Inter-American Development Bank
Office of the Chief Economist
Working Paper 342
Washington D.C.

POLICY OPTIONS FOR POVERTY ALLEVIATION

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***Abstract**:* This work builds on previous research to develop some methodology that simplifies the identification of the best policy options for poverty alleviation in a given country. The argument we develop is that when a population can be divided into subgroups according to an easily identifiable characteristic, the problem of alleviating poverty through a targeted mechanism can be viewed as one of choosing among three options: (i) provoking a marginal change in the average income of certain subgroups; (ii) changing the distribution of resources within subgroups in the margin; and (iii) generating a marginal change in the differences between the subgroups. To asses the impact of each possibility we derive a formula that measures the elasticity of a poverty index to changes in the level and distribution of income, and argue that the between-group elasticity is an indicator of the potential of using one characteristic rather than another. This indicator simplifies the ranking of characteristics in terms of their usefulness for guiding resource allocation, and provides a broad picture of the options that policy makers have at hand. To illustrate the usefulness of the methodology, we will apply it to recent data from Mexico.

JEL Classification: I3, O54, D63, O2

Keywords: Poverty, Inequality, subgroup decomposition, Mexico.

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+ The views expressed in this work are those of the author and do not necessarily reflect those of the Inter-American Development Bank.

Note: This paper is published as Chapter 6 in Székely, M. *The Economics of Poverty, Inequality and Wealth Accumulation in Mexico*, **MacMillan**, London, 1998.

March 1997

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Introduction

The rises in poverty and inequality that accompanied the widespread implementation of stabilization and macroeconomic liberalization programs in most of the developing world since the early 1980s, have had important consequences for the design of policies aimed at alleviating poverty, as most governments are now facing growing social demands while having access to more limited funds to satisfy them. This has enhanced the need for more efficient poverty alleviation strategies that either achieve larger gains under a given budget, or that reduce the financial cost of a given poverty reduction.

The literature on poverty measurement has addressed the above issue by developing targeting techniques that help to balance the costs of finding the intended beneficiaries of a program, and the benefits of increasing the resources that each member of the target population receives. As precise and detailed information about whom and where the poor are is not usually available, the alternative has been to use an easily identifiable characteristic by which the population can be classified into subgroups, with which the problem can be stated as one of reaching target groups rather than individuals.

One of the problems of designing the best targeting schemes in the latter context, is that it is usually difficult to determine which population characteristic should be used to guide the resources (e.g. grouping the population according to its geographic location rather than depending on its schooling, gender, age, or other observable attributes). Strictly speaking, one should measure the financial costs and benefits of each feasible option before taking such decisions, but due to the difficulties of performing such estimations, this is not normally done[1]. Moreover, although several authors have already noted that the impact of a targeted program will ultimately depend on the ways in which the subgroups are defined (if characteristic *a* is less correlated with poverty than characteristic *b*, it is likely that choosing *a* over *b* will yield smaller poverty reductions), there seem to have been few efforts to rank the characteristics as for their advantages to increase the effectiveness of the resources.

The objective of this work is to build on some existing methodologies to develop a simple way of ranking population characteristics in terms of their advantages as criteria for targeting resources to the poor. The central argument under which the work develops is that the problem of alleviating poverty can be viewed as one of choosing among three options: (i) provoking a marginal change in the average income of certain subgroups; (ii) changing the distribution of resources within subgroups in the margin; and (iii) generating a marginal change in the differences between the subgroups. To asses the impact of each possibility we derive a formula that measures the elasticity of a poverty index to changes in the level and distribution of income, and argue that the between-group elasticity is an indicator of the potential of using one characteristic rather than another. In the literature on targeting, some ways of performing comparisons between characteristics have already been proposed (we discuss this further in the text), but we argue that our method has the advantage of simplicity and of providing a broader picture of the options that policy makers have at hand.

To illustrate the usefulness of the methodology, we will apply it to data from Mexico. This country provides a particularly interesting example of a case where geographic targeting has been used without previously assessing its costs and benefits as compared to other available criteria.

The work consists of three sections. Section 1 addresses the methodological issues on poverty alleviation. Section 2 applies the methodology to Mexican data, while Section 3 draws some conclusions.

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[1] As noted by Grosh (1995), most of the times geographic targeting - this is, classifying the population according to its location - is used due to the low administrative costs involved in its implementation, but its advantages as compared to other available criteria is seldom assessed.

1. Theoretical Issues on Poverty Alleviation

This section discusses some ways of building on already existing methodologies to generate additional information on policy options for poverty alleviation. Following most of the literature on the subject, we will restrict our attention to the case where minimizing the value of a poverty index is the objective, and as our intention is not to suggest specific mechanisms to transfer resources, we will abstract from complications such as the generation of incentives (i.e. migration and labor supply), administrative costs, general equilibrium effects, and political economy considerations[2], as well as from the macroeconomic problems involved in the financing of the programs[3].

To place the problem in an adequate perspective, we can start by expressing a poverty index *P*, in the following generic form:

(1)

$$P = P[z, m^*, L^*]$$

where *z* is the poverty line, L^* represents the parameters that fully describe the characteristic Lorenz curve of a population (which includes information about income distribution), and μ^* is the average value of the variable chosen as welfare indicator (which we can call income for simplification purposes). This illustrates that in general terms, poverty in any population is a function of the amount of resources available in the economy, and of the way in which such resources are distributed.

As our aim is to asses the impact of different policy alternatives over *P*, we need to choose a specific poverty index to substitute in equation (1). Here we will follow most of the literature on the subject and focus on the well known family of P_α indexes suggested by Foster et.al. (1984), which take the following functional representation:

(2)

$$P_\alpha = \frac{1}{N} \sum_{i=1}^{n} \left(\frac{z - y_i}{z}\right)^\alpha \qquad for\ all\ \ y_i < z$$

where *N* is the size of the population, *n* is the number of poor, y_i represents the income level of individual *i* for all $y_i<z$, and α is a parameter indicating the relative importance attached to the incomes of the poorest of the poor in the measurement of poverty[4]. The attractiveness of the P_α indexes in the context of poverty alleviation lies on that,

[2] These problems are discussed by Thorbecke and Berrian (1992), Beseley and Coate (1992), Kanbur, et.al. (1994a, b), Ravallion and Datt (1995), Ravallion and Sen (1994), and Besley (1990), among others. Atkinson (1995) and Sen (1995) discuss the general theoretical aspects of these complications.

[3] Pradhan (1996) analyses this aspect in detail.

[4] The P_α family includes the head count ratio *H* (the proportion of poor in a population) and the poverty gap *HI* (the average distance from the incomes of the poor to the poverty line (*I*) weighted by *H*) when $\alpha=0$ and $\alpha=1$

given some classification criteria to divide the population into subgroups (denoted ρ) (i.e. geographic location, education level, gender, landholding class, etc.), P_a can be expressed as a weighted sum of subgroup poverty indexes[5]:

(3)

$$P_a = \sum_{j=1}^{k} {}_j(\rho) P_{a,j}[z, m_j(\rho), L_j(\rho)]$$

where $ß_j(\rho)=N_j(\rho)/N$ is the population weight of sub-group j, P_{aj} is the poverty level registered in sub-group j, μ_j and L_j represent the average income and inequality level within j, and k is the number of mutually exclusive subgroups defined by characteristic ρ.

It should be noted that while the weighted sum of each of the μ_j elements in (3) would equal μ^* in equation (1), the weighted sum of the L_j's, does not correspond to L^*. The reason is that, as explained by Bourguignon (1979) and Shorrocks (1980), when a population is divided into subgroups, total inequality (represented here by L^*) will arise from the inequalities between the subgroup mean incomes plus the weighted sum of the inequalities within the subgroups (which in this case are represented by the L_j's). Therefore, in principle the difference between L^* in (1), and the weighted sum of the L_j's in (3), is that the between-group component of inequality is not included in (3).

Given this description, the general policy problem could be viewed as one of assessing the impact on P_a of three broad options: (i) changing μ^* while leaving L^* unaffected (for instance through neutral economic growth or a universal multiplicative provision that rises each μ_j by the same proportion); (ii) shifting L^* while holding μ^* constant (through pure redistributions within groups); and (iii) moving μ^* and L^* simultaneously (by combining an expansion in μ^* with changes in L^*)[6]. Throughout the literature on poverty alleviation, some techniques to asses the impact on P_a of modifying some of the latter elements, have already been suggested. We now turn to their description.

Standard Approaches to Tackle the Problem

One way of addressing the problem of measuring the impact on P_a of a set of options, would be first to express a change in P_a, by:

(4)

$$dP_a = \frac{\partial P_a}{\partial m^*} dm^* + \frac{\partial P_a}{\partial L^*} dL^*$$

respectively, as special cases. a is commonly also given a value of $a=2$ in applied work, as this allows to incorporate information on the proportion of poor, the intensity of poverty, and the distribution of income among the poor, into the calculation of the index, simultaneously.

[5] This has been proved by Foster and Shorrocks (1991).

[6] The impact of all these possibilities, on P_a, will depend on where z is located, but for the purposes of this section we will assume that the problem of defining an adequate poverty line, has been resolved.

where the first term on the right hand side of (4) assesses the extent to which P_a would be modified if there was a marginal change in μ^*, while the second captures the impact of marginal changes in the parameters of the Lorenz curve.

Kakwani (1993) has already suggested some formulae that can be used to compute the elasticities of a P_a index to changes in either μ^* or L^*, which are a good start-point for the discussion. Following Kakwani, the elasticity of P_a to a proportional change in μ^* is given by:

(5)

$$h_{P_a} = \frac{\partial P_a}{\partial m^*}\frac{m^*}{P_a} = -\frac{a(P_{a-1} - P_a)}{P_a}$$

With respect to the elasticity of P_a to marginal change in the parameters of L^*, a change in inequality measured for instance by the Gini index (which is directly related to the Lorenz curve) can be obtained through an infinite number of transfer patterns. In this case, to make the procedure operational, Kakwani obtained the elasticity for an inward shift in the entire Lorenz curve, assuming that the shift is given according to the following formula: $L^*_1(p)=L^*_0-\tau[p-L^*_0(p)]$, where L^*_0 is the original curve, p denotes the parameters that characterize L^*, and L^*_1 is the Lorenz curve that is obtained after the shift. This implies that when $\tau<0$, L^*_0 shifts upward resulting in lower inequality. When $\tau=0.01$, the shift means for instance, that the Gini index has increased by 1%, and from this it can be shown that the elasticity of P_a to a 1% change in the Gini coefficient can be computed by:

(6)

$$e_{P_a} = h_{P_a} + \frac{a\, m^* P_{a-1}}{z P_a}$$

Therefore, equations (5) and (6) could be used to asses the impact on P_a, of either modifying μ^* or L^*, through a set of policies.

In reality, the choice among modifying μ^* or L^* normally depends on the information that policy-makers have about who and where the poor are. For instance, in the hypothetical case of having perfect information about the poor, the problem of minimizing P_a with a given budget would be reduced to transfer a *perfectly targeted* benefit to each of the poor. The provision of the budget would reduce the value of P_a both by the rise in μ^*, but also by an inward shift in the parameters of L^* as those at the lower tail of the distribution would increase their share of a larger income. This would maximize the impact on poverty, as only the target population would receive the benefit.

As noted by Besley and Kanbur (1993), one of the main problems for achieving larger poverty reductions with a given budget, is that in practice there are informational constraints about the poor. In fact, in the extreme of having absolutely no information about who and where the poor are, the best option would perhaps be to act exclusively on μ^* by introducing a *universal program* that allocates an equal proportional benefit to every member of the population regardless of its position in the distribution (this would also simulate the effect of neutral economic growth on poverty). This guarantees that at least a proportion of the budget reaches the target

population, although at the expense of small benefits per-head and leakages to the non-poor. As compared to the perfectly targeted alternative, the effect on P_a will tend to be smaller, as the policy does not have any effect on L^*[7].

Another way of providing universal benefits for poverty alleviation is through additive rather than multiplicative transfers, which consist on allocating an equal amount of resources to each individual. In this case, the benefit would affect μ^*, but in contrast to the case of multiplicative provisions, there will also be an effect over L^* because even an equal amount in absolute terms, has larger value relatively speaking, the lower the income of the individual. Although Kakwani's formulae does not contemplate this possibility explicitly, it can be shown that the sum of equations (5) and (6) yields the elasticity of P_a with respect to an additive universal transfer. To show this, we can obtain the derivative of P_a with respect to an additive income rise, with which the elasticity of P_a with respect to the transfer, can be derived[8]. This elasticity would be given by:

(7)

$$y_{P_a} = \frac{\partial P_a}{\partial m^*}\frac{m^*}{P_a} = -\frac{a\, m^*}{P_a\, z} P_{a-1}$$

So, by using equations (7), (6) and (5), it is now easy to verify that:

(8)

$$y_{P_a} = h_{P_a} - e_{P_a}$$

which shows that an additive universal transfer to the whole population is equivalent to rising μ^* proportionally while generating a marginal inward shift in the Lorenz curve.

Thus, in the context of the discussion of what are the best ways of reducing the value of P_a given the existence of either perfect or absolutely no information about the poor, the usefulness of equations (5) to (8) lies

[7] Cornia and Stewart (1995) and van de Walle (1995), have noted that although most universal programs depart from the notion of general coverage, they are based on the principle that some individuals (presumably non-poor) exclude themselves from being beneficiaries when the cost of demanding the benefit is large enough. Therefore, strictly speaking even the introduction of a multiplicative universal provision can be accompanied by an inward shift of the Lorenz Curve. Similarly, when a proportional universal provision implies larger gains for the non-poor (e.g. because they have better means to appropriate the benefit) the rise in μ^* could be accompanied by an outward shift in L^*.

[8] The derivatives used to calculate the elasticity were originally obtained by Kanbur (1987a, b).

in that they generate information that can help to decide whether to modify P_a through purely distributive mechanisms, by using only universal multiplicative transfers, or by a combination of both (the additive solution).

In reality, the situation regarding informational constraints is most of the times somewhere between the two extremes of either having perfect or absolutely no information about the poor, as at least a rough idea about who and where the poor are, is normally available. For instance, if the population could be classified into subgroups according to some observable characteristic p (i.e. gender, geographic location, occupation, education) then it would be possible to use *imperfect targeting*, which consists on searching for target groups rather than for each poor individual, and then ranking the subgroups in terms of policy priority. Although a benefit to a specific subgroup will most of the times involve leakages to non-poor individuals or lack of coverage to some of the poor located in subgroups to which resources are not provided, this is an attractive and widely used option because it normally raises the benefit per-head and reduces the leakages to the non-poor, as compared to universal benefits.

To explore the potential of using imperfect targeting to reduce poverty, we can follow the principle in equation (4), to express:

(9)

$$\frac{dP_{a,j}}{P_{a,j}} = h_{P_{a,j}} \frac{d\mu_j}{\mu_j} + e_{P_{a,j}} \frac{dL_j}{L_j}$$

which illustrates that each P_{aj} may vary due to shifts in either μ_j or L_j. The impact of a multiplicative benefit targeted to some j would be assessed by the first term on the right hand side of (9), while a marginal redistribution of income within a subgroup would be assessed through the second term. As in the case of equation (8) above, it can be shown that the sum of both elasticities (when attaching a negative sign to the second term in (9)) is identical to the elasticity of P_{aj} with respect to an additive transfer to each subgroup, as the shift would simulate the effect of a proportional rise in μ_j combined with a marginal inward shift in L_j.

To add up these subgroup effects in terms of their influence on P_a, we can use the decomposability property in equation (3) to express the elasticity in (5), as:

(10)

$$h_{P_a} = \sum_{j=1}^{k} h^*_{P_{a,j}}(p) = \sum_{j=1}^{k} S_j(p) h_{P_{a,j}}(p) \quad \text{where } S_j = \frac{\mu_j P_{a,j}}{P_a}$$

where (10) makes the connection between P_a and a marginal multiplicative shift in μ_j more apparent, and shows that it is possible to asses the effect of transferring a universal proportional benefit to a specific subgroup of a population, on P_a.

In contrast, the aggregation problem in the case of the elasticity of P_a to marginal shifts in the Lorenz Curve is not solved so straight forwardly because as already explained, when a population is divided into subgroups, overall inequality will consist of a sum of the within group differences plus the inequalities between the subgroups. Therefore, the weighted sum of the elasticities with respect to L_j will usually not be equal to the

elasticity of P_a with respect to L^* shown in (6), precisely because L^* includes information on both, the between and within group components, while L_j only refers to the within-group term . So, following the principle in (9) we could define:

(11)

$$q_{P_a} = \sum_{j=1}^{k} q^*_{P_a,j}(p) = \sum_{j=1}^{k} S_j(p) e_{P_a,j}(p)$$

where T_{Pa} captures the impact of marginal redistributions within each subgroup, on P_a, and can be used to asses the effect of a marginal income redistribution within j that provokes a 1% shift in the subgroup's Gini coefficient.

Regarding the provision of additive transfers to the subgroups, it can be verified that:

(12)

$$\Omega_{P_a} = \sum_{j=1}^{k} \Omega^*_{P_a,j}(p) = \sum_{j=1}^{k} S_j(p) y_{P_a,j}(p) = \sum_{j=1}^{k} S_j(p)[h_{P_a,j} - e_{P_a,j}]$$

where O_{Pa} is the elasticity of P_a to simultaneous marginal growth and redistribution within each of the subgroups defined by p. It should be noted that O_{Pa} is not equal to the elasticity in equation (7), as it only includes information on the impact of within-group redistributions, while (7) contains the effect of within and between-group changes.

Thus, by incorporating the principles in equations (10) to (12) it is also possible to asses the impact on P_a of targeting resources only to specific subgroups of the population. As explained by Besley and Kanbur (1993), imperfectly targeted benefits consist precisely on allocating more resources to those subgroups that need them most, and so, it is usually the case that different subgroups will receive different amounts of resources. Kanbur (1987a, 1987b) has used a concept similar to the elasticities in equations (10) to (12) to identify which allocations yield the largest reductions in P_a, and has demonstrated that in the case of marginal multiplicative provisions the maximum poverty reduction is achieved when resources are transferred to the subgroups for which the differences between P_{aj} and $P_{(a-1),j}$ is largest. In the case of additive transfers, the largest poverty reduction is achieved when the benefit is given to the j that registers the highest $P_{(a-1),j}$ index.

These rules derived by Kanbur have been widely used in the literature on poverty alleviation, and it has become standard practice to compare the reduction in P_a of distributing a budget according to these optimal allocations, with other distribution criteria.

It is interesting to note that the case of reducing the inequalities between the subgroups (the element of L^* not directly observable in equation (9)) which constitutes another policy option used in reality, is not included in the principle of equation (9), and this is perhaps why this possibility is seldom acknowledged in the literature on

poverty alleviation. In fact, most poverty alleviation strategies include, at least implicitly, the objective of reducing the distances between the average incomes of the subgroups (e.g. geographic targeting is based on reducing the disparities between regions, land redistributions intend to close the gap between land owners and landless individuals, while other policies such as transferring benefits exclusively to female headed households are aimed at compensating for the disadvantages faced by women with respect to men in the labor market). So, it would seem desirable to incorporate an indicator of the impact of these type of shifts into our discussion. We now turn to this problem.

Introducing and Additional Element: Assessing the Impact of Between-Group Redistributions

Regarding the question of how to asses the influence on P_α of a marginal shift in the inequalities between the subgroups, it would be necessary to estimate the elasticity of P_α to a marginal change in the distance of the subgroup mean incomes, that leaves μ^* unaffected[9]. Following our discussion from the previous section, the problem could be stated as one of evaluating the effect of a multiplicative or additive transfer from one population subgroup to another, but as in the case of the elasticity in (6), it is first necessary to specify the pattern of transfers through which inequality will change.

One way of solving this problem is to note that as mentioned before, the difference between the weighted sum of the L_j's in equation (3), and L^* in equation (1), is that the former aggregates the influence of the within-group inequalities, while the latter includes the within group as well as the between group components of an inequality index. Therefore, the difference between equation (6) - which assesses the influence of a marginal proportional shift in the entire Lorenz curve -, and equation (11) - which only incorporates the influence of within-group shifts -, is precisely the between group component of inequality. This would lead to argue that the difference between these two elasticities would yield the elasticity of P_α to a marginal shift in the inequalities between the subgroups, which is precisely what we are looking for.

At first sight the latter argument could appear troublesome, because it is well known that the Gini index - which is used to compute the elasticities in (6) and (11) - does not belong to the family of additively decomposable inequality measures, and so it cannot be decomposed into the sum of within and between group inequalities only[10]. This would in principle imply that the difference between a marginal shift in L^* and a marginal

[9] Kakwani (1993) has argued that equation (8) can be rewritten in the following way to obtain an indicator of the impact of differential sub-group growth rates, on P_α:

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where the second term on the right hand side of the equation is interpreted by the author as the "between-group" component of a change in poverty. It is easy to verify that the equation cannot be used for our purposes, because if we require that $d\mu^*/\mu^*=0$, as would be our case, the expression becomes meaningless.

[10] The reason is that the Gini is based on comparing income levels and income rankings amongst individuals. When a population is classified into subgroups, a problem arises because the ranking of an individual will not necessarily coincide with the ranking of the subgroup to which he belongs (the only exception is when the subgroups are formed according to income class). In other words, the rankings will usually overlap when individuals are classified into mutually exclusive subgroups. Cowell (1995), Bourguignon (1979), and Shorrocks (1988) explain this further.

shift in some L_j would not necessarily be equal to a shift in the between-group term when the calculations are based on the Gini, as is our case.

Nevertheless, several authors have demonstrated that although the Gini (G) does not yield an exact subgroup decomposition, it is still possible to decompose the index into three terms in such a way that[11]:

(13)

$$G = G_W + G_B + G_R$$

where G_W represents the weighted sum of the Gini indexes for each subgroup, G_B includes the influence of the inequalities between the subgroups, and the last term G_R is a residual. Although several interpretations have been attached to the G_R component, it is generally agreed that it captures the influence of the intensity of permutations that occur when instead of ranking all individuals according to their position in the overall distribution, they are ranked with respect to the average income of the subgroup to which they belong.

Therefore, given the meaning of G_R, it would follow that the derivative of G_R with respect to a marginal shift in the parameters of the Lorenz curve through the pattern assumed for computing (6), would equal zero, as this kind of shift implies that the Lorenz curve moves proportionally, and thus, the ranking of each individual would not change. This can be shown by writing the elasticity of P_a with respect to $L^*=L^*(G_W,G_B,G_R)$ in (13), as:

(14)

$$e_{P_a} = \frac{\partial P_a}{\partial L^*}\frac{L^*}{P_a} = \frac{\partial P_a}{\partial G_W}\frac{\partial G_W}{\partial L^*}\frac{L^*}{P_a} + \frac{\partial P_a}{\partial G_B}\frac{\partial G_B}{\partial L^*}\frac{L^*}{P_a} + \frac{\partial P_a}{\partial G_R}\frac{\partial G_R}{\partial L^*}\frac{L^*}{P_a}$$

but as the pattern of transfer assumed requires that the rankings remain unaltered when a redistribution takes place, then it has to be true in this case that:

(15)

$$\frac{\partial G_R}{\partial L^*} = 0$$

[11] This has been shown by Silber (1989), Yitzhaki and Lerman (1991), and Sastry and Kelkar (1994), among others.

which means that when the Gini is used for the calculations, the elasticity of P_a with respect to a between-group shift will be equal to the difference between the elasticity to L^*, and the elasticity of P_a with respect to the L_j's. This can be expressed as:

(16)

$$x_{P_a} = \frac{a\, m^*\, P_{a-1}}{z P_a} - \sum_{j=1}^{k} S_j \frac{a\, m_j\, P_{(a-1),j}}{z P_{a,j}}$$

which using our notation yields:

(17)

$$x_{P_a} = e_{P_a} - \sum_{j=1}^{k} q^*_{P_{a,j}}(p)$$

Therefore equation (17) can be interpreted as the effect of a marginal change in the inequalities between the subgroups, on P_a.

A More Comprehensive Approach

In sum, given the formulae in equations (10), (11), and (17), we can suggest an alternative way of expressing equation (4) where the effects of marginal changes in either in μ^*, $\mu_j(p)$, or $L_j(p)$, can be explicitly

assessed:

(18)

$$\frac{dP_a}{P_a} = \sum_{j=1}^{k} h^*_{P_a,j}(p)\frac{d\,m_j}{m_j} + \sum_{j=1}^{k} q^*_{P_a,j}(p)\frac{dG_j}{G_j} + x_{P_a,r}\frac{d\,G_B}{G_B}$$

The first term on the right hand side of (18) can therefore be used either to estimate the potential impact on P_a of applying a universal multiplicative scheme to all *j*'s (similar to the effect of economic growth), or to asses the potential for poverty alleviation of targeting resources multiplicatively only to some subgroups of the population. The second term assesses the potential of policies that rely on pure redistributions of income within subgroups, while the sum of the first and second terms will estimate the impact of an additive distribution to specific target groups. The third term provides information on the impact over P_a, of marginally reducing the disparities between groups, while the sum of the second and third terms gives the elasticity of P_a with respect to L^*. Thus, by comparing the value of the elasticities, the expected impact of alternative policy combinations can be assessed, and this may help to clarify the options at hand.

Expressing the problem of defining a strategy to reduce poverty through equation (18), has at least three advantages as compared to the standard procedures found in the literature. First, setting the problem in marginal terms may be helpful because the conditions for poverty alleviation may change substantially during the implementation of a policy. In fact, in reality resources are usually distributed by taking sequential marginal decisions rather than through definite resolutions taken in anticipation, and the equation provides information on these grounds[12].

Another advantage of (18), is that it encompasses the main tools used in the literature on poverty alleviation, but it adds an indicator on the between-group differences. In fact, most of the recent studies on the topic take a more partial view and compare at the most two of the options included in the equation. For instance, the works by Ravallion (1989, 1991, 1993), Ravallion and Chao (1989), Glewwe (1990), Baker and Grosh (1994), and Ravallion and Sen (1994) focus exclusively on the question of how much would poverty decline if imperfectly targeted proportional benefits are allocated to some subgroups; Kanbur (1987a, 1987b) addresses this same question and also that of redistributing incomes between the subgroups, while Datt and Ravallion (1993) refer to between group and within group redistributions, and Kakwani and Subbarao (1993) deal with universal multiplicative transfers and within group redistributions.

Another important advantage, is that the framework facilitates the task of identifying which are the best

[12] It should be noted that the procedure in (21) can also be applied to specific subgroups by treating each of them as an individual unit. For instance, if certain *j* has been selected to receive a benefit due to its high poverty level, the method can be reapplied by taking *j* as an independent population, and computing all the elasticities. It can be seen that the definition of p may include several population characteristics, and finer partitions can be selected until the information allows to do so. The advantage of incorporating additional indicators to classify the subgroups, is that the risk of incurring in leakages to non-poor individuals reduces, although at the expense at higher costs in finding the poor.

population characteristics to guide resource allocation, but this needs to be discussed in some detail[13].

Elasticities and the Choice of Characteristic

As any population can be differentiated among many dimensions (e.g. gender, geographic location, education, occupation, age, etc.), strictly speaking, it would be necessary to compare the advantages and disadvantages of using different ways of classifying the subgroups before selecting a p to guide resource allocation.

The importance of this decision lies on the fact that as explained by Lipton and Ravallion (1995) and Besley and Kanbur (1993), the impact of an imperfectly targeted program will ultimately depend on the definition of p, because if the characteristic chosen to define the subgroups is not meaningful, the allocation of resources through this criteria will lead to leakages to non-poor individuals, or non-coverage of the poor. Thus, to identify the best policy option it seems necessary to be able to properly asses the costs and benefits of using each of the available p to find which performs better.

In spite of the importance of the choice of p, it seems rather surprising that the question of selecting an indicator to construct the subgroups, is seldom addressed in the literature. Most applied work has simply used the most common partitions such as geographic location, rural-urban distribution, or gender, under the argument that these indicators have advantages such as the low administrative costs implied by their use, but the cost-effectiveness of the choice is not usually assessed in terms of financial gains or losses. Although this problem has been noted by Glewwe (1992), Ravallion (1989), and Kanbur (1991), it seems that only Glewwe (1992) has compared the advantages of using different criteria to form the subgroups. Glewwe's procedure consist on assessing the reduction in P_a that would be achieved when distributing resources according to the optimal allocation rule derived by Kanbur (1987a) and verifying under which definition of p the largest reduction in P_a is achieved.

One of the important advantages of using the principle in equation (18) is precisely that the elasticities allow to relate poverty alleviation with a set of characteristics of the population in a relatively simple way, because the between-group elasticity will indicate the size of the gains from reducing the disparities between the subgroups, when classified according to p. The advantages as compared to the method by Glewwe (1992), is that this procedure does not require information about the size of the budget available, and that it provides information on a wider set of policy options through the application of a single formula.

So, the usefulness of (18) is that if after computing all the elasticities for different definitions of p it is noticed that the value of the third term on the right hand side of the equation is relatively large for a partition, this will mean that such p it has the largest potential for reducing poverty. However, before selecting a specific p, the administrative and other costs implied by its use should also be taken into account, and thus, the advantage of (18) is that it provides information on which characteristics are worth considering, and more important, it gives an idea about how large the cost of using a p need to be, to make it worthwhile to use other alternatives instead.

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[13] One limitation of using (18) for taking policy decisions is that there may be some causality between income redistributions and μ^*, which are ruled out by the structure of the equation (here we are considering only first round effects). In fact, one traditional argument is that if income is redistributed from individuals with high propensities to save towards those with low propensities, the outcome may be a decline in μ^*, and thus a poverty-increasing effect. Additionally, if economic resources are restrained from being allocated where they are most productive, μ^* may decline. However, the costs and benefits of income redistributions in terms of economic growth have been questioned lately. For instance, Persson and Tabellini (1994), and Bourguignon (1991) have argued that a shift in L^* will not necessarily affect μ^*, as is commonly believed, and this poses doubts on the relation between μ^* and L^*. Therefore, it is not clear whether equation (18) would over or underestimate the impact of changes in L^* over P_a.

The fact that (18) makes it easy to discriminate among a set of characteristics considerably simplifies the problem of selecting a specific policy tool to alleviate poverty. For instance, if it was noticed that the elasticity of P_α with respect to between-group redistributions when ρ represents land-holding class, is relatively large, an obvious choice would be to use land reform as a means to alleviate poverty. Alternatively, if the elasticity was larger when the ownership of factors of production is used instead, the introduction of a public works program that rises the demand for unskilled labor, would perhaps constitute a more feasible option. Furthermore, if the "between-group" elasticity was low and only the elasticity to mean income changes was high, this would indicate that the potential of income redistributions between groups is lower than that of rising everyone's income (e.g. through growth promoting policies). In sum, the choice of ρ is essential because this decision may "contaminate" the process of choosing a specific mechanism to alleviate poverty (this problem is not directly address here).

In sum, the central theoretical argument of this Section has been that viewing the policy problem through (18) can help to set general guidelines for poverty alleviation, as the elasticities simplify the process of choosing: (a) between a strategy that emphasizes economic growth rather than distributive policies, for poverty alleviation; (b) between universal or imperfectly targeted programs; (c) among a set of characteristics of the population that can be used to guide resource allocation; and (d) the use of multiplicative or additive tools. It should be emphasized that the problem of assessing the costs of specific mechanisms still remains, but the information generated by (18) at least may provide good indication on the characteristics of a population in which policies should focus.

In what follows, we will apply the principle in (18) to some recent Mexican data in order to illustrate its usefulness.

2. Poverty Alleviation in Mexico

To illustrate the type of results and conclusions that can be derived from the procedure suggested in the previous section, we will apply the principle in equation (18) to the most recent data on income distribution from Mexico. The data set is the "Income and Expenditure of the Household National Survey" held in 1992 by INEGI[14].

To apply our methodology, we will compute the elasticities by using the poverty index in (2), and we will define $\alpha=2$. We will use all the characteristics of the population for which the survey provides information, namely the gender, age, geographic location (among rural and urban areas), education level, occupation, region of residence, sector of activity, labor market status, as well as the number of members belonging to each household[15]. We will use the household head's characteristics as reference for classifying the population into

[14] The household survey is representative at a National level, has information on all sources of income, and was held between September and November of 1992. The sample size is 11,920. For more detailed information see Székely (1996).

[15] For the purposes of this work we will use a poverty line set at 167,949 monthly 1992 pesos (equivalent to 54.28$ US, that is, almost two dollars a day). The information to construct the poverty line was taken from Coplamar (1983), which reports the results of a large study that tried to measure the cost of living in Mexico. We selected a bundle of goods that includes the cost of food that provides the minimum caloric intake necessary for survival, as well as the resources to acquire a minimum of education, housing and health. To inflate the cost of the poverty line from the original 1983 prices we used the average consumer price index by item of consumption for the six months prior to the survey (which was the reference period). A detailed description of the items included in the bundle can be found in Coplamar (1983).

subgroups[16]. Table 1 presents the results of applying equation (18) to the data[17].

[16] The survey questionnaire contains a specific question asking who the household head is, and the answer is not necessarily based on either age, gender, or the amount of resources that each member contributes with, but is normally based on idiosincratic elements. Due to the way in which the question is presented, female headed households may be under represented in the survey because it is common to find that even when the female is the main income provider and an adult male is not currently living in the household, the eldest male child or the absent male adult are reported as household head.

[17] It should be noted that we have only computed the elasticities for each characteristic individually and by dividing the population into subgroups according to the definitions in the surveys, but strictly speaking finer subgroups could be defined by combining the partitions in different ways.

Table 1
Elasticities of P_a

Subgroups	(%) Reduction in Poverty Through			
	Marginal Multiplic. Transfers	Marginal Within-Group Redist.	Marginal Additive Transfers	Marginal Between-Group Redist.
Overall Population	-1.93	-9.45	-11.38	
Education				
Uneducated	-0.68	-1.69	-2.37	
Primary	-1.17	-3.00	-4.17	
Secondary	-0.07	-0.35	-0.42	
High School	-0.01	-0.08	-0.09	
Higher Education	0.00	-0.00	-0.00	
Total	-1.93	-5.13	-7.06	-4.32
Occupation				
Other Occupations	-0.17	-0.87	-1.04	
Professionals	-0.02	-0.29	-0.31	
Rural Workers	-1.07	-1.94	-3.00	
Industrial Workers	-0.43	-1.14	-1.57	
Middle level Workers	-0.18	-0.75	-0.93	
Domestic Servants/Street Sellers	-0.06	-0.19	-0.25	
Total	-1.93	-5.17	-7.10	-4.28
Sector of Activity				
Agriculture	-1.16	-2.50	-3.66	
Manufacturing	-0.21	-0.87	-1.07	
Electricity/Construction	-0.25	-0.79	-1.04	
Trade-Restaurants-Hotels	-0.17	-0.85	-1.02	
Services	-0.15	-0.94	-1.08	
Total	-1.93	-5.95	-7.88	-3.50
Rural-Urban Location				
Rural	-1.52	-3.08	-4.60	
Urban	-0.41	-2.22	-2.63	
Total	-1.93	-5.30	-7.23	-4.15
Labor Market Status				
Employee	-1.03	-4.87	-5.90	
Employer	-0.13	-1.25	-1.38	
Self-Employed	-0.75	-2.39	-3.14	
Non-Remunerated Family Worker	-0.02	-0.08	-0.10	
Total	-1.93	-8.59	-10.52	-0.86

Table 1 (Continues)

Subgroups	(%) Reduction in Poverty Through			
	Marginal Multiplic. Transfers	Marginal Within-Group Redist.	Marginal Additive Transfers	Marginal Between-Group Redist.
Household Size				
1-2 Members	-0.02	-0.22	-0.24	
3-4 Members	-0.20	-1.29	-1.49	
More than 4 Members	-1.71	-5.84	-7.55	
Total	-1.93	-7.34	-9.27	-2.11
Regional Location				
North West	-0.07	-0.40	-0.47	
North East	-0.04	-0.28	-0.33	
North	-0.19	-0.84	-1.02	
Central West	-0.27	-1.02	-1.29	
Central	-0.53	-2.48	-3.01	
South	-0.24	-0.85	-1.09	
South East	-0.51	-1.10	-1.61	
South West	-0.06	-0.20	-0.26	
Federal District	-0.03	-0.18	-0.21	
Total	-1.93	-7.36	-9.28	-2.10
Age				
0-25 Years	-0.08	-0.38	-0.46	
26-45 Years	-1.16	-5.28	-6.44	
46-65 Years	-0.55	-3.00	-3.55	
65 or more	-0.15	-0.71	-0.85	
Total	-1.93	-9.37	-11.30	-0.08
Gender				
Male	-1.82	-8.59	-10.41	
Female	-0.11	-0.69	-0.80	
Total	-1.93	-9.28	-11.21	-0.17

Source: Own calculations from the Income and Expenditure Surveys by INEGI, 1992 by using the moderate poverty line.

Regarding the elasticity of P_2 with respect to marginal changes in the average income of the population (shown in the first column of the table) this statistic can be used to infer if there is any need for introducing poverty alleviation policies at all, or if economic growth by itself is likely to reduce poverty substantially. This is an interesting question because for instance, INEGI-CEPAL (1993) have argued that the restructuring process in Mexico has lead to a situation in which future increases in μ^* will surely imply

substantial poverty alleviation, and this could be taken to imply that the problem of improving policy design is not necessarily a great priority in this country.

To verify the above argument we can simply look at the first line in table 1 which measures the extent to which P_2 would change if average income raises marginally. According to this estimate, economic growth by itself has limited potential for poverty alleviation (only a 1.93% reduction of the value of P_2 would be achieved for every 1% increase in μ^*).

A Wider Set of Options for Poverty Alleviation

The second interesting conclusion that can be derived from the results in Table 1 is that the value of each of the elasticities changes considerably depending on the characteristic chosen to classify the population into subgroups, and that the potential of modifying the distribution of income either through within-group or between-group redistributions, is in most cases greater than the elasticity with respect to proportional income raises. This leads to think that to be able to generate significant poverty reductions in Mexico, it is necessary to use policies with distributive mechanisms. In this section, we briefly discuss the advantages of each of the characteristics for which the surveys provide information.

First, it is interesting to note that when the population is classified according to the age or gender of the household head, the between-group elasticity is very small. This suggests that there is no special advantage of using these partitions for allocating resources for poverty alleviation. In the case of gender, the result leads to think that policies aimed at closing the gap between male and female headed households (i.e. through legal reforms to strengthen female property rights), would have a negligible effect on the P_2 index. This result is not particularly surprising, as Appleton and Collier (1995) have also found evidence for several countries that leads to the same conclusion[18].

With regards to age, the potential of reducing between-group differences also appears to be negligible, and so any shift towards between-group equalization will have a small impact on P_2. This constitutes an interesting result, because it would lead to think that distributive policies such as transferring resources through public pension systems or social security in Mexico, would have limited potential for poverty reduction in the present circumstances.

Table 1 also shows that surprisingly, labor market indicators are not particularly helpful to guide resource allocation either, despite the fact that differences in the average incomes among the subgroups were found to be significant. This means that policies that tend to close the gap, for instance between those employed in the formal labor market and those in informal activities (here classified as self-employed), have limited potential for poverty reduction. In contrast, marginally reducing the inequalities among employees only would yield a decline of almost 5% in the value of P_2, but this is not a particularly appealing option. In sum, focusing on the labor market status would not seem to provide any significant advantages.

Poverty alleviation programs in Mexico have traditionally relied on geographic targeting. Since 1988, this strategy was reinforced with the introduction of the "National Solidarity Program", a social safety net to which considerable resources have been channelled[19]. Implicitly, this kind of strategies involve some concern for reducing regional disparities, and so it is interesting to observe that marginally reducing the inequalities between-regions would reduce overall poverty by 2.1%. Even if this seems to be a better

[18] However, the result should still be taken cautiously because the proportion of female-headed households may be under-represented in the Mexican surveys and this may have biased our estimates.

[19] See Panuco and Székely (1996) for a brief description of the program.

alternative as compared to the characteristics previously discussed, our results show that there are five other partitions that could improve the outcome. Besides, our calculations in the table show that options such as the provision of an additive transfer to the Central region alone, would have a larger marginal impact on poverty than reducing overall regional disparities. This does not suggest that using geographic location is inappropriate, but rather that its cost-effectiveness as compared to other characteristics needs to be properly assessed to determine if it constitutes the best option at hand[20].

As noted by Grosh (1994), one of the most common ways of transferring resources for poverty alleviation is through the use of means-tested programs assigned according to family characteristics. One way of assessing the potential of these kind of options, is by classifying the population according to household size, as this gives some idea on household composition and particularly about the number of children inhabiting each unit. Table 1 indicates that targeting benefits to large households has significant potential for poverty alleviation (a marginal additive transfer to households with more than 4 members would reduce overall poverty by 7.55%), but this result is strongly influenced by the fact that almost 70% of Mexican households have more than 4 members, and so the scheme would be almost equivalent to providing universal coverage. In contrast, policies that tend to close the gap between the incomes of small households which are generally richer, and large units that are normally poorer (such as child benefits that redistribute income towards the larger families), have more limited capacity for overall poverty reduction.

With regard to the sector of activity, this is a particularly interesting characteristic in the case of Mexico, because since 1985 the country engaged into an intensive economic liberalization process, and these processes are expected to change the profitability of some sectors and thus, the differences between them. Theoretically speaking, a shift toward market orientation of this kind will provoke resource reallocations in the economy, that in the long run should tend to equalize the rewards to the factors across sectors. Therefore, it is interesting to observe that in Mexico, a marginal shift towards equalizing the sectoral means would generate a 3.5% poverty decline. Following the theoretical argument, this could lead to think that economic liberalization by itself could yield substantial poverty reduction. Nevertheless, it is interesting to observe in the table that an additive transfer to individuals in the agricultural sector could generate a slightly larger reduction in P_2. This, added to the fact that sectoral disparities have widened considerably in Mexico precisely since the introduction of the liberalization measures[21], suggest that relying on the reduction of between-sector inequalities through market mechanisms may not be the best alternative, at least at present. The benefits from reducing the sectoral gap may be observed in the long-run, but it would not seem appropriate to rely on this possibility when the intention is to improve the conditions of the poor in the immediate future.

As for the classification of the population into rural and urban areas, our results show that as expected, this criteria constitutes a better alternative to guide resources than the prior six we have discussed. In fact, the elasticity with respect to marginal reductions in the inequalities between groups in this case would have a significant 4.15% poverty reduction potential. It is interesting to note that although this partition is broader than the grouping by region, it constitutes a better device for guiding policy decisions than the latter. However, it should also be noted that the elasticity of P_2 with respect to marginal improvements in the distribution of income within rural areas alone would have an even larger impact on overall poverty, and that there are still other characteristics that would generate larger reductions by their use.

Perhaps the most conclusive result in Table 1, is that according to our estimates, the best option for

[20] To our knowledge this kind of exercise has not been undertaken in Mexico to date.

[21] This has been shown by Székely (1995).

poverty alleviation in Mexico would be to generate marginal reductions in the inequalities between the subgroups classified according either to education or the occupation of the household head, both of which register larger between-group elasticities than any other characteristic. Additionally, it is interesting to note that these are the only cases in which the between-group element is greater than any of the elasticities with respect to additive transfers.

By taking a closer look at our results, we find that any marginal reduction in the between group gap when the population is classified by education level would reduce poverty if it was provoked by transfers from individuals with secondary education or more towards the uneducated and with primary schooling only. In the case of occupation, the marginal shift would need to involve transfers from professionals and middle-level workers (which generally have greater skills), toward rural workers, domestic servants and street sellers, and to a lower extent towards industrial workers, all of which are characterized by being relatively unskilled (specially in the case of the first two categories). This indicates, that the use of policies that tend to rise the rewards to unskilled labor, for instance by increasing the demand for this factor, would constitute the best options for poverty alleviation[22].

Perhaps the most straightforward policy suggestion that would be expected to act in this direction, would be the enhancement of public education, but the non-monetary costs in which individuals need to incur to gain access to schooling could have as consequence that the poorest of the poor would exclude themselves from acquiring the benefit. Moreover, as we are using the characteristics of the household head as reference, it is not clear at all that this family member would increase its education even if the education system was improved. Another option is the introduction of public works programs, which could be more attractive because they involve opportunity cost of participation that deter the non-target population from the scheme[23]. This alternative generates benefits to the poor on the one hand, through paying the labor offered by each individual, but on the other, it reduces the excess labor supply and therefore has consequences for the wage structure of some of the skilled workers not covered directly by the policy. Thus, in some sense the mechanism simulates a marginal redistribution between relatively skilled and unskilled individuals by marginally lowering the rewards to the former while rising those of the latter[24].

Only recently, Phelps (1994a, b) has suggested the use of subsidies to the minimum wage to produce similar outcomes. The argument is that by providing incentives to private firms for hiring unskilled workers, poverty will be reduced not only through the funds received by those willing to offer their labor at the minimum pay, but also because the increased demand for unskilled individuals will tend to reduce the gap between those occupied in activities that require skilled labor and education, and those that do not[25].

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[22] Thorbecke and Jung (1996) have arrived to the same conclusion for the case of Indonesia, although through a general equilibrium approach.

[23] Datt and Ravallion (1994), Ravallion and Datt (1995) and Parikh and Srinivasan (1993) provide a description of this types of programs in India and agree in that this policy option has been successful in transferring most of the benefits to the target population. As compared with other schemes such as investment funds (described by Glaesner, et.al. (1994)), the advantage of public works programs is that they provide employment exclusively to the poor.

[24] It should be mentioned that as discussed by Kanbur, et.al. (1994a) and Besley and Coate (1992), these types of programs may also carry costs such as the creation of negative labor supply responses and adverse incentives to work in the labor market, which would have to be properly measured to asses the cost-effectiveness of the option.

[25] It should be noted that this strategy is not equal to rising the minimum wage. As explained by Freeman (1996), Bell and Wright (1996), Machin and Manning (1996) and Addison and Blackburn (1996), the danger with this option is that the demand for unskilled labor may decline as consequence, while introducing a subsidy to the

The strategy therefore combines the use of market forces with poverty alleviation mechanisms, and could constitute an effective mechanism to close the between-group gap for poverty reduction.

Although the identification of specific policies for poverty alleviation would still require of the measurement of the costs involved in the use of each p, our results have helped to identify some broad strategies (specifically schemes that tend to reduce the gap between the payments to skilled and unskilled labor) for poverty alleviation in Mexico. One advantage as compared to regional targeting schemes such as the National Solidarity Program currently in operation, is that some of the mechanisms that could produce this outcome include participation costs that tend to exclude the non-target population from the benefit.

3. Conclusions

The objective of this work has been to explore ways of simplifying the identification of the best policy options for poverty alleviation in a given country.

We have build on some previous research to derive a formula that assesses the impact of marginally reducing the inequalities between subgroups, on overall poverty. By adding this term to other measures that have already been suggested in the literature, we derive an equation that allows to asses the effect on poverty of modifying (a) the average income of specific subgroups by using multiplicative or additive transfers; (b) the distribution of income within the subgroups; and (c) the inequalities between the subgroup mean incomes. There are three advantages of viewing the policy problem from this perspective. First, as it follows a marginalistic approach, the formulae does not need information on the size of the budget available to identify which are the best ways of distributing resources. Second, it simplifies the ranking of population characteristics in terms of their usefulness to guide resource allocation, and third, it provides a way of adding up the effect on poverty of different policy options. This last feature enables us to set the problem in a broad context and to identify some guidelines for poverty alleviation.

By applying the methodology to recent Mexican data, we find that economic growth by itself is not likely to yield a substantial poverty reduction in the country. By computing the elasticities and using all the socioeconomic characteristics for which there is information, we find that the largest poverty reductions in the country could be achieved through policies that close the gap between the individuals with low and high education and skills. In contrast, strategies such as geographic targeting, which have traditionally been used in the country, have more limited potential. This does not mean that geographic targeting should not be used, but that it would first be necessary to determine if the administrative, political and other costs inherent in it, outweigh the losses implied by its selection.

Although our intention here is not to suggest the use of specific policies for poverty alleviation, we are able to identify some alternatives that in principle seem feasible and could be analyzed in more detail in the future. These are the introduction of public works programs or a subsidy to the minimum wage.

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minimum provides incentives to hire unskilled workers, which drives demand up.

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