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THE POVERTY IMPACTS OF CASH AND IN-KIND TRANSFERS:

EXPERIMENTAL EVIDENCE FROM RURAL MEXICO

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Abstract

The unique experimental design of the Food Support Program (*Programa de Apoyo Alimentario*) is used to analyze in-kind and cash transfers in the poor rural areas of southern states of Mexico. The intent to treat effect on poverty of cash transfers of real value 25% less than the market value of in-kind transfers, is identical to that of in kind transfers. Potential explanations of this result are investigated by looking into the differences in impacts of in-kind and cash transfers on food consumption and nonfood expenditures and on the allocation of family labor between agricultural and nonagricultural activities. Both in- kind and cash transfers have identically large positive impacts on food consumption. Non-food expenditures are also higher in the localities with cash transfers, whereas they remain unaffected in the localities with in-kind transfers. Both kinds of transfers have a significant impact on the time allocation of males (and not females) who switch from agricultural to nonagricultural activities. But, the availability of cash transfers has a significantly higher marginal effect than in-kind transfers on the shift towards non-agricultural activities. Overall, the findings suggest that cash transfers may be better able than in-kind transfers at mitigating the impact of market imperfections, thus increasing both equity and efficiency.

JEL classification: J22; O12; C21
Keywords: Adult Labor Supply; Cash Transfers; Consumption; Difference-in-Differences; In-Kind Transfers; Mexico; Poverty; PAL; Randomized design.

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1. Introduction

Monetary transfers and transfers in-kind are two widely used instruments of poverty alleviation and redistribution in developed and developing countries alike. Naturally, there is a long-standing debate about the relative merits of each alternative form of social assistance (Currie and Gahvari, 2008). Means-tested transfers in-kind, such as food transfers or educational vouchers, are widely considered to be more politically palatable as a means of redistributing public funds to poorer households (Slesnick, 1996). In-kind food and school-related transfers are also believed to have long-term investment properties (e.g. Blank, 2002). For example, food transfers targeted to poor households with children may lead to better child nutrition and better health of these children in their adult years.

Yet, cash transfers are increasingly becoming the preferred mode of poverty alleviation particularly in developing countries. For example, the majority of the recent social assistance programs in Latin America provide conditional income transfers in the form of cash on the grounds that cash transfers are administratively more efficient than in-kind transfers in terms of the cost incurred per unit value of the benefit.[1] Cash transfers, however, may be subject to leakages in the sense that only part of the public assistance (i.e. cash) may be used for the consumption of the commodity subsidized, with the remainder of the benefit being directed towards the consumption of less desirable or less nutritious commodities such as alcohol and tobacco.

One important concern in this debate, though by no means the only one, is whether the impact of an in-kind transfer on monetary measures of poverty, typically measured by household consumption or income, is different from the impact of a cash transfer. Poverty measures offer the

advantage of being simple, albeit imperfect, summary measures of the effects of the program in the in the communities exposed to the program. This paper contributes to this literature by shedding new light on the relative impacts of in-kind or cash transfers on poverty, food and non-food consumption, and labor supply, using data from a conditional cash and food transfer program in the poor rural areas of Southern Mexico called PAL (*Programa de Apoyo Alimentario or Food Support Program*). The principal objective of the program is to alleviate poverty through the improvement of the food and nutrition conditions of targeted households living in rural poor communities with a population less than 2,500 and with a high and very high marginality index. The original program transfer consists of a monthly food basket with a value of 150 Mexican pesos or about US$15 at the time of Program implementation (2003) for the federal government (mean share of transfer to pre-program consumption is 10.6, median is 8.2%) and it is accompanied by an educational component (the requirement to attend initial program organization sessions, followed by diet, nutrition, and health-related educational sessions).

In order to get a better understanding of the impacts of in-kind and cash transfers on poverty and welfare we cast a wide net by examining the impacts of such transfers not only on some key components of total consumption, i.e., food and nonfood, but also on production as summarized by the allocation of family labor between agricultural and nonagricultural activities. [2] A distinguishing feature of the PAL evaluation sample is that it is based on a randomized design, with randomization of the type of program benefit received at the locality level. In our empirical analysis we apply the difference-in-differences estimator on repeated observations from households and their members in treatment and control villages surveyed for the purpose of evaluating the impact of the PAL program.

We find that cash transfers of real value 25% less than the market value of in-kind transfers, have identical poverty impacts as in kind transfers. Potential explanations of this result are investigated by looking into differences in the impacts of in-kind and cash transfers on food

consumption and nonfood expenditures and on the allocation of family labor between agricultural and nonagricultural activities. Our empirical findings shed light on the debate about the potential equity and efficiency effects of redistributive policies. Consistent with findings on the impacts of the food stamp program (Blundell and Pistaferri, 2003), our combined estimates on the impact of the PAL program on labor supply and consumption suggest that the cash transfers provided by the PAL program are better able than in-kind transfers at mitigating the impact of market imperfections, thus increasing both equity and efficiency.

The organization of the paper is as follows. Section 2 contains a brief review of the evidence on the impacts of in-kind and cash transfers, while Section 3 describes the PAL program and the data used. Section 4 presents the poverty impacts of in-kind and cash transfers, summarizes the theoretical predictions and presents estimates of the different impacts of in-kind and cash transfers on food consumption, non-food expenditures, and the allocation of labor supply. Section 5 concludes with some considerations for policy.

2. A Brief Review of the Evidence on the Impacts of In-Kind and Cash Transfers

The size of the impacts of these two types of transfers on poverty reduction depends on the type of the in-kind transfer, the real value of the transfers to households, household preferences and characteristics including knowledge and education level, and the constraints households face in re-allocating resources within and between consumption groups and work activities. Regarding the impacts on consumption, the traditional economic model distinguishes between the case of an infra-marginal and an extra-marginal in-kind transfer. If the in-kind transfer is smaller than what was consumed prior to the intervention (infra-marginal transfer), then the marginal effect of a transfer in-kind would be no different from the effect of a cash transfer (Southworth, 1945). In contrast, if the in-kind transfer is greater than what was consumed prior to the intervention (extra-

marginal), then the effect of a transfer in-kind on consumption is likely to be different from the effect of a cash transfer.

Similar arguments apply to the impacts of in-kind and cash transfers on labor supply. The traditional economic model implies that transfers are likely to be associated with reduced work effort and thus lower efficiency in the use and allocation of resources. Provided leisure is a normal good, cash transfers leading to an increase in household income will in turn result in more leisure and less work as households attempt to increase their welfare by substituting between leisure and consumption. As long as the in-kind transfer is infra-marginal, there should be no difference in how labor supply responds to a cash or an in-kind transfer. However, as noted by Leonesio, (1988) and Gavhari (1994), in the case where in-kind transfers are extra-marginal (or overprovided), in-kind transfers can increase, rather than decrease, labor supply. Thus, it is conceivable that in-kind transfers are able to reinforce the impacts of the program on poverty over and above the value of the in-kind transfer.

The empirical evidence available to date on the effects in-kind or cash transfers provides a fragmented picture of the effects of these transfers on poverty since most studies focus either on the impacts on total food consumption and diet or on labor supply alone. In addition, the empirical estimates available are derived primarily from non-experimental studies on the food stamp program in the US, has the shortcomings typically attributed to all non-experimental studies: reliance on econometric methods and untested behavioral assumptions as a means of constructing counterfactual outcomes, potential biases arising from endogeneity, and selection into the program based on unobserved factors. With these caveats in mind, Senauer and Young (1986) try to distinguish econometrically between infra-marginal and extra-marginal food stamp recipients and present results that contradict the prediction of the traditional economic model by showing that food stamps have a significantly greater impact on food purchases than an equal amount of cash income, *even* for infra-marginal recipients of food. Del Ninno and Dorosh (2003), using data from

various food grain distribution and cash transfer programs in Bangladesh, find that the marginal propensity to consume (MPC) out of wheat transfers in–kind is significantly higher than the MPC out of cash transfers. In a more recent study, that takes advantage of the rollout of the food stamp program, Hoynes and Schazenbach (2009) find that the introduction of food stamps led to an increase in overall food expenditure.

To date, the only empirical evidence based on an experimental design is Fraker, Martini, and Ohls (1995). Using experimental data from four demonstrations of converting food stamps into a cash transfer, they conclude that food spending would be reduced by 18 to 28 cents per dollar of food stamp benefit cashed out. In contrast to the significant positive effects of food stamps on food expenditure, Fraker and Moffitt (1988), Hagstrom (1996), Keane and Moffitt (1998) and Hoynes and Schazenbach (2009) find that participation in the food stamp program has insignificant or small labor supply impacts.

There is a variety of reasons why the impacts of in-kind and cash transfer may differ even among infra-marginal households. In general, transfer programs targeted to women may change the relative weight given to women in the decision process within households (e.g., Attanasio et al. 2011). It is possible that women may have more control over in-kind food transfers while men may have more control over cash transfers. In this case, the impacts of cash and in-kind transfers may differ because of differences in the preferences between men and women. In-kind transfers may also have more of social stigma attached to them than cash transfers or affect the preferences of households in the sense that they give rise to a social obligation to consume the benefit received. The PAL data offer the ideal setting for testing whether indeed the impacts of the transfer in-kind differ from transfers in cash.

3. The PAL Program and the Data Used

The data we use are based on a longitudinal sample of 5,851 households in 206 poor rural localities from six southern Mexican states (Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, and Veracruz), surveyed in two rounds, one in 2003/2004 and the other in 2005. This sample has been collected for the purpose of evaluating the *Programa de Apoyo Alimentario* (PAL). This program has as its major objective contributing to overcome poverty and improving food and nutrition conditions of target households, living in rural poor communities not covered by other federal food aid programs (e.g., *Oportunidades*). The final program operation rules do not specify the woman in the household as the recipient of the food transfer, although in practice more than 75% of beneficiaries are women. In order to be covered by this program, the localities have to meet some requirements such as having a population of less than 2,500, having a high or very high marginality[3] and being accessible (not more than 2.5km from a road), and close enough (not more than 2.5 km) to a DICONSA[4] store, because the distribution system was implemented by DICONSA.[5]

The PAL program provides in-kind transfers (food baskets) to most of the 150,000 target households that receive it. The cash transfers provided by the program were implemented for those very isolated communities where DICONSA did not regularly reach. The lack of any concrete ex-ante evidence of whether in-kind or cash transfers have a larger nutritional effect, combined with the interest of the program administrators to improve the design of the program, led to the design of an experimental field trial as part of the PAL initial evaluation. The value of the cash transfer was designed to be identical to the cost of the food basket at wholesale prices paid by the Federal government, i.e., 150 pesos every month. However, it turned out that at local prices, the food basket costs about 30% more for the consumer than for the Federal government. This suggests that the value of the cash transfer in real terms was smaller than the market value of the transfer in-kind. The benefits are distributed through DICONSA, the related federal program which distributes non-perishable foods and housekeeping goods throughout rural poor communities. The PAL program offers nutrition and health education sessions (*platicas*), as well as participation in program-related

logistic activities. However, given that attendance of the *platicas* is not a requirement for the receipt of the benefits, the PAL program is essentially an unconditional transfer program. [6]

The evaluation design is an experimental community trial. A two-stage sampling was implemented: in the first stage a random sample of 208 rural (i.e. with population less than 2,500) communities was selected from a pool of 8 of the poorest states (Southeast region of Mexico); in the second stage, 33 households per community were selected using systematic random sampling to be interviewed. Localities were randomly assigned into three treatment groups and one control group. Two of the treatment groups were assigned to benefit from food (in-kind) transfers with and without a health and nutrition education sessions, and a third group a cash transfer of equal value to the food basket plus the education package. Two communities (one Control, the other food basket without education) were lost to follow up (refused to further participate) so that final evaluation was conducted on 206 communities. The main objective of including in the evaluation design the in-kind treatment group without any educational sessions was to get an estimate of the value added of the educational sessions on the potential impacts of the program, and to estimate the effect modification of the education sessions on nutrition outcomes. However, after the initiation of program operations it became apparent that the treatment in these communities was contaminated, since communities in the group without education organized themselves to receive them so that educational sessions were also offered in this group.[7] Given the partial contamination of the original evaluation design, our empirical analysis below pools the original two in-kind treatment groups into one, as in Leroy et al. (2010).[8] The control and the treatment groups were surveyed on two occasions two years apart: at baseline in October 2003 through April 2004, and at follow-up in October through December 2005. The delivery of the PAL benefits begun in June 2004 and the average time of exposure to the availability of the program transfers was 14 months.

The original intention was to deliver the food baskets to the beneficiary households every month, but for logistical reasons the program ended up delivering two baskets every two months

(with the cash benefits distributed with the same frequency). The localities in the control group that did not receive any benefits were covered by the program immediately after the impact evaluation.

The original food basket transferred consists of the following basic products: powdered fortified milk (8 packages of 240 gr. each), beans (2 kg), rice (2 kg), corn flour (3 kg), soup pasta (6 packages of 200 g), vegetable oil (1 lt.), cookies (1 kg), corn starch (100 g), chocolate drink in powder) (400 g), cereals (ready-to-eat) (200 g), and sardines (2 cans of 425 gr. each). [9] The basket was designed to contribute approximately 450 calories per day per adult for an average household (of 4.2 equivalent adults).

The sample size was calculated so that statistical tests had the power to detect statistically significant and biologically relevant differences in several nutritional and economic variables. Specifically, the calculations of the sample size prior to the baseline survey were based on 60 communities per treatment group, a power of 80 percent, and a minimum detectable difference in food per capita consumption between each treatment and control group between 17.8 percent.[10] The final sample consisted of 33 households per community and around 52 communities per treatment group.[11]

3. The Effects of Cash and In-Kind Transfers

The estimated impacts of PAL on the outcome variables of interest are based on the *difference-in-differences* (DiD) estimator. This estimator compares differences between the treatment and control groups before and after the start of PAL and offers the advantage that any time invariant pre-program unobserved heterogeneity between the treatment and control groups is eliminated in the estimation of impacts. The untested maintained assumption behind the application of the DiD estimator is that the time or trend effect is identical between the treatment and control groups. Specialized empirical specifications are implemented for poverty, consumption,

and labor force participation, and are discussed below. In the specification for consumption and labor supply, we also include a number of control variables that may be useful for increasing the efficiency of the estimates.

Table 1

Table 1 presents the summary statistics of the key variables used in the analysis. The sample of households used for the analysis of consumption is what remains after dropping households with food consumption less than 1 percentile and more than the 99 percentile of the food distribution in the sample.[12] The small value of the transfer in relation to the value of pre-transfer consumption (mean share 10.6% and median share 8.2%) suggests that the total value of the transfer is infra-marginal for the majority of the households. However, as is shown in annex B, when the specific items in the food basket are considered, many items are over-provided in the sense that more than 88% of the households in the sample in the baseline round consumed in the last seven days less than the quantity of the item contained in the food basket, (e.g., corn flower, and corn starch, cereals, lentils, fortified powder milk, and chocolate powder).[13]

The impact of PAL on poverty

To set the stage, we begin with the comparison of the change in a poverty measure in the treatment villages to the changes in the corresponding poverty measure in the control villages. Poverty is measured by the total food and nonfood consumption per capita at the household level. Consumption, unlike income, provides a more accurate measure of the value of the transfers to the households and thus of the welfare households are able to attain as a consequence of these transfers. The survey collects information on the quantity of food consumed (including the quantity consumed out of own production and food gifts or donations including those of the PAL at follow-up) in the last seven days for 61 food items. The monthly value of food consumed is obtained by multiplying the quantity of food consumed of each food item multiplied by the median unit value of

the same food item at the locality level. [14] The unit value of each food item is derived from the additional questions on the value and quantity purchased (and not necessarily consumed) in the last seven days. The value of household food consumption per month is defined as the sum of the value of food consumed, and the value of meals consumed away from home. Total consumption expenditures per capita (*PCE*) is defined as the sum of the value of food consumption and non-food expenditures per capita.

The choice of a poverty line is a major concern when poverty measures are estimated. For this reason we report estimates of the program's impact on poverty using three different poverty lines for rural areas of Mexico (expressed in June 2002 pesos): the national food poverty line (*linea alimentaria*) that is equal to the value of the basic food basket (*canasta basica*), the "capacity" or basic needs poverty line that includes the value of the basic food basket and the monetary amount necessary to satisfy basic health and education services, and the "patrimonial" poverty line, which includes other basic non-expenditures in addition to basic health and education services.[15]

The regression equation behind the estimation of PAL's impact on poverty is:

$$P\ (i,t,\alpha) = \beta_0 + \sum_{j=1}^{2} \beta^J T_j(i) + \beta_{R2} R2 + \sum_{j=1}^{2} \gamma^J \left(T_j(i) * R2\right) + \eta(i,t) \qquad (1)$$

where the left hand side variable $P(i,t,\alpha)$ is defined as

$$P(i,t,\alpha) = \left(\frac{z - PCE(i,t)}{z}\right)^{\alpha} * Poor(i,t),$$

where $PCE(i,t)$ denotes the monthly per capita expenditure of household *i* in the month of interview t divided by the value of the consumer piece index for Southern Mexico in the month of interview of the household[16], z is the poverty line used (in June 2002 Pesos), α takes on the values 0, 1, and 2, and $Poor(i,t)$ is a binary variable taking the value of 1 if $PCE(i,t) \leq z$, and equal to 0 otherwise, β and γ are fixed parameters to be estimated $T_1(i)$ is a binary variable taking

the value of 1 if the household *i* resides in a treatment community that received the food basket, and 0 otherwise, and $T_2(i)$ is a binary variable taking the value of 1 if the household resides in a treatment community that received the cash transfer. The binary variable *R2*, is equal to 1 for the second round of the survey, and equal to zero for baseline observations..

It can be easily confirmed that for a specific value of the parameter α, the specification of the regression equation (1) yields estimates of the different measures of poverty suggested by Foster, Greer, and Thorbecke (1984) for each survey round and for each treatment and control group. For example, the intercept term β_0 is the estimate of the poverty rate (headcount ratio for $\alpha = 0$, poverty gap for $\alpha = 1$, or the severity of poverty for $\alpha = 2$) in the control localities in the baseline round, while $\beta_0 + \beta_T^J$ is the corresponding estimate of poverty in the treatment group J (J=1,2) in the baseline round.[17]. The coefficients β^J allow the poverty rate to differ between treatment and control groups before the initiation of the program. Given the randomized assignment into the three treatment groups and the control group, the two coefficients β^1 and β^2 are not expected to be significantly different from zero (i.e. pre-program differences in the baseline are expected to be zero).

Using the terminology of Heckman, La Londe, and Smith (1999), the parameters γ^1 and γ^2 provide an estimate of the "intent to treat effect" (ITE) of in-kind and cash transfers on poverty. The ITE is an estimate of the impact of "offering" these two types of transfers in the treatment villages regardless of whether households actually receive (by choice or not) the benefits of the program. The ITE is of particular interest to policy makers since it captures the operational efficiency in the implementation of the program, such as delays in the delivery of the food baskets and/or cash transfers, as well as any potential general equilibrium or spillover effects of the transfers on non-beneficiary/non target households in the treatment villages. However, the focus on the average effects of the offer (ITE) of in-kind and cash transfers is unable to shed much light on the

differences in behavior induced among those actually receiving the transfers. For example, more detailed data on the extent to which and how in-kind transfers were used by recipient households (e.g. whether all food items in the basket were consumed or some unwanted items were sold at a lower than the market price) could provide a deeper and more informative explanation of potential differences in impacts.

Table 2

Table 2 reports the full set of parameter estimates of equation (1). The negative and strongly significant estimates of γ^1 and γ^2, imply that PAL had a significant impact in reducing poverty between the two rounds. Using the food poverty line, for example, the double difference estimate of the impact of PAL on the cash group, i.e. γ^2, suggests that PAL decreased the headcount poverty rate by 8.9 percentage points (or by 13.5%) from the 65.8% headcount poverty rate in the baseline in this treatment group. Along similar lines, the in-kind transfer is estimated to decrease poverty by 10.7 percentage points (or by 15.7%) from the 68.3% headcount poverty rate in the baseline.[18] Using the same poverty line, the impact of PAL transfers on poverty is even higher when we measure poverty by the poverty gap (P(1) and the severity of poverty (P(2)). The poverty gap in the in-kind group decreases by 23.9%, while the severity of poverty decreases by 29.4% from the corresponding baseline values. The same general pattern emerges when we use the capacity poverty line and the patrimonial poverty line. [19]

The Wald tests of the null hypothesis that the DiD estimate of the poverty impact of a transfer in-kind is equal to the poverty impact of a cash transfer, i.e., H_o: $\gamma^1 - \gamma^2 = \delta = 0$, could not reject the null. Thus, cash transfers of real value 25% less than the market value of in-kind transfers, manage to have identical poverty impacts in the treated communities. In the remainder of this paper we carry out a closer investigation of the possible explanations for this result by looking into the differences in the impacts of in-kind and cash transfers on food consumption and nonfood

expenditures as well as on the allocation of family labor between agricultural and nonagricultural activities.

The Expected Effects of Cash vs. In-Kind Transfers

The main differences between the impacts of cash and in-kind transfers on consumption and labor supply theoretically arise in the situation where the group of goods provided in-kind is "over-provided" (or extra-marginal). In order to illustrate the differences between the impacts of cash and in-kind transfers on consumption and labor supply, it is useful to consider a simple model with three commodities, leisure L, food C_F, and non-food C_{NF}.[20]

Let the utility function $U(C_F, C_{NF}, L)$ be separable in its three arguments, i.e. $U_{ij} = 0$, where *i* and *j* refer to L, C_F, and C_{NF}, and the budget constraint be $P_F C_F + P_{NF} C_{NF} + WL = V + W\Omega$ where V is non-labor income, P_F, P_{NF}, and W, is the price of food, nonfood, and time, respectively, and Ω is the time endowment of the household.

Graphically, a cash transfer of value T causes a parallel shift of the initial budget line by T/P_F to the new dotted budget line to the right, and its impact on food and nonfood consumption is summarized by the initial and post-transfer points A and A* (see figure 1). As can be inferred from figure 1, the cash transfer is likely to increase the consumption of both food and nonfood, while labor supply will decrease (assuming leisure is a normal good). At both points A and A*, the first order conditions characterizing the optimal choice of food and nonfood consumption and leisure before and after the transfer are given by the equations

$$\frac{U_F}{U_{NF}} = \frac{P_F}{P_{NF}}, \quad \frac{U_L}{U_F} = \frac{W}{P_F}, \text{ and } \quad \frac{U_L}{U_{NF}} = \frac{W}{P_{NF}}$$

In the case of an in-kind food transfer of the same quantity that could be purchased with the cash transfer T (i.e. T/P_F) the budget constraint also shifts to the right, but the region in the upper

left corner is not attainable (see figure 2).[21] In this event there are two possible cases depending on the initial situation and the preferences of the household. For households consuming initially more food than the in-kind transfer (i.e. infra-marginal households), such as households in the lower region of the budget line before the transfer in figure 2 (e.g. point A to the right of the vertical dotted line), the in-kind transfer will have exactly the same effect as a cash transfer. [22] For these households the in-kind food transfer shifts the budget constraint parallel and to the right thus having the same effects as the cash transfer discussed in figure

Figure 2 also presents an example of a household which prior to the transfer the optimum is at point B and after the transfer the maximum level of utility is attained at point B*.[23] In the same figure, the equilibrium point B** indicates the optimal choices of this household in the hypothetical case of a cash transfer instead of an in-kind transfer. For a household described by the point B* in figure 2, the first order conditions summarizing its optimal choices are given by

$$\frac{U_F}{U_{NF}} > \frac{P_F}{P_{NF}}, \quad \frac{U_L}{U_F} = \frac{W}{P_F}, \text{ and } \quad \frac{U_L}{U_{NF}} < \frac{W}{P_{NF}}.$$

Thus, although for these "constrained" households total consumption expenditures are identical (since both points B* and B** lie on the same budget line), it can be easily predicted that their expenditure on nonfood will be lower than in the case of a cash transfer of the same value, while their expenditure on food will be higher. Moreover, the level of welfare would be higher than the case where transfers are in the form of cash instead of in-kind, since point B** lies on a higher indifference curve compared to point B*. For extra-marginal households such as those at B* the constraint imposed by the food transfer may also affect their labor supply quite differently than in the case of cash transfer. The budget constraint equation may be used to infer that the increased expenditure on nonfood will be met by an equal decrease in expenditures on both food and leisure. In fact, with the separable utility function assumed, it follows that both C_F and L will decrease,

not just one (or the other), or else the condition $\frac{U_L}{U_F} = \frac{W}{P_F}$ will be violated.[24] Thus, in-kind transfers are likely to result in higher hours of work in cases where the in-kind commodity is "over-provided", whereas cash transfers are likely to lead to a reduction in hours worked.

To summarize, the simple economic model presented above implies that in-kind transfers, in general, are likely to have heterogeneous impacts on the consumption and labor supply of households depending on their initial situation prior to the implementation of the program. It is important to note that it is only for infra-marginal households that the food transfer is expected to have the same effect on consumption and labor supply as a cash transfer. Empirical estimates of the effect size of in-kind transfers are generally the weighted average outcome of the two different types of households. For example, the estimates of the program's impact on consumption in the treatment sample receiving the in-kind transfer would be affected by the proportion of households in the treatment group for which the transfer is infra-marginal. One extreme case is the case where the in-kind transfer is where transfers are infra-marginal for all households (type A in figure 2). In this case, the estimated impact on the treatment group should be equal to the estimated impact in the treatment group receiving the cash-equivalent value of the transfer. The other extreme case is the one where the in-kind transfer is extra-marginal (type B or B* in figure 2) for all households. In this case, the in-kind transfer is likely to increase food consumption by more than a cash transfer which implies that the impact of the in-kind transfer on this treatment group is likely to be higher than the impact in the treatment group receiving the cash-equivalent value of the transfer.

Impacts of PAL on Food and Non-Food Consumption

Figure 3 compares the kernel density function of the natural logarithm of the value of food per capita of the households assigned in the treatment groups receiving the transfer in-kind and in cash, against the corresponding density of food consumption per capita in the control group,

separately for the baseline and the follow-up rounds. Figure 4 does the same for the log of nonfood expenditures. Given that the comparisons are conducted within survey rounds and not across survey rounds we do not adjust for potential changes in the cost of living over time in these graphs.

Figures 3 & 4

A comparison of the density functions in the baseline allows one to detect potential differences in the distribution of food consumption and non-food expenditures prior to the start of the program. Figure 3 for the baseline round suggests that there are no major pre-existing differences in the distributions of food and non-food consumption between the two treatment groups and the control group, which confirms the generally successful implementation of the randomized design. The extent to which there are any significant differences in the conditional mean food and total consumption in the two treatment groups from the control group in the baseline is also examined in the regression analysis conducted below. Figure 4 of the kernel density functions of food consumption and non-food expenditures per capita in the follow-up round reveals a visible shift to the right in the distribution of consumption of food in both treatment groups compared to the control group, 18-24 months after the baseline round, and about 14 months after the start of the PAL transfers. Thus, the PAL program appears to have had a positive impact on food consumption, irrespective of the form of the transfer. However, no visible impacts appear on the distribution of non-food expenditures for either in kind or cash transfers relative to the control group in the second round.

Figure 5

Figure 5 allows a direct comparison of the kernel density functions of food and nonfood consumption in the in-kind treatment group against cash treatment group, separately for the baseline and the follow-up rounds. Figure 5 reveals no significant differences in the distributions of food consumption and non-food expenditures between the two treatment groups either in the baseline or in the round after the start of the PAL program. Thus, the preliminary indications are

that there are no apparent differences in the effect size of in-kind and cash transfers on food and total expenditures.[25]

For a quantitative estimate of the effect sizes on food consumption and non-food expenditures, we use a variant of the regression equation for poverty, i.e.,:

$$Y(i,t) = \beta_0 + \sum_{j=1}^{2} \beta^J T_j(i) + \beta_R R2 + \sum_{j=1}^{2} \gamma^J \left(T_j(i) * R2\right) + \sum_{k=1}^{K} \theta_k X_k(i,t) + \eta(i,t) \quad . \qquad (2)$$

where $Y(i,t)$ denotes the value of the outcome indicator of interest for household, or individual *i* in period/round *t*, β, γ, and θ are fixed parameters to be estimated and the variables $T_j(i)$ and *R2* are as explained above. The vector ***X*** summarizes observed individual, household, and village characteristics. The last term in equation (1), η, summarizes the influence of unobserved factors. In most specifications, we assume that $\eta(i,t) = \mu(i) + \varepsilon(i,t)$ where $\mu(i)$ is a household-specific fixed-effect (or individual-specific fixed effect in the labor supply analysis) effect and $\varepsilon(i,t)$ is a pure random error term with the usual properties.

When examining impacts on food consumption, the dependent variable $Y(i,t)$ in equation (2) is the (real) value of food consumption per capita per month. Along similar lines, when investigating impacts on non-food expenditures the dependent variable $Y(i,t)$ in equation (1) is the real total value of nonfood expenditures per capita per month. Real consumption is derived by dividing the current value of food consumption and non-food expenditures of each household by the value of the consumer piece index for Southern Mexico in the month of interview of the household.[26]. We have also investigated the sensitivity of our findings to the use of an adult equivalent measure in place of the total number of members in the household in each round. Given that the results were qualitatively the same we only present the results using the per capita measure.

In the regression analysis we estimate three alternative specifications that also serve as a test of the robustness of the results. In specification A, column (A) in table 2, we simply use binary variables identifying the date of interview of the household. This specification implicitly assumes that the inflation rate between all treatment and control villages is equal. In specification B, in addition to variables identifying the date of interview of the household, we include binary variables identifying the village of residence of the household. Lastly, in specification C we use binary variables identifying the household (or household-specific fixed effects).

The control variables used in place of the vector *X(i,t)* in equation (1) consist of a set of binary variables identifying the date of interview of the household, and individual and demographic composition variables in each round. In particular, we include the age of the household head, his/her gender, years of education, binary variables for his/her marital status, the household demographic composition (i.e., the number of children separately by age group, adult men (and women separately) aged 19 to 54, and men (and women) 55 and over) a binary variable indicating whether this is an indigenous household and binary variables identifying whether the household receives benefits from other programs (such as *DIF*, *Desayunos Escolares*, and *Oportunidades*).[27], In specification A, in addition to the control variable s *X(i,t)* we also include two community level variables, such as the value of the estimated marginality index[28] for the locality, and the distance between the community and the *"cabecera municipal"* (the governing center of the municipality and likely the largest locality of the municipality).[29]

Table 3

Table 3 presents the estimates of regression equation (2) for food consumption and non-food expenditures. The estimates of β^1, and β^2, are occasionally statistically significant which implies that there are some pre-existing differences in food <u>and</u> non-food consumption between each one of the two treatment groups and the control group. These findings support the use of the

DiD estimator since it is able to control for these pre-existing differences that the randomized design was unable to eliminate.

The double difference estimates of the ITE of the program in each treatment group, i.e., the estimates of γ^1, and γ^2, the coefficients of T1xR2 and T2xR2, reveal that the program had a positive and significant impact on increasing food consumption and non-food expenditures. Overall, the estimated effect sizes reveal that inferences about the relative impacts of cash and in-kind transfers are somewhat sensitive to whether adjustments are made for village or household time invariant effects. In specifications B and C, in addition to controlling for the month of interview, we attempt to better account for time-invariant unobserved heterogeneity either at the village or at the household level. Specifically, the estimated value of the parameter γ^1, implies that the in-kind transfer leads to an increase in mean food consumption between 43.99 pesos per capita (specification A) and 48.7 pesos per capita (specification B). The impact of the cash transfer on food consumed is between 39.4 (specification A) and 49.7 pesos per capita (specification B).

Expressed in elasticity form, these estimates imply that the elasticity of food consumption is greater than 1 (or 1.62 for in-kind and 1.61 for cash transfers in specification B)[30] suggesting that food is a luxury good in this sample of households. Similar behavior regarding food consumption, typically considered to be a necessity instead of a luxury good, has been observed for very poor households in Colombia (Attanasio, 2011) and in Ethiopia (Kedir and Girma, 2007).

The impact of cash transfers on non-food expenditures is between 28 and 34 pesos per capita (specifications A and B), which imply an elasticity of non food expenditures to cash that is around 1 (ranging between 0.94 and 1.14, depending on the specification). Thus the receipt of cash transfers is associated with increases in both food consumption and non-food expenditures. In contrast, in-kind transfers appear to have no significant impact on non-food expenditures. To the extent that the quantities of some of the items in the food basket are infra-marginal, one would expect that the receipt of the food basket would release some resources that beneficiary households

could reallocate freely to increase either the consumption of more preferred food items or other non-food items. On the other hand, taking into consideration the fact that many food items in the PAL food basket are overprovided (see Annex B), the absence of a significant effect on the non-food expenditures in the localities receiving the food basket suggests that the in-kind food benefit is "sticky", in the sense that it is not diverted easily towards non-food expenditures by reselling and buying more preferred non-food items.

Next, we investigate in more detail whether the marginal propensity to consume food out (or the size effect) of a in-kind transfer is significantly different from that of a cash transfer. A common empirical finding in the studies based on the food stamp program in the US (e.g., Fraker et al., 1995 ; Senauer and Young, 1986) as well as from other developing countries (Del Ninno and Dorosh, 2003) is that the marginal propensity to consume (MPC) food out of a transfer in-kind is typically greater than the marginal propensity to consume food out a cash transfer. In fact, Senauer and Young (1986) provide evidence that this is the case even for households for which the transfer is infra-marginal. Irrespective of the specification used, Wald tests of the hypothesis that the marginal propensity to consume food out of a transfer in-kind is equal to the marginal propensity to consume food out a cash transfer, i.e. $\gamma^1 - \gamma^2 = \delta = 0$, could not reject the null for either food or non-food consumption (see Table 3).

The preceding tests of equality in the MPC to consume out of in-kind and cash transfers did not take into consideration the differences in the real value of the food basket and the cash transfer. Under the maintained (untested) assumption of a linear relationship between food consumption or total consumption and income, and thus a constant MPC, the estimated MPC of a cash transfer can be adjusted upward by the ratio of the mean value of the food basket with the value of the cash transfer in the sample, to yield an estimate of the size effect of a cash transfer that is equivalent in real value to the value of the food basket.[31] The last row of Table 3 presents the Wald tests of the equality of the in-kind MPC with the "adjusted" MPC out of cash transfers assuming that the value of

food basket of 200 pesos at local prices and the nominal value of the cash transfer of 150 pesos (i.e., H_0: $\gamma^1 - (200/150)^* \gamma^2$). The test results reveal that this adjustment does not affect the conclusions regarding the equality of the size effect of in-kind and cash transfers.

Table 3

The inverse power function used by Andrews (1989) provides a useful tool for making more precise the inferences one can draw from the inability to reject the null hypothesis of identical effects between in-kind and cash transfers. Following Andrews, we can determine two regions: (i) a region of low probability of type I error, i.e. values for the difference δ where we can conclude with significance level α =0.05 that the true difference is $|\delta| < c$, and (ii) another region of high probability (>0.50) of type II error, i.e. where no evidence is provided against values of the true difference. The two- sided inverse power tests of the null hypothesis $H_0 : \gamma^1 - \gamma^2 = \delta = 0$ against the alternative $H_1 : \gamma^1 - \gamma^2 = \delta \neq 0$ for specification (C) for food consumption reveal that the difference in the effect size on food consumption between in-kind and cash transfers is less than 34.79 pesos per capita per month with significance 0.05, but the test provides no evidence that the difference in the effect size is less than 18.91 pesos per capita per month. In other words, the tests of the equality of the marginal propensity to consume food out of in-kind and cash transfers can distinguish with 5 per cent significance differences in the marginal propensities to consume food that are less than 116 per cent of the value of the PAL transfer of 30 pesos per capita per month (assuming an average family of 5), but are unable to discriminate between identical effects and differences in the effect size up to 63 per cent of the value of the per capita PAL transfer. Overall, the inverse power tests for all three specifications both food and non-food consumption in table 3 suggest that the power of the test of identical size effects between in-kind and cash transfers is low.

The simultaneous increase in food and non-food consumption as a result of the PAL intervention combined with the fact that food consumption per capita increases by an amount

higher than the per capita value of the transfer, are consistent with the presence of sizeable multiplier effects fourteen to eighteen months after the initiation of the PAL transfers in the treatment localities. One plausible explanation may be due to the effects of the PAL intervention on overall productivity.[32] In relatively isolated rural village economies characterized by the nonseparability of the production decisions of a household from its consumption needs, government social assistance programs such as the PAL program examined here, lead to a change in the shadow value of time of rural household members, which in turn may trigger behavioral responses by the recipient households not only on the consumption side but also on the production side (Strauss, 1986; de Janvry et al., 1991; Taylor, 2005). Blundell and Pistaferri (2003), for example, present statistical evidence that the food stamp program in the US provided effective partial insurance, especially among low-income households. Thus, it is quite plausible that the insurance against downside risk provided by the steady flow of food by the PAL program is associated with a reallocation of labor from less to more productive activities. It is for this reason that the potential effects on the allocation of labor among agricultural and non-agricultural work activities are also investigated in more detail in below.

The Impacts of PAL on the Allocation of Adult Labor

In our analysis of the impact of the PAL program on labor supply, we focus on adult males and females between 18 and 60 years of age (in the baseline round). The dependent variable $Y(i,t)$ in regression (2) is specified by a binary variable indicating whether an individual *i* works in the labor market in period *t*. Specifically, a person is classified as working in the labor market ($Y(i,t)=1$) if he/she reported having worked over the previous week (paid or unpaid) or had work but did not work. All others, such as those looking for work, students, doing household chores, and retired/pensioners, are classified as not working in the labor market (($Y(i,t)=0$).[33]

Equation (1) is estimated using a linear probability model, and thus the coefficient reported represent marginal effects on the probability of participation.[34] Table 4 presents the DiD estimates (summarized by the parameters γ^1 and γ^2 in equation 2) of the impact of PAL on participation in labor market activities of male and female adults.[35] Two specifications are used: in specification A we use same set of control variables in consumption (including binary variables for the round of interview) as well as binary variables for each village in the sample (and correcting standard errors for clustering of individuals at the village level). Specifically, the vector *X(i,t)* in equation (1) consist of a set of binary variables identifying the date of interview of the household, and the age of the individual, his/her gender, years of education, binary variables for his/her marital status, the household demographic composition (i.e., the number of children separately by age group, adult men (and women separately) aged 19 to 54, and men (and women) over the age of 55) a binary variable indicating whether this is an indigenous household and binary variables identifying whether the household receives benefits from other programs (such as *DIF*, *Desayunos*, and *Oportunidades*). In specification B we include binary variable for each individual in the sample (individual fixed effects) in place of the village fixed effects.

Table 4

The two specifications used may be considered as a check for the robustness of the estimated impacts, since specification A ignores the panel nature of the sample and treats the two rounds as different cross-sections of individuals, whereas specification B simply utilizes the panel of individuals for which we have two observations. In short, the estimates reveal no significant effects of PAL on total labor market participation and there are no differences in the impacts of the food basket and the cash transfers.[36] Unlike many of the transfer programs in the US, there is no reduction in the benefits of the PAL program if beneficiary labor supply or labor income increases. Thus the PAL transfer acts as pure income effect. Assuming that leisure is a normal good, theory predicts that for infra-marginal households transfers (in cash or in-kind) are likely to increase

leisure and reduce work. The apparent absence of a significant effect on labor market participation suggests that the income effect of the transfer is too small. These results are consistent with the empirical evidence from the US where participation in the food stamp program has insignificant or small labor supply impacts (Fraker and Moffitt (1988), Hagstrom (1996), Keane and Moffitt (1998) and Hoynes and Schazenbach (2009). According to Moffitt (2002), an explanation for these findings is that the food stamp program is an infra-marginal transfer for most recipient households, which makes them nearly equivalent to cash.

In table 4 we also present separate estimates on the impacts of transfers on participation in agricultural and nonagricultural activities. Individuals who reported working in the labor market are classified as working in agricultural activities if they reported working in primary sector activities such as caring for animals, farming, forestry or fishing (INEGI, 2007). [37] Individuals who work in other activities such as selling clothes, cosmetics, foods, handicrafts, etc., are considered as performing nonagricultural activities. The estimates reveal considerable differences in the effects of in-kind and cash transfers on the participation of adult males in agricultural and non-agricultural activities. Cash transfers have a significantly negative effect of the participation of males in agricultural activities and a significantly positive effect on participation of males in non-agricultural activities. In-kind transfers have a smaller negative (and statistically insignificant) effect than cash transfers on male participation in agricultural activities and a smaller positive and significant effect than cash transfers on male participation in non-agricultural activities. The Wald tests reveal that the marginal effects of in-kind and cash transfers on the probability of participating in agricultural and non agricultural activities are not identical when an adjustment is made for the smaller real value of the cash transfer.

In contrast to males, neither cash nor in-kind transfers seem to have no significant effect on the participation of females in agricultural or non-agricultural activities. However, although not statistically significant at conventional levels, the estimates reveal that there is a qualitative

difference in the response of female participation to in-kind and cash transfers, as suggested by the opposite signs of the marginal effects of in-kind transfers (negative) and cash transfers (positive).

One plausible interpretation of the above results is that the transfers of the PAL program provide partial insurance (reduce down-side risks) for food consumption sufficiently so as to allow recipients to allocate less of their time in agricultural production, intended to guarantee food in the event of income and other shocks, and more towards nonagricultural activities. These results are also consistent with the prediction of the basic non-separable agricultural household model with incomplete markets for credit, or insurance. As Morduch (1992) and Bardhan and Udry (1999) demonstrate, an agricultural household facing binding liquidity constraints is likely to choose a more conservative portfolio of activities that reduces the variance of its incomes, but that also has a lower expected income than the activities chosen in the absence of any liquidity constraints. The switch from agricultural activities to nonagricultural activities suggests that the food consumption insurance provided by the PAL cash transfers relative to in-kind transfers relaxes more of the binding liquidity constraints faced by poor agricultural households enough to induce a reallocation of labor towards nonagricultural activities with higher returns (Lanjouw, 1999). Overall these findings suggest that the PAL cash transfers, are better able at mitigating the impacts of market imperfections than in-kind transfers thus increasing both equity and efficiency.

5. Concluding Remarks and Policy Considerations

This paper sheds new light on the relative impacts of in-kind or cash transfers on poverty, using data from a conditional cash and food transfer program in the poor rural areas of Southern Mexico called PAL. The analysis reveals that an offer (intent to treat effect) of cash transfers of real value 25% less than the market value of in-kind transfers, succeeds at having identical poverty impacts as in kind transfers in the treated communities.

Potential explanations of this result are investigated by looking into the differences in impacts of in-kind and cash transfers on food consumption and nonfood expenditures as well as on the allocation of family labor between agricultural and nonagricultural activities. It is found that both in- kind and cash transfers have identically large positive impacts on food consumption. Moreover, non-food expenditures are also higher in the localities getting cash transfers, whereas non-food expenditures remain unaffected in the localities getting in-kind transfers. This latter result is consistent with the widely held belief that in-kind food benefits are "sticky", in the sense that they are not easily diverted towards non-food expenditures by reselling and buying more preferred non-food items. The analysis of whether in-kind or cash transfers affect overall participation in the labor market and the choice between participating in agricultural and nonagricultural activities reveals that the transfer, irrespective of whether it is cash or in-kind, does not affect participation in labor market activities. However, both kinds of transfers have a significant impact on the time allocation of males (and not females) who switch from agricultural to nonagricultural activities. Moreover, the availability of cash transfers has a significantly higher marginal effect than that of in-kind transfers on the shift of males from agricultural to non-agricultural activities.

The finding of a larger impacts of cash transfers on male participation in non-agricultural activities provides one plausible explanation for the large effect of cash transfers on poverty as well as food consumption and non-food expenditures, in spite of a having real value that is 75% of the market value of the in-kind transfer. The steady flow of cash available through the PAL program appears to be relaxing binding liquidity constraints faced by poor agricultural households sufficiently so as to allow recipients to re-allocate their time from less productive agricultural activities towards more productive nonagricultural activities.

Before concluding, it is important to point out a couple of caveats associated with these findings. The first relates to the potential role of differences in the intensity of the educational

sessions received by the in-kind and cash transfer groups. Although the partial contamination of one of the original treatment arms prevented a clean evaluation of the impact of educational sessions on outcomes of interest, it is conceivable that the equal effect on consumption outcomes of a cash transfer that has lower real value could be attributed to a lower average quantity (or quality) of the educational component received by the communities assigned to the treatment group with an in-kind transfer. Second, the conclusion hinges on the maintained or untested assumption that all the foods contained in the food basket were actually consumed by the household.

Albeit indirect, the available evidence suggests that these caveats may not be important. The finding of no differences in food expenditures between the cash and in-kind groups, where the education sessions could have played a role, suggests that differences in the educational component of the in-kind and cash treatment groups may not be a source of concern. There is also evidence suggesting that all the items in the food basket were actually consumed rather than sold or wasted. Leroy tt al. (2010) find that the consumption of energy in the in-kind transfer group increased more than that of the cash group and especially the consumption of energy from the food groups that the basket contained in bigger proportion (i.e. cereals and legumes).

In closing, social assistance programs, especially those involving transfers in–kind, would do well to document and analyze the costs of administering and delivering their benefits to poor households. At least in the case of infra-marginal or small transfers, that have the explicit objective of alleviating poverty, the choice of whether to provide transfers in the form of cash or food in-kind should be determined primarily, if not exclusively, by the administrative cost incurred per unit value of the benefit. In-kind transfers typically involve high handling and transportation costs, whereas cash transfers are relatively cheaper to deliver. The identical impacts on poverty by cash transfers of a real value that is approximately 75% of the value of in-kind transfers combined with the lower administrative costs of cash transfers provide a very strong case in favor of the use of cash transfers instead of in-kind transfers as an effective instrument for poverty reduction. Well

targeted cash transfers not only redistribute resources to poor households but are relatively better than in kind transfers at promoting economic efficiency as well.

ENDNOTES

[1] Examples of such programs include the *Oportunidades* program in Mexico, the *Bolsa Familia* program in Brazil, *Bono de Desarrollo Humano* in Ecuador, *Familias en Accion* in Colombia, *PRAF* in Honduras, *PATH* in Jamaica, and *Red de Proteccion Social* in Nicaragua, among others. Rigorous evaluations of some of these types of programs suggest that they are having significantly positive impacts on consumption and nutrition as well as school attendance (e.g. Schultz, 2004, Hoddinott and Skoufias, 2004; Maluccio and Flores, 2004).

[2] The impacts of in-kind and cash transfers of the PAL program on the consumption of calories, protein, and fat, and specific micronutrients, such as vitamins A, and C, iron and zinc, are investigated in detail by Leroy et al (2010). The impacts on child nutritional outcomes are analyzed in Gonzalez-Cossio et al (2006).

[3] The locality level marginality index takes into account housing quality (including the percent of households without piped water, sewage, and electricity), income (proportion of household below 2 times the minimum wage), education (including illiteracy), and urbanization (CONAPO, 2001).

[4] DICONSA is the Mexican government's agency that manages the supply of food (through its stores) to rural poor localities priced below those found in retail local stores.

[5] Apparently, the targeting at the community level did not limit itself to communities of very high and high marginality, because 37% of the selected communities had a medium rather than a high level of marginality (Leroy et al., 2010). In part, this also explains why there is some coverage by the *Oportunidades* program, especially in the control communities in the sample (see Table 1).

[6] Program administrators have confirmed that since the start of the PAL program the "conditionalities" associated with the program were not enforced. For example, there is not a single instance of a household being denied of the benefits of the program on the grounds of not attending the *platicas*.

[7] It has proved impossible to get more clarity from the program implementers on exactly what transpired in this treatment group. According to some reports, the communities randomly assigned into the in-kind with no education sessions treatment group, organized and demanded these educational sessions

[8] We have confirmed that the conclusions remain unchanged for some outcomes regarding the relative effect size of in-kind and cash transfers, when the two in-kind treatment groups as kept as separate (e.g., see the working paper Skoufias et al. 2008).

[9] This is the food basket (basket A) provided between June and October 2004. There were small changes in the contents of the food basket provided between November 2004 and April 2005 (basket B): Cereals were replaced by dried meat (100gr), and corn starch by lentils (500 gr).

[10] Also, ICC=0.220 and σ =69

[11] For more details the reader is referred to Gonzalez de Cossio et al. (2006).
[12] Annex A contains a closer investigation of the extent to which the randomized design of the PAL managed to eliminate any pre-existing differences between the treatment and control groups.
[13] In annex B we examine the extent to which the PAL food basket "over-provides" individual food items in relation to the consumption pattern of households in the sample in the baseline round.
[14] In the few cases where the market price for a food item in the list of foods consumed is missing , the prices of similar items is used.
[15] For rural areas, the national food poverty line (basic food basket per capita) is P$494.77 per capita per month, the "capacity" poverty line is P$587.29/mo, and the "patrimonial" poverty line is $946.49/mo (all poverty lines expressed in June 2002 pesos). http://www.indesol.gob.mx/docs/3_genero/niv_Nota_tecnica_pobreza_2002.swf
[16] The national consumer price index (base year June 2002) was obtained from Banco de México for the baseline survey months between October 2003 and April 2004 and for the follow-up survey from October to December 2005. http://www.banxico.com.mx/polmoneinflacion/estadisticas/indicesPrecios/indicesPreciosConsumidor.html
[17] For example, the food poverty line yields a baseline headcount poverty rate P(0) of 63.5% in the control localities and a headcount poverty rate of 68.3% in the group assigned to in-kind transfers and 65.8% in the group assigned to cash transfers. Along similar lines, $\beta_0 + \beta_{R2}$ is the poverty rate in control localities in round 2, and $\beta_0 + \beta^J + \beta_{R2} + \gamma^J$ is the poverty rate in treatment group J, (J=1, 2) in round 2.
[18] Thus, a cash transfer equal to 10.75% of household consumption (see table1) decreases the poverty rate by 13.5% implying that the elasticity of poverty to the cash transfer is -1.26. A similar calculation for the in-kind treatment group, assuming the value of the in-kind transfer is identical, yields an elasticity of poverty to the in-kind transfer of -1.44. Using 200 pesos for the value of the in-kind transfer in the in-kind treatment group, (which translates to the mean share of 14.6%of household consumption), decreases the elasticity of poverty to the in-kind transfer down to -1.07.
[19] The same pattern of findings emerged when also estimated the impacts on poverty using the median of PCE in the sample (which results in lower poverty line than the national food poverty line). Using the patrimonial poverty line, PAL has no significant impact on the headcount poverty rate. This is due to the fact that the patrimonial poverty line is very high relative to the PCE in this sample, which leads to a very high headcount poverty rate in the baseline.
[20] The theoretical model underlying the impacts of cash and kind-subsidies on consumption has been developed more than 65 years ago by Southworth (1945). The simple model presented here extends Southworth's model by including leisure in the utility function (e.g., see Killinsgworth, 1983, and Murray, 1980).
[21] This assumes that the in-kind transfer cannot be sold or exchanged for cash or other nonfood items.
[22] At the empirical level there may be other reasons why the impacts of in-kind and cash transfer may differ even among infra-marginal households.
[23] This is only for the purposes of exposition. Households, in practice cannot be forced to consume all or any of the additional quantity provided by the in-kind transfer, and they might sell some or all of the in-kind transfer at a lower price than the prevailing market price to attain a utility level even higher than B*.
[24] The assumption of a utility function separable in its arguments is not necessary. Gavhari (1994) and Leonesio (1988) have demonstrated that in general, if C_F and L are Hicks-Allen substitutes, then the effect of an "over-provided" in-kind transfer is to increase hours of work rather than decrease them.
[25] However, cash and in-kind transfers are likely to have a differential impact on household welfare. As figure 2 illustrates, while the total expenditures of households receiving cash or in-kind benefits should be identical (points B** and B* are on the same budget line), the welfare of households receiving cash transfers is higher than the welfare of households receiving in-kind transfers (welfare is higher at B** than at B*).
[26] The measure of real consumption used imposes the same inflation rate across villages in the sample. The results remain the same using the logarithmic of nominal food consumption and village level or household level fixed effects that allow for initial differences in relative prices (see Skoufias et al. 2008).
[27] A household is classified as indigenous if at least one person, older than 18 years, speaks an indigenous language.
[28]We used the value of the CONAPO marginality index for the year 2000.
[29] The community level variables are excluded when village- or household-level dummies are included in the regressions.
[30] Actually the elasticity of food consumption to in-kind transfers is 1.21 if the food basket were valued at 200 pesos, instead of 150 pesos, amounting to a mean 14.6% of total consumption in the in-kind treatment group (see table 1).
[31] The same adjustment is also applied by Cunha (2012).
[32] The sizeable multiplier effects of the PAL program on consumption are consistent with the findings of Gertler et al. (2012), who found that rural households receiving PROGRESA/*Oportuninades* cash transfers increased their investments in micro enterprises and agricultural activities which, in turn, improved the households' ability to generate income.
[33] Individuals who reported permanent incapacity to work are dropped from the sample analyzed. In fact, the classification was based on questions 2.15, 2.16, and 2.18 in the baseline survey, (and questions 2.12, 2.14, and 2.15 in the

follow-up survey). The set of three questions in each survey round is useful for verifying the nature of the work performed.

[34] As Ai and Norton (2003) have demonstrated, the coefficient of the interaction term in nonlinear models, such as probit or logit, does not equal the marginal effect calculated by statistical software. We have also estimated the marginal effect of the interaction terms using the *inteff* command in Stata proposed by Norton et al (2004) with similar qualitative results as with linear probability model presented here.

[35] The complete set of parameter estimates is available directly from the authors upon request.

[36] To know if there is an impact difference on the size of the impact among the three treatment groups we implement a test using the *lincom* command in Stata 9.0 and adjusting p value for multiple comparisons with Bonferroni's method. (p-value adjusted to 0.016 for 3 comparisons).

[37] To better classify individuals working in agricultural and nonagricultural activities we also used the information reported on the type of tasks performed in their work (question 2.17 in the baseline survey and question 2.13 in the follow-up round). We obtained the same qualitative results without reclassifying individuals based on the information on actual tasks performed.

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Figure 1: Cash transfer

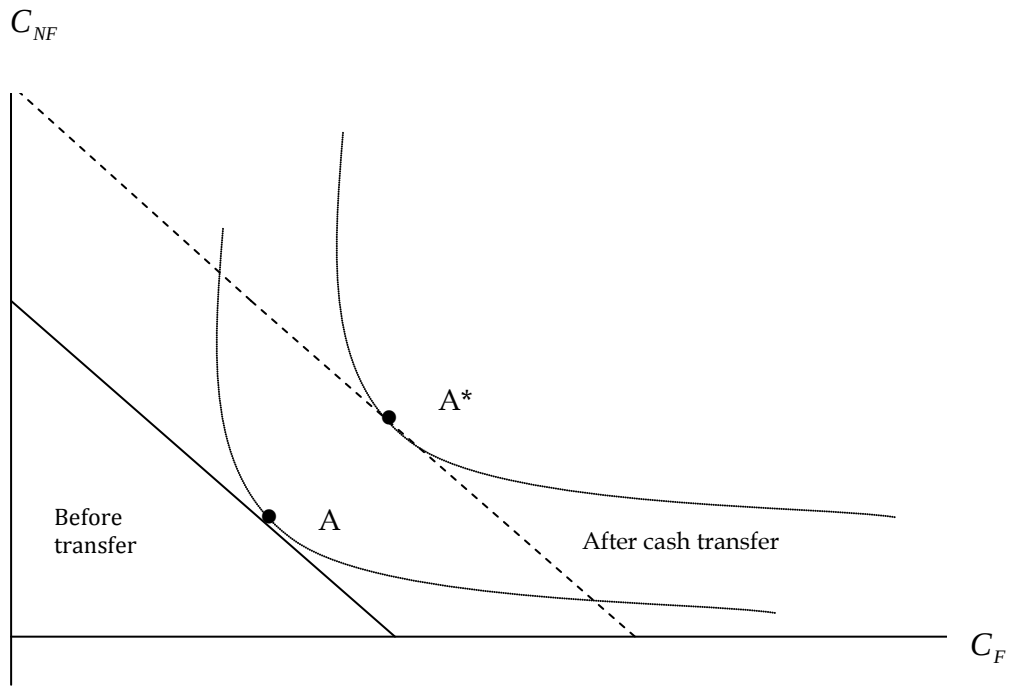

Figure 2: In-kind transfer

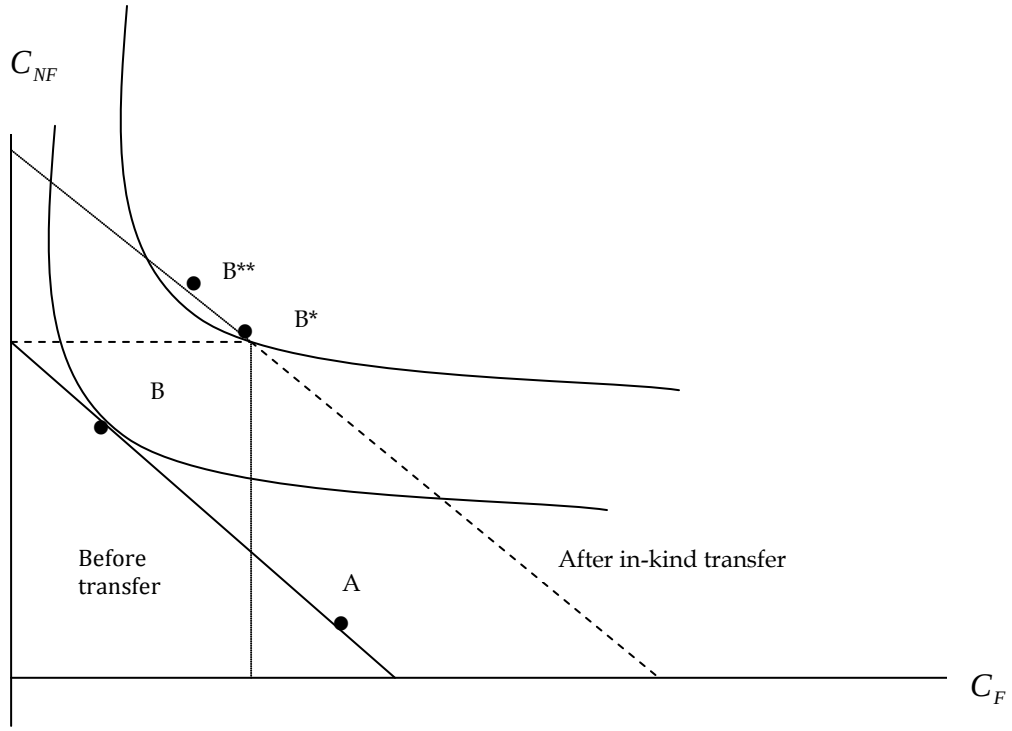

Figure 3

Kernel Density Functions in Baseline Round

Food Consumption and Non-Food Expenditures per capita: In-Kind vs. Control and Cash vs. Control

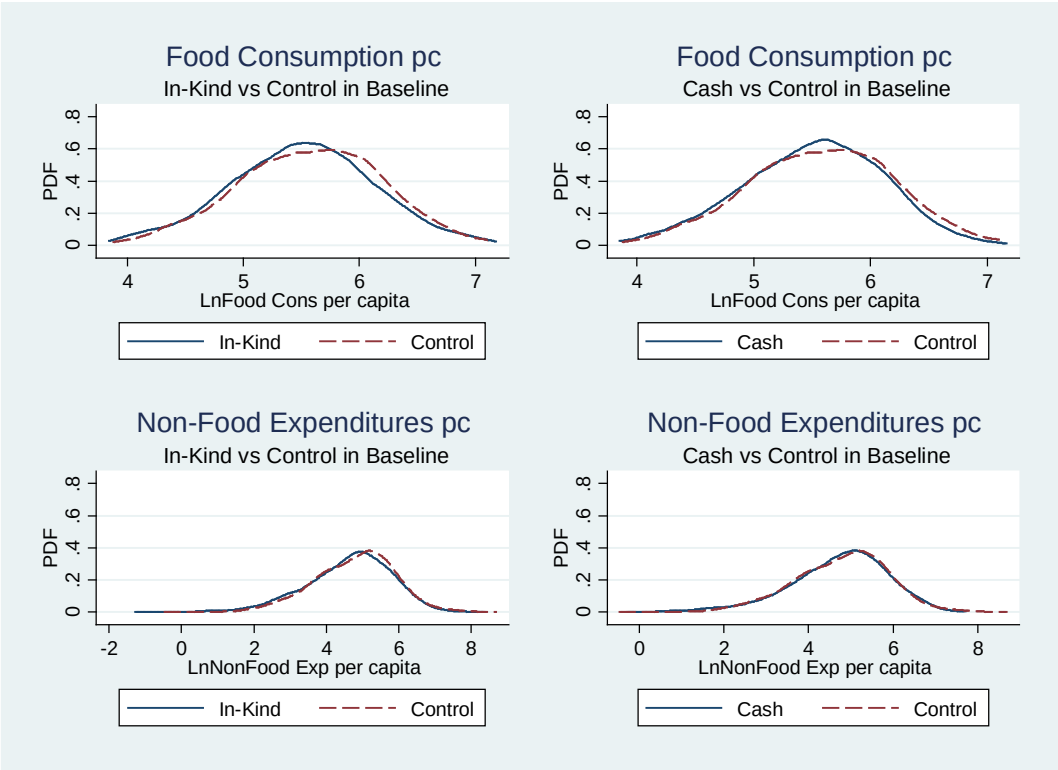

Figure 4

Kernel Density Functions in Follow-up Round

Food Consumption and Total Expenditures per capita: In-Kind vs. Control and Cash vs. Control

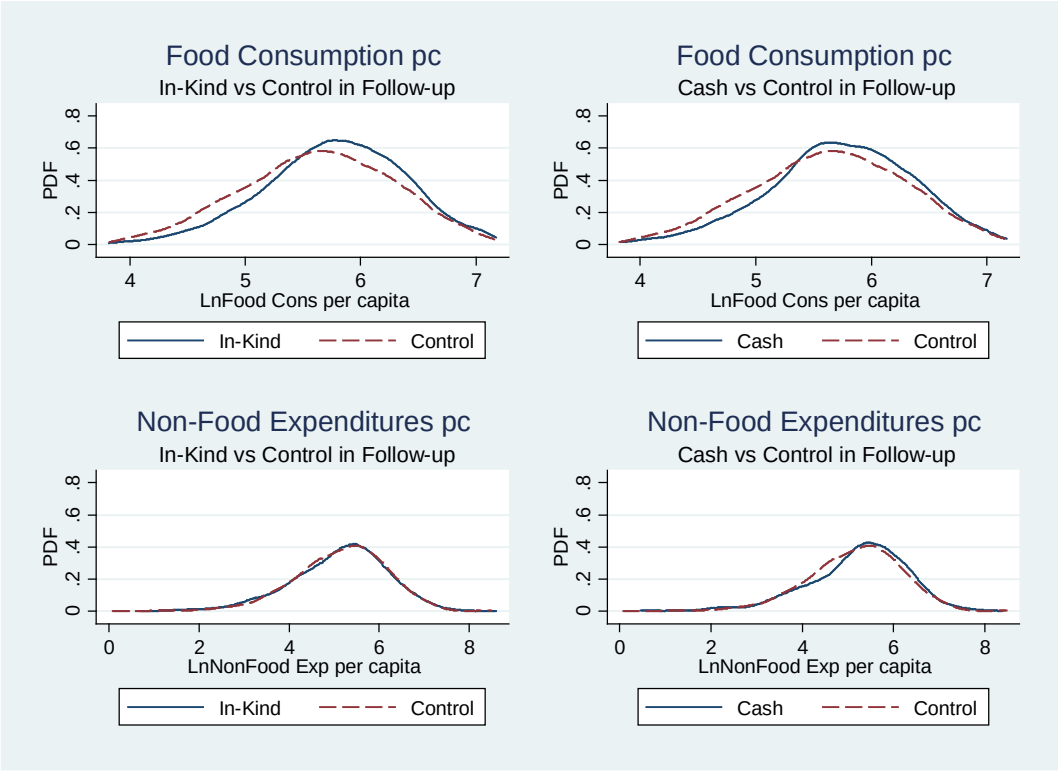

Figure 5

Kernel Density Functions in Baseline and Follow-Up Rounds

Food Consumption and Non-Food Expenditures per capita: In-Kind vs. Cash

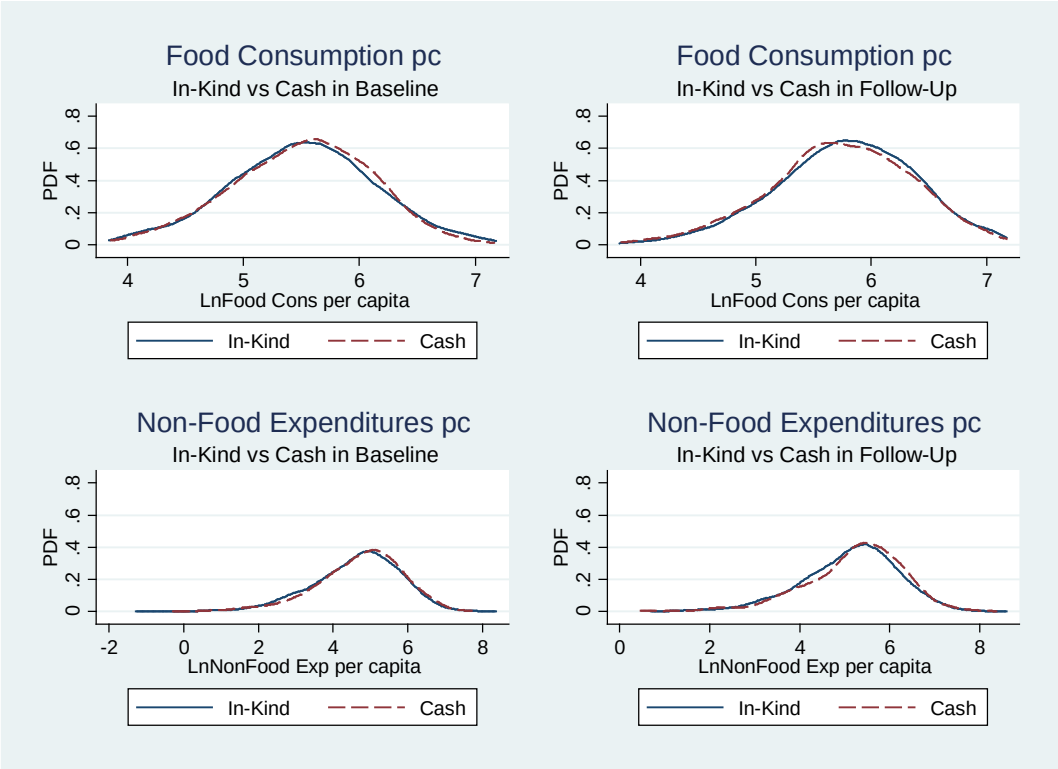

Table 1: Means of main variables used in the empirical analysis

	Baseline Survey			Follow-up Survey		
	In-Kind	**Cash**	**Control**	**In-Kind**	**Cash**	**Control**
Monthly value (in June2002 pesos):						
Food Consumption per capita	277	271	292	328	315	291
Nonfood Expenditures per capita	168	176	192	233	254	234
Total Consumption per capita	445	447	484	560	570	525
Ratio of cash transfer to Food Cons.[1]	16.4%	16.6%	15.1%	12.5%	13.3%	14.4%
Ratio of cash transfer to Total Cons[1]	10.9%	10.7%	9.7%	7.7%	7.7%	8.3%
Ratio of in-kind transfer to Tot.Cons[2]	14.6%	14.3%	13%	10.2%	10.3%	11%
Household size (no. of members)	4.68	4.6	4.8	5.0	5.0	5.2
Speaking indigenous language	19%	14.2%	21.0%	19.3%	15.3%	21.1%
Household is also receiving benefits from:						
Indigenous Health program	0.1%	0.5%	0.0%	0.1%	0.5%	0.0%
DIF	3.2%	6.0%	6.4%	3.3%	6.0%	6.3%
Desayunos	12.6%	11.2%	13.6%	12.8%	11.4%	13.9%
Oportunidades	10.4%	9.3%	18.7%	10.6%	9.4%	19.1%
Number of households	2,839	1,415	1,325	2,829	1,402	1,294
Males 18-60 yrs of age participating in						
Labor market activities	88.2%	89.4%	88.0%	87.4%	88.0%	86.4%
Agricultural activities	60.9%	66.7%	57.6%	56.9%	61.4%	57.0%
Nonagricultural activities	27.3%	22.7%	30.4%	30.5%	26.6%	29.4%
Number of males	3,398	1,716	1,684	2,728	1,343	1,240
Females 18-60 yrs of age participating in						
Labor market activities	23.3%	21.9%	23.9%	26.1%	28.6%	28.3%
Agricultural activities	4.0%	5.5%	3.6%	5.0%	7.3%	6.0%
Nonagricultural activities	19.3%	16.4%	20.4%	21.2%	21.4%	22.3%
Number of females	3,712	1,965	1,951	3,121	1,653	1,511

Notes:

[1]This is the sample mean of the ratio of the value of the cash transfer (150 pesos) expressed in June 2002 pesos to the value of food or total household consumption (also expressed in June 2002 pesos)

[2] This is the sample mean of the ratio of the value of the in-kind transfer in local prices (200 pesos) expressed in June 2002 pesos to the value of food or total household consumption (also expressed in June 2002 pesos)

Table 2 – Difference-in-Differences Estimates of the Impact of In-kind and Cash Transfers on Poverty[A]

POVERTY LINE	Headcount poverty ratio	Gap poverty ratio	Severity of poverty ratio
Food poverty line	**P(0)**	**P(1)**	**P(2)**
β^1	0.048	0.033	0.023
β^2	0.023	0.015	0.010
β^R	-0.050**	-0.029**	-0.017*
γ^1 (in-kind)	-0.107***	-0.072***	-0.050***
γ^2 (cash)	-0.089***	-0.055***	-0.038**
Constant	0.635***	0.268***	0.147***
H₀: $\gamma^1 - \gamma^2 = 0$	0.58 [0.4469]	1.36 [0.2441]	1.08 [0.2995]
"Capacity" poverty line	**P(0)**	**P(1)**	**P(2)**
β^1	0.048	0.035	0.026
β^2	0.040	0.018	0.012
β^R	-0.042**	-0.032***	-0.021**
γ^1 (in-kind)	-0.089***	-0.077***	-0.057***
γ^2 (cash)	-0.100***	-0.062***	-0.044***
Constant	0.720***	0.333***	0.192***
H₀: $\gamma^1 - \gamma^2 = 0$	0.19 [0.6630]	0.98 [0.3225]	1.18 [0.2789]
"Patrimonial" poverty line	**P(0)**	**P(1)**	**P(2)**
β^1	0.006	0.030	0.030
β^2	0.015	0.020	0.017
β^R	-0.041***	-0.036***	-0.030***
γ^1 (in-kind)	-0.011	-0.064***	-0.066***
γ^2 (cash)	-0.017	-0.060***	-0.056***
Constant	0.922***	0.527***	0.348***
H₀: $\gamma^1 - \gamma^2 = 0$	0.18 [0.6749]	0.06 [0.7995]	0.54 [0.4628]

Notes:
A. Poverty lines, per-capita consumption in baseline and follow-up rounds deflated to 2002 pesos
* p<0.10; ** p<0.05; *** p<0.01
Significance tests are based on robust standard errors clustered at the locality level
Hypotheses tests: The numbers reported are the values of the F-statistic under the null and underneath in brackets is the associated p-value.

Table 3 – Difference-in-Differences Estimates of the Impact of In-kind and Cash Transfers on Food Consumption and Non-Food Expenditures per capita (per month)

	Monthly Food Consumption p.c. (nobs=11,072)			Monthly Non-Food Expenditures p.c. (nobs=11,072)		
Coeff. of:	**(A)**	**(B)**	**(C)**	**(A)**	**(B)**	**(C)**
β^1	-17.475 [12.866]			-31.149** [13.150]		
β^2	-30.646** [12.819]			-24.280* [14.595]		
β_R	14.979 [16.589]	-11.936 [13.948]	-0.865 [13.017]	66.934*** [18.696]	31.423 [21.664]	52.239*** [18.396]
γ^1 (in-kind)	43.998*** [12.020]	48.734*** [10.933]	48.500*** [9.686]	16.403 [13.115]	18.823 [12.797]	15.715 [14.898]
γ^2 (cash)	39.435*** [12.891]	47.868*** [13.222]	45.818*** [11.252]	27.923* [15.751]	33.844** [14.954]	30.882* [16.054]
Control vars X(i,t) included?	YES	YES	YES	YES	YES	YES
Binary vars incl.?	month of interview	month of Interview & village	month of interview & household	month of interview	month of Interview & village	month of interview & Household
R-squared	0.181	0.122	0.086	0.130	0.076	0.069
H_0: $\gamma^1 - \gamma^2 = 0$	0.15 [0.6964]	0.01 [0.9436]	0.08 [0.7812]	0.91 [0.3417]	1.69 [0.1955]	1.63 [0.2017]
H_0: $\gamma^1 -$ (200/150)* $\gamma^2 = 0$	0.36 [0.5516]	0.96 [0.3291]	1.06 [0.3033]	1.75 [0.1877]	3.09* [0.0805]	2.82* [0.0929]

Notes:
Food Consumption and Non-Food Expenditures in baseline and follow-up rounds deflated to 2002 pesos
Robust standard errors in brackets
* p<0.10; ** p<0.05; *** p<0.01
For a complete list of the variables included as controls in the regression see text.
Hypotheses tests: The numbers reported are the values of the F-statistic under the null and underneath in brackets is the associated p-value.

Table 4—The power of the null hypothesis H_0 : $\gamma^1 - \gamma^2 = \delta = 0$

	Monthly Food Consumption p.c.			Monthly Non-Food Expenditures p.c.		
	(A)	**(B)**	**(C)**	**(A)**	**(B)**	**(C)**
$\hat{\sigma}$	11.68	12.23	9.65	12.09	11.57	11.88
			against H_1 : $\gamma^1 - \gamma^2 = \delta \neq 0$			
b	22.89	23.97	18.91	25.28	22.68	23.28
c	42.11	44.09	34.79	43.58	41.71	42.83
			against H_1 : $\gamma^1 - \gamma^2 = \delta > 0$			
b	19.21	20.12	15.87	19.89	19.03	19.54
c	38.43	40.24	31.75	39.78	38.06	39.08

Notes:

$\hat{\sigma}$ denotes the standard error estimate for $\hat{\delta}$

The parameter b defines the region of low power (or of high probability of type II error), i.e., $\{\delta : 0 < \delta \leq b\}$

The parameter c defines the region of high power (or of low probability of type I error), i.e., $\{\delta : |\delta| > c\}$

Table 5 –The impact of PAL (difference in difference estimates) on the probability of working

	All activities		Agricultural activities		Non-Agricultural Activities	
MALES (n=12,101)						
	(A)	(B)	(A)	(B)	(A)	(B)
Coeff. of:						
γ^1 (in-kind)	0.020	0.022	-0.028	-0.024	0.048**	0.046***
	[0.019]	[0.014]	[0.026]	[0.019]	[0.021]	[0.017]
γ^2 (cash)	0.012	0.013	-0.059*	-0.050**	0.071***	0.063***
	[0.023]	[0.016]	[0.033]	[0.021]	[0.026]	[0.019]
Control vars X(i,t) included?	YES	YES	YES	YES	YES	YES
Binary vars incl.?	month of interview & Village	month of interview & household	month of interview & village	month of interview & household	month of interview & village	month of interview & household
R-squared	0.022	0.010	0.034	0.022	0.028	0.015
H_0: $\gamma^1 - \gamma^2 = 0$	0.15	0.48	1.20	2.23	1.25	1.26
	[0.6947]	[0.4872]	[0.2742]	[0.1357]	[0.2644]	[0.2617]
H_0: $\gamma^1 -$ (200/150) $\gamma^2 = 0$	0.02	0.08	1.93	3.69*	3.06*	3.90**
	[0.8848]	[0.7749]	[0.1662]	[0.0549]	[0.0815]	[0.0484]
FEMALES (n=13,860) Coeff. of:						
γ^1 (in-kind)	-0.015	-0.021	-0.006	-0.006	-0.010	-0.016
	[0.020]	[0.015]	[0.013]	[0.008]	[0.017]	[0.014]
γ^2 (cash)	0.030	0.020	-0.001	-0.006	0.030	0.026
	[0.024]	[0.018]	[0.015]	[0.010]	[0.018]	[0.016]
Control vars X(i,t) included?	YES	YES	YES	YES	YES	YES
Binary vars incl.?	month of interview & Village	month of interview & household	month of interview & village	month of interview & household	month of interview & village	month of interview & household
R-Squared	0.097	0.024	0.019	0.008	0.087	0.022
H_0: $\gamma^1 - \gamma^2 = 0$	4.34**	7.09**	0.13	0.00	5.86**	8.92***
	[0.0385]	[0.0078]	[0.7219]	[0.9757]	[0.0164]	[0.002]
H_0: $\gamma^1 -$ (200/150) $\gamma^2 = 0$	4.04**	5.93**	0.07	0.02	5.99**	8.09***
	[0.0457]	[0.0149]	[0.7948]	[0.8851]	[0.0152]	[0.0045]

Notes:
Robust standard errors in brackets
* p<0.10; ** p<0.05; *** p<0.01
For a complete list of the variables included as controls in the regression see text.
Hypotheses tests: The numbers reported are the values of the F-statistic under the null and underneath in brackets is the associated p-value.

ANNEX A

In this annex, we present estimates from a multinomial logit model estimating the probability of being in the in-kind treatment group, and in the cash transfer group relative to the probability of being in the control (the reference group).[38] In a pure randomized design, observed individual, household and locality variables should have no significant role at predicting whether a household or an individual is assigned to any of the two treatment groups (relative to the control group). The occasional significance of some variables indicates that the random assignment did not manage to balance totally the sample across the treatment and control groups, especially with respect to household consumption (Table A.1). The sample of individuals used in the analysis of participation in labor market activities seems to be well balanced (see Table A.2). We interpret these findings as providing justification for evaluating program impacts using the double-difference estimator that measures program impacts controlling for any pre-existing differences in characteristics and key outcome variables across the treatment and control groups.

Table A. 1: Individual, Household, and Locality Characteristics and the Probability of Being in one of the Treatment Groups (Multinomial Logit Estimates)

	In-kind group	Cash Transfer Group
Real Food Consumption pc	-0.000	-0.001*
Real Nonfood Expenditures pc	-0.000**	-0.000
Gender of Household head (1=male, 0= female)	-0.234	-0.431*
Age of Household head in yrs	-0.002	0.000
Years of Schooling	-0.012	-0.022
Marital Status: Free Union	-0.137	-0.299*
Widower	0.086	0.090
Separated	0.006	0.025
Divorced	-0.282	-0.325
Single	0.066	-0.031
Indigenous Household	0.077	-0.409
Children 0-5	-0.029	-0.093
Children 6-12	-0.047	-0.052
Adults 13-18	0.014	-0.098
Adults19-54	-0.032	0.011
Adults 55+	0.005	-0.017
Household receiving DIF?	-0.807**	-0.137
Household receiving Desayunos	0.044	-0.070
Household receiving Oportunidades	-0.832**	-0.726

Locality Marginality Index (2000 index)	0.011	0.046
Locality Distance (km) from Municipal Center	-0.000	0.000
Constant term	1.581***	0.926*
Notes: Standard errors corrected for clustering at the village level * p<0.10; ** p<0.05; *** p<0.01		

Table A. 2: Individual, and Household Characteristics and the Probability of Being in one of the Treatment Groups
Multinomial Logit Estimates for Sample of Adult Males and Females

	In-kind group		**Cash Transfer Group**	
	Males	**Females**	**Males**	**Females**
Participates in Agricultural Activities? (1=yes)	0.145	0.134	0.334*	0.511
Participates in Nonagricultural Activities? (1=yes)	-0.072	-0.026	-0.168	-0.230
Age in yrs	-0.004	-0.001	0.001	0.001
Years of Schooling	0.014	-0.001	-0.005	-0.013
Indigenous Household	0.019	-0.003	0.044	-0.002
Children 0-5	-0.046	-0.065	-0.045	-0.034
Children 6-12	0.058	0.043	-0.062	-0.050
Adults 13-18	0.012	0.012	0.043	0.030
Adults19-54	0.018	0.038	0.012	0.081
Adults 55+	-0.156	-0.055	-0.475	-0.468
Is household head? (1=yes)	0.086	-0.118	0.030	-0.272
Marital Status: Free Union	-0.149	-0.146	-0.256	-0.273*
Widower	-0.331	-0.117	-0.332	-0.063
Separated	0.204	-0.151	-0.059	-0.112
Divorced	1.571	-0.471	1.184	0.163
Single	0.086	-0.056	0.088	0.044
Constant Term	0.636*	0.778**	-0.105	0.195
Notes: Standard errors corrected for clustering at the village level * p<0.10; ** p<0.05; *** p<0.01				

ENDNOTES

[38] Additional tests confirming the generally successful balancing of the PAL evaluation sample can be found in Gonzalez-Cossio T. (2006) and Leroy et al. (2010).

ANNEX B

The food items of the PAL food basket and the consumption patterns of households in the sample

In this annex we conduct a more detailed investigation of the extent to which the PAL food basket "over-provides" individual food items in relation to the consumption pattern of households in the sample in the baseline round.

The table below presents the fraction of households which report consuming the specific food items contained in either of the two versions of the PAL food basket as well as the fraction of households consuming less than what is provided (on a weekly basis) by the food basket.[39] By construction, the food basket will appear to "over-provide" food items that households did not happen to consume in the last seven days.

Table B.1

Food item in PAL food basket (quantity per month)	**Households consuming the food item in the last seven days (in %)**	Households consuming a **smaller** quantity than that in the PAL basket **(% of households for which item is over-provided)**
Corn flower (3 kg/mo)	13	88
Soup pasta (1.2 kg/mo)	66	62
Rice (2 kg/mo)	79	40
Cookies (1 kg/mo)	39	71
Cereal (ready to eat) (200g/mo)	5	95
Beans (2 kg/mo)	94	9
Lentils (500g/mo)	9	92
Dry Meat (100g/mo)	n.a.	
Sardines (2 cans 425 gr each)	n.a	
Powder Milk (fortified) (1.92 kg/mo)	6	97
Vegetable Oil (1 Ltr/mo)	91	12
Chocolate (powder) (400g/mo)	5	96
Corn starch (100g/mo)	3	97

ENDNOTES

[39] Basket A was provided between June and October 2004 and basket B between November 2004 and April 2005.