [T]here are three ways of raising the wage:
>
> i) By improving the opportunities open to labourers (by, for example, having infrastructural investments in the rural sector). This would [lower] the supply curve in [Figure 1].

ii) By assigning a larger food stock for distribution through FFW. This raises the 'potential employment' curve.

iii) By simply deciding to set [w] above [w_∞] and maintaining an excess supply of labour. What I have argued above is that we should raise wages via methods (i) and (ii); option (iii) ought not to be normally used.

In assessing Basu's argument, one can readily see his case *against* pitching the wage rate at z, if that stratagem is dictated entirely by some primary, non-contingent value (of the type called *basic* by Sen 1967) which upholds the desirability of minimizing the headcount ratio: this poverty index, which fails both the monotonicity and transfer axioms, has little in the way of ethical appeal to (unconditionally) commend it. But why must a rejection of P_0 on ethical grounds entail an endorsement *only*, and at the polar extreme, of $P_{\alpha \to \infty}$, the sole member of the P_α family of poverty measures whose minimization is compatible with an optimal wage of w_∞? The answer is self-evident if the ethical content of the wage-setting exercise is driven solely by considerations of equitableness. For then, in as much as the distribution-sensitivity of P_α is an increasing function of α, one must necessarily go all the way down to indefinitely large values of α in order to be maximally 'equity-conscious' (and therefore, interchangeably, 'ethical'). But assigning lexical priority to equity over all other considerations may not, for good reason, be a widely-held basic value: there are rational moralities which entertain tradeoffs between equity and other values (such as efficiency), and which resist an unconditional insistence on various forms of 'positional dictatorship'. Indeed, it has often been held that the 'extreme' egalitarianism upheld by 'Rawls-type' formulations (of which the measure $P_{\alpha \to \infty}$ is an example) is an endorsement of a somewhat unattractive form of 'dictatorship of the weakest/poorest'.

It is not exceptionable, therefore, to fail to see that maximizing coverage is the only valid objective of an anti-poverty employment programme: there may be a genuine ethical case for effecting a tradeoff between coverage, on the one hand and, on the other, the individual-specific level of benefit which is delivered by the programme. The point may be exemplified by means of an analogy (while guarding against a literal-minded interpretation of the parallels sought to be established). Suppose it takes Rs 10 to acquire one square meal, and that a ten-rupee note is available for charity. There are, let us say, six potential beneficiaries to consider, of whom one can already afford one square meal and the remaining five have completely empty pockets. The ability to have command over two square meals, it will be assumed, will constitute the ability to escape 'poverty'. Suppose the choice of allocations is restricted to a set of three options {A, B, C}. In option A, the richest of the six poor individuals is given the ten-rupee note, which will reduce the (aggregate) headcount index of poverty from six to five. In option B, one of the five completely destitute individuals is given the ten-rupee note, in which case the headcount index will remain unaltered but poverty, according to 'some more sophisticated poverty measures', will register a decline. In option C, each of the five destitutes is given Rs 2, which again will not affect the headcount calculus but will be endorsed by a 'Rawls-type' poverty index. It is conceivable that two equity-conscious individuals may be united in resisting option A without necessarily agreeing about the ranking of options B and C. There is a certain resonance with the 'life-boat ethics' dilemma here. It could well be held that enabling just one of the five destitutes to acquire at least one square meal (option B) might be

'ethically superior' to leaving all five of them better off than initially but still in fairly impaired circumstances with Rs 2 each (option C).

The tradeoff between the coverage of an unemployment scheme and the wage that is offered has similarities to the problem exemplified by the above illustration. The very fact of entertaining reasonable grounds for effecting a tradeoff has two *general* implications which may be worth emphasizing. The first is that it may be factually mistaken to credit the planner or evaluator with a conscious and deliberate choice of poverty index whose minimization then leads to her/his wage-setting recommendation. The second is that it may be normatively mistaken to infer an unconditional preference over alternative poverty indices on the planner's or evaluator's part on the basis of her/his wage-setting recommendation. These issues are elaborated in what follows.

First, the 'factual mistake'. Let T be the target population of an employment programme, and w the wage rate compatible with the coverage implied by T. In practice, one might be expected to have a more direct and immediate judgement of the relative attractiveness of alternative combinations of (T,w) than of the relative attractiveness of alternative values of an exponential parameter (α) in a poverty index. Typically, that is, one would—taking all 'relevant considerations' into account—favour some particular combination of (T,w), say (T*,w*). It is true, of course, that one can *infer* the value of α—call it α*—such that a minimization of P_{α^*} will yield (T*,w*) as the optimal solution to the wage-setting problem. The factual point to note is that it is not a deliberate choice of α* and the minimization of P_{α^*} which has resulted in the recommendation of (T*,w*), but that the latter choice is prior (and compatible with, though not caused by, the minimization of P_{α^*}). This is saying no more than what is contained in Basu's statement attributing a greater immediacy to 'our more intuitive normative penchant [than to] one formally derived from trying to minimize [a poverty] index…'. (Only, and as we have seen earlier, it is conceivable that one's 'normative penchant' could lead to a recommendation of (T*,w*) which is different from Basu's prescription of (T^{∞},w_{∞}).)

Second, the 'normative mistake'. This has to do with the possibility that a criticism of a 'low' wage in a public employment programme may well be an indirect criticism of the smallness of the budgetary outlay B and/or the height of the cumulative density function F(.). Specifically, while w_{∞} is always the lowest budget-exhausting wage that can be set *in relation to the size of B and given the F(.) function*, unhappiness with the lowness of w_{∞} may stem from an absolute rather than relative perspective. If w_{∞} is seen to be an *absolutely* low wage, then, to endorse w_{∞} after 'normalizing' for B and F(.) might be to endorse (a) poor macroeconomic management in the dimensions of growth and distribution (as reflected in F(.)) and/or (b) low budgetary allocations (as reflected in the size of B) arising, possibly, from fiscal profligacy or excessive defence spending or poor revenue collection. Going back to Figure 1, a critic who favours w_2 over w_{∞} when the cumulative density function is F(.) and the budgetary outlay is B, may continue to endorse w_2 when the cumulative density function shifts downward to G(.) through investment in rural infrastructure, and the potential employment curve moves outward through an increase in the budget size from B to B′: but notice from Figure 1 that w_2 under the new dispensation is precisely the wage (Basu's prescription!) yielded by the intersection of the (new) supply and potential employment curves. To put it differently, it is possible for one—without being guilty of ethical inconsistency—to appear to be minimizing poverty as measured (say) by the index P_2 under one set of circumstances,

and by the index $P_{\alpha \to \infty}$ under a different set. Hence the difficulty of inferring a person's 'ethical orientation' from an allegedly 'revealed' preference over poverty indices.

To summarize: (a) a choice of (T,w) which is dictated by minimization of $P_{\alpha \to \infty}$ would be regarded as the uniquely ethical outcome only if lexical priority is accorded to the value of equity; (b) if tradeoffs with other values are permitted, then ethically rationalizable choices of (T,w) could diverge from (T^{∞},w_{∞}); (c) it may be empirically erroneous to causally associate choices of (T,w) with deliberate minimization of some well-defined poverty index; and (d) it may be normatively erroneous to deduce an unconditional ('revealed') preference in the space of poverty measures from data on preferences in (T,w) space.

5.2 Self-selection

The second argument in favour of the low wage of w_{∞} is linked to the self-selection feature of this wage-setting formula; as Basu (1991: 367) puts it: '[w_{∞}] has another advantage. It sharpens the self-selection property of FFW since…, as [the wage] becomes smaller, the wealthier (in terms of labour income) will be less inclined to come for FFW jobs, thereby paving the way for the poor to take these up'. This, of course, is true, but the policymaker needs to *know* what the wage w_{∞} is before its self-selection property can be exploited. The question therefore arises of what information the planner requires, at a minimum, in order to identify the wage w_{∞}. It would appear that a necessary item of information is the shape of the cumulative density function F(.). While it is one thing to know that w_{∞} is determined by the intersection of the labour supply (or F(w)) curve and the employment potential (or M(w)) curve, the 'actual execution of this', as Basu (1991: 366) says, 'may not be as easy as it appears. In Afghanistan, wages were set so low, in an effort to maximize the spread, that the projects were perennially short of labour. In Lesotho the wage was set so high that landowners were quitting working on their own land to work at FFW sites'. Briefly, in order to implement the w_{∞} solution, the planning agency must be assumed to have knowledge of the income distribution (though not, of course, knowledge of who has what income).

With knowledge of the shape of the F(.) function, it may appear that the 'sharpened self-selection' property is exclusively a feature of the w_{∞} wage solution. For, if the objective is to implement, say, the w_2 wage, then note that the optimal (P_2-minimizing) coverage is constituted by the poorest $F(x_2)$ proportion of the population; however, the potential suppliers of labour at a wage of w_2 are constituted by the poorest $F(w_2)$ proportion of the population, and (see Figure 1) since F(.) is a monotically increasing function and $w_2 > x_2$, $F(w_2) > F(x_2)$. So the question arises as to how, in the presence of this excess supply, one can confine the wage employment programme to the target population $T2 \equiv [0,x_2]$ when one only has knowledge of the shape of the cumulative density function but not of who has what income. This, presumably, is the second, instrumental (or 'sharpened self-selection') argument in favour of the Basu (w_{∞}) wage solution.

In principle, however, the planning agency can implement the w_2 wage solution by making a wage policy announcement which is 'incentive compatible'. To see what is involved, let us employ h_2^* as a shorthand for B/w_2. Let h_2 stand for the actual labour supply when the wage rate is w_2. (Of course, $h_2 = F(w_2)$). The agency could now make

the following wage policy announcement, call it Announcement W: 'The wage on offer will be w_2, *provided* h_2 does not exceed h_2^*; if h_2 does exceed h_2^*, then the wage on offer will drop to x_2'. Every person with income $x \in T2 \equiv [0,x_2)$ may be expected to reason as follows: 'the wage on offer, even under the worst circumstances, is x_2, which compares favourably with my reservation wage, so it is worthwhile for me to participate'. Every person with income $x \in [0,w_2) \backslash T2$ may be expected to reason as follows: 'Clearly, each person with income $x \in T2$ will participate. If I, too, decide to participate, then h_2 will exceed h_2^*, and the wage on offer will be only x_2—which compares unfavourably with my reservation wage. There would therefore be no point in my participating'. The net effect is to make Announcement W capable of implementing the P_2-minimizing solution. The 'instrumental' justification for the low wage of w_∞ is, therefore, arguably not uniquely relevant to the w_∞ wage solution.

6 A modified wage employment programme

Anti-poverty wage employment programmes, in principle, are supposed to contribute to the creation of physical infrastructure and durable assets with a potential for generating benefit streams into the future. In practice, however, a great many of these schemes end up, as Basu (1981) puts it, in the creation of 'roads that get washed away' during the next monsoon. In effect, therefore, these 'wage employment programmes' are a disguised form of direct transfers with the advantage of a built-in self-selection feature in them. This advantage, however, is purchased at a cost: the wage component of an employment programme is not the only component of costs that needs to be reckoned. Ravallion (2001 [1990]; 287) points out that 'the agency incurs an administrative cost … in addition to the benefit paid out. For example in a relief work scheme, this covers supervision and all materials and tools used…' Citing evidence from India, Guhan (2001: 315-16) reports: 'the nominal wage component in the total cost involved in creating a personday of employment was about 50 per cent in the late 1980s…' He proceeds to list a number of generic drawbacks of employment schemes:

> The poor can derive indirect benefits from the assets created under the EGS [Employment Guarantee Scheme] but only on two conditions: the assets must be durable (not just roads that are washed away in the next rains) and they should be such as to benefit the poor (at least along with the non-poor). Available studies indicate that non-durable rather than more permanent works tend to be preferred for a variety of reasons: the dispersion of the works, the tendency to economize on materials in order to increase the wage content, and local political pressures. In many cases, works are abandoned incomplete and new ones started elsewhere: the maintenance is sorely neglected (Mahendra Dev 1992: 52-3). Furthermore, assets such as irrigation, soil conservation, and roads are likely, by their very nature, to benefit the landowning and trading non-poor rather than those who have laboured to create them. … [Employment schemes also] leave out … the unemployable such as the old and the handicapped and do not have an urban equivalent (Guhan 2001: 316-7).

For all practical purposes, therefore, a wage employment programme could be a somewhat expensive form of direct income transfer: that is to say, if the wage on offer

is w, then every person in the identified target population is enabled to avail himself of this 'dole', provided he foregoes his existing income which, specifically, will require him to be physically present at the work site for the duration of the day when he could be earning his income elsewhere. It would amount to more than a figure of speech to suggest that evaluations of actual performance on the ground indicate that the costs of an 'employment' programme might be significantly less if the beneficiary were required not to work but merely to twiddle his thumbs. However, it is neither attractive nor practicable to enclose human beings in a pen in order to secure the requisite measure of self-selection. Indeed, one way of exploiting the distinctive advantage of an employment scheme while mitigating some of its distinctive drawbacks as enumerated by Guhan, would be to reformulate it as an *adult literacy programme*. Specifically, if it is believed to be worthwhile to transfer a benefit of, say, w* to each individual in the poorest, say, h* proportion of the population, then presumably this can be achieved through a policy announcement of the type W considered toward the end of section 5. Only, the benefit of w* is now a compensation not for physical labour but for putting oneself through school. Savings on implements, tools and materials can be substantial; corrupt and inefficient works contractors can be by-passed; the old and the disabled need not be excluded from the ambit of programme benefits; a significant contribution to the creation of a capital asset—albeit social and human rather than physical—can be achieved; the stream of benefits from the acquisition of literacy can be ensured to accrue to the poor, with the added attraction of a large component of (particularly intra-household) externality being generated by the literacy programme (on which see Basu and Foster 1998); and an adult literacy programme, unlike an employment scheme, can be replicated in the urban areas.

7 Concluding observations

In this paper we have quickly reviewed optimal anti-poverty budgetary rules, in the context of two kinds of intervention—direct income transfers and wage employment programmes—when poverty is measured by a spectrum of indices describing different degrees of distribution-sensitivity and belonging to the well-known Foster, Greer and Thorbecke (P_α) family of measures. The two types of intervention have been compared in terms of cost effectiveness under conditions of both partial and complete information regarding the personal distribution of incomes. The case of employment programmes has been analysed with respect to both the ethical and (informationally) instrumental advantages which might be possessed by alternative optimal policies—corresponding to the minimization of alternative poverty measures—in the form of different wage-coverage combinations. It has been argued that a 'low wage-large coverage' combination does not necessarily dominate, either from ethical or sharply-defined self-selection considerations, other plausible 'equity-conscious' combinations. Finally, attention has been drawn to the possible advantages of reformulating a wage-employment programme as an adult literacy programme, where the emphasis is on exploiting the principle of self-selection which is integral to employment schemes while avoiding some of their drawbacks. This paper has been largely in the nature of an analytical summary of a number of important debates in anti-poverty policy, with the objective less of presenting a set of revelatory results than of reviewing and clarifying a class of issues native to the literature.

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