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# Targeting the Poor in Mexico: An Evaluation of the Selection of Households into PROGRESA

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**Summary.** — In this paper, we conduct an evaluation of the targeting method used by Health Education and Nutrition Program (PROGRESA) of Mexico to identify beneficiary households. We address two key questions: (a) How well does PROGRESA's targeting perform; and (b) How does the program perform in terms of its impact on poverty alleviation relative to other feasible methods and transfer schemes. The first question is accomplished by comparing PROGRESA's method to an alternative selection method based on household consumption, which is our preferred measure of welfare. We employ the concepts of undercoverage and leakage and find that PROGRESA selection method is more effective in identifying the extremely poor localities or households but less so when it comes to distinguishing among localities or households in the middle of the scale. To address the second question, we compare the potential impact of PROGRESA on poverty alleviation against uniform transfers that involve no targeting at all, targeting based on consumption, and geographic targeting (i.e., targeting at the locality level rather than at the household level). We find that PROGRESA's method of targeting households outperforms uniform coverage and targeting at the locality level in terms of reducing the poverty gap and severity of poverty indices, even after taking into account the economic costs of targeting. But, the closeness of PROGRESA's performance to what could be achieved by geographic targeting alone raises some serious questions about the costs and benefits associated with the practice of household targeting within poor localities. 

*Key words* — education, health, Mexico, nutrition, targeting, poverty, PROGRESA

## 1. INTRODUCTION

In 1997, the government of Mexico embarked on a new program aimed at alleviating extreme poverty in rural areas. PROGRESA, the Education, Health and Nutrition Program, adopts an integrated approach to combating the different causes of poverty. Its distinguishing characteristic is that cash benefits (averaging to 20% of household income prior to the program) are targeted directly to households on the condition of sending their children to school and visiting health centers on a regular basis. By the early part of the year 2000, the program included nearly 2.6 million families in 72,345 localities in all 31 states. This constitutes around 40% of all rural families and one-ninth of all families in Mexico. The total annual

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budget of the program in 1999 was around $777 million, equivalent to just under 20% of the Federal poverty alleviation budget or 0.2% of GDP.

For Mexico, PROGRESA represents a significant change in the provision of social programs. The earlier anti-poverty program PRONASOL, in place during 1988–94, was a decentralized, community based, demand-driven program, which though achieving a high profile, was susceptible to local political influences and not very effective at reaching the extreme poor (Yaschine, 1999). In contrast, under PROGRESA statistically rigorous methods are used at the headquarters in Mexico City in order to identify the extreme poor households and assure objectivity in the selection process. As part of the renewed effort to fight poverty general food subsidies, such as the tortilla price subsidy, are also phased out. Such subsidies are widely acknowledged to have a high impact on the government budget and a negligible effect on poverty.

In this paper, we conduct an evaluation of the method used for selecting beneficiary households in the PROGRESA program. [1] Our analysis of the PROGRESA targeting method comes at a crucial time as other Latin American countries (such as Honduras, Argentina, Nicaragua, Ecuador and Venezuela) are in the process of considering following Mexico's example in the application of targeted cash transfers to poor rural families. Our evaluation is formulated in the following terms: how well does PROGRESA's targeting perform in terms of its objective after taking into account the costs and the constraints (financial and political) of achieving these objectives? Our answer to this question consists of two parts. First, we evaluate PROGRESA's accuracy in targeting both at the community level, and at the household level, (see Sections 3 and 4 of the paper). Second, we evaluate the performance of PROGRESA's targeting in terms of its impact on poverty alleviation relative to other feasible methods and transfer schemes assuming the same total budget (see Section 5). The first step is accomplished by comparing PROGRESA's method to an alternative selection method based on household consumption, which is our preferred measure of welfare. For the second task, the list of feasible alternatives includes uniform transfers that involve no targeting at all, targeting based on consumption, and geographic targeting (that is, targeting at the locality level rather than at the household level). The costs associated with these different schemes affect the budget available for poverty alleviation.

## 2. EVALUATION FRAMEWORK

Our evaluation is based on a framework consisting of three key elements: (a) a social objective, (b) a set of economic, political and social constraints under which policy has to operate, and (c) a range of instruments available to attain these objectives. Although PROGRESA has interlinked objectives with respect to health, education and nutrition, we will measure the social objectives or benefits derived from PROGRESA's targeting solely in terms of its potential impact on poverty alleviation. Even though we limit the objectives of PROGRESA to alleviating poverty, our analysis highlights that the relative efficiency of transfer schemes depends on whether the government is concerned about the number of poor households as a percentage of the total population (i.e., the headcount poverty rate) or the depth and severity of poverty among poor households. [2] In contrast to PROGRESA which uses income, the variable we use to identify and quantify poverty is based on household consumption. There is a widespread view in the economics literature that consumption-based standard-of-living measures are preferable to income-based measures (e.g., see the discussion in Deaton, 1997). Income is thought to be a more sensitive topic than consumption so that deliberate underreporting is likely to be greater for income than consumption. Moreover, even if reliably measured, income is likely to be subject to shocks from period to period, especially if the household engages mainly in agricultural or self-employment activities. Under these circumstances, estimates of current household consumption are likely to provide a more reliable estimate of the household's permanent income (sustainable standard of living) than are estimates of current household income.

The economic, and some, though by no means all of the social and political constraints under which policy has to operate are reflected in the amount of budget available for PROGRESA. The budget is assumed to be fixed and limited in the sense that it is not sufficient to eliminate poverty completely. A wide variety of instruments may be utilized for the attainment of these social objectives. Policy instruments

range from uniform transfers that apply no selection criteria at all to other schemes that involve varying degrees of selection criteria. Each of these instruments has different costs and benefits associated with it. The primary benefit derived from targeting at the household level is that classifying households into those eligible and ineligible for receiving benefits from PROGRESA is a more effective way of using the limited funds towards the achievement of the social objective (Besley & Kanbur, 1993; Grosh, 1994; Van de Walle, 1998). This, however, involves a variety of costs such as administrative (targeting and service delivery), incentive and socio-political costs. For example, the mechanism used to identify the poor so that they can be given benefits incurs certain costs. As discussed in further detail below, in the case of PROGRESA this mechanism involves the collection of a household survey within all the localities selected as marginal (or as more likely to contain poor households). Such costs are taken into account appropriately reducing the fixed budget available for poverty alleviation. [3]

The selection of households as PROGRESA beneficiaries is accomplished in three stages. First, communities are selected using a marginality index based on census data. Second, within the selected communities, households are chosen using survey data collected at the household level. Third, the list of potential beneficiaries is presented to a community assembly for review and discussion and the list is changed according to established criteria for the selection of beneficiary families. Given that the importance of the third step is minute, we describe and evaluate the first and second stages of PROGRESA's targeting. [4]

## 3. EVALUATION OF THE FIRST STAGE OF THE PROGRESA TARGETING MECHANISM

### (a) *Description of community selection by PROGRESA*

Communities were selected for coverage by PROGRESA using the following process. First, using census data, a marginality index was developed for each locality in Mexico using the method of principal components, based on seven variables. The seven indicators which are used to construct the marginality index for each locality consist of: (i) the share of illiterate population aged 15 or more; (ii) the share of dwellings without running water; (iii) the share of household dwellings without drainage; (iv) the share of household dwellings without electricity; (v) the average number of occupants per room; (vi) the share of dwellings with earth floor; and (vii) the percentage of labor force working in agriculture sector. [5]

Of the 200,151 localities in Mexico, only 74,994 had data on all seven variables described above. Thus the principal components analysis was run directly only on these 74,994 localities, and the marginality index was constructed from the first principle component. Regression techniques were used to estimate the marginality index for an additional 29,698 localities. In total it was possible to construct an index for 105,749 localities, containing 99.36% of the population.

Localities deemed to have a high or very high degree of marginality [6] (76,098 localities covering 14.7 million people) and with more than 50 and less than 2,500 inhabitants were considered priorities to be included in the program. Logistical and financial considerations, as well as program components that require the use of school and health services, brought to bear other criteria in the selection of PROGRESA localities: geographic location, distance between localities, and the access to health and school infrastructure. Combining data from the Public Health and Education Ministries with computerized geographical information, service zones were established, whereby localities were characterized by their access to these required services, taking into account the availability and quality of roads when the services were not located in the same community.

The size, geographical, and service-access restrictions imposed on localities are more than likely to have excluded localities with higher concentrations of poor households. We take the view that these restrictions are necessary to the operation of PROGRESA as it was conceived, and do not consider this latter aspect as mistargeting but rather as a consequence of the nature of the program. [7] Thus our evaluation of the first step of PROGRESA is based on the set of localities with a marginality index.

### (b) *Evaluation of the selection of communities*

Ideally, with census data available at the individual or even at the household level, we could construct estimates of the probability that any given household is poor as well as

Table 1. *PROGRESA'S selection versus consumption-based selection of localities*

| | | Classification by Consumption-based Methods | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Very Low | Low | Medium | High | Very High | Total | Percent |
| Classification by PROGRESA's methods | Very Low | 613 | 3473 | 3 | | | 4089 | 5 |
| | Low | | 5361 | 250 | | | 5611 | 7 |
| | Medium | | 5390 | 7088 | 3 | | 12481 | 17 |
| | High | | 83 | 15819 | 682 | | 16584 | 22 |
| | Very High | | | 6104 | 27770 | 2357 | 36231 | 48 |
| | Total | 613 | 14307 | 29264 | 28455 | 2357 | 74996 | 100 |
| | Percentage | 1 | 19 | 39 | 38 | 3 | 100 | |

poverty maps disaggregated at the community level that could in principle provide a more consistent evaluation of the overall selection process of beneficiary households by PROGRESA (e.g., Elbers, Lanjouw, & Lanjouw, 2000; Hentschel, Lanjouw, Lanjouw, & Poggi, 2000). The nature of the data accessible to us allowed us to evaluate each stage of the selection process (i.e., localities and households) more or less independently of the other. Given access to census data aggregated at the locality level rather than at the individual or household level, our evaluation of the locality selection consists of constructing a consumption-based criterion of identifying localities where poor households are likely to reside. We then contrast our proposed selection criterion to the selection made by PROGRESA. Using the nationally representative 1996 Mexican National Survey of Income and Expenditures (ENIGH), [8] we first construct household-level consumption per adult equivalent, classify households as poor or nonpoor using the 25th percentile as the poverty line, and then estimate a probit model of poverty status, restricting the set of explanatory variables to those which are also available in the census data used by PROGRESA. Next, we take the coefficients from the poverty probit and apply them to the census data at the locality level for the 74,994 localities that had all the variables necessary for constructing the marginality index. Using out of sample prediction, each locality is assigned a predicted probability of being poor. Based on the predicted probabilities, we then use the statistical method developed by Dalenius and Hodge to separate communities into five groups, from low to high marginality. This classification of communities is then compared to the PROGRESA marginality index with a $5 \times 5$ matrix using the concepts of undercoverage and leakage (Cornia & Steward, 1995).

The undercoverage rate (exclusion error) is calculated by dividing the number of localities that are not covered by PROGRESA but should be covered according to our criterion, by the total number of localities that should be covered (the target population). The leakage rate (or inclusion error) is the percentage of beneficiary localities that should not be receiving any benefits, and is calculated by dividing the error of inclusion by the number of localities covered by the program. Leakage occurs if localities under the principal components method are classified as more marginal compared to the probit method. Conversely, undercoverage occurs if localities under the principal components method are classified as less marginal compared to the consumption-based method. The $5 \times 5$ matrix can be found in Table 1.

Localities that fall on the diagonal indicate that both methods coincide in the allocation of localities to a particular category. We consider localities off the diagonal, but with just one level of difference, as an acceptable boundary of misclassification. From Table 1, one can observe a shift downward and to the left in the categorization of localities. For example, while the principal components method allocates almost half of all localities to the Very High category, the probit method has only 3% in this category. The bulk of localities under the principal components method are in the Medium, High, and Very High (88%) categories, while the consumption-based probit model allocates them primarily to the Low, Medium and High categories. On the other hand, the probit method is less apt to classify localities in the Very Low category as well. While the principal components method puts over 4,000 localities in this category, the probit model puts only 613 localities.

Overall the down and leftwards shift does not appear too serious. The off-diagonal corner cells remain empty. The majority of localities remain within at least one category distance. But, those who do shift more than one category present a problem. Most significant are those localities that are considered High or Very High marginality under principal components, and that are reclassified by the probit as medium (6,104 localities) or Low (83). PROGRESA initially incorporated localities in the two highest marginality categories, beginning with the most marginal first. The probit would entail a fairly significant number of these localities from being excluded in the initial stages of PROGRESA. On the other hand, the probit method allocated only approximately 30,812 localities to these categories, while the principal components brought in over 52,000. Assuming a similar budget constraint, the localities classified as Medium by the consumption-based probit would also have been brought in, greatly minimizing the problem of undercoverage. [9]

For the most part, PROGRESA's marginality index performs quite well when contrasted to a consumption-based probit model. The probit model results in a more precise categorization of poverty which implies that geographic targeting based on the marginality index is more likely to result in inclusion errors rather than exclusion errors. The fit between the two methods is particularly tight for the Low and Very High marginality categories, and is more diffuse in the middle categories. This suggests that the PROGRESA marginality index loses its power of distinction between medium marginality localities precisely at a time when PROGRESA is expanding into less marginal communities. This will introduce a measure of arbitrariness into the selection of these communities. One way to counteract this problem would be to incorporate information from other alternative marginality indices, such as the consumption-based probit method presented here.

## 4. EVALUATION OF THE SECOND STAGE OF THE PROGRESA TARGETING MECHANISM

### (a) *A brief description of PROGRESA's selection of beneficiary households*

After identifying program localities based on the method described above, PROGRESA proceeds with the selection of beneficiary households within the selected localities. First, in each of the selected marginal localities a census of all the households is conducted. Second, total household income is derived based on the individual income data collected by the census. This income measure excludes income from children between ages eight and 18 (the age group covered by PROGRESA). Third, adult family income per capita is constructed by dividing the value of income in the previous step by the number of household members and compared with the *Standard Food Basket* (which is equivalent to an average aggregate income of approximately two minimum wages) of 320 Pesos per capita per month in order to generate a new binary variable taking the value of 1 for poor households (if income is less than the poverty line) and 0 for nonpoor (if income is greater than or equal to the poverty line). Finally, discriminant analysis is applied, separately for each geographical region, in order to: (i) identify the variables that discriminate best between poor and nonpoor households; and (ii) use the identified variables to develop an equation for computing an index (discriminant score) that represents parsimoniously the differences between the poor and nonpoor households. [10]

### (b) *Evaluation of PROGRESA's selection of families*

Our evaluation of PROGRESA's household selection process uses the data collected by PROGRESA (ENCASEH survey) in November 1997 for 24,077 households residing in a sample of 506 marginal communities covered or soon to be covered by PROGRESA. [11] On average 78% of the households in our sample are classified as beneficiaries by PROGRESA. In the initial stages of the selection process, PROGRESA utilizes an individual level, or per capita, welfare measure by dividing household income by the number of household members. This measure of welfare requires the following set of assumptions: (i) everyone in the household receives an equal allocation; (ii) everyone in the household has the same needs; and (iii) the increase in the minimum cost or level of income for an additional member in the household is the same irrespective of family size. The first assumption is defendable due to lack of information on consumption at the individual level. Individual needs, however, usually vary by gender and age, and economies of scale of living together may exist.

These assumptions may have important consequences on the poverty status of large families. For example, the use of a per capita measure of welfare typically results in larger households having a higher probability of being classified as poor (Lanjouw & Ravallion, 1995). The dominant role of family size and dependency ratios in the PROGRESA selection process is discussed in detail in Skoufias *et al.* (1999). We experiment with alternative individual-level welfare measures and settle with using an equivalence scale that accounts for different nutritional needs by gender and age. Use of this adult equivalent welfare measure does not lead to major changes in the selection of beneficiary households, as compared to the per capita measure. Due to its conceptual advantages, however, we utilize the adult equivalent measure throughout the rest of this paper.

Second, Skoufias *et al.* (1999) examine the impact of taking into account economies of scale. While the results suggest that economies of scale are present and significant, the point estimates are well outside of acceptable ranges calculated for other countries. For this reason, we ignore economies of scale in the rest of the analysis. Simulation results, however, with typical values of economies of scale parameters result in high leakage rates, suggesting that many large families would no longer be selected as beneficiaries if economies of scale were taken into account. Thus the validity of the no economies of scale assumption requires more research.

### (c) *Construction of the standard of comparison*

Since we do not have reliable consumption data for the households in our evaluation sample, we use the 1996 ENIGH household survey to estimate the parameters of the relationship between household consumption and household characteristics. We then use these estimated parameters to obtain predicted consumption per adult equivalent for the households in our evaluation sample.

Specifically, our method (described in detail in Skoufias *et al.*, 1999) consists of the following steps. First, we restricted the ENIGH sample to rural localities of less than 2,500 inhabitants that eventually were incorporated into PROGRESA. This yielded a sample of 2,513 households. Second, we constructed a measure of total consumption and an equivalence scale to derive consumption per adult equivalent. Third, we regressed the logarithm of total consumption per adult equivalent on household characteristics (size, composition, assets, *etc.*) that are also present in the 1997 ENCASEH data set. The estimates of the parameters of the relationship between consumption per capita and household characteristics were obtained using the method of least absolute deviations that yields estimates that are robust to outliers and the presence of heteroskedasticity in the data. Specifically, we estimated a linear equation for the median (or the 0.5 conditional quantile) of the logarithm of consumption per adult equivalent ($\ln C$) that may be denoted as:

$$Q_{0.5}(\ln C \,|\, X_{\text{ENIGH96}}) = \beta_{0.5} X_{\text{ENIGH96}},$$

where $\beta$ is a vector of coefficients, and $X$ is a vector of explanatory variables, including a set of dummy variables for state of residence so as to account for differences in the cost of living at the state level. [12] Finally, based on the parameters of the median regression in the ENIGH survey and values of the corresponding household characteristics in the 1997 ENCASEH survey we then derived the Predicted Consumption per adult equivalent ($P \ln C$) for households.

### (d) *Comparison of PROGRESA with the consumption-based targeting*

Having constructed the standard against which PROGRESA's selection will be contrasted, we then need to devise a method by which we classify a household or beneficiary and nonbeneficiary. We adopt a flexible approach and base our analysis on three different cut-off-points (or poverty lines). (i) A very strict poverty line based on the 25th percentile of consumption per adult equivalent. This poverty line implies that 25% of the households are poor and 75% are nonpoor and reflects an attempt to capture PROGRESA's stated objective of aiming to reach households in *extreme* poverty. (ii) An intermediate poverty line based on the 50th percentile of the consumption per adult equivalent; and (iii) a poverty line based on the 78th percentile of the consumption per adult equivalent. With this latter poverty line the resulting poverty rate equals the average poverty rate in our sample derived from PROGRESA's classification methods. Note that our poverty line is absolute in the space of welfare, so as to guarantee that the poverty comparisons made are consistent in the sense that two individuals or households with the

same level of consumption are treated the same way irrespective of the region or the state they are located in (Ravallion, 1998). [13]

In Table 2, we present the undercoverage and leakage measures commonly used as a means of measuring the accuracy of a targeting program. [14] The reader is cautioned that with our strict poverty line, the exclusion error is the more (if not the only) relevant measure for evaluation of PROGRESA's targeting, since the inclusion error will be high by construction.

Given PROGRESA's objectives, the critical question is whether PROGRESA's classification has left out any of the households that according to our indicator are extremely poor. In addition, the highest poverty line at the 78th percentile provides PROGRESA's targeting with the best chances of achieving exclusion or inclusion errors that would be approximately equal to zero if its targeting were identical to the consumption-based targeting. For these reasons this is our preferred poverty line and this cut-off value forms the basis for the simulations in the latter part of the paper.

As revealed in Table 2, the undercoverage rate is 6.6% when the extreme poverty line is used. In other words, approximately seven out of 100 households classified as extreme poor by the "perfect" targeting method based on consumption are not classified as poor by PROGRESA. Since PROGRESA is using a poverty line that yields on average a poverty rate of 78%, that means that these extreme poor households are assigned a discriminant score that is high enough to disqualify them from PROGRESA benefits. Even with such a high poverty line, 6.6% of the extreme poor, as determined by consumption, were still excluded by PROGRESA. These exclusion errors are probably a reflection of the tendency of the discriminant analysis method to classify as beneficiaries households with more children and to exclude smaller households or older households that have no young children.

Table 2. *Undercoverage and leakage rates of PROGRESA with different poverty lines*

| | Poverty line used | | |
|---|---|---|---|
| | 25th percentile (%) | 50th percentile (%) | 78th percentile (%) |
| Undercoverage rate | 6.63 | 10.80 | 16.27 |
| Leakage rate | 70.10 | 42.87 | 16.34 |

As the poverty line increases, the undercoverage rates increase as well, to 10.8% at the 50th percentile, and 16.27% at the 78th percentile. This suggests that the targeting accuracy of PROGRESA is lower for moderately poor households, that is, the group of households between the 25th and 78th percentile of consumption. [15] Put differently, PROGRESA's targeting works better at identifying extremely poor households. This raises some serious concerns regarding the use of PROGRESA's current targeting method during the next phase of the program, as PROGRESA expands into less poor areas. [16]

As mentioned above, when the low poverty line is applied the leakage rate is high by construction. That explains the 70% leakage rate obtained with low poverty line. This leakage rate decreases to 43% and 16% as the poverty line increases.

### (e) *PROGRESA's leakage and undercoverage rates relative to alternative targeting methods and transfer schemes*

The accuracy of PROGRESA's targeting is not directly comparable to other targeted programs in Mexico. Part of the reason for this lies in the fact that PROGRESA is the first program to be subjected to a rigorous evaluation of its methods and overall effectiveness. Moreover, rural households in extreme poverty have never been the explicit target of any program before PROGRESA. Nevertheless, from the few published estimates of undercoverage and leakage rates for other programs in Mexico it appears that the targeting errors committed by PROGRESA are miniscule compared to the targeting errors associated with the tortilla subsidy (targeted mainly at households in urban areas), and the undercoverage rates of the urban milk program and other food supplementation programs (see Cornia & Steward, 1995).

Nevertheless, it is still important to know whether the leakage and undercoverage rates estimated above are more or less serious errors. For example, if the majority of the poor households excluded from participation by the PROGRESA targeting method are close to the poverty line then there would be less cause for concern compared to the case if they were far below the poverty line. For this reason we applied a weighting scheme along the lines of the Foster, Greer, and Thorbecke (1984) or FGT family of poverty measures. With these mea-

sures a parameter $\alpha$ can be set according to society's sensitivity to the income distribution among the poor. Specifically the FGT poverty measures are summarized by the formula:

$$P(\alpha) = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z - c_i}{z}\right)^{\alpha},$$

where $N$ is the number of households, $c_i$ is the per capita consumption (or income) of the $i$'th household, $z$ is the poverty line, $q$ is the number of poor individuals, and $\alpha$ is the weight attached to the severity of household poverty (or the distance from the poverty line). When $\alpha = 0$, the FGT measure collapses to the Headcount Index, or the percentage of the population that is below the poverty line. When $\alpha = 1$ the FGT measure gives the poverty gap $P(1)$, a measure of the average depth of poverty. When $\alpha = 2$, the FGT index becomes the Severity of Poverty index. The $P(2)$ measure assigns more weight to individuals that are further away from the poverty line.

For our purposes, we calculated undercoverage rates using the formula,

$$U(\alpha) = \frac{1}{N_{\mathrm{PC}}}\sum_{i=1}^{q}\left(\frac{z - c_i}{z}\right)^{\alpha},$$

where $N_{\mathrm{PC}}$ is the total of households categorized as poor according to the consumption-based criterion and $q$ is the total number of households classified as nonpoor by PROGRESA. When $\alpha = 0$, this expression collapses to the undercoverage rate (see, for example, the undercoverage rate calculated in Table 2). When $\alpha = 2$ more weight is given to households that are further away from the poverty. Along the same lines, the leakage rate is defined as

$$L(\alpha) = \frac{1}{N_{\mathrm{PRO}}}\sum_{i=1}^{q}\left(\frac{c_i - z}{z}\right)^{\alpha},$$

where $N_{\mathrm{PRO}}$ is the total of households covered by PROGRESA and $q$ is the total number of households classified as nonpoor by the consumption-based targeting scheme.

The undercoverage (or leakage) rates for different values of $\alpha$ are not comparable within a given transfer or targeting scheme. To get a sense of how high or low the leakage rates of PROGRESA are we compare them with the undercoverage and leakage rates obtained with two other targeting and transfer schemes.

The first scheme is a *uniform transfer*. The full sample of 24,077 households is treated as poor. In this transfer scheme, every household is covered and as a result undercoverage is zero. It is the implicit desire to minimize undercoverage rates that in many occasions has been used as an argument in favor of uniform transfers. But, the major problem with a uniform transfer scheme is leakage.

The second scheme examined is *targeting at the locality level*. [17] This is a geographic targeting scheme of the type surveyed by Baker and Grosh (1994). At present, PROGRESA's beneficiary selection method may result in some households within a certain locality being excluded from the program while a significant fraction of the households in that same locality are covered by the program or vice versa. Within the subset of localities selected by PROGRESA as marginal, it is possible, with the use of the continuous marginality index constructed by PROGRESA, to rank localities as more or less marginal. Beginning with the most marginal locality, we classify as poor (or beneficiaries) all the households residing in that locality and then repeat these steps for the households in the locality with the next value of marginality index until the total number of poor households is equal to 78% of all the households in the sample. As discussed earlier, it is essential to have a poverty line that yields the same poverty across schemes.

In all of our calculations, consumption-based targeting with the higher poverty line (the 78th percentile) is treated as the perfect targeting scheme meaning that the undercoverage and leakage rates with consumption-based targeting are zero. Moreover, at this point we abstract from issues related to budgetary constraints or costs of targeting, but take these into account later. Tables 3 and 4 contain the undercoverage and leakage rates, respectively, estimated for the various targeting schemes.

Table 3 reveals that PROGRESA's undercoverage rate is lower than the undercoverage rate obtained if targeting were at the locality

Table 3. *PROGRESA's undercoverage rates using the FGT weighting scheme (percentage change in index relative to transfers with PROGRESA targeting)*

| | $U(0)$ | $U(1)$ | $U(2)$ |
|---|---|---|---|
| Uniform transfer (i.e., no targeting) | 0.0000 | 0.0000 | 0.0000 |
| Transfers with PROGRESA targeting | 0.1626 | 0.0487 | 0.0201 |
| Locality-level targeting (based on marginality index) | 0.1896 (16.61) | 0.0674 (38.45) | 0.0312 (55.42) |

Table 4. *PROGRESA's leakage rates using the FGT weighting scheme (percentage change in index relative to uniform transfer)*

| | $L(0)$ | $L(1)$ | $L(2)$ |
|---|---|---|---|
| Uniform transfer (i.e., no targeting) | 0.2200 | 0.0769 | 0.0561 |
| Transfers with PROGRESA targeting | 0.1634 −(25.73) | 0.0487 −(36.72) | 0.0313 −(44.15) |
| Locality-level targeting (based on marginality index) | 0.1896 −(13.82) | 0.0595 −(22.63) | 0.0413 −(26.34) |

level based on the marginality index. Moreover, PROGRESA's undercoverage rate is even lower if we were to focus on the severity of poverty of those excluded from the program. Put differently, locality-based targeting would have left out of the program more of the extreme poor compared to the PROGRESA targeting method.

Table 4 also reveals a generally favorable picture of PROGRESA. With PROGRESA's targeting method the leakage rate is lower than the leakage rate obtained with a uniform transfer, as well as lower than the leakage rate obtained with targeting at the locality level. [18] The households leaking into the program with PROGRESA's targeting are much closer to the poverty line (less well-off) compared to the households leaking into the program with uniform targeting or locality-based targeting.

## 5. EVALUATION OF PROGRESA'S IMPACT ON POVERTY ALLEVIATION RELATIVE TO ALTERNATIVE TARGETING METHODS AND TRANSFER SCHEMES

The preceding analysis suggests that PROGRESA's targeting method performs better then alternative methods. In this section, we provide a more conclusive evaluation by setting the budget of the program at a fixed amount and simulating the impact of the different targeting and transfer schemes, inclusive of targeting costs, on the indices of poverty. It should be kept in mind that the simulation results presented here are partial equilibrium results in the sense that they ignore the potential indirect effects of cash transfers or their method of financing and any possible behavioral responses by households. The budget is by construction equal to the total amount of benefits that would be distributed to all the poor households under PROGRESA's selection method. It is approximately 45% of the total poverty gap in our sample. [19]

### (a) *Alternative transfer schemes*

We start from the case where there is no cash transfer program and a fixed budget, and examine the decrease in the poverty rate if the cash transfers were uniform in the sense that the full budget available is allocated to all households without distinguishing between poor and nonpoor households. We then investigate how PROGRESA, given its beneficiary selection method, compares to the impact of a cash transfer program that has the same benefit structure (based on gender and age) and distributes the same funds but selects households based on an alternative indicator.

In the simulation assuming a uniform transfer scheme, each household gets the same absolute amount as a cash transfer. The cash transfer received by each household is the ratio of the total budget and the total number of households in the sample. The post-transfer consumption of the household (which equals the pre-transfer level of consumption and the cash transfer received) is then divided by the number of adult equivalent units of the household. For the case of consumption-based targeting, we first identify poor households based on the comparison of the household-specific consumption per adult equivalent and the 78th percentile poverty line. Households classified as nonpoor by the consumption-based criterion receive no benefits while households classified as poor are assumed to receive benefits according to the structure of benefits of the PROGRESA program. As with the uniform transfer case, the post-transfer consumption of the household (which equals the pre-transfer level of consumption and the cash transfer received) is transformed into adult equivalent units. But, a rule needs to be adopted regarding how the limited budget is allocated to the households selected as participants into the program. In simple terms the rule consists of giving benefits first to the neediest households and then moving progressively up the ranking of households until the budget is exhausted. A household is classified as having more need in the sense that its level of consumption per adult equivalent is further away from the poverty line. Our budget is lower than the total poverty gap, and as a consequence 19.56% of poor households do not receive any

benefits. These poor households are closer to the poverty line compared to the ones that do receive benefits. Similar steps are followed in allocating benefits to the households selected as poor by the PROGRESA targeting method.

It is imperative to clarify the implications of this budgetary allocation rule. By construction, this rule is likely to result in a very small (or zero impact) on the poverty rate most people are accustomed to, the Headcount index $P(0)$. If PROGRESA benefits are given first to those who are far away from the poverty line and not to those close to the poverty line, the headcount rate is not likely to change, unless the benefit given to a very poor household is large enough to cover the poverty gap. Note also that if the budgetary allocation rule were to be reversed, in the sense that the limited budget were first allocated to the households closer to the poverty line moving down progressively to households further away from the poverty line, then the impact on the headcount rate of poverty would be much higher. We are of the opinion that the latter budget allocation rule does not reflect the key objectives of PROGRESA and for this reason we adopt the rule of giving the money to the neediest first.

The preceding discussion also implies that in comparing the relative targeting success or failure of PROGRESA to alternative methods of selection, it is imperative to focus on the higher order measures of poverty such as $P(1)$ or $P(2)$. Only the higher order measures of poverty can provide an estimate of the relative effectiveness of PROGRESA's methods in identifying the poorest of the poor households in comparison to other targeting methods.

### (b) *Targeting costs*

Targeting necessitates the collection of information of a number of variables at the household level that are useful at identifying beneficiaries. Such variables include the income of each household by source or consumption expenditures over a reference period, household assets, etc. In practice it is quite difficult to distinguish between the service-delivery costs of the program and the costs associated with targeting. For example, a large component of the information collected by the ENCASEH survey is essential for the administration of the program as well as for targeting. For this reason we ran three separate simulations using a zero, low and high estimate for the cost of targeting. The low cost figure is based on the estimate of PROGRESA officials that the cost of collecting targeting information is only $60P$ per household out of the total of $170P$ per household for the whole ENCASEH survey.

Using these cost estimates, we then adjust the original budget used in our earlier simulation by subtracting the cost of surveying all the households in the sample with all costs deflated to June 1994 prices. Given that these survey costs are one-time in the sense that they are incurred only at the start of the program, and since PROGRESA plans to review the status of all households three years after the initiation of the program, we distribute these costs equally over time by dividing them by 36 (the total number of months of the duration of the program). [20] It turned out that the costs of targeting made very little difference in the estimates obtained for the impact of PROGRESA on poverty. Therefore, we report the estimates obtained assuming the full cost of the surveys.

For the case of locality-level targeting we assume there are zero targeting costs. We use an analogous method and simulate the scenario of PROGRESA using its limited budget to provide benefits to all households starting from the most marginal localities and then moving down to less marginal localities until the budget is exhausted. In this manner, we can get a sense of the impact of PROGRESA on the various poverty indicators without having to do targeting at the household level and thus without incurring any of the costs associated with targeting. Noneconomic costs include the potential conflicts and problems that can arise within small communities where households in many respects similar to households selected as beneficiaries are excluded from the program. [21] Such conflicts could work against the original objectives of the program, as communities may end up being more divided after the initiation of the program than before. In addition, the possible emergence of conflict within communities may give rise to criticisms of the targeting method of the program that may be accompanied by calls for universal coverage or elimination of inequities. If the impact of PROGRESA's second step on the poverty indices were to be approximately the same as that of locality-based targeting, then we could safely conclude that targeting at the household level is not a worthwhile effort given the objective of maximizing poverty reduction.

In our simulations, we do not consider problems related to program take-up or in-

centives effects. For example, households selected as potential beneficiaries may not have enough information nor find it in their interest to adhere to the requirements of the program. Moreover, targeting programs can have incentive effects that are side-effects of their goal of sorting the poor from the nonpoor. These incentive effects arise from the behavioral responses of households or individuals as they attempt to become eligible for the program. For example, the presence of the program may induce some households to reduce their work effort and thus their income so as to become eligible for program benefits (Kanbur, Keen, & Tuomala, 1995).

### (c) *Results*

In Table 5, we present the results of our simulations on the impact on poverty indices. The reader is cautioned that for any given transfer scheme the alternative poverty indices are not comparable. Comparisons are only meaningful for a given poverty index (that is, a given value of $\alpha$) across transfer and targeting schemes.

For the reasons discussed above, both perfect targeting based on household consumption and PROGRESA's targeting have little or no impact on poverty as measured by the headcount ratio. These results highlight the point that the social objective assumed is crucial in determining which transfer or targeting scheme is the most efficient. If the social objective of the government were to decrease the number of poor households as a percentage of the total population (the headcount rate), then according to our simulations, a uniform transfer is the most effective way. Locality targeting comes second, PROGRESA targeting a close third and perfect targeting last. With uniform transfers more households close to the poverty line receive benefits that are sufficiently high to make them cross over the poverty line.

The picture changes dramatically if the social objective were to have concern for the depth of poverty as measured by the Poverty gap index ($P1$), or the severity of poverty as measured by the Severity index $P(2)$. Given either one of these social objectives, PROGRESA's targeting is the second most effective scheme to perfect targeting based on consumption, and uniform transfers the least efficient scheme for reducing the depth or severity of poverty in Mexico. Moreover, since we have accounted for the costs of targeting, the higher impact of PROGRESA's targeting on the depth and severity of poverty than locality-based targeting implies that targeting by PROGRESA is worth the monetary cost, though not by much. Whether these benefits exceed the noneconomic costs associated with targeting is impossible to determine within the framework we have adopted in this paper. Qualitative studies conducted as part of the PROGRESA evaluation, however, suggest that noneconomic costs may be significant, suggesting that this dimension should be taken into account in order to understand the full cost of household-level targeting (Adato, 2000).

The exclusion of some of the nonpoor households in marginal localities provides the opportunity to include in the program poor households from less marginal localities. The extent to which targeting within localities is economically and ethically justified depends on the inequality of distribution of the welfare among households within localities and between localities. In order to obtain more insights on the question of whether and what proportion of households to select within a locality we have conducted a number of additional simulations.

Table 5. *Poverty indices under various targeting/transfer schemes with a fixed budget and including costs of targeting (percentage change in poverty index from case of no transfer)*

| | $P(0)$ (Headcount index) | $P(1)$ (Poverty gap) | $P(2)$ (Severity index) |
|---|---|---|---|
| No transfer (no anti-poverty program) | 0.7800 | 0.3142 | 0.1577 |
| Uniform transfer (i.e., no targeting) | 0.6434<br>−(17.52) | 0.2256<br>−(28.19) | 0.1006<br>−(36.18) |
| Transfers with consumption-based targeting | 0.7691<br>−(1.40) | 0.2158<br>−(31.30) | 0.0797<br>−(49.42) |
| Transfers with PROGRESA targeting | 0.7029<br>−(9.88) | 0.2203<br>−(29.88) | 0.0874<br>−(44.58) |
| Locality-level targeting (based on marginality index) | 0.6948<br>−(10.92) | 0.2214<br>−(29.51) | 0.0900<br>−(42.94) |

As it was pointed out above at the early stages of the program PROGRESA initially used a cut-off point that would allow on average 52% of the households in our sample to qualify as a beneficiary of the program. After a few months the formula used to select beneficiaries was revised and the cut-off point was moved up in order to let more households in. This "densification process" resulted in the current cut-off value that leads to 78% of the households being selected as eligible beneficiaries. The discriminant scores for each household in our sample, before and after the densification process, kindly made available by PROGRESA authorities, provide us with the opportunity to assess whether this expansion in program coverage within localities has the potential of having a bigger impact on the indices of poverty.

For our simulations we assumed a fixed budget amounting to 77.87% of the poverty gap, using a poverty line at the 52 percentile of predicted consumption. In reality, the decision by PROGRESA authorities to expand the number of households covered was accompanied by a simultaneous increase in the budget. We estimated the impact on the various indices of poverty under three different scenarios. In the first scenario, selection into the program is made by sorting households based on their discriminant score before the densification. [22] In the second scenario, we followed the same steps except that we ranked households by their discriminant score after the densification process. In the third, beginning with localities of the highest index of marginality, all households within a locality are covered by the program until the budget is exhausted.

The results of our new simulations are reported in Table 6. As can be seen, the impact of the transfers on higher poverty indices $P(1)$ and $P(2)$ increases with the selectivity of targeting. A more strict rule of selection into the program, for example one that allows 52% of the households in the program, decreases the depth and severity of poverty more than the current rule that classifies as beneficiaries 78% of the households. This result implies that even within rural communities of extreme poverty there is considerable variation in the distribution of welfare, making it possible to justify on strictly economic grounds the implementation of targeting rules even within the locality level and in spite of the costs associated with targeting.

### (d) *Impact on inequality*

As a last test of the targeting methods of PROGRESA, we have also examined the impact of the different transfer and targeting schemes on inequality. The social objective is now considered to be the minimization of inequality instead of poverty alleviation. The main shortcoming of the FGT poverty indices is that they assign weights only to poor households. Thus households just above the poverty line, though for all practical purposes identical to households just below the poverty line, receive no weight. Inequality indices provide an alternative means of evaluating the impact of various targeting and transfer schemes by comparing their impact on inequality in the total population of households. In this manner, the benefits accruing to households just above the poverty line do not necessarily have to be considered as leakage and are assigned a weight similar to that assigned for households receiving benefits just below the poverty line (Deaton, 1997).

Table 6. *Comparing the impact on poverty under more or less restrictive targeting rules (percentage change in poverty index from case of no transfer)*

| | $P(0)$ (Headcount index) | $P(1)$ (Poverty gap) | $P(2)$ (Severity index) |
|---|---|---|---|
| No transfer (no anti-poverty program) | 0.5200 | 0.1583 | 0.0635 |
| Uniform transfer (i.e., no targeting) | 0.4158 | 0.1076 | 0.0384 |
| | −(20.04) | −(32.04) | −(39.56) |
| Transfers with consumption-based | 0.4512 | 0.0721 | 0.0172 |
| targeting | −(13.23) | −(54.48) | −(72.90) |
| Transfers with PROGRESA targeting | 0.4085 | 0.0858 | 0.0264 |
| before densification | −(21.44) | −(45.82) | −(58.44) |
| Transfers with PROGRESA targeting | 0.4110 | 0.0892 | 0.0283 |
| after densification | −(20.97) | −(43.63) | −(55.39) |
| Locality-level targeting (based on | 0.4096 | 0.0928 | 0.0305 |
| marginality index) | −(21.23) | −(41.38) | −(52.03) |

Table 7. *Inequality indices under various targeting/transfer schemes with a fixed budget and including costs of targeting (percentage change in inequality index from the case of no transfer)*

| | GE(−1) | A(2) |
|---|---|---|
| No transfer (no anti-poverty program) | 0.13112 | 0.20776 |
| Uniform transfer (i.e., no targeting) | 0.13313 (1.53) | 0.21027 (1.21) |
| Transfers with consumption-based targeting | 0.06549 −(50.05) | 0.11581 −(44.26) |
| Transfers with PROGRESA targeting | 0.08463 −(35.46) | 0.14475 −(30.33) |
| Locality-level targeting (based on marginality index) | 0.09114 −(30.49) | 0.15418 −(25.79) |

We calculated the impact of the targeting and transfer schemes for two inequality indices: the Generalized Entropy index GE($a$) and the Atkinson index, A($e$). Both inequality indices involve a parameter that allows the index to be sensitive to different parts of the distribution. For example, for the GE($a$) index, the more negative $a$ is, the more sensitive GE($a$) is to consumption differences at the bottom of the distribution. The more positive is $e > 0$ is, the more sensitive is A($e$) to consumption differences at the bottom of the distribution. In Table 7, we report the values of these two indices with the values of the parameters set to $a = -1$ and $e = 2$ so that both indices are sensitive to differences at the bottom of the distribution of consumption.

Inspection of Table 7 reveals the same general patterns observed for the poverty index $P(2)$ in Table 6. For both inequality indices, uniform transfers have little or no effect on inequality while consumption-based targeting has the highest impact on inequality. PROGRESA's targeting runs second to consumption-based targeting but well ahead of the impact of targeting at the locality level.

## 6. CONCLUSIONS

The PROGRESA experience and the results of our evaluation of PROGRESA targeting methods provide important policy implications for other Latin American countries considering the adoption of similar schemes.

First, it is necessary to have the right expectations about the potential impact of programs targeted toward the extreme poor on the poverty measure that most people are familiar with. Targeted programs, such as PROGRESA, may be quite successful at reducing the poverty gap or the severity of poverty, but may have a negligible impact on the headcount ratio. A program may meet its social objective, but politically it may be difficult to sustain, if expectations are misplaced.

Second, PROGRESA's methodology of selecting beneficiary localities and households is relatively more effective in identifying the extremely poor localities or households but less so when it comes to distinguishing among localities or households in the middle of the scale. In short, it becomes increasingly difficult to differentiate between the moderately poor and the nonpoor once the program has covered the extreme poor. This implies that as PROGRESA or other similarly targeted transfer programs expand into less marginal communities the chances of selection errors are higher. A similar conclusion is derived from our evaluation of the targeting of households within localities. PROGRESA's targeting is not perfect but relatively more effective at identifying the extremely poor households within localities but less so when it comes to selecting households that are moderately poor.

Third, the noneconomic costs associated with targeting deserve serious consideration in the overall decision to pursue a household-level targeting strategy. We find that PROGRESA's method of targeting households outperforms alternative methods in terms of reducing the poverty gap and severity of poverty indices, even after taking into account the economic costs of targeting. But, the reduction in the higher order measures of poverty accomplished by household targeting over and above those accomplished by simply including all the households in the locality are relatively small. Whether these marginal successes of targeting at the household level is a worthwhile effort depends on the size of the noneconomic, or political and social costs of targeting, all of which are very difficult to quantify. Qualitative surveys from PROGRESA's evaluation show that these costs of targeting in rural, often indigenous, communities may not negligible.

We close by pointing out that our evaluation of the selection of beneficiaries into PROGRESA is not equivalent to evaluating the program as a whole. A recently completed evaluation of the PROGRESA program and its

components (Skoufias, 2000) suggests that PROGRESA has positive impact on the health, education, and nutrition of the members of the selected beneficiary households.

## NOTES

1. It is important to clarify at the start that this paper does not attempt to provide an evaluation of the success or failure of the program. Numerous reports from an extensive evaluation of PROGRESA's components are available at http://www.ifpri.org/themes/progresa.htm.

2. As Atkinson (1995) points out, the relative efficiency of different transfer schemes may be hard to pin down when objectives are not clearly defined.

3. We assume that the budget is fixed although we do recognize the possibility that the instruments used, such as targeting, may affect the degree of political support for the program and hence the funds available for poverty alleviation. In Section 5, we discuss our simulations with locality-based targeting in relation to the political economy aspects of targeting.

4. A more detailed description of the three stages of PROGRESA and of the household survey used for our evaluation can be found in Skoufias, Davis, and Behrman (1999).

5. The first four variables were obtained from the Population and Housing Count of 1995 and the last three from the General Population and Housing Census of 1990 (both carried out by the National Institute of Statistics, Geographics and Information INEGI).

6. The marginality index was divided into five groups based on the degree of marginality. The cutoff points were determined by the Dalenious and Hodges (1959) statistical procedure (for details of this application, see de la Vega, 1994).

7. PROGRESA is primarily aimed at increasing household usage of existing health and schooling facilities. It is arguable that an alternative way of alleviating poverty could be achieved through building new school and health facilities in localities where these do not exist. We consider such issues as outside the scope of our evaluation of PROGRESA's targeting.

8. The ENIGH is also carried out by INEGI and covers 14,042 urban and rural households.

9. As another test of the accuracy of the marginality index in identifying the poor households (rather than just the localities where they may be located) Skoufias *et al.* (1999), repeat the exercise conducted above, though this time applying the principal components weights to the ENIGH households. The results are similar to those found in Table 1.

10. Note that the fraction of beneficiary households arrived at by PROGRESA's methods generally varies from region to region.

11. The households in these 506 localities formed the sample that was used to evaluate the impact of the PROGRESA program on health, education and nutrition. See Skoufias (2000) for more details and a summary of the evaluation methods used and results obtained.

12. The individual parameters estimates from these regressions are available from the authors upon request. The adjusted $R^2$ of the consumption regression was equal to 0.5516.

13. It is imperative to acknowledge that our effort (like any other) to identify poverty at the household level is likely to be subject to errors arising from a variety of sources. We make no effort to estimate the standard error associated with our poverty status of households as this likely to be too high to warrant any meaningful evaluation of PROGRESA's selection at the household level (e.g., Hentschel *et al.*, 2000).

14. For a welfare-based interpretation of the concepts of undercoverage and leakage see Coady and Skoufias (2001).

15. The undercoverage rate with either of the two higher poverty lines, can be expressed as a weighted average of the undercoverage rates of the extreme poor and the moderately poor. The higher undercoverage rates obtained with the higher poverty lines imply that the undercoverage rate of the moderately poor is higher than that for the extreme poor.

16. Our estimates of undercoverage and leakage reported in Table 2 proved to be quite robust to differences in the specific method used to target households based

on predicted consumption. Using the probabilistic approach of Hentschel *et al.* (2000) yielded the same general conclusion about PROGRESA's targeting accuracy.

17. An in-depth comparison of this geographic targeting scheme to PROGRESA's targeting at the household level is presented in Skoufias *et al.* (1999). All of our simulations here are based on localities from the pool of 506 localities already selected to be covered by the first step of PROGRESA's selection method.

18. Note that the leakage rate and undercoverage rate for locality level targeting are approximately half the corresponding rates of locality level targeting for Mexico obtained from the simulations of Baker and Grosh (1994) who use the poverty line at the 30th percentile of consumption per capita.

19. We do not provide an evaluation of whether the size of the budget is appropriate. Such issues can only be addressed later when more detailed data become available on the constraints, the incentives and opportunity costs faced by rural families and policy makers.

20. It should be noted that until March 2001, no action has been taken toward revising the eligibility status of households receiving benefits.

21. Other noneconomic costs to targeting may exist, such as the undermining of traditional community-wide forms of organization.

22. Lower discriminant scores signify poorer households. Since the disrciminant scores of PROGRESA where derived separately by region, and some of the households were classified as poor in spite of their discriminant score (from feedback during the third stage of beneficiary selection), we took care to first sort all households classified as poor, then by the marginality index of the locality (higher index values signifying more marginal communities) and finally by the region-specific discriminant score of the household.

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