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ABSTRACT

Most impact evaluations of conditional cash transfers and unconditional cash transfers focus on the returns to increased human capital investments that will be reaped largely or exclusively in the future (that is, when current children have increased productivity as adults). But such programs aim not only to increase human capital investments with implications on future distributions of income but also to alleviate current poverty and reduce current inequality. This paper considers the current distributional gains from such programs and how those depend on the degree of inequality aversion in the social welfare function. Simulations show that for a range of inequality aversion parameters, the welfare gains from current redistribution for the Mexican PROGRESA conditional cash transfer program are as large, or possibly much larger, than the estimated present discounted value of future earnings from human capital investments in lower and upper secondary schooling. These, moreover, are an underestimate of the gains from redistribution because, in addition to current gains, such gains will be augmented in the future through the distribution of the returns on the human capital investments induced by cash transfer programs. Therefore, to fully evaluate such programs, it is critical to incorporate the distributional gains, not only the impacts on human capital investments.

Keywords: social welfare, equity, transfer programs
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1. INTRODUCTION

Transfer programs in low- and middle-income countries have increased appreciably in the last decade. By 2010 between 0.75 and 1.0 billion people in such countries received conditional and unconditional cash support, including more than 60 million people in Brazil, 30 million in Mexico, and 9 million in Ethiopia (DFID 2011). Many of these programs, particularly conditional cash transfer (CCT) programs, are expected to create human capital. Others, such as public works (workfare), construct physical assets as well as target income to low-income households, which indirectly may increase human capital investments (Mani et al. 2014). Many of these programs are designed to address both current poverty and future income growth and poverty (Levy 2006; Alderman and Yemtsov 2014). They combine efficiency and equity motives because poorer households are most likely to face capital, information, and insurance market imperfections that limit their investments below levels that would be implied by efficiency (Das, Do, and Özler 2005; Behrman and Skoufias 2010).

Although numerous studies evaluate the impact of such programs on human and physical capital and others assess the targeting effectiveness of transfers and, thus, their contribution to poverty reduction, attempts to combine those two objectives to indicate the overall effectiveness of transfer programs are limited by the absence of a common metric. Take, for example, education. A range of studies have reported the impact of transfer programs on schooling (Baird et al. 2014; Behrman 2009; Behrman, Parker, and Todd 2013; Fiszbein and Schady 2009; Orazem and King 2008). Often the estimated increased schooling from a given level of transfer is compared with the impact of equal-value alternative investments in the sector, thus providing a cost-effectiveness ranking.¹ Alternatively, benefits can be converted into the expected impact on the present discounted value of lifetime earnings (assuming individual earnings are the only impact of policy interest) and compared with the present discounted value of costs (Behrman, Parker, and Todd 2011, BPT in the remainder of this paper).

In both of these examples, however, the impact on current distribution of consumption is ignored. It is hard to argue that society does not value the poverty reduction or the increased equity resulting from a transfer given that society chooses to use resources to administer the targeting of such programs to the poor. If the value of increased equity or reduced poverty are policy goals, then standard benefit-cost estimates are presumably lower bounds for the true benefit-cost ratios of multi-objective policy packages that are directed toward current distributional goals as well as enhanced investments.²

Is this a minor underestimation, one that could, perhaps, be ignored when prioritizing investments? While the distributional social benefit cannot be directly measured, leaving it out of any assessment implicitly assumes that the social value of distribution is zero, a tacit assumption that is hard to defend in the context of transfer programs. To illustrate the range for the possible contribution of increased consumption of low-income households to the total impact of a well-known CCT program, Mexico’s PROGRESA, the current paper estimates social benefits under different assumed degrees of social inequality aversion using an explicit social welfare function. In particular, we construct a grid of the total benefits from the PROGRESA transfers that are conditional on attending lower or upper secondary school, including the social value of increased consumption by the poor under different assumed values for a parameter that measures social welfare of different outcomes given distributional weights. Because the benefits from current consumption are immediate while the benefits from human capital investments accrue after a number of years, the relative contribution from redistribution to social welfare also depends, in part, on the discount rate. As this is also not directly observed and there is some debate about the appropriate discount rate to use, the simulations are presented with redistribution parameters on one axis and discount rates on the other. Clearly, both matter since if redistribution of

¹ Dhaliwal et al. (2013) present a variation of this approach, assigning the transfer from PROGRESA as a cost in a cost-effectiveness comparison of diverse schooling investments but excluding all but a single type of benefit as an outcome due to the challenges of aggregation of distinct categories of benefits. To no surprise, it appears costly to achieve the results studied.
² The standard argument for separating equity from efficiency considerations in project evaluation with the former being addressed in separate transfers clearly does not apply to CCTs.
current consumption has any value at all, the share of its contribution to total benefits is higher the larger the discount rate for future earnings impact of program-induced human capital investments.

Our particular illustration is informative about a program that has been analyzed extensively from both the perspective of human capital improvements and distributional efficiency. Among the latter is a study by Coady and Skoufias (2004), which decomposes welfare gains from targeting and redistribution using different welfare weights. The results are presented in relative terms and one that is scale neutral. Wodon et al. (2003) also compare the social welfare of PROGRESA relative to other programs using an index based on decomposition of the Gini index. No study that we know of, however, is designed to include the distributional benefits of PROGRESA together with the value of the gains in future productivity. Brent (2013) does attempt this task for a pilot program for orphans and vulnerable children in Kenya, offering an approach that includes both dimensions of the CCT programs in cost-benefit analysis using primary school enrollments as well as distribution of consumption. That particular example has a favorable outcome under reasonable assumptions about the implicit social welfare function, but the results are driven largely by the distribution component. In contrast, the current study shows an appreciable role of the transfer in both increasing future earnings and the distribution of current consumption and provides additional perspective on an assessment of dual roles of a transfer program.
2. APPROACH

The simulation is based on an additive social welfare function in which social welfare $W$ is summed over individual well-being $x_i$ of the $N$ individuals in the society:

$$W = \sum_{i=1}^{N} \frac{x_i^{1-\varepsilon}}{(1-\varepsilon)}, \quad \varepsilon \neq 1; \quad \ln W = \sum_{i=1}^{N} \ln x_i, \quad \varepsilon = 1.$$  

(1)

An important characteristic of this welfare function is that a single distribution parameter, $\varepsilon$, indicates how society values inequality. A higher value of $\varepsilon$ implies greater inequality aversion. As $\varepsilon \rightarrow \infty$, $W$ becomes Rawlsian and the lowest individual well-being is at the core of social welfare as equity considerations dominate entirely. If $\varepsilon = 0$, $W$ is utilitarian with no concern about distribution. Figure 2.1 illustrates these possibilities. The straight isowelfare line is for $\varepsilon = 0$. Moving along an isowelfare curve from an equal distribution with $x_i = x_j$ at point $a$ to a very unequal distribution with $x_i << x_j$ at point $b$ has no impact on social welfare for this function with $\varepsilon = 0$. In this extreme case, the distribution of individual welfare is irrelevant in the sense that it does not affect social welfare, which is identical along the linear isowelfare curves. At the other extreme, with $\varepsilon \rightarrow \infty$, the welfare function is L-shaped. If one starts with equal distribution at point $a'$ and increases either $x_i$ or $x_j$, there is no impact on welfare. All that matters is the well-being of the worst-off member of society, for which reason this welfare function is called Rawlsian. At this extreme, distribution is everything in the sense that the only way to increase social welfare is to improve the consumption of the unit with the lowest well-being. In between these two extremes are an infinite number of possible isowelfare curves. Those that are closer to the L-shaped extreme by being fairly sharply curved weigh equality much more than those that are closer to the linear extreme by having little curvature.

Figure 2.1 Two isowelfare curves for well-being between individual $i$ and individual $j$: Rawlsian L-shaped ($\varepsilon \rightarrow \infty$) and utilitarian linear case ($\varepsilon = 0$)

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3 We have assumed symmetry around the 45-degree line so the corner of the isowelfare curve is on this line. One could allow asymmetry (what Behrman, Pollak, and Taubman [1982] call “unequal concern” because welfare weights are such that for the same consumption level some families are weighted more heavily in the welfare function than others), but this complication would not add much to our analysis.
This welfare function also has the property that the ratio of marginal social utility of two individuals is the reciprocal of the ratio of their well-being raised to the power of the distribution parameter, $\varepsilon$:  

$$\frac{\partial W/\partial x_i}{\partial W/\partial x_j} = \left(\frac{x_j}{x_i}\right)^\varepsilon.$$  

(2)

This expression indicates again that if $\varepsilon = 0$ then there is no difference in the marginal social utility with different distributions between the $i$th and $j$th individual; and, thus, society places no value on redistribution. If the $i$th individual is poorer than the $j$th and, thus, $x_j/x_i$ is greater than one, then for all values of $\varepsilon > 0$, social welfare increases at a faster rate with an increase of well-being for the $i$th individual than an equal increase in well-being for the $j$th. As $\varepsilon$ increases, the social gain of redistribution from richer to poorer individuals also increases.

Equation 2 has been applied to various studies of taxation and redistribution (Deaton 1997; Coady and Skoufias 2004; Coady and Harris 2004). These studies often compare the relative outcomes of different taxation instruments and do not present their result in terms of a dollar metric that can be combined with the investment returns of a transfer program, which is our objective. Indeed, Equation 1 is not anchored in a manner conducive to ordinal comparisons. The value of aggregate welfare is asymptotic at 1, approaching infinity from below and negative infinity from above. That is, the value of $W$ becomes negative if $\varepsilon > 1$, a parameter value that is often explored in the literature (Deaton 1997; Olken 2007; Coady and Skoufias 2004). Therefore, direct comparisons of $W$ are meaningful for a given value of $\varepsilon$, but not for changing values of $\varepsilon$.

This study, however, is not attempting to measure aggregate welfare but only the sum of marginal changes relative to the change at a reference value, $\delta W/\delta x$. To do this we require a few additional assumptions. First, we focus on Equation 2, aggregating weighted marginal changes attributable to the program. Consistent with much of the literature, we use per capita consumption or expenditures as the measure of individual well-being (Deaton 1997). However, in order to make direct comparisons of $W$ when the value of $\varepsilon$ varies, we need to calibrate the calculations. We first set $x_j$ to mean per capita consumption. This is a common choice; for example, Atkinson and Brandolini (2010) use per capita income in their study of global inequality. However, that study as well as many others based on Equation 1 focus on relative income inequality across states and do not require a cardinal value as is necessary in order to sum changes in welfare with the present discounted value of increased earnings. We thus also need to set $\delta W/\delta x = 1$. This choice is consistent with conventional use of per capita income growth as an indication of improved welfare. If this simulation achieves our objective of opening up a line of inquiry, the sensitivity to alternative measurement approaches can be explored. We return to this issue briefly below.

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4 Squire and van der Tak (1975) start with Equation 2 and integrate back to get Equation 1. Equation 2, however, is also a property of an alternative social welfare function, $W = (1 - \varepsilon) \sum_{i=1}^{N} x_i^{1-\varepsilon}$ as used by Behrman and Birdsall (1988). Equation 2 also makes it apparent that the overall origin of this social welfare function stems from the convexity of utility under constant relative risk aversion as acknowledged in Atkinson (1970).

5 Alternatively, one can calibrate based on median per capita expenditures as in Olken (2007). Coady and Skoufias (2004) calibrate on the mean income for the poorest quintile.
While the current simulation focuses on benefits from a conditional transfer program, in the standard benefit-cost literature in the absence of distributional weights, transfers are not considered either a cost or a benefit as they are assumed merely to shift resources and not actually use them.\textsuperscript{6} Once one considers distributional weights for beneficiaries, one needs to consider these for financing as well. Few, if any, taxation systems are free of economic distortions. While the issue of how different taxation policies affect the relative net social value of a transfer program is important (Coady and Harris 2004), it is an issue for which we do not have anything to add to the literature. Nevertheless, we do take the distributional impact of revenue into account by modeling the program in a manner that offsets the transfers paid out with revenues (so that the net resources available to the economy are unchanged). In particular, we assume that the program is financed out of general taxation with the consumption of each individual’s resources reduced by his or her share of the total taxation bill. However, we also assume that the program is financed by a reallocation of current revenue and, thus, total revenue is not affected. Therefore, there is no \textit{additional} deadweight loss from \textit{additional} taxation.\textsuperscript{6}

\textsuperscript{6} The costs of targeting and administering a program are real resource costs but are left out of this study in order to focus on the main theme.
3. DATA

The program studied is the support to lower and upper secondary school students under PROGRESA. While this is only one component of the well-known CCT program in Mexico, subsequently called Oportunidades and recently renamed Prospera, it is particularly suited to this study as the contribution to future earnings have been estimated (BPT 2011) allowing us to focus on the distributional component and the relative magnitude of the two components under different assumptions. We use the 2002 nationally representative Mexican Family Life Survey (MxFLS) as the basis of our simulations below. These data were obtained in January 2014 from the MxFLS website (www.ennvih-mxfls.org). The survey covers 8,440 households and 35,677 individuals with 532 individuals aged 8 to 21 from 413 households in lower or upper secondary school reporting that they received a transfer from PROGRESA. For the current study the amount of transfer received by these recipients was based on the allocation formula reported in BPT (Table 3.1) rather than the amount reported per individual in the survey data. We assume that the monthly support for secondary school students was provided for only 10 months of the year in accord with the academic year.

Table 3.1 Monthly schooling grants (pesos) in the second semester of 2003

| Grade                  | Boys | Girls |
|-----------------------|------|-------|
| Primary               |      |       |
| 3rd year              | 105  | 105   |
| 4th year              | 120  | 120   |
| 5th year              | 155  | 155   |
| 6th year              | 210  | 210   |
| Lower secondary       |      |       |
| 1st year              | 305  | 320   |
| 2nd year              | 320  | 355   |
| 3rd year              | 335  | 390   |
| Upper secondary (high school) | |       |
| 1st year              | 510  | 585   |
| 2nd year              | 545  | 625   |
| 3rd year              | 580  | 660   |

Source: Table 1 from Behrman, Parker, and Todd (2013).

Taking our measure of current welfare as current consumption, it is not necessarily the case that consumption increases on a one-for-one basis with a unit of transfer ($t$). We assume that $\delta x_i / \delta t_i = \delta x_i / \delta y_i * \delta y_i / \delta t_i$ where $y_i$ is incremental expenditures. While the former derivative is likely close to 1 (by construction in this study), $\delta y_i / \delta t_i < 1$ in most cases because labor allocation will be affected by a transfer due to the substitution effect coming from the change in the price of schooling whenever the transfer includes conditionality. Thus, the increment of income from the transfer will be somewhat offset by reduced labor earnings.

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7 This means that our simulations are conditional on the coverage of PROGRESA in 2002, not lower coverages for earlier years or higher coverages for later years.
8 Thus, we are ruling out many forms of savings although we recognize that this is a simplification from behavior (Gertler, Martinez, and Rubio-Codina 2012).
The MxFLS reports consumption after the distribution of PROGRESA. To derive an estimate of what consumption would have been in the absence of the program we subtract the net per capita transfer \( (v_i) \), which is the transfer to all families with eligible individuals in lower or upper secondary school minus assumed labor reallocation to schooling as well as the household’s share in the taxes necessary to fund the program. BPT report that male PROGRESA recipients aged 12 to 16 reduced their labor by 28.6 percent. Thus, we subtracted 28.6 percent of the average of labor earnings of males in that same age bracket who were not in school and also in the poorest quartile of the population—roughly the share of population that was targeted in PROGRESA at the time—from the estimated transfer received by the families of similar males who were in school.\(^9\) Taxation is assumed to come from the value-added tax and is based on the household’s share of total taxable consumption with the nonexempt categories based on Davila and Levy (2010). As indicated, the aggregate taxation is set equal to the aggregate value of the transfer.

While most households do not receive a transfer for lower and upper secondary school students—even those that receive PROGRESA support based on compliance with other conditions may not have a student in the appropriate age bracket—all do pay a share of taxation. There is, thus, a marginal welfare gain or loss for each household from this component of the program.

In theory, the social welfare function is based on individual well-being, and different individuals in a household may have different weights in the social welfare function. However, as the aggregation is additively separable, in the absence of different individual weights, the summation is unaffected by utilizing changes in household consumption, although the weights themselves are based on per capita expenditures. The total distributional benefit is obtained by \( \sum_{i=1}^{n} v_i \frac{(x_j / x_i)}{\varepsilon} \), where \( v_i \) is net transfer to \( n \) individuals in society and change in consumption is assumed to be equal to this net transfer. As the welfare weights, \( (x_j / x_i)^\varepsilon \), depend on the level of consumption we take the average of pre- and post-PROGRESA distributions. That is, \( x_i = \frac{1}{2}(x_i^0 + x_i^1) \) where the superscripts 0, 1 indicate pre- and post-program consumption.

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\(^9\) This assumes that the labor reallocation is due to the reallocation of current income and current consumption to investment in schooling that leads to the future earnings estimated by BPT. To the degree that the change in labor is partially increased leisure—currently outside the welfare measure used here—the overall welfare gain for PROGRESA beneficiaries is somewhat underestimated in our procedure.
4. RESULTS

Table 4.1a reports the present value of the increased schooling from the component of PROGRESA for lower and upper secondary school based on BPT and using a range of plausible discount values. As the gains in schooling are based on participating in the program for six years, they have been divided by six and multiplied by the number of beneficiaries in the sample in order to compare with the annual distributional benefits. These are indicated in Table 4.1b. In principle, with neither welfare weights on transfers nor taxes, when $\varepsilon = 0$ a fully paid-for program should have no distributional benefits or losses. However, there is an estimated reallocation of labor into time spent in school that reduces current consumption in PROGRESA households. In some studies this might be considered a cost; indeed, it is likely that households view this as an opportunity cost when deciding on their schooling investments. However, as the reduction in current consumption does influence the estimated distribution when $\varepsilon > 0$, for parallel purposes the implication of reduced consumption is also included in the estimates of the distributional benefits when $\varepsilon = 0$.

Table 4.1a Present discounted values of benefits in terms of increase in expected earnings attributable to PROGRESA

| Discount rate | 3%  | 5%  | 10% |
|---------------|-----|-----|-----|
| PDV of benefits per person for 6 grades of schooling (USD) | 3,557 | 1,499 | 438 |
| Exchange rate (pesos to USD) | 11 | 11 | 11 |
| PDV of benefits per person for 6 grades of schooling (pesos) | 39,127 | 16,489 | 4,818 |
| PDV of benefits per person per grade of schooling (pesos) | 6,521 | 2,748 | 803 |
| Sample size | 532 | 532 | 532 |
| Total PDV of benefits per grade of schooling (pesos) | 3,469,261 | 1,462,025 | 427,196 |

Source: Computed from Behrman, Parker, and Todd (2013) based on an assumed additional grade of schooling and a return to schooling of 10% of earnings per additional grade of schooling.

Note: PDV = present discounted value.

Table 4.1b Total annual benefits from redistribution

| Redistribution parameter | Benefits |
|--------------------------|----------|
| 0                        | -768,182 |
| 0.5                      | 220,022  |
| 0.7                      | 754,875  |
| 1                        | 1,922,129|
| 1.3                      | 3,951,724|
| 1.5                      | 6,232,349|
| 2                        | 20,220,588|

Source: Authors’ calculation from Mexican Family Life Survey.

Note: See text for details.

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10 Equation 1 imposes a lower bound on any discount rate that is consistent with the rate of income growth when $\varepsilon > 0$. This is because the marginal contribution of future income to welfare declines as income grows at a rate that is determined by $\varepsilon$. This is additional to pure time preference. However, since BPT do not base the estimated returns to schooling on any assumed growth in productivity this bound does not apply to this study.
Table 4.2a presents the total peso value of the program for the entire sample in the MxFLS. Our goal is not to scale this result for the entire national investment in the program but to illustrate the relative contribution of increased current consumption of low-income households. Thus, the share of total benefits that is attributable to the long-term increase of worker productivity is presented in Table 4.2b. When \( \varepsilon = 0.7 \) there are appreciable distributional benefits from current consumption even with a relative high weight placed on future productivity, that is, when the discount rate is low. With this distribution parameter, when the discount rate rises from 3 percent to 5 percent, the share of benefits attributed to future earnings drops from 82 percent of total benefits to 66 percent. It is only a third of the total when the discount rate is 10 percent. When \( \varepsilon = 1 \) future gains in productivity amount to about two-thirds of the total at the lowest discount rate considered and decline to less than a fifth at the highest illustrated in Table 4.2b; at higher values for \( \varepsilon \) the human capital component quickly becomes a negligible portion of the total.

### Table 4.2a Total estimated present discounted value of benefits from PROGRESA lower and upper secondary schooling support inclusive of distributional benefits

| Redistribution parameter | Discount rate | 3%     | 5%     | 10%   |
|--------------------------|--------------|--------|--------|-------|
|                          | Discount rate |        |        |       |
|                          | 0            | 2,701,079 | 693,843 | -340,986 |
|                          | 0.5          | 3,689,282 | 1,682,046 | 647,218 |
|                          | 0.7          | 4,224,135 | 2,216,899 | 1,182,071 |
|                          | 1            | 5,391,390 | 3,384,154 | 2,349,325 |
|                          | 1.3          | 7,420,985 | 5,413,749 | 4,378,920 |
|                          | 1.5          | 9,701,610 | 7,694,374 | 6,659,545 |
|                          | 2            | 23,689,849 | 21,682,613 | 20,647,784 |

Source: Authors’ calculation from Mexican Family Life Survey.
Note: See text for details.

### Table 4.2b Relative shares from human capital increases compared with the total including redistribution

| Redistribution parameter | Discount rate | 3%  | 5%  | 10% |
|--------------------------|--------------|-----|-----|-----|
|                          | Discount rate |    |     |     |
|                          | 0            | 1.28 | 2.11 | -1.25 |
|                          | 0.5          | 0.94 | 0.87 | 0.66 |
|                          | 0.7          | 0.82 | 0.66 | 0.36 |
|                          | 1            | 0.64 | 0.43 | 0.18 |
|                          | 1.3          | 0.47 | 0.27 | 0.10 |
|                          | 1.5          | 0.36 | 0.19 | 0.06 |
|                          | 2            | 0.15 | 0.07 | 0.02 |

Source: Authors’ calculation from Mexican Family Life Survey.
Note: See text for details.
While PROGRESA is targeted to roughly a quarter of the population, there is a social welfare gain for transfers to all households when the transfer they receive exceeds their share of taxation since the welfare function is continuous in consumption over the population. Thus, under the assumption that the welfare weight is based on Equation 2 with the reference consumption, $x_j$, at mean per capita expenditure, what is commonly called a program leakage does not necessarily preclude net distributional gains depending on the share of beneficiaries in any expenditure category and the share of the costs assigned to them. This effect is illustrated in Table 4.3 for $\varepsilon = 0.7$. A third of the PROGRESA recipient households have expenditures between the 25th percentile and the mean consumption and 12 percent actually have consumption per capita higher than the mean (this consumption category represents less than half the households since, as is commonly observed, expenditures are skewed upward and the mean is above the median). The transfer to all of the 413 PROGRESA secondary-school transfer recipient households in the MxFLS leads to net increases of social welfare for these households—that is, none pay more taxes for this program than they receive as benefits—although the social welfare gain per peso spent by the government is less than one for the better-off recipients while it is about two for the poorest quartile. Given that the tax needed to finance the program is distributed among the entire population in this simulation according to the share of consumption subject to the value-added tax, the payments lead to a net social welfare loss for the entire population above the 25th percentile of expenditures per capita—that is, for both recipients and non-recipients in that group.

Table 4.3 Redistribution benefits for different expenditure groups when $\varepsilon = 0.7$

| Variable                  | Number of individuals | Number of individuals receiving PROGRESA | Number of households receiving PROGRESA | Value of transfer (pesos) | Redistribution benefits (pesos) | Redistribution benefits to PROGRESA households (pesos) |
|---------------------------|-----------------------|------------------------------------------|----------------------------------------|---------------------------|---------------------------------|------------------------------------------------------|
| Households in 1st quartile | 8,285                 | 290                                      | 225                                    | 1,070,200                 | 1,628,025                       | 1,849,000                                            |
| Households between 25th percentile and mean | 14,027               | 184                                      | 138                                    | 694,492                   | -176,457                         | 481,991                                              |
| Households above mean     | 10,821                | 58                                       | 50                                     | 228,125                   | -696,693                         | 94,471                                               |

Source: Authors’ calculations from Mexican Family Life Survey based on redistribution parameter, $\varepsilon = 0.7$.

Note: Households receiving PROGRESA refer only to the grants for postprimary education.

In Tables 4.4a, b and c we take the illustration one step further by considering an additional distribution issue, the distribution of deadweight costs over the population. Often the cost of the funds for an investment is based on the cost of servicing a loan. In public finance literature, it is generally argued that the revenue for loan repayment ultimately comes from taxes and incurs distortion of economic behavior. Estimates of the marginal social cost of public funds typically run in the range of 20 to 25 percent of the revenue (Auriol and Warlters 2012; Harberger 1997). If that cost is neutrally distributed over the population, or if no welfare value is placed on distribution, the cost can be put into the denominator of a benefit-cost ratio, or netted out as a lump sum from total benefits. If the deadweight costs are not borne equally over the population such an approach slightly distorts the welfare benefits. The estimates in Table 4.4 assume that the share of the aggregate deadweight loss is proportional to the earnings of the household (here proxied by consumption).
Table 4.4a Total annual benefits from redistribution inclusive of deadweight loss from taxation

| Redistribution parameter | Benefits     |
|--------------------------|-------------|
| 0                        | -1,264,513  |
| 0.5                      | -236,459    |
| 0.7                      | 291,798     |
| 1                        | 1,424,766   |
| 1.3                      | 3,385,109   |
| 1.5                      | 5,593,858   |
| 2                        | 19,254,902  |

Source: Authors’ calculation from Mexican Family Life Survey.
Note: See text for details.

Table 4.4b Total estimated present discounted value of benefits from PROGRESA inclusive of deadweight loss from taxation

| Discount rate | Redistribution parameter |
|---------------|--------------------------|
|               | 3%                       | 5%                       | 10%                      |
| 0             | 2,204,748                | 197,512                  | -837,317                 |
| 0.5           | 3,232,802                | 1,225,566                | 190,737                  |
| 0.7           | 3,761,059                | 1,753,823                | 718,994                  |
| 1             | 4,894,027                | 2,886,791                | 1,851,962                |
| 1.3           | 6,854,370                | 4,847,134                | 3,812,305                |
| 1.5           | 9,063,119                | 7,055,883                | 6,021,054                |
| 2             | 22,724,163               | 20,716,927               | 19,682,098               |

Source: Authors’ calculation from Mexican Family Life Survey.
Note: See text for details.

Table 4.4c Relative shares from human capital increases compared with the total including redistribution

| Discount rate | Redistribution parameter |
|---------------|--------------------------|
|               | 3%                       | 5%                       | 10%                      |
| 0             | 1.57                     | 7.40                     | -0.51                    |
| 0.5           | 1.07                     | 1.19                     | 2.24                     |
| 0.7           | 0.92                     | 0.83                     | 0.59                     |
| 1             | 0.71                     | 0.51                     | 0.23                     |
| 1.3           | 0.51                     | 0.30                     | 0.11                     |
| 1.5           | 0.38                     | 0.21                     | 0.07                     |
| 2             | 0.15                     | 0.07                     | 0.02                     |

Source: Authors’ calculation from Mexican Family Life Survey.
Note: See text for details.
Finally, our choice of setting $\delta W / \delta x_j = 1$ at mean consumption has an implication for distribution; as the mean is higher than the median the transfer program will appear to provide more distribution using the mean rather than the median. To ascertain the degree that the results are sensitive to this assumption we re-estimated the main results using the median for $x_j$ (see the tables in the annex). When the discount rate is 0.05 and $\epsilon = 0.7$ the estimated social welfare value of the component of PROGRESA transfers attributed to distribution using a benchmark set at median expenditures declines by 8 percent and the share of total benefits from increased human capital rises from 66 percent of the total to 71 percent. By construction, the relative decline is larger when the distribution parameter is larger. The differences are not major relative to the overall patterns observed.
Governments, including that of Mexico, devote substantial resources to means testing or otherwise targeting transfer programs. They clearly value increased consumption of the poor in and of itself as well as any contribution the transfers may make to increased investment in human capital (Levy 2006). The results here indicate that under a range of plausible social welfare weights and discount rates this redistribution can account for a high share of the total social benefits of the transfers. The study has also concentrated on only a subset of PROGRESA recipients. More families with younger children benefited by the program all of whom would contribute to distributional gains using Equation 2. However, the present discounted productivity gains from increased schooling—given the high rates of primary schooling existing in Mexico prior to the introduction of the program—are likely to be a relatively small share of the total. If almost all the effects of the transfers to primary-school-age children are distributional, we underestimate the distributional gains in our simulations.

Thus, assessing a transfer program in terms of a single education (health) outcome—in effect, asking, “Is the transfer the most cost-effective way to allocate the education (health) budget?”—will provide a misleading answer compared with using the human capital improvements as one dimension of the answer to the question “Is the program the best way to allocate the funds devoted to transfers given multiple objectives?”

The current study has not explored the possibility that the investments in schooling not only raise future productivity but also increase future equity. That is, we estimate the value of changes in welfare during the investment period but not the present discounted value of all future changes in distribution. Conceivably future distributional gains stemming from PROGRESA would add an extra dimension to our results and would likely reinforce the contribution of the program to social welfare, but these discounted future distributional gains likely would not qualitatively alter our main results.

Researchers apply substantial creativity and effort to minimizing biased assessments of the impact of transfers on human capital accumulation, employing a wide array of tools for impact evaluation that control for self-selection into a program or nonrandom placement of the program itself. The biases avoided, however, may be small in comparison with the error of implicitly limiting the value of the program to a single outcome. As indicated in this paper, under a range of plausible assumptions about Mexico’s policy goals, the social value of redistribution can be as great, or greater, than the measured value of the increased productivity attributed to the program.

Unfortunately, of course, the underlying social welfare function is not directly observable. Not only is the parameter \( \varepsilon \) not derived from observations, the underlying functional form used in this study is not the only plausible candidate for modeling the social policy objectives of the government. For example, it is not necessarily the case that the government’s objective in means testing is redistribution per se, as implied in this study, but poverty reduction—in which case \( \varepsilon = 0 \) for all households above the poverty line. Coady and Skoufias (2004) use such an approach to assess alternative targeting strategies for PROGRESA and also employ Equation 2 for deriving the social valuation of increased income. Little and Mirrlees (1994) report that although World Bank staff made myriad attempts to ascertain the value of distribution from governments’ revealed preferences in the 1970s, few were applied and interest rapidly waned. Behrman and Birdsall (1988) present such a study designed to uncover the revealed social preference based on investments in schooling in Brazil and find the estimated value for \( \varepsilon \) to be 0.68. This is close to the value for \( \varepsilon \) of 0.57 at which the benefits begin to exceed the costs for the Kenyan CCT studied by Brent (2013) and one reason why we illustrated some of the findings using the 0.7 value.

It is unlikely that any consensus will be achieved on the precise value for this parameter. In addition, major policy choices may be sensitive to the value of the social discount rate. However, the fact that these parameters are hard to specify should not be a justification for avoiding sensitivity analysis on their implications for program design or policy choice.
APPENDIX: ESTIMATES USING MEDIAN PER CAPITA CONSUMPTION

Table A.1 Total annual benefits from redistribution

| Benefits | Redistribution parameter |
|----------|--------------------------|
|          | 0                         | -768,182                  |
|          | 0.5                       | 185,994                   |
|          | 0.7                       | 596,652                   |
|          | 1                         | 1,373,563                 |
|          | 1.3                       | 2,553,127                 |
|          | 1.5                       | 3,764,877                 |
|          | 2                         | 10,325,850                |

Source: Authors’ calculation from Mexican Family Life Survey.
Note: See text for details.

Table A.2 Total estimated present discounted value of benefits from PROGRESA lower and upper secondary schooling support inclusive of distributional benefits

| Discount rate | Redistribution parameter |
|---------------|--------------------------|
|               | 3%                       | 5%                       | 10%                      |
| 0             | 2,701,079                | 693,843                  | -340,986                 |
| 0.5           | 3,655,254                | 1,648,018                | 613,190                  |
| 0.7           | 4,065,913                | 2,058,677                | 1,023,848                |
| 1             | 4,842,824                | 2,835,588                | 1,800,759                |
| 1.3           | 6,022,388                | 4,015,152                | 2,980,323                |
| 1.5           | 7,234,138                | 5,226,902                | 4,192,073                |
| 2             | 13,795,110               | 11,787,874               | 10,753,046               |

Source: Authors’ calculation from Mexican Family Life Survey.
Note: See text for details.

Table A.3 Relative shares from human capital increases compared to the total including redistribution

| Discount rate | Redistribution parameter |
|---------------|--------------------------|
|               | 3%                       | 5%                       | 10%                      |
| 0             | 1.28                     | 2.11                     | -1.25                    |
| 0.5           | 0.95                     | 0.89                     | 0.70                     |
| 0.7           | 0.85                     | 0.71                     | 0.42                     |
| 1             | 0.72                     | 0.52                     | 0.24                     |
| 1.3           | 0.58                     | 0.36                     | 0.14                     |
| 1.5           | 0.48                     | 0.28                     | 0.10                     |
| 2             | 0.25                     | 0.12                     | 0.04                     |

Source: Authors’ calculation from Mexican Family Life Survey.
Note: See text for details.
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