

**Evaluating the Self-selection Targeting Method
of the Oportunidades Program in Mexico**

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Oportunidades Program in Mexico

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Abstract

The present paper evaluates the effectiveness in reducing poverty of the targeting mechanism carried out by the Mexican social program Oportunidades. The main objective of this paper is to find whether the newly introduced targeting method in the urban areas in Mexico in 2002 (the self-selection method) is effective or not compared with the former targeting method used in the rural areas (the census method). The performances in terms of reducing poverty index are compared for the self-selection method, the census method, a hypothetical perfect targeting and the uniform transfer, by assuming a situation in which a transfer is given to the households classified as eligible for the program under each method. The budget is set equal for all the targeting methods, assuming that the amount subtracted the targeting costs of each method would be the total transfer amount. The household welfare is measured in terms of consumption, while the criterion applied by Oportunidades is basically based on income. It is found that the self-selection method reduces poverty index almost equally to the census method, and the two methods are more effective than only executing the geographic targeting. Concerning the way of distributing the transfer, distributing uniformly to the targeted households slightly reduces poverty more than the way of distributing applied by Oportunidades. Also, by comparing the consumption amount of the households targeted by the self-selection method and census method, it is found that the consumption amount of the households targeted by the self-selection method is likely to be less. Taking into account that the self-selection method can be carried out

with less budget amount, the Oportunidades program's decision of having applied this to the urban population can be supported.

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1. Introduction

For social programs in developing countries, it is essential to carry limited resources to the people who need them the most. In the context of poverty alleviation programs, the selection of beneficiaries (targeting) is made to achieve the maximum result from a given budget. The term targeting refers to a method in which the government or policy makers choose to focus on certain groups of populations as objectives for the program. This allows for scarce resources to be delivered to those who need them the most. Evaluating the mechanism of targeting methods and improving it would help deliver the scarce resources to those who need support the most, and hence would help improve the poverty alleviation programs.

This paper evaluates the targeting mechanism of Mexico's poverty alleviation program Oportunidades in urban areas of Mexico (the self-selection method).¹ The main objective of this paper is to compare the effectiveness in reducing poverty of the self-selection method with the alternative methods, especially the method which has been used by Oportunidades in rural areas (the census method).²

Oportunidades used the self-selection method when it started covering

¹ Oportunidades was initiated under the name of Progresa in 1997, and the name was changed to Oportunidades in 2002. In this paper, the name Oportunidades is used to refer to the program throughout all the periods from 1997, as well as to refer to the period after 2002. If the discussion is focused on only the period before 2002, the name Progresa is used.

² The terms "self-selection method" and "census method" are used for simplicity in this paper, representing the targeting method applied for urban areas and rural areas, respectively.

urban areas in 2002. The self-selection method is increasingly being used in the developing world (Alatas et al 2012).

Under the self-selection method, those who desire to participate in the program need to go to the program module first. This means that under the self-selection method some parts of the program procedures are left to the potential beneficiaries, while under the census method, as an alternative, the program officers find all the potential beneficiaries by visiting each household in the targeted area. Therefore, under the self-selection method less targeting costs are needed, but there is a risk that some households cannot finish the procedure for some reason. As a result, the self-selection method is predicted to target the poor households less precisely than the census method. What should be concerned is whether or not this imprecision of the self-selection method overwhelms its advantage of lower targeting costs, compared with the census method.

Although Oportunidades put much importance on the evaluation process, and there are many studies evaluating the impacts of Oportunidades, it seems that there has been relatively less discussion of its targeting mechanisms, especially the self-selection method. As the existing evaluations for the targeting of Oportunidades in urban areas, the investigations by Gutierrez et al (2003) and Coady and Parker (2005b) are raised.

The former evaluated the targeting mechanism in semi-urban and urban areas. They first calculated savings obtained by using the targeting

within the localities after the geographic targeting was done.³ Then they compared the effectiveness and costs of the method of taking surveys for each household in the locality that was taken in 2001, and the method of self-selection process that was taken in 2002, using the percentage of eligible households that were detected (i.e. incorporated). The shortcoming of this study is that they used the same criteria with Oportunidades for judging the eligibility of the households for measuring the effectiveness of the targeting mechanism. The criteria that judges if the household is eligible or not should be compared with another one, such as the consumption based measure that I will use here. For analyzing the effectiveness of the self-selection process, they compared incremental costs for each locality. Instead of using incremental costs, I will compare the reduction in the poverty measures using several targeting methods, under a given budget. Applying this method, it becomes possible to compare more than two targeting methods, and to see how much poverty would be reduced using each. Moreover, this method enables to take into account the extent of poverty of households, not merely looking at if the household is poor or not.

The latter study focuses on analyzing the participation process of the households under the self-selection method. They analyze which factors were significant for poor households to participate in the program under the self-selection method, using regression analysis. Although this work explains the mechanism of the self-selection well, we cannot know how effective the targeting was in urban areas, compared to other methods.

³ The geographic targeting indicates the selection of eligible zones for the program. In the case of Oportunidades, the eligible areas is selected first by the geographic targeting, and then the targeting at the household level is executed.

Hence, this paper is expected to shed a light on some aspects of the self-selection method that these studies could not analyze. If the efficiency of the self-selection method turns out to be good enough relative to other targeting methods, it would result in a reduction in the targeting costs for social programs. Although I focus on Mexico, generally the self-selection method is applicable for both other developing countries and developed countries, too. This paper contributes to improving the self-selection method and reducing the targeting costs for social programs worldwide.

For the analysis of this paper, I follow the methodology used by Skoufias et al (1999) and its updated version Skoufias et al (2001), which evaluated the targeting performance of Progresa in rural areas. The methodology used in this paper is a comparison of poverty measures after giving a transfer to the households classified as eligible for the program under several targeting methods. The household welfare is measured in terms of consumption, while the criterion applied by Oportunidades is mainly based on income. The budget is set equal for all the targeting methods. The targeting methods compared are the self-selection method, the census method, the simulated “perfect” targeting based on consumption, and the uniform transfer. For the poverty measures, I use the measures developed by Foster et al (1984), or the FGT measures. The data used in the analysis comes from the ENCELURB 2002 collected by Oportunidades in 2002, when Oportunidades started covering the urban areas.⁴ In order to test if there

⁴ ENCELURB is the abbreviation of the Spanish name of the survey: “*Encuesta de Evaluación de Hogares Urbanos* (Urban Household

are significant differences in the effectiveness between the different targeting methods, the statistical significance of the differences is tested, which was not done in Skoufias et al (1999) nor in Skoufias et al (2001).

The main finding of this paper is that in terms of reducing poverty indices, the effectiveness of the self-selection method is almost equal to the effectiveness of the census method. However, as the lower targeting costs of the self-selection method would allow for a smaller budget, applying this method in urban areas seems meaningful, especially for developing countries that have limited financial resources.

The structure of this paper is as follows. The following section 2 briefly describes the Oportunidades program and its targeting methods. In section 3, the dataset I use is described. Section 4 explains the methodology for the analysis, and section 5 shows its results. Given the results in section 5, in section 6 further analyses are given about the targeting performance of the self-selection method and census method. Finally, section 7 gives concluding remarks.

2. The Program and Targeting Methods⁵

In this part a brief description of the program Oportunidades and its targeting methods is given. The following part 2.1 explains the program in general, and part 2.2 focuses especially on the description of targeting method taken by Oportunidades. In part 2.3 a brief description of the analysis of this paper is given.

2.1 Program Description

In August 1997, the Government of Mexico launched its flagship social safety-net program, Progresa, in rural areas. The program has expanded its coverage gradually, and in 2002 it entered small and medium urban localities under its new name, Oportunidades. Oportunidades is a Conditional Cash Transfer (CCT) program, where the transfer is given in cash, conditioned on a household's behavior, such as children's enrollment in school. The main goal of the program is to foster the human capital of households in a state of poverty, and hence to cut the cycle of poverty passed on to future generations, that is, the situation that those who are born in a poor household are likely to be poor in the future, too.

Oportunidades consists of three components: education, health and nutrition. The education component gives the household a monthly scholarship, as long as their children satisfy a certain percent of school attendance. The scholarship is given to students from the third grade of

⁵ See Levy (2006) for more detailed description of the program design.

primary school to the third grade of high school up to 21 years of age.⁶ In addition to the monthly scholarship, a transfer support to buy school supplies is given, twice a year for students in primary school, and once a year for students in secondary or high school. The amount of the scholarship increases as the grade of the student rises. Because girl students are more likely to drop out of school than boys, the amount of the scholarship is higher for girls than boys in secondary and high school. In order to prevent the households from having incentives to have more children so that the transfer amount would increase, a monthly limit of the scholarship for one household is set. The amount of the transfer in 2002 is presented in table 2.1, along with the transfer for nutritional support described below.

The health and nutrition components are integrated. The health component provides an opportunity for a monthly health check at the public clinic. The nutrition component gives the households a monthly cash transfer as a support for their nutrition, conditioned on accomplishing the monthly health check. The nutrition component also provides a nutritional supplement to the households. The monthly transfer amount in 2002 for the nutrition component is shown in table 2.1.

Table 2.1. The amount of cash transfer given by Oportunidades in

⁶ To be precise, the eligibility is limited to primary or secondary school students under 18 years old. For high school students (including other professional schools), the eligibility is limited to students between 14 and 21 years old. The estimated transfer amount calculated in the analysis (described in section 4) follows the restrictions of these age ranges.

July-December 2002

Components	Transfer amount		
Nutritional support	150		
Educational scholarship	Monthly transfer		Support for school supplies
Primary school			First transfer
3 rd grade	100		135
4 th grade	115		
5 th grade	150		
6 th grade	200		
Secondary school	Boys	Girls	250
1 st grade	290	310	
2 nd grade	310	340	
3 rd grade	325	375	
High school	Boys	Girls	250
1 st grade	490	565	
2 nd grade	525	600	
3 rd grade	555	635	

The transfer amount is presented in Mexican pesos. The scholarship for primary and secondary school students is limited up to 915 Mexican pesos monthly for one household. The scholarship for high school students is limited up to 1550 Mexican pesos monthly, including the scholarship for primary or secondary students. These limits do not include the support for school supplies.

Source: Oportunidades website, *Monto de los Apoyos, Histórico, Oportunidades*.

(http://www.oportunidades.gob.mx/Portal/wb/Web/oportunidades_historico) accessed on June 10, 2012.

2.2 Targeting Methods⁷

Here I describe how the beneficiaries were selected under Oportunidades

⁷ For more information about the targeting method in urban areas, see, for example, Gutierrez et al (2003), Orozco and Hubert (2005) or Orozco (2007).

in urban areas. The process of the targeting is as follows.

2.2.1. Geographic targeting

First, the geographic targeting which determines the beneficiary zones was carried out. In order to estimate how many poor households were concentrated in the zone, a “marginality index” was constructed. This index shows the aggregated socioeconomic living condition in the locality and is calculated using the Geographic Information System (*Sistema de Información Geográfica; SIG*) provided by INEGI (*Instituto Nacional de Estadística, Geografía e Informática*).⁸

Originally, in rural areas the geographic targeting was done at the level of localities. But as in urban areas, there is a large population and the poor households are less concentrated than in rural areas, they set a smaller unit than the localities called Basic Geostatistical Areas (*Áreas Geoestadísticas Básicas; AGEB*). These AGEBs were ranked by a concentration of poor households and accessibility of social services that are necessary for the program such as schools and public clinics, making use of the marginality index. However, the efficiency for detecting the poor households in this method turned out to be very low, and it was necessary to look for another way.

Thus, the geographic targeting was carried out at the level of street blocks. As in the case of AGEBs, the street blocks were ranked

⁸ Marginality index consists of the following data: percentage of illiterate population, percentage of dwellings without access to water, percentage of dwellings without drainage, percentage of dwellings without electricity, average of occupants per room, percentage of dwellings with dirt floor and percentage of primary sector population.

according to the concentration of poor households, using the marginality index.

2.2.2. Targeting at the household level

For the selected street blocks, the selection of the eligible households was carried out. The eligibility status was decided according to the estimated income of the households, as a result of a proxy means test. Originally in rural areas, this targeting was done by visiting each household in the selected locality one by one and taking a survey of the household's socioeconomic situation. According to the scores of the proxy means test, which was carried out as a part of the survey, the eligibility status of the household was decided. For convenience, I call this method "census method".

However, in urban areas where the poor households are less concentrated, taking this method was considered to be costly given its effectiveness. Alternatively, the following "self-selection method" was used. In this method, those households in the selected street blocks who wish to participate in the program need to go to a program module, where a simple survey about their socioeconomic situation is completed. If a household is considered possibly eligible for the program, a program official will visit the household to take a more detailed survey on another day. If the household passes this survey, then the household needs to go once more to the module to finish procedures.

The problem under the self-selection method is, although this enables to save the targeting costs by giving up visiting each household, that some

households may be excluded from the program. For instance, those households that do not know the program or do not have access to the program module systematically cannot participate in the program. Because these households may be more likely to be one of the poorest, the effectiveness for reducing poverty of each method is worth comparing.

2.3. Outlook of the Analysis of This Paper

The main objective of this paper is to look at the efficiency of the self-selection method compared with other alternative targeting methods. Especially, the comparison with the census method, which was altered by the self-selection method, is paid attention to.

The “efficiency” of the targeting methods is solely measured in terms of the effectiveness in reducing poverty. To measure this, I use the poverty measures developed by Foster et al (1984), or the FGT measures, which are described in section 4. I suppose that under a given budget, the households in the sample are given a transfer, according to their eligibility status under several targeting methods. Comparing the improvement in FGT measures after the transfer under several targeting methods, it becomes possible to compare the effectiveness in reducing poverty. The targeting methods compared here are the self-selection method used by Oportunidades in urban areas, the census method used by Progreso in rural areas, the hypothetical “perfect” targeting based on consumption, and the uniform transfer.

For the criterion to measure household welfare and hence to measure the

household's eligibility status for the program, I use consumption of the household, instead of income, which is used by Oportunidades. Therefore, households with consumption below the cut-off point (described in section 4) would be considered poor. This allows me to measure the household's socioeconomic state neutrally apart from the eligibility status judged by Oportunidades. It also enables me to avoid the possibility that there are errors in the sample itself.

From this analysis, one can find out how effective at reducing poverty the self-selection method is, compared with the other targeting methods. Comparing the self-selection method and the census method, the feasibility of the self-selection method for urban areas will be shown. It is expected that the self-selection method reduces poverty more effectively than the census method, or at least equally, because in urban areas applying the census method is predicted to be costly due to a lower concentration of poor households. Next, the comparison between the self-selection method and the uniform transfer would give the effectiveness of applying the targeting at the household level. In the case of Oportunidades, the self-selection process is taken after the geographic targeting is executed. As described in the following section, the sample I use was taken after the geographic targeting had been made. Hence giving a transfer equally to the whole sample means the results from the geographic targeting. Comparing the differences in reduction in the FGT measures between the self-selection and the uniform transfer, one can see how effective taking the secondary targeting in addition to the geographic targeting is.

3. Data Description

For the analysis in this paper, I basically rely on ENCELURB 2002 (*Encuesta de Evaluación de Hogares urbanos 2002*). This is the baseline survey carried out for the evaluation process of Oportunidades in urban areas, and is the only available data for evaluating Oportunidades in urban areas.

3.1. Data Contents

ENCELURB 2002 consists of three kinds of questionnaire data: (1) screening questionnaire; (2) socioeconomic characteristics questionnaire; and (3) biologic specimens, anthropometric measurements, breastfeeding, and food frequency questionnaire. According to INSP (2005:14), these data was collected for the following aims:

(1) The screening questionnaire was used to collect basic data on the socioeconomic characteristics of households to determine their status of eligibility in the Program and thus perform the selection of the final sample of households. It was applied to all resident households except for households in “neighboring street blocks”. As described later, this questionnaire was carried out as a part of the sampling process for ENCELURB, thus this questionnaire process was applied to the whole sample of households at the first stage of the sampling.⁹ This questionnaire includes simple contents that judge the eligibility status of

⁹ As described later, some households living in the street blocks neighboring the original treatment zones were included in the treatment zone after this questionnaire. So the screening questionnaire does not have data of these households.

the households.

(2) The socioeconomic characteristics questionnaire is a multi-topic questionnaire that collected information on the household and the household members regarding sociodemographic, health, education, occupation, consumption, expenditure, income, gender, addictions, and reproductive health aspects, among others.¹⁰ It was applied to the final evaluation sample of households that was selected based on the results from the screening questionnaire. Adequate informants to whom this questionnaire was applied were older than 15 years of age and knowledgeable of the household and household members' data. In addition, youngsters 10 to 21 years of age were directly surveyed to answer the section on tobacco and alcohol use. Women 15 to 49 years of age were also directly surveyed on the questions specific to reproductive health.

(3) The biologic specimens, anthropometric measurements, breastfeeding, and food frequency questionnaire was added in order to measure how the health and nutrition aspect of Oportunidades affected the beneficiaries.

Taking into account the contents of ENCELURB 2002, the analysis in this paper is based on the socioeconomic characteristics questionnaire part of the data. In particular, I use data on households' consumption, eligibility status judged by Oportunidades, and incorporation status into the program.

¹⁰ Other variables consist of savings and debts, access to financial services, experiences of participation in social programs in the past, immigrations, and so on.

3.2. Sampling Method

What should be noted about ENCELURB 2002 (and other following panel surveys) is that the sampling method employed by Oportunidades is not random. Since ENCELURB 2002 was designed to evaluate the program's impact, it is needed to measure the program effect, which is any difference in benefited households or individuals that is attributable only to the program. So a comparison group that is as similar as possible to the treatment group is needed. For this purpose, Progresa (the former Oportunidades) set randomly assigned comparison group in rural areas.¹¹ However in urban areas, driven by ethics, financial, or practical reasons, random allocation of a comparison group similar to the one in rural areas was not applied. To create a comparison group that is as similar as possible to the treatment group, the following method of sampling was used.

First, according to the Evaluation Advisory Group's calculation and a previous analysis of statistical power, the sample size that is necessary to have statistically significant differences was calculated. These calculations yielded a sample size of 14,000 households divided in four groups: 6000 eligible households enrolled in the program in intervention zones; 2000 eligible households, but not incorporated into the program; 4000 almost eligible households (households with a deprivation score slightly lower than the cut-off point determining eligibility); and 2000

¹¹ In rural areas, some randomly selected localities that satisfy the program eligibility were deliberately not incorporated and set as a control group.

non-eligible households (INSP 2005, 7).

After the sample size was determined, which street blocks to be included in the sample was examined in the following ways.

3.2.1. Sampling method for intervention zones

For the sample in the intervention zones, 149 street blocks were selected by a probabilistic method through single-stage, stratified and cluster sampling, using information from the 2000 Census. In this method the street blocks were divided into 6 strata by the number of eligible households per street block. Street blocks for the sample were selected with a probability proportional to the number of eligible households in them. All the street blocks with 50 or more eligible households were included in the sample, while street blocks with no eligible households were excluded.

3.2.2. Sampling method for non-intervention zones

To define the evaluation control group with consideration to ethical and financial factors, the Advisory Group proposed to define the control sample by means of a matching or equalization of characteristics techniques scheme. To this end, logistic regression models were estimated using a series of socioeconomic characteristics at the street block level. The nearest neighbor matching method was applied using the estimated values. This is based on the proximity of the estimated

values using the absolute value of the difference between them. This procedure guaranteed the comparability between street blocks in at least one series of observable variable.¹²

Because non-intervention zones tend to have a smaller number of eligible households than intervention zones, the blocks with more eligible households were chosen with higher probability.

3.2.3. Identifying households

Then sample households were selected. In the selected blocks in intervention and non-intervention zones, census was taken for all resident households to collect the necessary sociodemographic data for reclassifying the households according to their status of eligibility for the program (eligible, almost eligible and not eligible). This involved applying the screening questionnaire. According to this classification of eligibility status, the sample of households to whom the socioeconomic characteristics questionnaire was applied were selected within the full sample.

After this process, because the number of households in the treatment group was not statistically sufficient, additional households were included by tracking administrative records and adding households included in Oportunidades in the blocks neighboring those blocks that were already selected. Because these households were not included in the screening questionnaire described above, households in these blocks have no data on the screening questionnaire.

¹² For details, see INSP (2005, 8).

In non-intervention zones, all household members were included in the sample.

After the final evaluation sample was formed, questionnaires on other topics were carried out. Here again, all the households in the sample were reclassified according to the socioeconomic characteristics questionnaire. Table 3.1 shows the final composition of the sample.

Table 3.1 The number of the households classified by their eligibility status

Zone	eligible	Almost eligible	Not eligible	Missing Classification**	Total
Intervention	6,311	2,245	2,273	734	11,563
Non-intervention	3,634	945	292	767	5,638
Total households	9,945	3,190	2,565	150	17,201
Total persons	76,002				

* The classification by eligibility was based on the data from the Questionnaire on Socioeconomic Characteristics of Households 2000.

** Households left unclassified due to a lack of data in some key variables included in the classification algorithm. All reported an incomplete field interview.

Source: INSP (2005, 12)

3.3. Remarks Implied by the Data

As described earlier, ENCELURB was especially designed for evaluations of the program impact, and it was constructed so that the comparison between incorporated households and not incorporated households would be the easiest. Apparently this is not as suitable for the evaluation of targeting results, because the structure of the socioeconomic status of the sample should be as similar as possible to the real society. However, as this is the only available data that shows

the incorporation status to Oportunidades and socioeconomic data including consumption, it was necessary to use this dataset to carry out the analysis. In reading this paper, the following limitations of the dataset should be kept in mind.

Note that the selection of the sample was carried out after the geographic targeting. Because the samples were already “selected” in this data, poor households are more likely to be concentrated than in the actual population. In this sense, discussing the absolute value of targeting results obtained by this sample makes no sense, and only comparing several schemes within this sample would be feasible. For example, the poverty rate in this sample is 58%, calculated using the eligibility status estimated by Oportunidades. This poverty rate would be considered very high, because more than a half of the households are in the state of poverty. But this number from ENCELURB never reflects the reality, and is due to the concentration of the poor households in the sample. So there is no point discussing an absolute number taken from this sample. The analysis is only feasible if comparisons are taken only within this ENCELURB 2002 sample.

Although the analysis in this paper includes some restrictions, the following things will be implied. First, it should be taken into account that the sample was taken after the geographic targeting. This assumes that what will be compared here (self-selection method and method by taking survey) shows which method is more effective for identifying the eligible households after eligible localities (or street blocks) are

determined. Given the lower concentration of poor households in urban areas compared with rural areas, the targeting at the household level played an important role for the effectiveness of the program;¹³ analyzing the effectiveness of the targeting of the households after the geographic targeting will be also meaningful.

Additionally, the characteristics of the communities included in the sample are urban (relatively) poor ones where poor households are less concentrated compared to rural communities. Although this result cannot be applied to another community, the result here will imply that one method can be more optimal for detecting the poor households, in such localities that poor households do not concentrate so much, like urban areas in developing countries or some areas in more developed countries where poor households are relatively concentrated.

For the analysis here, I use the sample only in the treatment zones. By including the sample in the control zones the effectiveness of the targeting of Oportunidades would be underestimated because these households in the control zones are intentionally not incorporated to the program, not because of the errors of targeting. The data needed for this analysis is available for 10,748 of the 11,563 households in the treatment zones. The sample I use is made up entirely of these 10,748 households.

¹³ For instance, Gutierrez et al (2003) pointed out that with targeting on household level the necessary budget to cover all the eligible households was only 8% of the budget needed in the case of applying only the geographic targeting.

4. Evaluation Framework

4.1. Outline of the Framework

The objective of the analysis here is to compare how much poverty is reduced under several different targeting methods. I follow the methodology used in Skoufias et al (1999) and its revised version Skoufias et al (2001) which evaluated the targeting results of Progresa in rural areas. Comparing the targeting results measured by one unique number, we will be able to say which method is more effective. I use the poverty measures developed by Foster et al (1984), or FGT measures, and I will see by how much these measures are reduced after the transfer given by each targeting method, under a given budget. Targeting costs and eligible households targeted differs across the various methods. Giving the available funds (that is the total budget minus targeting costs) to the beneficiary households identified by several methods, we can see how much poverty is reduced by each targeting method. The targeting methods compared here are (i) the self-selection method applied in Oportunidades in urban areas, (ii) the method of taking a census for all the households in the locality that was taken in Progresa and Oportunidades in rural and medium urban areas (census method), (iii) simulated perfect targeting based on households' consumption, and (iv) uniform transfer.

I construct a criterion based on consumption as a measure of households' welfare or poverty status. This is in order to capture the households'

welfare status more precisely as well as to compare the targeting performance using a measure apart from the measure applied in Oportunidades. So here the amount of consumption of the households is considered to reflect the “true” economic state of the households.

4.2. Constructing the Consumption-based Criterion

4.2.1. Consumption as a measure of welfare

In an economic point of view, expenditure-based or consumption-based standard-of-living measures are preferable to income-based measures (Skoufias et al 1999, Deaton and Zaidi 1999). The main theoretical reason is that according to the permanent income theory of consumption, estimates of current consumption are likely to provide a more reliable estimate of the household’s permanent income (sustainable standard of living) than are estimates of current income. Current income may be more volatile and subject to shocks from period to period, especially if the household engages in agricultural or self-employment activities. In contrast, consumption can be smoothed at least to some extent by saving and borrowing.

There are some practical considerations. Income may exhibit higher seasonal variability compared to consumption. To get an accurate estimate of the average income over the year, several times of visits would be required. Given that the data I use here is collected just once, it is logical to assume that consumption measures households’ welfare better than income.

4.2.2. Calculating the total consumption of the households

In ENCELURB 2002, the consumption data on a number of items is available.¹⁴ The amount of consumption of each good is presented in monetary units (Mexican pesos), and the monetary amount of lagged payments or gifts received is also available. Although the data aggregated to monthly total consumption is also available, I calculate it myself by adding the consumption on all items because the aggregated monthly total consumption in ENCELURB 2002 is not available for some households, and how consumption is aggregated is not clear.

One thing should be kept in mind here. A shortcoming of the consumption data in ENCELURB 2002 is that it does not have data on consumption out of own production (auto-consumption). As a result, the consumption of households that cultivate their own crops may be particularly underestimated. For this reason in Skoufias et al (1999), using the data by Progres, ENCEL98M (*Encuesta de Evaluación, 98*

¹⁴ The items available here are categorized as: weekly food expenses (1) (tomatoes, onions, potatoes, chili, carrots, pumpkins, bananas, apples, oranges, other fruits, other vegetables, tortillas, white bread, sweet bread, paste soup, beans, rice, pie and other cereals), weekly food expenses (2) (beef, chicken, pork, tuna, fish, eggs, milk, cheese, other milk products, other animal products, soda, sugar, powdered drinks, alcoholic drinks, coffee, vegetable oil, potato chips and other articles), other weekly expenses (matches, transport, newspaper, candles, cigarettes, alcoholic drinks), monthly expenses (personal cleanliness articles, children cleanliness articles, house cleanliness articles, fuel, personal services, diversions, house's rent), quarterly expenses (adult clothes, children or young people clothes, adult footwear, children footwear, toys, books and music CDs, health), and annual expenses (school payment, furniture, repairs, utensils, household-electric, cars, other expenses).

Marzo; Evaluation Survey 98 March) was avoided. However, I dismiss this effect of auto-consumption for the following reason. Unlike Skoufias et al (1999) that evaluated the targeting in rural areas, I exclusively focus on the targeting in urban areas, where there are relatively few households cultivating their own crops. In the data of socioeconomic questionnaire in ENCELURB 2002, less than 5% of households engage in agriculture (445 out of 10831 households). Although there may be some households that cultivate their own crops even if they do not engage in agriculture, in urban areas where the land for cultivating crops is scarce, these households can be considered negligible.

4.2.3. Per-capita consumption versus adult equivalent consumption

Once households' monthly consumption is calculated, adjusting it by household size is required. Two ways of measuring this are considered: per-capita consumption and adult equivalent consumption.

Per-capita consumption is obtained by dividing total consumption by the number of people in the household. This measure is valid under the following set of assumptions: (a) everyone in the household receives an equal allocation irrespective of age and gender; (b) everyone in the household has the same needs irrespective of age and gender; and (c) the cost for two (or three or more) people living together is the same as the cost of each person living separately (Skoufias et al 1999 in Appendix E). Although the first assumption (a) is difficult to deny due to lack of

information on consumption or income at the individual level, the second and third assumptions (b) and (c) seem to not hold true. Not everyone has the same needs and in particular their needs vary based on their age and gender. Also there are economies of scale from living together, because family members benefit from each other's consumption, or because there are public goods that can be used by all family members at no additional cost. However, for the matter of the third assumption (c), or the economies of scale, whether or not to take this into account was unsettled (Skoufias et al 1999 in Appendix E). They estimated the economies of scale in both rural and urban areas in Mexico, and found that the estimated value was different from the values in most other countries, though the estimate implied that economies of scale were present and significant.

Considering this, I use Adult equivalent consumption, which takes into account the various needs that vary based on gender and age. This is calculated by dividing total consumption by the adult equivalent family size (AEFS). AEFS is the family size adjusted to the number of adults. This is constructed using different weights for different age and gender groups as derived by the Instituto Nacional de Nutrición (1987). AEFS is constructed using the following formula:

$$\text{AEFS} = (0.41)*\text{children0-4} + (0.80)*\text{children5-10} + (1.15)*\text{males11-14} + (1.05)*\text{females11-14} + (1.38)*\text{males15-19} + (1.05)*\text{females15-19} + (1.26)*\text{males20-34} + (0.92)*\text{females20-34} + (1.15)*\text{males35-54} + (0.85)*\text{females35-54} + (1.03)*\text{males}\geq 55 + (0.78)*\text{females}\geq 55.$$

Table 4.1 compares how the poverty status of the households differs

depending on per-capita consumption or adult equivalent consumption. Here my calculation assumes that 58% of the households are in state of poverty. This poverty line of 58% is the one applied in this paper, as described later.

Table 4.1. The composition of the poor and non-poor households with per-capita consumption and adult equivalent consumption

(Poverty line = 58%)		Adult equivalent consumption		
		non-poor	poor	total
Per-capita consumption	non-poor	4137	355	4492
	poor	355	5901	6256
	total	4492	6256	10748

Source: calculation by author.

This table shows that it does not matter so much which consumption measure is applied, given that the disagreement between the two measures are negligible: the number of the households that are classified as poor with per-capita income but non-poor with adult equivalent consumption (355 households) is equal to the number of the households that are classified as non-poor with per-capita income but poor with adult equivalent consumption (355 households). Also this difference is not so large: these numbers are less than 5% out of the total households.

Given this indifference of using per-capita consumption or adult equivalent consumption and theoretical support, adult equivalent consumption is used as the measure of households' economic state by

which the households' poverty status is judged here.

4.3. Constructing the Cut-off Point

Next, I set the poverty line that divides poor and non-poor in my consumption based criterion. The question that arises here is how many households should be included in the program, i.e. how many households are classified as poor. For the comparison, the poverty line set here should divide the same percentage of households as Oportunidades did (that is 58%). If my cut-off point is different from that used in Oportunidades, my criterion will overestimate or underestimate the number of the poor households, and a precise evaluation for the targeting result will become difficult.

As an alternative cut-off point, there is an absolute poverty line set by CONEVAL (2009). According to them the poverty line in 2002 is 724 Mexican pesos of per-capita monthly income.¹⁵ According to this poverty line, 84% of the households in the sample fall into the poor category.¹⁶ This estimate is much higher than that of Oportunidades. With this divergence it is difficult to compare the method of Oportunidades with alternative methods and obtain significant results. In addition, it is possible that Oportunidades could not afford to include 84% of the households, even if this poverty line had been precise. I

¹⁵ The available data on the poverty line by CONEVAL (2009) is that in 2000. So this poverty line in 2002 was calculated using the consumer price index obtained from the data of the Bank of Mexico.

¹⁶ For this calculation I used the adult equivalent consumption instead of the per-capita consumption that were described in part 4.2.3. If I use the per-capita consumption, this poverty rate becomes 87%.

believe this divergence is due to the budgetary or practical constraints on program coverage, and not the result of targeting errors. For this reason I would rather use the same percentage used in Oportunidades for the cut-off point.

According to the classification of the socioeconomic questionnaire of ENCELURB 2002, Oportunidades classified 58% of the total households as poor in the sample I use, and 49% were incorporated in the program. It is believed that about 9% of the households did not participate in the program for various reasons such as a lack of information about the program, incapacity of going to the program module, unwillingness to be incorporated in the program and so on (Coady and Parker 2005b). Here I assume that these households were planned to be incorporated in the program, but could not participate. If Oportunidades had a perfect identification of the poor households, these households would be incorporated to the program.

Therefore, I set the poverty line at 58%. With this cut-off point 58% of the households are classified as poor, ordered by their consumption level.

4.4. Targeting Costs and Transfer Amount Assumed

In this analysis I look at how much poverty is reduced after giving a transfer to those who are identified as eligible by the various targeting methods, under a given budget. Here I assume the budget to be as similar

as possible to the actual expenditure by Oportunidades. The budget is calculated using the estimated transfer amount given to the beneficial households and the targeting costs. The total budget is calculated as follows:

Assumed budget = total transfer amount given to the incorporated households + (average targeting costs per incorporated household)*(the number of the incorporated households).

For the targeting costs, I rely on the data presented in Gutierrez et al (2003). According to them, the costs of targeting under the self-selection method were 104.90 Mexican pesos per identified eligible household. Since the costs of targeting are one-time costs that are paid only at the start of the program, I distribute these costs equally over time by dividing them by 36 (the total number of months of the duration of the program).

To estimate the total transfer amount, I calculated two types of transfer amount. The first transfer amount is obtained by using the average transfer amount per incorporated household (I call this type of transfer amount “the average transfer amount”). According to Angelucci and Attanasio (2008), the average transfer amount received by one household at the time of targeting was 316 Mexican pesos.¹⁷ Among the households in the sample of 10,748 households, 5,265 households were incorporated into the program by the method of self-selection. The total budget

¹⁷ This figure was calculated based on the average transfer amount in 2003. The transfer amount was adjusted in 2002 pesos, using consumer price index.

assumed here becomes:

Assumed budget = $316 * 5,265 + (104.90/36) * 5,265 = 1,678,081.6$
(Mexican pesos).

The second transfer amount is estimated following the method of distributing the actual transfer amount applied by Oportunidades (I call this type of transfer amount “the estimated transfer amount”). As described in the section 2, Oportunidades gives transfer conditioning the school attendance and health check. The components of the cash transfer are the nutritional and educational support. Receiving the nutritional support is conditioned on executing the medical check, and the educational support is conditioned on school attendance. As the transfer amount varies depending on the household member’s school level and grade, the data on household members’ schooling situation was utilized. However, there are a number of errors in these data in ENCELURB 2002, which required that I make corrections to this data.¹⁸ I assume that if the person is actually going to school, the person is receiving the educational support. I also assume that all the beneficiary households are receiving the nutritional component.¹⁹ Giving these transfers to those

¹⁸ The correction was made based on the following principles. First, I assumed that there no one skipped the grade. The schooling level of those who did not satisfy the minimum age was modified to the appropriate level. Second, some members in the sample had inadequate set of the schooling level and grade, and these data were corrected. For example, there was a person at the 4th grade in the secondary school, but as the years of education in Mexico are 6, 3, and 3 for primary, secondary, and high school respectively, the person should be at the 4th grade of the primary school. However, as these corrections never can be done perfectly, I suggest that the reader refer to the results obtained by both two simulated budgets above.

¹⁹ For details of the transfer amount, see table 2.1 in section 2.

who were incorporated in the program, and summing these transfers, the total transfer amount turns out to be 1,905,819 Mexican pesos. Adding the targeting costs, the total budget yields:

Assumed budget = $1,905,819 + (104.90/36)*5265 = 1,921,160.6$
(Mexican pesos).

In the following section, how to distribute these budgets according to the assumed transfer scheme is explained.

4.5. Comparison of Targeting Methods

Here I describe the targeting methods compared, and which households are classified as poor under each method. Note that in the socioeconomic questionnaire of ENCELURB 2002, data on the status of program incorporation of the households and the poverty status judged by Oportunidades are available. Which households are given the transfer depends on this data. The targeting methods compared are the following:

Self-selection method

As described earlier, this method was actually applied by Oportunidades in urban areas. This method leaves some procedures to the households. Those who desire to be accepted into the program need to go to the program module in order to be examined their eligibility status. If they are proven to be eligible in the module, means testing at the house is carried out. If they are also judged to be eligible through this means test,

they are incorporated to the program.

With this method the 5,265 households that were actually incorporated into the program receive the transfer. As was done in the previous section, I assume the average transfer amount given to these households to be 316 Mexican pesos for the first assumed budget, and the amount that depends on how many the household members enrolled in school for the second budget. In the analysis, it is assumed that the full amount of the transfer is consumed. Therefore, the targeted households' consumption amount after the transfer is calculated by adding this transfer amount to the households' consumption. Then poverty measures after the transfer is calculated using the adult equivalent consumption amount of the households, which is calculated from the households' consumption amount after the transfer. This calculation is applied to the other targeting methods in the analysis as well.

Census method

This method was applied by Progresa and Oportunidades in rural and semi-urban areas. In this method, all the households in the eligible locality are interviewed for the census, and eligible households are asked to incorporate to the program, while the self-selection method leaves this procedure to the households by requiring them to go to the program module. As described earlier, under the self-selection method, some households were not incorporated into the program even if they were classified as poor, mainly because these households could not complete the procedure by themselves. Since in this method the households do not

need to go to the module to complete the procedures, more households are likely to participate in the program than the self-selection method. For the analysis, I assume that all the households classified as eligible by Oportunidades will also receive the transfer under this method. The households that were classified as non-poor but incorporated into the program will also receive the transfer, as targeting errors. Those who receive the transfer in this method will be the 5,265 households actually incorporated into the program, and the 2,174 households that were classified as eligible but did not participate for some reason.

I assume that the total budget is equally distributed among these households.²⁰ The number of households that are supposed to receive the transfer in this method is 7,439. Hence the budget per eligible household for the first budget will be the total budget of 1,679,081.6 Mexican pesos divided by 7,439 households: 225.71 Mexican pesos. For the second budget, this becomes 258.26 Mexican pesos. And according to Gutierrez et al (2003), the targeting costs for this method were 154.90 Mexican pesos per one eligible household. Dividing these targeting costs by 36 months and subtracting them from the budget per household, the transfer amount distributed to each household will be 221.41 Mexican pesos for the first budget and 253.95 Mexican pesos for the second budget.

Targeting based on consumption

²⁰ In fact, the transfer amount received in rural and semi-urban areas also was determined as was done in urban areas, but applying this amount here was not possible because for the analysis the total budget needs to be the same for all the targeting methods.

For a comparison, I add this method as perfect targeting. In this method, I assume that the eligible households are selected based on the “perfect” measure of household welfare: consumption. With respect to household consumption, the bottom 58% of households will receive the transfer.

In order for the program to estimate the household’s consumption perfectly, it is logical to think that at least taking the census for all the households within the eligible locality is required. For the targeting costs of this method, I assume the same amount as with the census method: 154.90 Mexican pesos per eligible households divided by 36 months.

The number of households who receive the transfer in this method is 6,256. As in the case of the census method, assuming the total budget is equally spent for each eligible household, the transfer amount distributed to each household will be 263.97 Mexican pesos for the first budget, and 302.79 Mexican pesos for the second budget.

Uniform transfer

This method distributes the transfer equally to all the 10,748 households in the sample. The transfer amount will be 156.22 Mexican pesos for the first budget and 178.75 Mexican pesos for the second budget. I call this method “uniform transfer” for convenience, however, the sample households are already selected by Oportunidades after the geographic targeting, and the households in the sample can be considered a subgroup of all the households chosen by the geographic targeting. This transfer should be considered the result of the geographic targeting.

4.6. FGT Measures

Next, I describe the poverty measure used here, FGT family of poverty measures.

4.6.1. Description of FGT measures

FGT measures are denoted by the formula:²¹

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

where N is the total number of households, c_i is the per capita consumption (or income) of the i 'th household, z is the consumption (or income) at the poverty line, and α is the weight attached to the severity of household poverty (or the distance from the poverty line). $1\{\cdot\}$ is an operator which takes value 1 if the condition $\{\cdot\}$ is true and 0 otherwise. When $\alpha = 0$, the FGT measure becomes to the Headcount Index, or the percentage of the households that are below the poverty line.

When $\alpha = 1$, the FGT measure gives the poverty gap, a measure of the average poverty. I will give one example to explain how this poverty gap differs from the poverty line. Let's consider a society that consists of two households, where the poverty line is set at \$100 (hence the households with consumption or income below \$100 are classified as poor). Suppose two cases. In the first case, both households consume \$90.

²¹ For more description, see Skoufias et al (1999, 5).

In the second case, both households consume \$10. It is easy to conclude that the second case is worse off in terms of the poverty. However, only with the concept of the poverty line, we cannot explain why the second is worse, because in both cases the number of the poor households is the same. The poverty gap index is 0.1 for the first case, and 0.9 for the second. The poverty gap reflects the average difference between the poverty line and the income or consumption of the poor households.

When $\alpha > 1$, the FGT measure becomes the Severity of Poverty index. I use this index with $\alpha = 2$. This measure assigns more weight to households that are farther away from the poverty line and thus in more severe poverty. Let's consider extreme situations for the above example. Now, in the first situation, both households can spend \$50 for their consumption, and in the second situation one household consumes \$90 and the other household consumes \$10. In these situations, the poverty gaps are the same. However, it can be said that the poverty in the second situation is harder to overcome, because there is a household suffering from more extreme poverty. The Severity of Poverty index reflects these situations. The index is 0.25 for the first situation, and 0.41 for the second.

For each value of α , the lower the index is, the less poverty there is. So the objective of the poverty alleviation programs is formulated as reducing these FGT poverty indices.

4.6.2. The advantage of using FGT measures

FGT measures are highly regarded consumption (or income) based measures of poverty because these measures overcome problems that arise with other poverty measures. Suppose that poverty lines divide the poor and non-poor, irrespective to how poor the people are. The poverty gap measures how far the poor people are away from the poverty line, but with the poverty gap we still cannot know the whole sketch of the poverty. Raj (1998, 290-292) explains the problems with these measures citing the Pigou-Dalton transfer principle to the measurement of poverty:

***Weak Transfers Principle.** A transfer of income from any person below the poverty line to anyone less poor, while keeping the set of poor unchanged, must raise poverty.*

Both the Headcount Index and the poverty gap fail to satisfy this criterion. Suppose that the income is transferred to a household in poverty from a poorer household, so that the income of the household will not exceed the poverty line. According to the weak transfers principle, this transfer increases poverty, but both indices stay the same. This type of increase in poverty is only captured utilizing the severity of poverty index, $P(2)$ in the FGT measure.

Note that it is not possible to compare different indices with different values of α . The comparison is only possible for several indices with the same value of α . In this analysis, I compare carefully each index with the same value of α , according to each targeting method.

5. Results

In the analysis for this paper the FGT measures of the sample in ENCELURB 2002 are derived, giving a transfer to eligible households under various targeting methods, under a given budget. The results are shown separately for the budgets that were described in the part 4.4. In the part 5.1, the FGT measures for the first budget are shown, which were estimated using the average transfer amount per incorporated household; the second budget that was estimated using the estimated actual transfer amount is shown in part 5.2. For each result, the difference of the FGT measure from the measure without transfer is presented. It is useful to compare these differences within the same value of α , in order to see how effective the targeting method is. For both results, the hypothesis testing is done to check the statistical significance of the differences in the measures from two different targeting methods. Note that it is not possible to compare the figures from the different budget, but it is suggested to refer to the observations from the results of both budgets. Also note that when considering the FGT measures, it is impossible to compare the figures across different values of α . And finally, discussions for these results are made in part 5.3.

5.1. Results from the Budget with Average Transfer Amount

As described in the part 4.4, the budget with average transfer amount was estimated using the average transfer amount of 316 Mexican pesos

per incorporated household. The total budget is 1,678,081.6 Mexican pesos, and the amount calculated by subtracting the targeting costs from the budget was equally distributed to those households who are classified as eligible under the targeting methods.

The FGT measures before and after the transfer are presented in Table 5.1. For all the indices, a smaller number of the index means less poverty. The targeting method that produces the smallest index number is considered to be the most effective at alleviating poverty. Note that the headcount index (expressed by P(0)) of the state without transfer is necessarily equal to the poverty line (or cut-off point) I set in part 4.3, that is 58%. P(1) and P(2) indicate the poverty gap and the severity index respectively. As discussed in part 4.5, these indices are thought to represent the state of poverty in a society more accurately than the headcount index. Thus, more importance should be put on the reduction of these indices. Table 5.1 reports the FGT measures without transfer in row 1; of the self-selection method in row 2; of the census method in row 3; of the consumption based targeting in row 4; and of the uniform transfer in row 5. The numbers in the parenthesis indicate the difference from the index without transfer under the same value of α .

Table 5.1. FGT measures with or without transfer for each targeting method under the first budget

Targeting method	P(0) (Headcount index)	P(1) (Poverty gap)	P(2) (Severity index)
Without transfer (1)	0.582	0.215	0.106
Self-selection (2)	0.508	0.163	0.072

	(-0.074)	(-0.052)	(-0.034)
Census (3)	0.510 (-0.072)	0.162 (-0.053)	0.071 (-0.036)
Consumption based (4)	0.462 (-0.120)	0.139 (-0.076)	0.058 (-0.048)
Uniform transfer (5)	0.511 (-0.071)	0.167 (-0.048)	0.075 (-0.032)

The numbers without parentheses indicate the FGT measures without transfer or with transfer under the targeting method. The numbers in the parentheses indicates the difference from the FGT measure without transfer.

Source: calculation by author.

The intuitive interpretation of the figures in table 5.1 is as follows. The measures of P(0) indicate the headcount ratio. In the case without transfer, 58.2% of the households are classified as poor, and this number is necessarily equal to the poverty line I set. The measures of P(1) indicate the poverty gap. In the case without transfer the figure of 0.215 means the average difference of the poor household's consumption from the consumption amount at the poverty line. The measures of P(2) indicate the severity index. The interpretation of these measures is similar to P(1), but more weights are put on the households whose consumption amount is far away from the poverty line.

Looking at any FGT measure with transfer (row 2-5), the figures are smaller. Hence it is shown that the FGT measures are reduced by giving a transfer under all the targeting methods. However, it is needed to test the statistical significance of this reduction. I conducted the hypothesis testing for the differences between the original FGT measures without transfer and the FGT measures after the transfer under each targeting method. Also, in order to make the comparison across two different

targeting methods, the differences in the FGT measures between two different targeting methods are tested.

The differences in the FGT measures from two different targeting methods and their t-statistics are shown. It reports the difference between the FGT measures without transfer and the measures under the targeting methods. Here, the FGT measures without transfer is assumed to be exogenous,²² and the t-statistics for the difference is calculated using the standard error of the other measure that is compared with the measures without transfer. This shows whether the reduction in the FGT measure is statistically significant or not by giving a transfer under several targeting methods. For all the tables in this section t-statistics of the differences are shown in parentheses.

Table 5.2. No transfer versus other targeting methods under the first budget

Targeting method	P(0)	P(1)	P(2)
Self-selection (1)	-0.074*** (-15.396)	-0.052*** (-25.250)	-0.034*** (-27.481)
Census (2)	-0.072*** (-14.992)	-0.053*** (-25.919)	-0.036*** (-29.527)
Consumption based (3)	-0.12*** (-24.918)	-0.076*** (-39.750)	-0.048*** (-44.817)
Uniform transfer (4)	-0.071*** (-14.646)	-0.048*** (-22.992)	-0.032*** (-25.472)

The figures without parentheses indicate the difference of the FGT

²² For all the calculation of testing the statistic significance of the differences between two different FGT measures, I assume that one measure is exogenously given, and the statistical significance of the difference from that measure is calculated using the standard error of the other measure, instead of looking at the standard error of the difference itself, due to availability of the necessary information.

measures between no transfer and other targeting methods. The t-statistics are shown in parentheses.

*: indicates significant at the 10% level.

** : indicates significant at the 5% level.

***: indicates significant at the 1% level.

Source: calculation by author.

Table 5.2 shows that giving the transfer under any of the targeting methods significantly reduced the FGT measures obtained without transfer. This shows that giving a transfer does reduce poverty, as expected.

Next, the differences between the FGT measures after the transfer for two different targeting methods and their t-statistics are shown. This tests if there are large enough differences in efficiency across several targeting methods. As was done for the measures without transfer above, it is assumed that the measures from one targeting method are exogenous and t-statistics are calculated using the standard error of the measures from the other targeting method. This means that for one combination of two targeting methods, there exist two different t-statistics. However, here I present one t-statistic per combination of targeting methods for simplicity. The whole analysis is not shown here but in fact it is found that the two different t-statistics from one combination of targeting methods make little difference. The following table 5.3 shows the differences in the FGT measures between two different targeting methods. In panel A the differences between the self-selection method and the other methods are shown, assuming that the FGT measures from the self-selection method are exogenous. In panel B, similarly, the

differences between the census method and other methods are shown, except for the self-selection method that is already compared in panel A, assuming the measures from the census method are exogenous. Finally, in panel C the differences between the consumption based targeting and the uniform transfer are shown. In panel C the measures from the consumption based targeting are assumed to be exogenous. For each difference, the t-statistics are given in parentheses.

Table 5.3. Comparison of the FGT measures from several targeting methods under the first budget

Targeting method	P(0)	P(1)	P(2)
Panel A. Self-selection method versus the other targeting methods			
Census (1)	0.002 (0.405)	-0.001 (-0.375)	-0.001 (-1.073)
Consumption based (2)	-0.046*** (-9.480)	-0.024*** (-12.448)	-0.014*** (-12.849)
Uniform transfer (3)	0.004 (0.753)	0.004* (1.949)	0.002** (1.986)
Panel B. Census method versus consumption based targeting and uniform transfer			
Consumption based (1)	-0.048*** (-9.886)	-0.023*** (-12.047)	-0.013*** (-11.643)
Uniform transfer (2)	0.002 (0.347)	0.005** (2.315)	0.004*** (3.022)
Panel C. Consumption based targeting versus uniform transfer			
Uniform transfer (1)	0.049*** (10.207)	0.028*** (13.320)	0.016*** (13.022)

The figures without parentheses indicate the difference of the FGT measures between the consumption based targeting and other targeting methods. The t-statistics are shown in parentheses.

*: indicates significant at the 10% level.

** : indicates significant at the 5% level.

***: indicates significant at the 1% level.

Source: calculation by author.

Table 5.3 reveals that not all differences are statistically significant. This means that for some combination of targeting methods, their efficiency for reducing poverty is almost the same. The following conclusions can be made from these tables.

First, looking at row 2 in panel A, row 1 in panel B and panel C, against all other targeting methods, consumption based “perfect” targeting shows its significant effectiveness. Second, more importantly, from row 1 in panel A, none of the differences between the measures under the self-selection method and the census method were statistically significant. This suggests that the effectiveness for reducing poverty of the self-selection method and the census method can be considered almost equal. Third, from row 3 in panel A, the differences between the uniform transfer and the self-selection are significant for P(2) at the 5% level, and P(1) at the 10% level. From row 2 in panel B also the differences between the uniform transfer and the census method are significant for P(1) at the 5% level, and P(2) at the 1% level. Taking into account that the sample is taken after the geographic targeting was executed, in this analysis the uniform transfer can be considered to correspond to the samples derived by the geographic targeting. Hence this supports that taking the secondary targeting after the geographic targeting is effective.

In summary, if preferences of targeting method are based on poverty reduction, the self-selection method and the census method are preferred equally and only second to the perfect targeting based on consumption. The uniform transfer is found to be the least effective method.

5.2. Results from the Budget with Estimated Transfer Amount

In this part, the results from the budget estimated by calculating the actual transfer amount are shown. The estimated transfer amount was calculated using the data on schooling situation of the household members in my sample. The resulting average transfer amount per household is approximately 362 Mexican pesos in this case. This yielded the total budget of 1,921,160.6 Mexican pesos. As was done in 5.1, the amount calculated by subtracting the targeting costs from the budget was equally distributed to those households who are classified as eligible under the targeting methods. Note that because of the necessity of maintaining the same budget amount for all the targeting methods, the way of distributing the transfer according to the schooling information is not applicable to the other methods.²³ In order to make the comparison with the previous results and to see the effect on alleviating poverty of the distribution of the transfer, I added the measures with the transfer equally distributed to the incorporated households under the self-selection as well as with the transfer distributed following the actual transfer amount. For convenience, I call this way of distributing “self-selection with average transfer amount”. Table 5.4 shows the results for this budget.

²³ If I apply this way of distributing the transfer to the other methods, the total budget spent will not be the same with the budget spent under the self-selection method because the number of the households receiving the transfer differs on the targeting method. This brings a problem on how to adjust the amount of the budget, where I will be forced to reduce or raise the amount of transfer artificially. To discuss this problem, further discussions are needed, and hence I avoid using this way of distributing for the other methods.

Table 5.4. FGT measures with or without transfer for each targeting method under the budget with estimated transfer amount

Targeting method	P(0)	P(1)	P(2)
Without transfer (1)	0.582	0.215	0.106
Self-selection (with estimated transfer amount) (2)	0.508 (-0.074)	0.160 (-0.054)	0.071 (-0.035)
Self-selection (with average transfer amount) (3)	0.498 (-0.084)	0.156 (-0.058)	0.069 (-0.038)
Census (4)	0.499 (-0.083)	0.155 (-0.060)	0.067 (-0.039)
Consumption based (5)	0.444 (-0.138)	0.130 (-0.085)	0.053 (-0.053)
Uniform transfer (6)	0.511 (-0.071)	0.167 (-0.048)	0.075 (-0.032)

The numbers without parentheses indicate the FGT measures without transfer or with transfer under the targeting method. The numbers in the parentheses indicates the difference from the FGT measure without transfer.

Source: calculation by author.

From table 5.4, one can say that the measures without transfer (in row 1) are necessarily equal to the ones shown in table 5.1. Given the larger budget compared with the previous part, in this table the measures after the transfer are reduced more than in table 5.1. Note that the difference between the two measures from the self-selection method in row 1 and 2 depends only on the way of distributing the transfer. Under the self-selection method with the estimated transfer amount (row 1) the budget is distributed according to the household member's schooling

status. On the other hand, under the self-selection method with the average transfer amount the budget is distributed equally to the households incorporated in the program, as was done in the first budget. Under the other targeting methods, the budget is distributed equally to the households classified as eligible under the targeting method.

Now, as was done in the previous part, the statistical testing is conducted for this result. First, the differences between the FGT measures without transfer and other targeting methods are shown in table 5.5.

Table 5.5. No transfer versus other targeting methods under the second budget

Targeting method	P(0)	P(1)	P(2)
Self-selection (with estimated transfer amount) (1)	-0.074*** (-15.396)	-0.054*** (-26.449)	-0.035*** (-28.283)
Self-selection (with average transfer amount) (2)	-0.084*** (-17.477)	-0.058*** (-28.682)	-0.038*** (-30.946)
Census (3)	-0.083*** (-17.130)	-0.060*** (-29.806)	-0.039*** (-33.936)
Consumption based (4)	-0.138*** (-28.829)	-0.085*** (-45.991)	-0.053*** (-52.168)
Uniform transfer (5)	-0.071*** (-14.646)	-0.048*** (-22.992)	-0.032*** (-25.472)

The figures without parentheses indicate the difference of the FGT measures between no transfer and other targeting methods. The t-statistics are shown in parentheses.

*: indicates significant at the 10% level.

**: indicates significant at the 5% level.

***: indicates significant at the 1% level.

Source: calculation by author.

Table 5.5 shows that all the differences are statistically significant, too. It is shown that also with this budget, giving a transfer does reduce the poverty.

Finally, the differences between the FGT measures after the transfer for two different targeting methods and their t-statistics for this budget are shown. As was done in the previous part, only one t-statistic is calculated per combination of targeting methods. The whole analysis is not shown here but there are no large differences in the statistical significance between the two different t-statistics for this budget, either. The following table 5.6 shows the differences in the FGT measures between two different targeting methods. In panel A, the differences between the self-selection method with the estimated transfer amount and the other methods are shown, assuming that the FGT measures from the self-selection method with the estimated transfer amount are exogenous. In panel B, similarly, the differences between the self-selection method with the average transfer amount and other methods are shown, except for the self-selection method with the estimated transfer amount that is already compared in panel A, assuming the measures from the self-selection method with the average transfer amount are exogenous. In panel C the differences between the census method and the consumption based targeting, and the differences between the census method and the uniform transfer are shown. In panel C the measures from the census method are assumed to be exogenous.

Finally, in panel D, the differences between the consumption based targeting and the uniform transfer are shown, assuming the measures from the consumption based targeting are exogenous. For each difference, the t-statistics are given in parentheses.

Table 5.6. Comparison of the FGT measures from several targeting methods under the second budget

Targeting method	P(0)	P(1)	P(2)
Panel A. Self-selection method with the estimated transfer amount versus the other targeting methods			
Self-selection (with average transfer amount) (1)	-0.010** (-2.083)	-0.004* (-1.903)	-0.002* (-1.916)
Census (2)	-0.008* (-1.736)	-0.005*** (-2.594)	-0.004*** (-3.560)
Consumption based (3)	-0.064*** (-13.337)	-0.031*** (-16.541)	-0.018*** (-17.359)
Uniform transfer (4)	0.004 (0.753)	0.006*** (3.032)	0.004*** (2.856)
Panel B. Self-selection method with the average transfer amount versus the census method, the consumption based targeting and the uniform transfer			
Census (1)	0.002 (0.347)	-0.001 (-0.660)	-0.002 (-1.555)
Consumption based (2)	-0.054*** (-11.240)	-0.027*** (-14.448)	-0.015*** (-15.061)
Uniform transfer (3)	0.014*** (2.836)	0.010*** (4.881)	0.006*** (4.726)
Panel C. The census method versus the consumption based targeting and the uniform transfer			
Consumption based (1)	-0.056*** (-11.590)	-0.025*** (-13.734)	-0.014*** (-13.279)
Uniform transfer (2)	0.012** (2.489)	0.012*** (5.512)	0.008*** (6.176)
Panel D. The consumption based targeting versus the uniform transfer			
Uniform transfer (1)	0.068***	0.037***	0.021***

	(14.009)	(17.648)	(16.983)
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The figures without parentheses indicate the difference of the FGT measures between the consumption based targeting and other targeting methods. The t-statistics are shown in parentheses.

*: indicates significant at the 10% level.

** : indicates significant at the 5% level.

***: indicates significant at the 1% level.

Source: calculation by author.

The results for this budget are quite similar to the previous results for the other budget. First, from row 3 in panel A, row 2 in panel B, row 1 in panel C and panel D, the “perfect” targeting based on consumption is significantly more effective than the other targeting methods, as it must be. Second, from row 2 in panel A and row 1 in panel B, the differences between the measures under the self-selection method and the census method are significant only if the estimated transfer amount is applied in the former method. Using the same method of distributing the budget, the differences are not significant between the self-selection method and the census method. Again the effectiveness for reducing poverty of the self-selection method and the census method is shown to be almost equal. Third, as there is a larger budget compared with that of the previous section, the advantage of applying the secondary targeting (which means targeting at the household level made after the geographic targeting) becomes more apparent than in the case of the other budget. From row 4 in panel A, row 3 in panel B and row 2 in panel C, all the differences in the measures between the uniform transfer and the secondary targeting (i.e. the self-selection method and the census method) are shown to be significant, except for P(0) under the self-selection method with the estimated transfer amount in row 4 in panel A. Compared with the results

in the previous part, the differences and their statistical significances seem to be larger in this budget than in the previous budget. This suggests that using a secondary targeting method is more effective when a larger budget is given.

In addition to these results, the measures from different ways of distributing the transfer are comparable with this budget. The differences in row 1 in panel A are the differences depending on how the budget is distributed, that is, applying the way of distributing of Oportunidades or distributing equally. From these measures, one can say that distributing the budget equally is slightly more effective, though the differences are significant only at the 10% level.

Summarizing the results for the second budget, the perfect targeting based on consumption is the most effective, followed by the self-selection method with the average transfer amount and the census method, which have an almost equal effect. The self-selection method with the estimated transfer amount comes in fourth place, and the uniform transfer is found to be the least effective.

5.3. Implications from the Results

By summarizing the results in part 5.1 and 5.2, the following three things are observed. First, the self-selection method and the census method reduced poverty almost equally. Second, the uniform transfer was less effective than both the census method and the self-selection method. Third, distributing the budget equally to the eligible households

reduced poverty slightly more than the transfer amount applied by Oportunidades. For the first observation, further analysis will be given in the following section 6. Here, discussions are made for the latter two points.

5.3.1. Necessity for the targeting at the household level

Comparing the results concerning the uniform transfer and the self-selection method or the census method, the uniform transfer is found to be less effective than the two other methods. The ineffectiveness of the uniform transfer compared with the self-selection method or the census method supports the necessity for targeting at the household level. The same conclusion was also drawn by Gutierrez et al (2003). This result would support the targeting itself for social programs, especially for countries with limited budgets. With targeting, the limited resources are distributed more effectively to those who need them the most rather than without targeting. Targeting at smaller levels seems better for poverty alleviation.

Comparing the results from the two different budgets, the differences between the uniform transfer and the self-selection method or the census method are even larger under larger budgets. This would suggest that there is greater necessity of taking the secondary targeting if the program coverage is wider, and hence a larger budget is expected.

5.3.2. Distribution of the transfer

By comparing the results for the second budget concerning the self-selection method with the estimated transfer amount and with the transfer distributed equally, the latter distribution of the transfer reduced more FGT measures. Although the differences are only significant at 10% for P(1) and P(2), this suggests that distributing the transfer equally is slightly more effective for reducing poverty. The transfer amount applied by Oportunidades highly depends on the household's composition, and the households with more school age children are likely to receive a larger transfer payment. The results suggest that the households with more children are not necessarily more likely to be extremely poor.

6. Further Analysis Regarding the Performance of Self-selection Method and Census Method

The results in part 5.1 and 5.2 reveal that the self-selection method (with average transfer amount in the case of the second budget) and the census method reduce the poverty indices by almost equal amount. This result is contrary to what was expected. In fact, Oportunidades abandoned the census method in urban areas where poor households are less concentrated because applying the census method was predicted to be relatively more costly against its effectiveness than the self-selection method.

Then, is it logical to conclude that applying either self-selection method or census method is indifferent? To answer this, I need to look more closely at the targeting performance of the two methods. In this section, I try to compare them by executing other additional analyses.

6.1. The Rate of Targeting Errors

One way to evaluate the performance of targeting methods is to calculate the rates of “under-coverage” and “leakage” under both the self-selection and census method. Under-coverage rate is defined as the proportion of poor households who are not included in the program, out of the total poor households in the sample. Leakage rate refers to the proportion of non-poor households who participate in the program, out of the total beneficiary households. As was done in the previous sections, the state of poverty is judged by the adult equivalent consumption

amount of the household with the same poverty line. The following table 6.1 shows this.

Table 6.1. The rate of under-coverage and leakage in the sample

Targeting method	Under-coverage (1)	Leakage (2)
Self-selection	40.0%	28.8%
Census	19.4%	32.2%

Source: calculation by author.

According to column 1 of Table 6.1, one can find that under the self-selection method, 40% of the poor households could not participate in the program. If census method includes all the eligible households into the program, this rate becomes about a half of the rate under the self-selection method. This means that out of the total poor households in the sample, 20.6% (1293 households) could not participate in the program under the self-selection method but would participate under the census method. Knowing their characteristics is of my interest here.

It can be said that leakage rate, shown in column 2 of table 6.1, represents the efficiency of the targeting. It is implied that the higher the rate is, the more budget is being spent on the non-poor households, which should be given to the poor households for the sake of poverty reduction. Comparing the two targeting methods, the census method has slightly higher rate. This is because the classification of the households by the program is not perfect and under the census method a substantial number of non-poor households would also be included in the program mistakenly. Therefore, under the census method less proportion of the

budget is reaching to the poor households, even if we take into account its higher targeting cost.

As an additional implication, this suggests that some non-poor households are surely excluded from the program by targeting. Recall that in this sample, the poverty rate is 58%, meaning that there are 42% of non-poor households in the sample. In other words, without targeting, the (natural) leakage rate would be 42%. The leakage rate of the two targeting methods suggests that around 10% of non-poor households would be excluded from the program, even though whether or not this rate is sufficient is unclear.

Simply looking at these rates, one can find that if the two methods perform almost equally according to the results in section 5, it is natural to think that the census should succeed in incorporating many extremely poor households, because giving a transfer to these households improves the FGT measures a lot and this compensates the fact that less amount is reaching to the poor households under the census method. In the following analyses, I try to reveal the difference of the targeted households between the two methods, in terms of consumption amount.

6.2. Average Distance of the Targeted Households' Consumption Amount from the Cut-off Point Consumption Amount

Here, two types of indices are calculated: the average gap of the poor households targeted under each method from the poverty line; and the average gap of the non-poor households targeted, in terms of

consumption amount. Making use of these indices, I can compare the effectiveness of the targeting over different size of the number of the households targeted.

6.2.1. Average distance of consumption amount from the poverty line for poor households targeted

First, I try to look at how much poor the targeted households are. If the households detected under one targeting method are poor enough, it can be said that the targeting method works effectively. On the other hand, if the detected households contain substantial non-poor households, the targeting method would be paying some unnecessary costs. Here, the following index is introduced:

$$U(\alpha) \equiv \frac{\sum_{i=1}^N 1\{c_i < z\} \left| \frac{c_i - z}{z} \right|^\alpha}{\sum_{i=1}^N 1\{c_i < z\}},$$

where N is the number of the households targeted, c_i is the amount of adult equivalent consumption of the household i , z is the consumption amount at the cut-off point, and α is the weight attached to the distance from the poverty line ($\alpha = 1, 2$ is supposed here). $1\{\cdot\}$ is an operator which takes value 1 if the condition $\{\cdot\}$ is true and 0 otherwise.

Note that the denominator breaks down into the number of poor households out of the households targeted. Therefore, when $\alpha = 1$, this index means the average distance of the targeted poor households from the poverty line, in terms of their consumption amount. When $\alpha = 2$, more weights are attached to the households with relatively less consumption amount.

If this index is applied for all the households from the sample, it will indicate the state of average poverty state in the sample, where no targeting is executed. I shall call this state “status quo”. The following table 6.2 shows the indices from the households from status quo, the households targeted by the self-selection method, and the households targeted by the census method.

Table 6.2. Average distance of the targeted households’ consumption amount from the cut-off point consumption amount for the targeted poor households

	U(1)	U(2)
Status quo (1)	0.369	0.183
Self-selection (2)	0.392 (1.064)	0.201 (1.100)
Census (3)	0.386 (1.046)	0.195 (1.070)

The figures in parentheses indicate the ratio to the index from status quo (in row 1).

Source: calculation by author.

From row 1 of table 6.2, one can find that for all the poor households in the sample, the consumption amount is less than the consumption amount at the poverty line by on average 0.369 (36.9%), and the squared difference in the consumption is on average 0.183 (18.3%). The row 2 and 3 indicate the indices from the households targeted by self-selection and census method, and their ratio to the indices from status quo. They suggest that the average gap from the poverty line of the households targeted by self-selection is 1.064 times larger than from status quo. As for the census method, the average gap turns out to be 1.046 times larger

than from status quo. The ratios larger than 1 imply that the households targeted by both self-selection and census are more likely to be poor, compared with the households from whole sample. Comparing the indices from self-selection and census, it is found that the households targeted by self-selection method are slightly more likely to be poor than those targeted by census method.

Looking at the index U(2), a similar trend is found as the index U(1). That is, even putting more weight on poorer households, the average distance from the poverty line is larger than that from status quo, both under the self-selection and census method. Comparing the self-selection and census method, again the index from the self-selection method is larger. This, along with the result from U(1), suggests that out of the poor households targeted, the households under the self-selection method are on average poorer than those under the census method. Therefore, it can be said that the self-selection method targets more efficiently the poorer households.

6.2.2. Average distance of consumption amount from the poverty line for non-poor households targeted

Next, for the targeted non-poor households in contrast, the average distance from the poverty line in terms of the consumption amount is calculated for each targeting method. The index becomes in the following form:

$$L(\alpha) \equiv \frac{\sum_{i=1}^N 1\{c_i \geq z\} \left| \frac{c_i - z}{z} \right|^\alpha}{\sum_{i=1}^N 1\{c_i \geq z\}},$$

where the N , c_i , z and α are defined in the same manner as $U(\alpha)$.

This index indicates how far from poverty the non-poor households wrongly targeted are. When $\alpha = 1$, this means the non-poor households' the average additional consumption to the consumption amount at the poverty line. When $\alpha = 2$, more weights are attached to relatively more wealthy households. As was done in the case of $U(\alpha)$, $L(\alpha)$ is calculated for each group of the households targeted by the self-selection and census method, and the households from the whole sample (i.e. status quo). If this index is larger for one targeting method, it implies that the targeting method detects more relatively wealthy households and its precision would be less. The following table 6.3 shows the results.

Table 6.3. Average distance of the targeted households' consumption amount from the cut-off point consumption amount for the targeted non-poor households

	L(1)	L(2)
Status quo (1)	0.753	2.310
Self-selection (2)	0.553 (0.735)	0.980 (0.424)
Census (3)	0.569 (0.755)	0.925 (0.400)

The figures in parentheses indicate the ratio to the index from status quo (in row 1).

Source: calculation by author.

The results regarding index L(1) shows that by executing either self-selection or census targeting, we can exclude effectively wealthier households. Without targeting, the average consumption amount of non-poor households is higher than the amount at the cut-off point by

0.753 (75.3%) of it. The non-poor households targeted under self-selection method consumes on average 0.553 (55.3%) more than the cut-off point consumption amount, and this average is 0.735 times (73.5%) of the average of status quo. Similarly, the non-poor households targeted under census method consumes on average 0.569 (56.9%) more, and this is 0.755 times (75.5%) of the average of status quo. This indicates that by applying either self-selection or census targeting we can effectively exclude non-poor households with large amount of consumption, resulting in a reduction in the average consumption amount (above the poverty line) by from 24.5% to 26.5%.

Comparing the index of self-selection and census method, the average consumption amount of non-poor households detected is slightly less under the self-selection method. This suggests better efficiency of the self-selection method.

As for the index $L(2)$, – though this is not of so much interest because whether or not weighting the wealthier households is beyond the scope of the discussion – both under self-selection and census method the weighted average is reduced substantially (from 2.310 of status quo to 0.980 and 0.925 of self-selection and census, respectively). The index is slightly less for census method than self-selection method, just meaning that the consumption of the non-poor households targeted under the self-selection exhibits more variance than those under the census method.

6.2.3. Implications from the analysis

From the analysis in this part, the following things are implied. First, similarly to the results in section 5, by carrying out targeting at the household level, the program can focus on relatively poorer households, excluding relatively wealthier households.

Looking at the index $U(1)$, the average gap of the targeted poor households' consumption is larger than that from the whole sample, by 6.4 percent point under the self-selection method and 4.6 percent point under the census method. Looking at the index $U(2)$, even if more weights are put onto relatively poorer households, it is found that both the self-selection and census method target those households. On the other hand, the indices $L(1)$ and $L(2)$ suggest that even if the two targeting methods wrongly select non-poor households, their average consumption amount is less than the average of all the non-poor households in the sample.

Second, comparing the self-selection and census method in terms of the consumption amount of the targeted households, the former exhibits slightly more efficiency than the latter, except for the index $L(2)$. Although the self-selection method misses about 20% more poor households than the census method according to the results from 6.1, the average distance of the targeted poor households' consumption from the poverty line is larger under the self-selection method. This suggests the self-selection method is likely to target relatively poorer households.

6.3. Density Estimation of the Consumption Amount

The next step to compare the performance of self-selection and census method is to see the density of the consumption amount of the households targeted by each method. Using Kernel density estimation,²⁴ the probability density function of the consumption amount from the different groups of households is visualized.

The main interest is to see how the distribution of consumption amount differs over those targeted under the self-selection and census method. More specifically, how the distribution of consumption amount among poor households varies over different groups is of interest. Therefore, in this analysis, for the estimation of density function I focus on the households with consumption amount not far from the poverty line.²⁵

The next graph 6.1 shows the density of consumption amount of the households grouped by their eligibility status to the program judged by Oportunidades. This graph enables us to know how the eligibility status by Oportunidades and the criteria based on consumption differ. The vertical line in the graph shows the poverty line (about 441 Mexican pesos).

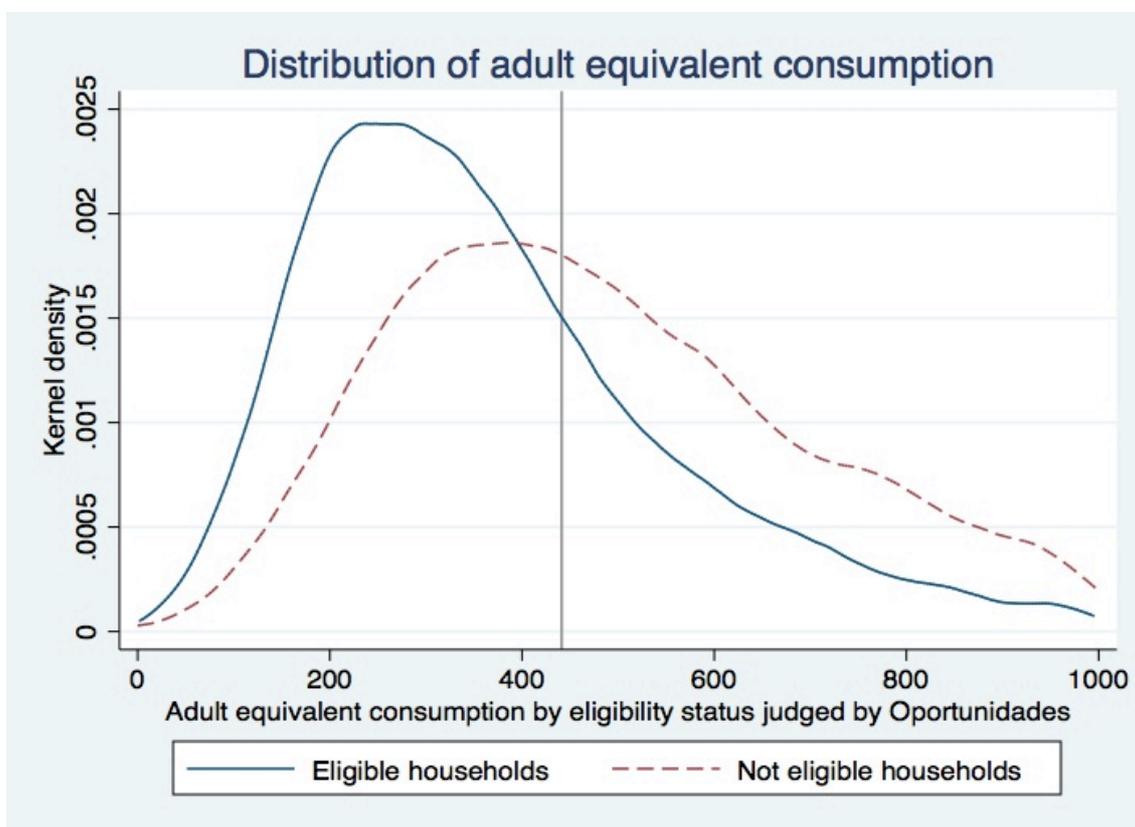
²⁴ The kernel density estimator is generally defined as:

$$\hat{f}_h(x) = \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x - X_i}{h}\right),$$

where $K(\cdot)$ is the kernel function and h is the band width. Here the Epanechnikov kernel is used as the kernel function, and the band width is the width that would minimize the mean integrated squared error.

²⁵ Specifically, I limit the sample for the households with adult equivalent consumption amount less than 1000 Mexican pesos. Note that the adult equivalent consumption amount at the cutoff point is about 441 Mexican pesos.

Graph 6.1. Distribution of adult equivalent consumption amount by eligibility status judged by Oportunidades



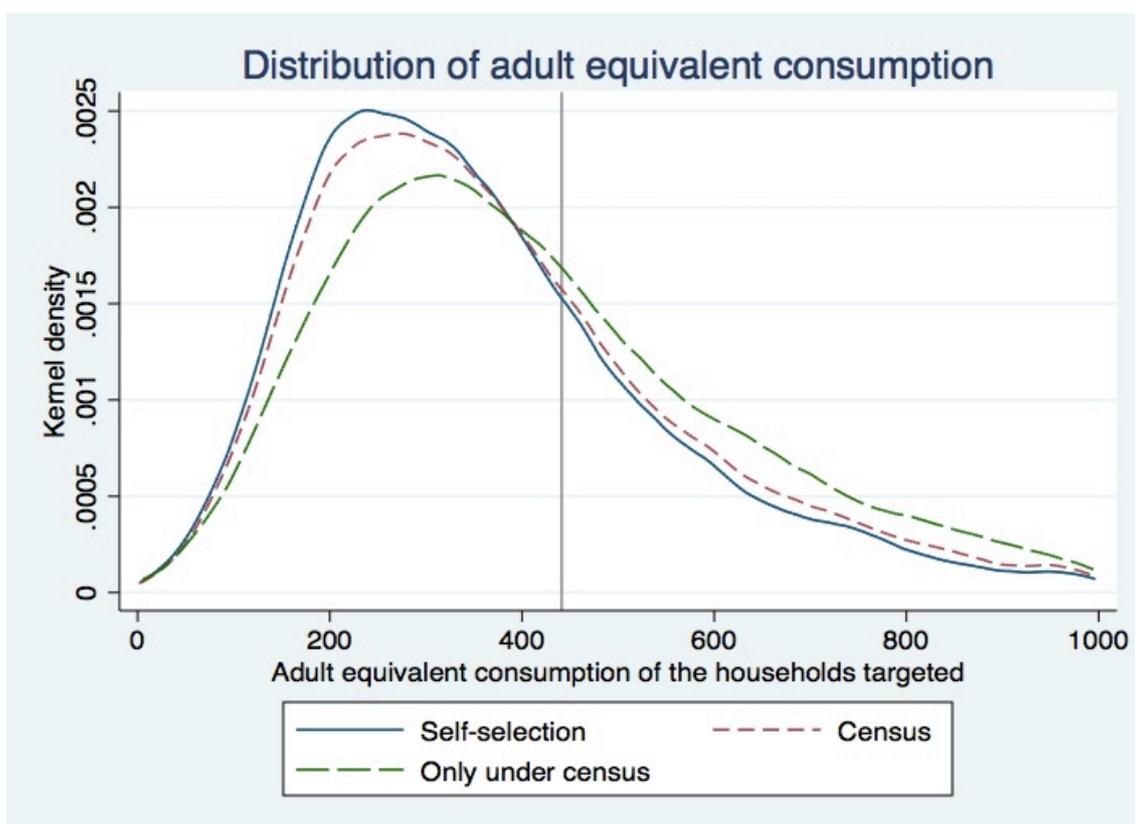
The vertical line in the graph indicates the poverty line.

Source: calculation by author.

Graph 6.1 reveals that consumption amount of the non-eligible households is likely to be higher than the eligible households, as it should be. However, there can be found a number of households with less consumption than poverty line among the non-eligible households. Moreover, the peak of the density of the consumption of non-eligible households is less than the poverty line. This suggests that, though it is obvious, the eligibility for the program and the poverty state measured by consumption do not coincide well. Note that the graph is shown just to indicate the difference between the two criteria, not to judge them.

Then, the following graph 6.2 shows the density of consumption amount of the households targeted by the self-selection method, of those targeted by the census method, and of those targeted by the census method but not by the self-selection method.

Graph 6.2. Distribution of adult equivalent consumption amount of the households targeted by the self-selection method, the census method, and only by the census method.



Each curve shows the density of the adult equivalent consumption amount of the households targeted by each method. The curve “Only under census” indicates the consumption of the households that are targeted by the census but not by the self-selection method. The vertical line in the graph indicates the poverty line.

Source: calculation by author.

Graph 6.2 shows how the distribution of consumption differs across the

households targeted by each targeting method. This shows that the distribution of the households targeted by self-selection and census method exhibits quite similar shape, but the distribution of self-selection is a little on the left. This means, out of the households targeted, under the self-selection method the rate of poor households is slightly higher than under the census method. Also, the density of the households above the poverty line is slightly higher under the census method, meaning that the census method is slightly more likely to target the non-poor households. This is the same implication as what was shown in part 6.2.

Looking at the curve “Only under census”, which shows the distribution of consumption among the households targeted by the census method but not by the self-selection method,²⁶ one can find that in this curve there is more density on the right than the other two curves. This explains why the curve of census method is slightly on the right of the curve of self-selection. However, the consumption amount at the peak of the density for “Only under census” is still less than the poverty line, which implies there is substantial number of poor households in this group. It can be said that the advantage of the census method is to be able to include these households into the program.

In summary, the targeting of the self-selection method can be said to be efficient because the targeted households are likely to be poorer than those targeted under the census method. On the other hand, the census method can include the larger number of poor households, which can be

²⁶ Note that these households are those who are classified as eligible by the Oportunidades’ criterion but not incorporated into the program.

said to be suitable for programs with wide coverage.

6.4. Overall Discussions on the Self-selection Method versus the Census Method

The analyses in this section compared the performance of the self-selection and census method more closely. In part 6.1 it is shown that under the census method around 20% more of the poor households would be incorporated into the program, compared to the self-selection method. However, the census method also includes non-poor households mistakenly, and the rate of non-poor households out of the total incorporated households is higher than the self-selection's case. In part 6.2 and 6.3, the detail of the consumption amount of the selected households under each targeting method is described. It suggests that the self-selection method targets poor households efficiently because the consumption amount of the targeted households is likely to be less, while the census method allows to include more number of the poor households. Here, discussions are made on some implied remarks.

First, the results from section 5 show that by giving a transfer to the targeted households the self-selection method and census method reduce the FGT measures by almost equal amount. On the other hand, the results from section 6 imply that the households targeted by the self-selection method tend to be poorer than the census method. Why did the census method perform as well as the self-selection method in section 5?

One of the causes for this might be the relatively large transfer amount.

The transfer amount given under the self-selection method is 316 Mexican pesos, which is almost three quarters of the consumption amount at the cut-off point (441 Mexican pesos). Even under the census method, the targeted households would receive about 221 Mexican pesos for the first budget and 254 Mexican pesos for the second budget. These transfer amount seem so large that with them most poor households would be able to go beyond the poverty line set here.

If the transfer amount is relatively large compared to the poverty line, the FGT measures should be reduced more if the transfer is given to the larger number of poor households.

Second, the characteristics of those households who are eligible but not incorporated into the program should be analyzed more closely, because these households affect the performance of the self-selection method crucially. Knowing why these households did not participate in the program would help improving the implementation of the self-selection method.

One example of describing a characteristic of these households would be the knowledge of the program. Under the self-selection method, those who want to participate in the program first need to go to the program module, and then their poverty status is examined and program incorporation is determined. However, according to Coady and Parker (2005b), 31% of the poor households did not know about the program module. Applying the same calculation to my sample, the percentage of the poor households that did not know about the module declined to about 25%. However, if I limit the sample to those households who are

classified as poor but not incorporated, the percentage rises to 49%.

Also, the analysis in part 6.3 shows the consumption amount of these households is likely to be more than that of the households targeted under the self-selection method (hence incorporated into the program). One possible reason for this might be that on the process of the self-selection targeting, wealthier households tend to give up making the procedure. That is, households would be less likely to apply for the program if they consider their probability of acceptance of the program is low. It seems natural to think that out of the households that knew about the program, the majority of the eligible but not incorporated households gave up the participation procedure because they did not consider themselves so much poor. Therefore, the consumption amount of the eligible but not incorporated households is found to be larger than the incorporated households.

To conclude this section, I summarize the advantages and disadvantages of the self-selection method against the census method.

The most notable advantage of the self-selection method would be its lower targeting costs compared with the census method. This advantage actually made Oportunidades decide to apply the self-selection method in urban areas where poor households are less concentrated. In addition, Gutierrez et al (2003) found that the self-selection method was effective for the localities with large populations. As the second advantage of the self-selection method, lower targeting costs under the self-selection method mean that the government can set a lower budget amount. So it can be said that the self-selection method is more likely to be applicable

for developing countries, whose financial resources are limited.

The demerit of applying the self-selection method is that it is difficult to take into account the participation of the targeted households who are expected to participate in the program. The self-selection method sometimes fails to involve poor households into the program, who need the program the most. However, this problem can be solved, or at least alleviated by improving the targeting process. One way of doing this would be to inform potential recipients more precisely. It is expected that the efficiency of the self-selection method could be improved.

7. Conclusion

In this paper, the effectiveness in reducing poverty of several targeting methods is compared. Assuming that a transfer is given to the eligible households under several targeting methods, under two types of budgets, by how much the FGT measures are reduced is observed. From this analysis, one can see how effective the method of targeting applied by Oportunidades is compared to alternative targeting methods.

The results from section 5 suggest the following three things. First, in my sample of ENCELURB 2002, the self-selection method and the census method reduced poverty index by almost equal amount. Second, the larger reduction in the FGT measures by the self-selection method and the census method compared with uniform transfer suggests that taking secondary targeting is effective. Third, distributing the budget equally to the eligible households reduces poverty slightly more than applying the amount of transfer used by Oportunidades.

Further analyses made in section 6 for the first topic also shows that the self-selection method targets poor households efficiently because the consumption amount of the targeted households is likely to be less, while the census method allows to include more number of the poor households.

Here are several points that are implied as concluding remarks from the results of the paper.

First, the results suggest that the decision of applying the self-selection

method turns out to not be bad, although there are not apparent gains from applying it in terms of poverty reduction. Also note that in the analysis the performance of the census method might be overvalued because of the strong assumption that all the eligible households would be included under that method. This is not always the case because there must be some households who do not participate in the program even if they can be incorporated. Indeed, taking into account that the self-selection method can be carried out with less budget amount, the Oportunidades program's decision of having applied this to the urban population can be supported.

Second, the efficiency of the self-selection method highly depends on the characteristics of the targeted areas. If the households have greater capacity to go to the program module independently, the self-selection method would be more effective in detecting poor households. Also, the relative efficiency of the self-selection method against the census method depends on the size of the locality and the extent of the concentration of poor households. For further studies, it would be worth investigating how the efficiency of the self-selection method and the census method varies, depending on the locality. Unfortunately, in this analysis I was only able to use the data that was taken after the geographic targeting, due to availability. With a dataset from the whole country, it would be possible to compare the effectiveness across different localities.

Third, it might be also worth investigating more closely the relationship

between the effectiveness for poverty reduction and the transfer amount and the way of distributing it. The results from section 5 suggest that the almost equal effectiveness of the self-selection and census method might be due to the relatively large transfer amount. The results also show that distributing the transfer equally to each household reduces slightly more poverty than the transfer amount used by Oportunidades. Though this could not be done in this paper, revealing how the results differ depending on these two factors would contribute to evaluate the targeting.

Fourth, as a limitation of this paper, there was no data on the targeting costs but the ones presented by Gutierrez et al (2003). It was unclear whether this data includes not only the administrative costs of the targeting but also such types of costs as the disutility among the poor households for going to the program module individually. However, there was no alternative way of estimating the costs for this paper.

Fifth, I could not make a sufficient discussion on the asymmetric information between the households and the program officers. As discussed in Conning and Kevane (2002), beneficiary households have an incentive to underreport their welfare state at the screening questionnaire made by program officers. Also, there might be problems of moral hazard once the households get the benefit of the program. Regarding the targeting methods seen in this paper, both the self-selection and census method may suffer from these problems, under which the proxy means test is carried out.

Similarly, there might be a reporting bias in the data on the households' consumption. However, coping with these issues is beyond the scope of the paper.

Finally, there would be two alternatives for the way of examining the poverty state of the households.

The first way is to look at the poverty dynamics instead of the static consumption. Jalan and Ravallion (1998) argue that a considerable proportion of poverty is accounted for by the "transient poverty", which is attributed to intertemporal variability in consumption. They point out that static consumption data contain considerable noise about long-term poverty status. If our concern is about the "chronic poverty" which persist over time rather than the transient poverty, it can be costly to use static data. This might be the case for this paper since one of the objectives of Oportunidades is to reduce the long-term poverty.

The second is to compare the targeting performances by looking at the distributions of the households' consumption without setting any certain poverty line. As is done in Duclos et al (2004), making use of the stochastic dominance literature instead of focusing on certain indices like FGT measures would enable us to avoid the weakness of such indices that the households are clearly distinguished by a certain poverty line, in spite of the similarity in welfare state of the households among the poverty line.²⁷ However, these strategies are outside the scope of this paper, too.

²⁷ For a discussion of this, see, for instance, Atkinson (1987).

This paper does not give an evaluation of the program itself. The program is evaluated only by its objective: the improvement in the human capital of the poor households. Neither does it give an evaluation of the targeting methods in general. The results are only for the specific group of population in Mexico of my sample. However, especially for Latin American countries that have a similar social structure, the results are considered applicable to some extent. In addition, the analysis in this paper would be replicable for the analysis of other countries.

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