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Abstract

Welfare programs are often implemented in-kind to promote outcomes that might not be realized under cash transfers. This paper uses a randomized controlled trial of a governmental food assistance program to test whether this form of paternalism is necessary, comparing precisely measured consumption and health outcomes under both in-kind food and cash transfers. Importantly, households do not indulge in the consumption of vices when handed cash. Furthermore, there is little evidence that the in-kind food transfer induced more food to be consumed than did an equal-valued cash transfer. This result is partly explained by the fact that the in-kind transfer was infra-marginal in terms of total food. However, the in-kind basket contained 10 individual items, and these transfers indeed altered the types of food consumed for some households. While this distorting effect of in-kind transfers must be a motivation for paternalism, households receiving cash consumed different, but equally nutritious foods. Finally, there were few differences in child nutritional intakes, and no differences in child height, weight, sickness, or anemia prevalence. While other justifications for in-kind transfers may certainly apply, there is minimal evidence supporting the paternalistic one in this context.

Keywords: in-kind transfers, paternalism, food expenditure, consumption, PAL

JEL classification: H42, D62, D12, O12, I38

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1 Introduction

Welfare transfers are often made in kind rather than in cash. In fact, governmental provision of health care, housing, child care, and food vastly dominate cash transfers in most countries, both developing and developed (Tabor 2002; Tesliuc 2006). However, from a rational recipient's point of view, an equivalent-valued cash transfer is weakly preferred as the transfer in-kind offers fewer budget choices - but it is precisely this ability to distort consumption that motivates many in-kind transfer programs (Currie and Gahvari 2008). The use of such paternalistic in-kind transfers may be justified if either (i) the social welfare function differs from individual welfare functions, creating negative externalities (e.g., Daly and Giertz 1972; Garfinkel 1973), or (ii) the recipient is only boundedly rational (e.g., Besley 1988; Thaler and Sunstein 2003). In either case, social welfare may be maximized by forcing the poor to consume more of a good than they would have otherwise chosen. While these motivations for in-kind transfers are well-known, there is little empirical evidence as to whether such paternalism is necessary.

This paper provides such evidence, testing under weak identifying assumptions whether equal-valued cash and food transfers lead poor, rural households to different consumption and health outcomes. Assuaging one paternalistic fear, households spend very little of the cash transfer on vices, such as alcohol and tobacco; rather, the majority of the cash transfer is spent on nutritious food, such as fruits and vegetables. Indeed, the government may be more interested in the welfare of children rather than the household as a unit - in-kind transfers that pass through parents are simply a logistical necessity. I therefore analyze the differential nutritional intake and health of young children across transfer types. While there is some evidence that one in-kind food (powdered milk) led to greater intake of the essential micro-nutrient iron, there is little evidence overall of differential caloric and nutritional intake under in-kind and cash transfers. Importantly, there is no evidence in terms of precisely measured child health outcomes that an in-kind food transfer is superior to an unconditional cash transfer of equal value. Other considerations for making transfers in-kind may certainly apply, but this evidence suggests that there is minimal need for paternalistically motivated in-kind transfers in this context.[1]

The data for this study come from a randomized controlled trial of Mexico's food assistance program, the *Programa de Apoyo Alimentario* (PAL), which was conducted concurrent with the national roll-out of the program in late 2003. The stated aim of PAL is a paternalistic one - to improve the food security, nutritional intake, and health of the poor through in-kind, rather than cash,

[1] Other motivations for in-kind over cash transfers include their ability to target the poor (Nichols and Zeckhauser 1982; Moffitt 1983), pecuniary redistribution not achievable through cash transfers (Coate, Johnson, and Zeckhauser 1994), and political economy considerations (De Janvry, Fargeix, and Sadoulet 1991; Epple and Romano 1996b). Currie and Gahvari (2008) offer a recent review of the motivations for in-kind transfer programs, concluding that, while these other considerations may apply to specific cases, the leading overall contender is paternalism.

transfers (Vázquez Mota 2004). Nationwide, participants receive monthly in-kind transfers consisting of 10 food items. Over 200,000 households currently receive PAL food aid and eligibility is determined through a universal means test; households do not apply for the program. The experiment included a representative, random sample of 208 villages, the transfer type was randomized at the village level, and eligible households received either (i) the in-kind food transfer, (ii) an unrestricted cash transfer, or (iii) no transfer. The Mexican National Institute of Health (*Instituto Nacional de Salud Publica* (INSP)) conducted a pre- and post-intervention panel survey which included detailed food recall modules at the household and individual levels, as well as precise measures of child health. The targeted population is poor (per capita consumption is less than two dollars per day), the transfers are large (at about 12% of pre-transfer household consumption), and malnutrition is a serious concern (e.g., 18% of children are anemic). Either transfer type had the potential to significantly improve welfare, and I find that both lead to significant increases in total (food plus non-food) consumption, broadly confirming the results of the initial INSP evaluation (González-Cossío et. al. 2006; Skoufias, Unar, and González-Cossío 2008).

Importantly, this field experiment allows a precise test of the canonical model of consumer demand under in-kind versus cash transfers (see, e.g., Southworth 1945, Moffitt 1989). The theory predicts that an in-kind transfer will only induce greater consumption of the transferred good than would an equal-valued cash transfer to the extent that it is *extra-marginal* and *binding*. An extra-marginal transfer is over-provided in that it is larger than the quantity that would be demanded under an equal-valued cash transfer, while a binding transfer is actually consumed, rather than traded away. As the PAL transfer consisted of 10 food items, its distorting effect can be measured for each item individually as well as for the transfer as a whole. In terms of total food consumption, the PAL in-kind transfer was infra-marginal for all households. Consistent with the theory, I cannot reject the hypothesis that the in-kind food transfer and an equal-valued cash transfer led households to the same increase in food consumption.

On the other hand, individual PAL food items exhibit a large variation in the extent to which they are extra-marginal and binding. For example, in-kind dried bean transfers were small compared to overall household bean consumption - thus largely infra-marginal and binding. In contrast, powdered milk was a sizeable, extra-marginal transfer as it was consumed in larger quantities under the in-kind than under the cash transfer. Despite this over-provision, the milk transfer was not binding for a large percentage of households, as suggested by reported consumption amounts that were lower than the transfer amount. Such information on the degree to which in-kind transfers distort consumption (compared to cash) is necessary if we are to justify their use on paternalistic grounds.

Distorted consumption, however, is not a sufficient justification for in-kind transfers, as they are in general substitutable with other non-transferred items - there is no reason to believe the specific

transferred items (e.g., milk or beans) are the only ones that can lead to the desired paternalistic outcomes, better nutrition and health. In fact, I find that binding, extra-marginal transfers induced households to substitute away from similarly nutritious non-transferred foods. This type of substitution is predicted by the theory of rationing (Tobin and Houthakker 1950; Neary and Roberts 1980; Deaton 1981), and this paper provides the first empirical test in an in-kind transfer context.[2] Furthermore, cash transfers induced consumption of non-transferred foods that were equally, if not more, nutritious than the in-kind foods. In this context, paternalistic in-kind transfers can only be justified if social preferences are defined over consumption of specific foods, rather than overall nutrient intake.

Despite finding little justification for paternalism at the household level, in-kind transfers may still be optimal if society desires that children consume more resources than parents would choose under an unrestricted cash transfer. Again, the data proves this fear largely unfounded, as both transfer mechanisms led to similar increases in calories consumed by children. There is some evidence that in-kind transfers led to greater intake of the essential micro-nutrient iron than did cash, and this increase most likely came through the higher consumption of iron-fortified powdered milk. There is no evidence, however, that differential nutrient intake led to observable health differences in terms of anemia prevalence, height, weight, or sickness two years after the start of the program.

If there are paternalistic benefits to in-kind transfers, sound public policy must weigh them against their costs. One cost of in-kind transfers is born directly by the recipient household - equal-valued cash transfers are weakly preferred to transfers in kind, and thus extra-marginal and binding in-kind transfers impart a lower utility than does cash.[3] A second cost is direct transaction costs; more likely than not, these transaction costs will be greater for in-kind goods compared to cash transfers. For the PAL transfers, the in-kind basket costs at least 20% more to administer than the cash transfer. Social preferences would have to heavily weight the small benefits in child nutritional intake afforded by cash transfers in order to conclude in-kind transfers are cost-effective.

This paper offers important lessons for public policy. First, it provides some of the first well-

[2]Neary and Roberts (1980) and Deaton (1981), independently, generalize the Tobin-Houthakker (1950) model of rationed consumer goods. These papers focus on constraints on consumption from above - the case of rationing - and briefly mention that the model applies equally to constraints from below. Distorting in-kind transfers are one example of such a constraint from below.

[3]Quantitatively, the household welfare cost of a distorting in-kind transfer, compared to a cash transfer, can be measured through an equivalent-variation exercise. First, we estimate the demand system for both transferred and non-transferred goods, which is analytically derived from utility maximization with respect to the usual linear budget constraint. Importantly, the estimated preference parameters also identify the conditional demand functions, derived from utility maximization with respect to a kinked budget constraint arising from extra-marginal, binding in-kind transfers. We then calculate the maximized direct utility under (i) a cash transfer and (ii) an equal-valued in-kind transfer, both as functions of income. The income required to equate these maximized direct utilities is an estimate of the value of the in-kind transfer to the household.

identified evidence on the benefits - or lack thereof - arising from a paternalistic in-kind food transfer. A small body of evidence is available from the United States' Food Stamp Program, showing that these vouchers are infra-marginal for most recipients and thus treated like cash (Moffitt 1989; Fraker, Martini, and Ohls 1995; Hoynes and Schanzenbach 2009; Whitmore 2002).[4] For those recipients whose consumption is distorted, Whitmore (2002) shows that they have access to a well developed re-sale market in food stamps, and that over-provided stamps that are not sold tend to induce consumption of some non-nutritious foods, such as soft drinks.

The developed country context, however, is very different from the one studied in this paper. Perhaps the best evidence on the debate in low income countries comes from cash transfer programs to the poor. Evaluations of several such programs should assuage some paternalistic fears, as they demonstrate that cash is largely spent on nutritious foods (e.g., Hoddinott and Skoufias (2004) in Mexico, Attanasio and Mesnard (2005) in Colombia, Maluccio (2007) in Nicaragua). However, these cash transfers are often conditional on school attendance and visits to health centers, or are coupled with in-kind nutritional supplement for young children (e.g., Attanasio et. al. 2005; Behrman and Hoddinott 2005a). As such, they do not allow us to fully separate out the effects of in-kind food transfers versus cash transfers.

Section 2 outlines a model of consumer demand under in-kind and cash transfers which guides the empirical analysis. Section 3 describes the PAL transfer program and the field experiment. Section 4 discusses identification of the empirical results, which are presented in section 5. Section 6 details the differential costs of PAL transfer types, and section 7 concludes.

2 Cash vs. Paternalistic In-kind Transfers

This section outlines a simple demand theory of in-kind versus cash transfers (see Moffitt 1989). The model serves to clarify the concepts of extra-marginal and non-binding in-kind transfers, and it identifies the situations in which such transfers will induce different household choices than would an equal-valued cash transfer. The section concludes with a discussion of how these potential distortions may motivate a paternalistic government to use in-kind transfers and how to test whether in-kind transfers are justified compared to cash transfers.

[4] Other factors may also motivate in-kind transfers in the U.S., such as their political palatability; however, paternalism must also be a motivating force (see, e.g., Currie and Cole 1993; Currie and Gahvari 2008).

2.1 A simple demand theory

Assume households have preferences over two goods, milk, q_M, and one composite good, q_F. In the absence of transfers, a utility function $U(q_M, q_F)$, strictly increasing and concave in both arguments, is maximized with respect to the budget constraint $p_M q_M + p_F q_F \leq Y$, where p_M, p_F, and Y are the price of milk, the price of the composite good, and the household's endowment, respectively. Line $\overline{AB}$ in Figure 1 gives this budget constraint graphically. A cash transfer of T shifts the budget constraint upwards to $\overline{CE}$, corresponding to $p_M q_M + p_F q_F \leq Y + T$, while an equivalent-cost transfer of milk $\overline{q}_M (= \frac{T}{p_M})$ leads to a kinked budget constraint that depends on the re-sale price of milk $\overline{p}_M$:

$$p_M q_M + p_F q_F \leq \begin{cases} Y + \overline{p}_M \overline{q}_M & if \quad q_M \leq \overline{q}_M \\ Y + p_M \overline{q}_M \quad = Y + T & if \quad q_M > \overline{q}_M \end{cases}.$$

If no premium is placed on the in-kind milk transfer (relative to milk purchased in the market), the re-sale price $\overline{p}_M$ necessarily lies in the set $[0, p_M]$. Note that the re-sale price may be discounted from the market price, reflecting, for example, the search and transaction costs of finding a willing buyer.[5]

The in-kind transfer is equivalent to a cash transfer if re-sale is frictionless; $\overline{p}_M = p_M$ and the budget line is again $\overline{CE}$. On the other hand, if re-sale is costly or not available, $\overline{p}_M \in [0, p_M)$ and the budget set is smaller. Budget line $\overline{FDE}$ reflects a re-sale price strictly between 0 and p_M, while $\overline{ADE}$ reflects the extreme case of no re-sale. As some bundles on $\overline{CD}$ are only available under in-kind transfers when re-sale is frictionless, it is clear that cash is weakly preferred to a transfer in kind.

Consider two households, I and II, with different preferences. For simplicity, assume that frictionless re-sale is not available, thus $\overline{p}_M < p_M$. Household I is indifferent between transfer type, moving from indifference curve I to I' under both mechanisms. Household II is weakly worse off under the in-kind transfer - it is forced to consume at II' (the kink) if $\overline{p}_M = 0$ and at II'' if $\overline{p}_M \in [0, p_M)$ while it would have chosen II''' under the cash transfer.

The in-kind transfers is considered *extra-marginal* for household II who consumes more milk than they would have under the cash transfer, and *infra-marginal* for household I. Thus, infra-marginal in-kind transfers are equivalent to cash.[6] An in-kind transfer is considered *non-binding* if

[5] It is possible that a premium is placed on an in-kind transfer due to lower transaction costs relative to purchases of the in-kind good in the market. I do not consider this case as it is unlikely to be present in the empirical application of this paper (transfers of common food items in rural villages).

[6] Note that extra-marginality is defined with respect to the post-cash-transfer budget, rather than pre-transfer budget, as a cash transfer will likely change demand for the in-kind good. For example, if the in-kind good is normal, a transfer of $\overline{q}_M$ could have been extra-marginal pre-transfer but the income elasticity of milk may be large enough to induce a post-transfer consumption of milk greater than $\overline{q}_M$, making the in-kind transfer infra-marginal post-transfer.

the household consumes less of the good than it was provided, and binding otherwise. The transfer is non-binding for household II when facing a strictly positive re-sale price (indifference curve II'').

Formally, let q_M^{Cash} and $q_M^{In-kind}$ represent demand for milk under cash transfer T and the in-kind transfer $\overline{q}_M$, respectively. Choices under the cash transfer define the extent to which the in-kind milk transfer was extra-marginal, $EM_M(\overline{q}_M)$:

$$EM_M(\overline{q}_M) = \begin{cases} \overline{q}_M - q_M^{Cash} & if \quad q_M^{Cash} < \overline{q}_M \\ 0 & otherwise \end{cases} . \tag{1}$$

Choices under the in-kind transfer define the extent to which the transfer is non-binding, $NB_M(\overline{q}_M)$:

$$NB_M(\overline{q}_M) = \begin{cases} \overline{q}_M - q_M^{In-kind} & if \quad q_M^{In-kind} < \overline{q}_M \\ 0 & otherwise \end{cases} . \tag{2}$$

The amount of the in-kind transfer that is in practice consumed, over and above what would have been consumed under a cash transfer is the *distortion effect* of the transfer:

$$D_M(\overline{q}_M) = EM_M(\overline{q}_M) - NB_M(\overline{q}_M) . \tag{3}$$

This simple model demonstrates that household utility is lower under an extra-marginal in-kind transfer than under an equal-valued cash transfer, as reflected by the utility associated with indifference curves II' or II'' compared to the unconstrained choice I'''. This welfare loss is obviously lower for a higher re-sale price.

Another prediction of the model is that the welfare loss due to a distorting in-kind transfer will be lower the more substitutable is the in-kind good with the composite good. This is not shown in Figure 1, but would be evident if I had drawn shallower indifference curves representing a higher degree of substitutability between milk and the composite good. For example, suppose that the composite good is other dairy products and that milk and other dairy products are (Hicks) substitutes. Faced with a binding, extra-marginal milk transfer, the household will tend to substitute away from other dairy as they are now over-provided with milk. Compared to a cash transfer, the in-kind welfare loss will be decreasing in the substitutability of the transferred and non-transferred goods.

2.2 Extensions

The model is readily extended to cases when (i) multiple non-transferred goods are available and when (ii) multiple goods are transferred in-kind (Neary and Roberts 1980; Deaton 1981).[7] An implication of having more non-transferred goods available is that the recipient has more opportunities to substitute away from substitutes, and towards complements, of a distorting in-kind good. As in the single non-transferred good case, this re-allocation of consumption will mitigate the welfare loss that would result in the absence of these substitutes and complements.

When multiple goods are transferred in-kind, the results of the above model hold for each good separately (see Neary and Roberts 1980). However, in order to compare the in-kind bundle as a whole to an equal-valued cash transfer, we must aggregate across all in-kind goods. One meaningful aggregation uses market prices to value in-kind goods.[8] Let $(\overline{q}_n, p_n)$ represent transfer amounts and associated market prices for N in-kind goods, $n = \{1,\ldots,N\}$. With $EM_n(\overline{q}_n)$ and $NB_n(\overline{q}_n)$ defined as in (1) and (2) above, we have:

$$EM_{Total}(\overline{q}_1,\ldots,\overline{q}_N) = \sum_{n=1}^{N} p_n EM_n(\overline{q}_n) \tag{4}$$

$$NB_{Total}(\overline{q}_1,\ldots,\overline{q}_N) = \sum_{n=1}^{N} p_n NB_n(\overline{q}_n)\ . \tag{5}$$

The distortion effect for the transfer as a whole, with prices as a norm, is thus:

$$D_{total}(\overline{q}_1,\ldots,\overline{q}_N) = EM_{Total}(\overline{q}_1,\ldots,\overline{q}_N) - NB_{total}(\overline{q}_1,\ldots,\overline{q}_N). \tag{6}$$

Note that the simple model and its extensions are time-independent, leaving re-sale as the only explanation for observed non-binding transfers. In practice, however, some in-kind items may be storable or consumed in an otherwise lumpy manner. This is more likely the case for goods such as food, and less likely for a good such as housing. If consumption choices are observed at only one point in time (as in the empirical example studied in this paper), non-binding transfers only identify an upper bound on the extent of re-sale, and a lower bound on the quantity of the transfer that was not consumed.

[7] Neary and Roberts (1980) and Deaton (1981) (independently) offer models of choice behavior under the rationing of a subset of goods when multiple other goods are available; in-kind transfers are simply potential constraints from below while rations are potential constraints from above, implying the model readily applies to both cases. However, these authors only consider the consequences of rations or transfers that are fully binding. The discussion here generalizes their framework to allow for non-binding transfers or rations.

[8] Other norms can be considered such as a count of the number of goods that were extra-marginal or non-binding for each household, or caloric content in the case of food.

2.3 Social Welfare and Policy Objectives

The ability for in-kind transfers to distort consumption can be a strong motivator for a paternalistic government to impose their preferences on households when social and household preferences do not coincide. For example, distorting in-kind transfers of food may increase social welfare if society values food consumption more than the household, which, under a cash transfer would prefer to purchase say, shelter or transportation. Another example is when in-kind transfers target individual family members such as children or pregnant mothers, whereas cash transfers are funneled through a household head.[9]

The model, however, suggests that only when in-kind transfers are extra-marginal and binding will they differentially influence consumption compared to an equal-valued cash transfer. If we believe that cash transfers are preferred to in-kind transfers *ceterus paribus*, a natural first step for a policy maker should be to estimate, for a given transfer, if a distortion exists and how large it is.

Distorted consumption in and of itself is not likely to be a sufficient justification for in-kind over cash transfers. Rather, it is more natural to believe that society is interested in distorting *outcomes*. In the case of food transfers, we would naturally care about the improvement in health resulting from nutritious food transfers, rather than increased food consumption *per se*. This distinction is especially important when there are multiple ways to achieve the outcome of interest - that is, there are other non-transferred good available for purchase with a cash transfer that can lead to similar outcome improvements. The second step of a policy analysis should therefore be to measure the extent to which distorting in-kind transfers influence the outcomes of interest differentially from a cash transfer.

Finally, any social benefit from in-kind transfers, whether in consumption or outcomes, must be weighed against the additional costs incurred relative to cash transfers. One cost is captured in the model above - that distorting transfers involve a loss of utility for constrained households. A second cost is any additional operating and transaction costs of in-kind over cash transfers. Purchasing, packaging, transportation, and distribution of in-kind goods likely involve higher costs than making cash transfers.[10]

If in-kind transfers are distorting, relative to cash, the optimal choice of policy instrument necessarily requires knowledge of costs society is willing to pay for paternalistic gains. The empirical exercise detailed below follows these steps in order to assess whether paternalistically motivated PAL food transfers are justified.

[9] Another example is if recipients have time-inconsistent preferences. In this case, in-kind transfers may be preferred by the household in the long run if distorted present consumption leads to superior long-run outcomes.

[10] Corruption may be an additional cost. It is unclear, however, whether in-kind or cash transfers are more corruptable in general.

3 The Transfer Program, the Experiment, and Data

3.1 The *Programa de Apoyo Alimentario*

Started in 2004 and still on-going, PAL operates in about 5,000 rural villages throughout Mexico. It is administered by the public/private company Diconsa which also maintains subsidized general stores in these areas. Monthly in-kind transfers are comprised of seven basic items - corn, rice, beans, pasta, biscuits, fortified milk powder, and vegetable oil - and two to four complementary items.[11,12] The contents were chosen by nutritionists to provide a balanced, nutritious diet and they provide about 1750 calories per day, per household (Campillo Garcia 1998). All of the items are common Mexican brands which were by and large available in local stores. The transfer is not conditional on family size, is delivered bimonthly, and the food in each basket costs the government about 150 pesos (approximately 15 U.S. dollars). Resale of the in-kind food transfers was not prohibited, nor were there purchase requirements attached to the cash transfers.

Program rules state that transfers are to be made to women whenever possible. In principal, transfers are conditional on attending monthly classes in health, nutrition, and hygiene which were designed to promote healthy eating and food preparation practices; however, evidence discussed below suggests that the transfers are in practice unconditional.

Program eligibility proceeds in two-stages where first poor, rural villages, and then poor households within eligible villages are offered the program. Villages are eligible to receive PAL if they have fewer than 2,500 inhabitants, are highly marginalized as classified by the Census Bureau, and do not currently receive aid from other food transfer programs. In practice, this last criterion implies that the village is not incorporated in either *Liconsa*, a subsidized milk program, or *Oportunidades*, a conditional cash transfer program. Household eligibility is determined through a means test of all households in eligible villages (Vázquez Mota 2004).

The village is required to elect a three-member 'Committee of Beneficiaries' whose responsibilities include disbursing aid within the village and teaching the educational classes. Food aid boxes are assembled in several warehouses throughout the country and then delivered to a central location in each village. Each household must collect its own aid package from the Committee and is required to present their PAL identification card to receive the package.

[11] The complementary items are changed periodically to add novelty, at times containing sardines, tuna fish, lentils, chocolate, cereal, or corn starch.

[12] Due to high transportation costs, approximately 4% of the most rural villages incorporated in the program received monthly cash transfers of 150 pesos instead of the in-kind food box. This is exclusive of the experimental sample described below.

3.2 The PAL Experiment

Concurrent with the national roll-out of the program, 208 villages were randomly selected from the universe of eligible PAL villages in eight southern states to be included in a randomized controlled trial.[13] These villages were randomized into four groups using a simple randomization algorithm. Eligible households would thus receive either (1) in-kind transfers plus educational classes (the standard PAL treatment), (2) in-kind transfers *without* the education classes, (3) a pure cash transfer of 150 pesos per month plus the education classes, or (4) no transfer nor classes. All other aspects of the program, including the role of the Committee of Beneficiaries, were unaffected by the experiment. The means test was applied in Cash and In-kind villages assigned to receive aid, and the program was offered as per program rules.

In practice, the orthogonal randomization into educational classes was confounded as 63% of PAL households in the In-kind *without* education treatment in fact attended classes. The reason for this non-compliance with the experimental design is not clear, but it may lie in poor oversight of the Committees of Beneficiaries who were responsible for teaching the classes. As such, the analysis in this paper abstracts from the effects of the classes by combining both in-kind treatment groups. Details on the randomization into education classes are available in Appendix A.

3.3 Data

In each experimental village, about 33 households were randomly selected for inclusion in a pre- and post-intervention panel survey. This survey was administered by the National Institute of Health (INSP), with the stated objective of studying the nutritional status of children and their mothers; intentionally, no mention was made of the experiment, PAL, or Diconsa. The pre-intervention round was conducted between October 2003 and April 2004, before the means-test was applied in the Cash and In-kind villages; the post-intervention round was conducted two years later in the final quarter of 2005. PAL began to phase-in aid delivery after the baseline surveys, completing coverage within a year. On average, households received about 12 months of aid in between survey waves. This fact is important for interpreting the cumulative effect of aid packages on health.

Receipt of the program in Cash and In-kind groups is self-reported in the post-intervention survey. Approximately 90% of households receive PAL transfers. Administrative data on receipt of the program is only available starting in 2006, once the experiment was completed and most Control villages were incorporated in PAL. Matching this administrative data with the experimental

[13] The eight states are Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz, and Yucatán.

survey data allows me to identify households in the Control group who would have recieved the program in experimental years. This knowledge is necessary for estimating the Average Treatment on the Treated parameters of interest as described in the next section. Appendix B contains details of this matching algorithm.

A 7-day food recall captured household-level consumption of 61 food items, and village median unit-values are used as measures of prices to aggregate across goods. Total household food expenditure is the sum of expenditure on individual foods plus food eaten away from home. Household expenditure, but not quantities, was collected in 26 non-food categories capturing the extent of non-durable consumption. At times, household level consumption variables are expressed in adult equivalents (AE) using a conversion suggested by the INSP (González-Cossío et. al. 2006). Individual-level food consumption was measured for children with a 24-hour food recall, and was subsequently converted into caloric and micro-nutrient content. Finally, precise child anthropometric and health measures were collected, including height and weight, blood tests for anemia, and self-reports of sickness in the last four weeks. Appendix C contains further details on the construction of unit-values, consumption variables, and health variables.

Table 1 summarizes the 7 basic and 3 complementary items - lentils, canned fish, and breakfast cereal - included in the PAL food basket at the time of the follow-up survey in late 2005.[14] All of the items are non-perishable as delivered and the distribution of caloric content suggests that the basket is the basis of a balanced diet (notably absent are fruits and vegetables). The powdered milk and corn flour are fortified with iron, zinc, and folic acid, three micro-nutrients known to be deficient in the Mexican diet. When valued at local baseline prices, there is some dispersion in the basket value across villages but this variation is small as evidenced by coefficients of variation in the range of 0.6 to 0.26. As a whole, the average value of the PAL in-kind package is 191 pesos with an inter-quartile range of about 31 pesos.

Note that the 150 peso cash transfer could only purchase about 80% of the in-kind basket. This discrepancy arose because the government set the cash transfer equal to the wholesale cost of the food, about 150 pesos. In order to make the policy relevant comparison of equal-valued transfers, I extrapolate program effects from cash transfers. This extrapolation involves reasonable assumptions detailed below.

[14] It is unclear whether experimental households received canned tuna fish (weighing 0.35kg) or canned sardines (weighing 0.8kg). As the household food recall survey does not distinguish these items either, the analysis assumes the mean weight (0.6kg) and calories throughout.

3.4 Baseline Balance and Attrition

Of the 208 experimental villages, 10 are excluded from the analysis - two could not be re-surveyed due to concerns for enumerator safety, two more were incorporated in PAL prior to the baseline survey, four received a different treatment than they were assigned in the randomization, and two are geographically contiguous, potentially violating the Stable Unit Treatment Value Assumption (SUTVA) (Rubin 1980). Observable characteristics of excluded villages are not significantly distinguishable from included villages (results available upon request).

At the households level, attrition was low; however, it was significantly higher for the control group at 14.9% then for the in-kind and cash groups at 10.5% and 10.9%, respectively.[15] Despite the overall greater number of atritted households in the Control group, it does not appear that they were observably different from atritted households in the Cash and In-kind groups. This is confirmed in Appendix Table A.1 which shows that baseline characteristics of non-atritted households do not vary systematically across treatment groups.

The analysis uses data on 4,923 households in 198 villages, which includes all treated households in Cash and In-kind villages and all matched-eligible households in Control villages. Details on the construction of this sample are available in Appendix B. The map in Figure 2 shows that the experimental villages are geographically diverse and randomly distributed spatially.[16] Table 2 confirms that treatment groups were balanced at baseline. The table contains mean household and village characteristics, by treatment group, and p-values from tests of mean differences across groups. Only 3 out of the 27 variables shown exhibit significance imbalance at the 5% level.

Table 2 also demonstrates the sample is poor - monthly total consumption (food plus non-food) per adult equivalent is about 550 pesos per month, or 55 U.S. dollars. Furthermore, the budget share of food out of total consumption expenditure is large, at about 68%. A small percentage of households (about 7 percent) report receiving Oportunidades transfers, and an even smaller percentage (about 2 percent) report receiving Liconsa, despite PAL rules excluding villages that are incorporated in these programs. However, a village-by-village check shows these households are spread evenly amongst the sample with no villages violating this eligibility rule *en masse*.

[15] P-values on tests of equality of attrition rates between In-kind and Cash groups versus the Control group are 0.01 and 0.03, respectively.

[16] The geographic clustering of localities in Figure 2 reflects the general population distribution in southern Mexico - a mountainous and heavily vegetated region that supports settlement mainly in flat or de-forested land.

4 Identification

The theory suggests that only extra-marginal and binding in-kind transfers will induce different consumption than would an equal-valued cash transfer. To estimate the amount of distortion, or lack thereof, induced by PAL in-kind transfers, I first estimate the extent to which PAL transfers were extra-marginal (EM_n and EM_{Total} in equations (1) and (4)) by comparing the distribution of consumption choices of PAL in-kind foods under the cash transfer to what would have been provided in-kind. Then I estimate the extent to which PAL transfers were non-binding (NB_n and NB_{Total} in equations (2) and (5)) by comparing consumption choices under the in-kind transfer to amounts actually provided.

Subject to two caveats, randomization ensures that the difference between these estimates of extra-marginal and non-binding transfers identifies the distortion effect, (3) and (6). The first caveat is that EM_n and EM_{Total} are identified under an equal-valued cash transfer, which would have to be about 193 pesos in Cash villages, rather than 150 pesos (see Table 2). Estimates of extra-marginal transfers below therefore serve as an upper bound on the degree of extra-marginality. The second caveat is that household consumption is only observed for a one week period, and it is therefore impossible to distinguish between re-sale and storage or otherwise lumpy consumption.[17] If consumption is not smooth temporally, estimates below of non-binding transfers are an upper bound on the amount of the transfer that was not consumed. A conservative lower bound is that the household ate, or will eat, the entire package.

Next, a parametric estimation of average treatment effects will uncover how household consumption and child well-being were differentially influenced by the PAL food transfer and an equal-valued cash transfer. The parameters of interest are thus Average Treatment effects on the Treated (ATTs) households and individuals for equal-valued transfers.[18]

In order to compare equal-valued transfers, I must extrapolate treatment effects. In practice, I linearly scale up treatment effects on consumption of the 150 peso cash transfer by a factor of $\frac{193}{150}$. This exercise provides a reasonable approximation of the feasible government policy of converting the entire cost of the in-kind transfers to cash.

[17] This caveat limits the extent to which this exercise measures the "stickiness" or "flypaper" effect of the transfers for the household as a whole (Jacoby 2002; Islam and Hoddinott 2008).

[18] Identification of treatment effects on the treated relies on the assumption that observed take-up is highly correlated with eligibility. Four pieces of evidence suggest that this is likely the case. First, the transfers are in practice unconditional. Even if class attendance was enforced, or if the recipient believed it would be enforced, the opportunity cost of attendance would have to be extremely high for a household to decline the program solely on the basis of a monetary cost/benefit comparison. Second, adverse stigma effects associated with participation (as in Moffitt 1983) are unlikely in this developing country context due to the absolute depth of poverty (Case and Deaton 1998). Third, evidence from Oportunidades, with a similar population to the PAL villages, shows that the take up rate amongst eligible households was above 97% (Angelucci and DeGiorgi 2009). Finally, households were required to present their identification cards to receive aid packages and villages were only delivered enough packages to cover incorporated households. This makes it unlikely that ineligible households in fact received aid.

Let $ATT(Cash)$, $ATT(InKind)$, and $ATT(InKind\text{-}Cash)$ refer to pure average treatment effects on the treated for the cash treatment (relative to the control), the in-kind treatment (relative to the control), and the in-kind treatment relative to the cash treatment. $ATT(Cash)$ for all consumption outcomes are identified through the exogenous income shock and are thus a local estimate of the slope of the Engel curves of each good. Assuming that Engel curves are locally linear with a slope equal to $ATT(Cash)$, the average treatment effects of equal-valued cash transfers (as compared to no transfer) are identified through $ATT^{EQ}(Cash) = ATT(Cash) * \frac{MeanBasketValue}{150}$, while $ATT^{EQ}(IK\text{-}Cash) = ATT(IK) - ATT^{EQ}(Cash)$ identifies the differential effects of equal-valued cash and in-kind transfers. Note that this assumption rules out goods being local necessities or luxuries and is thus a first-order approximation to the true Engel curve. However, the small size of the extrapolation limits the magnitude of potential biases.

This exercise makes intuitive sense for consumption goods. However, I do not make such extrapolations for child health outcomes; doing so would necessitate stronger assumptions about Engel curves for non-market outcomes. To the extent that health outcomes are increasing in income, however, $ATT(IK\text{-}Cash)$ for child height, weight, anemia, and sickness can be taken as upper bounds on the differential effects of equal-valued in-kind and cash transfers.

4.1 Estimation of Average Treatment Effect on the Treated

To improve efficiency and account for those chance differences in baseline characteristics mentioned above, $ATTs$ are estimated using a difference-in-differences (DD) estimator controlling for pre-treatment observable village characteristics:

$$Y_{ijt} = \alpha + \gamma POST_t + \sum_{g=1}^{2} \delta_g GROUP_{gj} + \sum_{g=1}^{2} \beta_g \left(GROUP_{gj} * POST_t\right) + \mathbf{X}_{ij}\lambda + \varepsilon_{ijt} \qquad (7)$$

Y_{ijt} is the outcome for household or individual i in village j at time t, $POST_t$ is an indicator for the post-intervention survey, $GROUP_{gj}, g \in \{1,2\}$ are indicators for Cash and In-kind treatment assignment of village j, X_{ij} is a vector of pre-intervention village characteristics, and ε_{jt} captures all unobserved heterogeneity in the outcome.[19] The coefficients β_g identify average treatment effects on the treated for In-kind and Cash treatment groups, $ATT(IK)$ and $ATT(Cash)$, while their difference identifies $ATT(IK\text{-}Cash)$. I test for significance of $ATT(IK\text{-}Cash)$ using a F-test of the equality of the β_g coefficients. Standard errors are clustered at the village level to account for unobserved intra-village correlation in the outcome variable.

[19] Village controls include: the presence of a Diconsa store, state indicators, and month of interview indicators.

5 Results

5.1 Extra-marginal and Non-binding In-kind Transfers

5.1.1 *Are in-kind transfers extra-marginal?*

In terms of total food consumption, the in-kind transfer is infra-marginal for virtually all households. That is, under the 150 peso cash transfer no household consumes less than 150 pesos of food per month, and 0.01% of the sample consumes less than 193 pesos of food per month (the value of the in-kind basket). However, looking at individual PAL food items, there appears to be considerable over-provision.

The solid curves in Figure3 are empirical CDFs of monthly quantities consumed by post-transfer Cash households for each PAL food item - note the different scales on the horizontal axes.[20] I discuss the dashed curves below. The vertical lines delineate the PAL transfer quantities, $\overline{q}_n$. For households consuming less than $\overline{q}_n$, the distance to the vertical line is the extra-marginality of each item, $EM_n(\overline{q}_n)$ (equation 1). It is evident that many households do not consume the in-kind foods at all; yet if transfers had been made in-kind, all would have received substantial rations. For example, powdered milk and canned fish are not consumed by about 82% and 76% of households, respectively. Note that PAL corn flour transfers are extra-marginal for about 83% of households, yet corn, in all its varieties, comprises about 17% of total food consumption (see Table 1). Households are accustomed to eating corn in either kernel or tortillas form, yet PAL transfers include corn flour.

The integration of each CDF from zero to the vertical line would provide an estimate of the average quantity over-provided for the sample as a whole. The intersection point of the CDF and the vertical line identifies the percentage of over-provided households, or the extensive margin of over-provision for the sample. Panel A of Table 3 summarizes this extensive margin numerically. Some items such as beans and oil are over-provided to only a few households (9.6 and 10.2 percent, respectively) while others, such as milk powder and lentils are over-provided to most (90.2 and 87.1 percent, respectively).

The aggregate value of extra-marginal transfers for each household is obtained as in equation 4, using village level prices. However, it will prove convenient to express $EM_{Total}(\overline{q}_1, \ldots, \overline{q}_{10})$ for each household as a percentage of the value of the in-kind basket - this distribution is plotted as the solid kernel density in Figure 4.[21] Over-provision is obviously not limited to a subset of

[20] The sample is top coded at the 95^{th} percentile for expositional convenience.

[21] Algebraically, this kernel density estimates the distribution of $\frac{EM_{Total}(\overline{q}_1,\ldots,\overline{q}_{10})}{\sum_{n=1}^{10} p_{n,j}\overline{q}_n}$ evaluated at village prices $\{p_{n,j}\}$.

households.[22] This density estimates the extent to which the PAL in-kind food basket would distort consumption, if it was perfectly binding (that is, the entire transfer was consumed). On average, 62.3% of the transfer was extra-marginal (the solid vertical line). However, notice that the variance across households is large implying the burden of over-provision varies across the population.[23]

5.1.2 *Are in-kind transfers consumed?*

The paternalistic benefits of in-kind transfers will be lower if households do not consume what was provided. Such non-binding transfers are measured in a similar manner to extra-marginal transfers above. Refer again to Figure 3 and focus on the dashed CDFs which plot monthly household consumption under the in-kind transfers. Transfers are non-binding for households to the left of the vertical line, in that the household is observed consuming less than the PAL transfer amount, $\overline{q}_n$. Infra-marginal transfers are by definition binding, so we would expect transfers of commonly consumed items, such as beans and oil, to appear to "stick".

Three observations suggest that observed non-binding transfers are a mixture of both re-sale and lumpy consumption. First, all of the goods are non-perishable and can be stored. Second, upon being opened, it would be hard to store part of the package of some items (e.g., canned fish or pasta soup). Third, for some items the quantities transferred are very small (e.g., cereal at 200 grams) and for others the discount rate is likely high (e.g., biscuits). Panel B of Table 3 summarizes the percent of households consuming less than the transfer amounts.

Aggregating across goods, $NB_{Total}(\overline{q}_1, \ldots, \overline{q}_{10})$ is valued at village prices, divided by the total village price of the basket, and plotted as the dashed kernel density in Figure 4. At the mean, 34.5% of the transfer is non-binding. However, there is a large variance and the distribution is skewed left, with 29.8% of the transfer non-binding for the mean household. In summary, in-kind PAL transfers were largely binding, but for specific items and some households the in-kind transfers did not appear to "stick."

[22] Aggregating by the number of extra-marginal items leads to a similar conclusion. 99.6% of households were over-provided with at least one good, while 53.3% were over-provided with 5 or more goods.

[23] This heterogeneity is indeed correlated with many observable characteristics, such as family size and composition. However, much of the variation is unexplained and is likely caused by unobservable tastes for certain foods - this is evidenced by a strong negative correlation between extra-marginal transfers and pre-treatment consumption of the in-kind goods.

5.1.3 *The distorting effect of In-kind transfers*

The extra-marginal value of the in-kind package would not have been consumed had the transfer been made in cash, while the non-binding value is an estimate of what was not consumed in practice; their difference estimates the extent to which the in-kind transfer distorts consumption. The extensive margin of the distortion effect can be seen for individual food items by differencing Panels A and B of Table 3, which is summarized in Panel C. For example, the most distorting item was milk powder - 44.1% of households were induced by the in-kind transfer to consume more milk powder than they would have under the cash transfer. The least distorting item - beans - only distorted consumption for 0.8% of households. Good-by-good comparisons such as these are useful if the policy objective is to increase consumption of specific items.

The aggregate distortion effect of the PAL in-kind basket can be seen in Figure 4 as the difference between the percentage of the basket that was extra-marginal and that which was non-binding. Note that randomization only identifies mean differences between the Cash and In-kind groups; without stronger assumptions, we can not "match" the distributions to answer the policy relevant question of what would be consumed under a cash transfer by those who were most distorted by the transfer in kind.

The aggregate distortion effect is not trivial, as can be seen by the plotted dis-similar densities. Comparing the means of the distributions, the average distortion effect is 27.9 percentage points with a clustered standard error of 1.8 percentage points. In level terms, in-kind PAL transfers forced households to consume 53.4 pesos more of the PAL basket than did the 150 peso cash transfer.[24]

5.2 Treatment Effects on Consumption

5.2.1 Aggregate Consumption

The results of the previous section suggest that the distorting effects of the in-kind PAL transfers are likely to be small for total food, but significant for individual food items. This section examines how these distortions influenced household consumption of other goods, first looking at aggregated consumption categories and then disaggregating to uncover possible substitution patterns amongst substitutes of in-kind goods.

Table 4 displays coefficients of interest from the estimation of equation 7 by OLS for four outcomes: total, food, and non-food consumption, and a category containing only the 10 food

[24] 53.4 pesos equals the average price of the in-kind basket in in-kind and cash villages, 191 pesos, times 27.86 percentage points.

items in the PAL basket. The bottom panel contains $ATT^{EQ}(Cash)$ - the predicted effect of a 193 peso cash transfer - and the p-value of a test of its significant difference from $ATT(IK)$.[25]

It is clear from column (1) that both transfer types significantly increased total consumption, but that effect sizes are indistinguishable from one another ($p\text{-}value$=0.44). Moreover, if the cash transfer had been of equal monetary value to the in-kind basket, the mean treatment effects are virtually identical - with ATT(IK) equal to 69.6 pesos and ATT^{EQ}(Cash) equal to 68.95 pesos.

Looking at food consumption only in column (2), again we can not reject the hypothesis that consumption increased by the same amount across equal valued transfer types: $ATT^{EQ}(Cash)$ for food is 44.66 pesos per AE, which is insignificantly different from $ATT(IK)$ for food of 60.65 pesos. As implemented, however, the in-kind transfers increased food consumption significantly more than did cash transfers (p-value = 0.06).[26]

Importantly, the majority of increased consumption consisted of food, under both in-kind and cash transfers - comparing across columns (1) and (2), food comprised $87\%(=\frac{60.65}{69.60})$ of the increase in total consumption for in-kind households and $65\%(=\frac{34.72}{53.56})$ of the increase for cash households.

Column (3) shows that consumption of the 10 food items in the PAL basket increased significantly more under the in-kind than the cash transfer - in-kind transfers induced an extra 40 pesos of consumption per AE of in-kind food items while the 150 peso cash transfer only induced a 7 peso increase. With approximately 4 adult equivalents per household, treated in-kind households only increased consumption of in-kind goods by about 160 pesos, or half of the value of the in-kind transfer. This is reflecting the evidence presented in previous section that in-kind transfers were either infra-marginal or non-binding; if not, we would expect $ATT(IK)$ for in-kind goods to equal the entire value of the in-kind transfer. A similar comparison for the Cash group implies that total household consumption of the PAL in-kind goods only increased by about 28 pesos. Even under an equal-valued cash transfer, we only would have seen a 9 peso per AE increase in the consumption of in-kind goods ($ATT^{EQ}(Cash)$), or about 36 pesos for the household as a whole. Comparing across columns (2) and (3), $66\%(=\frac{40.07}{60.65})$ of food increases for in-kind households were on in-kind goods, while under a 150 peso Cash transfer about a third of that percentage, $21\%(=\frac{7.18}{34.72})$, of the food increase consisted of the PAL in-kind goods.

Finally, column (4) contains treatment effects for non-food consumption. Neither the cash

[25]The top and bottom 1% of outliers are trimmed for each dependent variable; all main empirical conclusions are robust to this cut.

[26]Note that PAL transfers did indeed influence consumption through a different channel, namely general equilibrium price effects. Cunha, De Giorgi, and Jayachandran (2011) show that PAL cash transfers, through the income effect, increased demand and thus prices of foods by approximately 4% relative to the control. They also show that in-kind PAL transfers depressed prices of PAL goods and close substitutes by approximately 4%, relative to the cash transfer. Thus, the observed differential effects of cash and in-kind transfers on consumption are inclusive of these general equilibrium price effects.

transfer nor the in-kind transfer increased non-food consumption significantly compared to the control, although both point estimates are large. Comparing across treatments, the treatment effects are not significantly different from one another, even upon scaling up to compare equal-valued transfers (p-value = 0.18)

In summary, both in-kind and cash transfers led to large increases in total consumption of similar magnitude. In-kind households spent somewhat more of the increase on food than did cash households, but not significantly so. I now explore disaggregated consumption categories in order to expose whether cash transfers were spent in a manner consistent with the social preferences that motivated the PAL food transfers, and to what extent the PAL in-kind transfers altered consumption compared to an unrestricted cash transfer.

It is worth noting that treatment effects are relatively large compared to the value of the transfers. Scaling per-adult-equivalent treatment effects in Table 4 up to the household level implies multiplier effects for total consumption of 1.50 (s.e. 0.51) and 1.44 (s.e. 0.74) for the in-kind and cash treatments, respectively.[27] These large multipliers are not, in fact, surprising in light of similarly large multipliers from other transfer programs in Latin America.[28] One explanation (amongst many) for this multiplying effect is that households made profitable investments in physical capital not previously chosen due to either a lack of credit or a risk aversion profile that declines with income. Furthermore, the large standard errors associated with both multipliers imply that I cannot reject the hypothesis that either is equal to unity.

5.2.2 Disaggregate Consumption

Table 5 contains treatment effects for eight main consumption categories and several sub-categories, estimated with equation 7.[29] The categories are largely self-explanatory except for several "other" categories, which contain items that are consumed infrequently, if at all, by most households.[30] The table contains estimates of $ATT^{EQ}(Cash)$ and $ATT(IK)$, along with the p-value of a test of their equality.

[27] The in-kind treatment group has a mean village in-kind basket price of 190.6 pesos and 4.11 AE per household on average: $(\frac{69.60*4.11}{190.6}) = 1.50$; the cash treatment group has an average of 4.04 AE per household: $(\frac{53.61*4.04}{150}) = 1.44$.

[28] For example, Gertler, Martinez, and Rubio-Codina (2006) find a multiplier of 1.34 from the Mexican cash transfer program Oportunidades, Martinez (2004) finds a multiplier of 1.50 from the BONOSOL old-age pension in Bolivia, and Sadoulet, de Janvry, and Davis (2001) find multipliers ranging from 1.5 to 2.6 from the Mexican cash transfer program to farmers PROCAMPO.

[29] The top 1% of outliers are trimmed for each dependent variable; all main empirical conclusions are robust to this cut.

[30] The categories are mutually exclusive and exhaustive of the 61 food and 26 non-food categories included in the analysis. "Other grains" include white and sweet rolls, sliced bread, wheat flour, and wheat tortillas. "Other starches" include oats, soy, and the corn-based drink *atole*. "Junk food" includes sweet cakes (*pastelillos*), fried chips (*frituras*), chocolate, and sweets (*dulces*). "Sweet drinks" includes soda, bottled fruit drinks, and fruit drink powder.

Fruits and Vegetables

Fruits and vegetables increased markedly and significantly under both equal-valued cash and in-kind transfers, compared to the control; and, these increases are statistically indistinguishable from each other (p-value = 0.25). Fruits and vegetables composed a large percentage of the increase in food for both transfer types, as can be seen comparing with column (2) of Table 4; fruits and vegetables compose 37% of the increase in food under a 193 peso cash transfer and 20% of the increase under the in-kind transfer. To the extent that fruits and vegetables lead to improved health, this is evidence against the paternalistic justification for in-kind transfers.

Grains and Pulses

Five of the 10 PAL goods were grains - corn flour, rice, pasta, biscuits, and cereal - and the second row of Table 5 shows that consumption of all increased significantly under in-kind transfers, compared to both no transfer and an equivalent-valued cash transfer. However, increases in *overall* grain consumption under both transfers types are indistinguishable from one another (p-value = 0.25), at about 14 and 9 pesos per adult equivalent under in-kind transfer and equivalent-valued cash transfers, respectively. This is evidence that the in-kind transfers forced households to shift their consumption amongst types of grains, but that there was only a slight distorting effect of the in-kind transfers for grains overall.

Evidence of this substitution effect of in-kind transfers can be seen in the differential consumption of corn types by transfer mechanism. In-kind households increased their consumption of the corn flour that was provided to them by 3.07 pesos per AE, while cash households increased their consumption corn grain and tortillas by a noisy 2.22 pesos per AE. Note that the in-kind corn flour is nutrient-enriched while the corn grain and tortillas are in general not; the in-kind corn-flour may therefore induce better nutrition, but the effect sizes are small compared to the amount of corn consumed (median corn consumption per AE is about 155 pesos per month) and will likely not lead to significant health differences.

Considering the consumption of pulses (beans and lentils), lentil consumption increases significantly under the in-kind transfer ($ATT(IK) = 1.90$ pesos per AE). It is not surprising to see an insignificant increase in bean consumption under the in-kind transfer given that beans were largely infra-marginal.

Dairy, Meat, and Fats

In-kind milk transfers led to increased milk powder consumption, and this increase is over 5 times higher than that which would have occurred under an equivalent-valued cash transfers (21.91 pesos for $ATT(IK)$ compared to 3.86 pesos for $ATT^{EQ}(Cash)$). In-kind transfers also induced households to reduce their consumption of liquid milk - evidence that the milk powder transfer was over-provided. As more milk was consumed under in-kind transfers, the evidence again suggests that we must turn to health outcomes in an effort to justify transfers in-kind.

There is more evidence of substitution induced by the in-kind transfers in the next row on animal derived products. In-kind transfers of canned fish increased their consumption ($ATT(IK) =$ 4.37 pesos) relative to the cash transfer, but that increase is offset partially offset by the consumption of other seafood ($ATT^{EQ}(Cash) = 2.99$ pesos).

The "Fats" category is disaggregated to oil and the oil substitutes mayonnaise and lard. The in-kind oil transfer increased consumption of oil significantly, but with a small economic magnitude (1.03 pesos per AE), while cash transfers had an insignificant effect on fats consumption.

Alcohol, Tobacco, and Junk Food

Of interest in the "other foods" category are junk food & sweet drinks and alcohol, and tobacco in the non-foods category. The decision to make paternalistic food transfers may have been motivated by the fear that unconstrained cash transfers would have been spent on these goods; however, the evidence suggests otherwise. Junk food and sweet drinks contains consumption of candies, fried chips, soda, sweet cakes, and sweet fruit juices, and consumption increased in small magnitude and insignificantly - by 3.37 and 1.11 pesos per AE under in-kind and cash transfers, respectively. Furthermore, these point estimates are insignificantly different from one another (p-value = 0.39).

For alcohol consumption, while both treatments induced statistically significant increases (1.73 pesos per AE under in-kind transfers and 2.89 under cash) they are also indistinguishable from each other.[31] Expenditure on tobacco is not significantly effected by either transfer type, although the noisy negative point estimates are suggest a negative income elasticity for tobacco.[32]

[31] Only 5% of households report consuming alcohol in any amount. This is most likely an underestimate as the survey was usually answered by the female head of the households who might not be aware of all alcohol purchases by other family members. Importantly, given the large increase in consumption of non-alcohol goods under both transfer types, there is little leeway for household members to purchase non-recorded alcohol.

[32] Estimating a Tobit model for Alcohol and Tobacco consumption leads to similar conclusions, as does using data from a separate module that collected individual information on alcohol and tobacco consumption. Both methods suggest there is little effect of either transfer type on the consumption of these goods versus the control, and no difference between in-kind and cash villages.

Non-food goods

Finally, the bottom row of Table 5 shows that the large (although insignificant) increase in non-food consumption experiences by the cash over the in-kind treatment is concentrated in purchases of schooling inputs, medicine and hygiene products, and transportation. The spending on medicine and hygiene products, which includes the medicine, medical fees, and personal hygiene products, is insignificantly different across transfer types (p-value = 0.14), with about a 14 peso increase under in-kind and a 5 peso increase under cash transfers. However, both effect sizes are relatively large.

In summary, it appears that cash transfers were not spent on the vices (e.g., alcohol and tobacco) or non-nutritious foods (e.g., junk food) that may have motivated the paternalistic in-kind transfers. There is evidence that milk consumption was higher under in-kind transfers, but that a large percentage of the transfer was spent on fruits and vegetables under both transfer types. Cash transfers only significantly increased the consumption of 3 in-kind items (biscuits, milk powder, and canned fish) while in-kind transfers increased consumption of all transferred items except beans. I now consider whether the small observed differences in consumption led to meaningful changes in health and nutrition of children.

5.3 Treatment Effects on Nutrition and Health

I report average treatment effects for children aged 0 to 6 years old in the follow-up survey for the following outcomes: anemia, self-reported sickness, height, weight, total calories consumed, and consumption of three micro-nutrients, vitamin C, iron, and zinc. The literature has documented wide-spread deficiencies in vitamin C, iron, and zinc in Mexican children and shown that such deficiencies can negatively impact both short and long term child health and development (Barquera et. al. 2001). Table 6 contains baseline summary statistics, and conveys the age structure of the data available.[33] At baseline, children consumed fewer calories than recommended, and, for many, those calories do not contain essential micro-nutrients - 32% of children are not consuming the Recommended Dietary Allowance (RDA) of iron, while 47% and 41% are not consuming the RDA of vitamin C and zinc, respectively. 9% are under-weight and 18% are stunted, while over a third report being sick in the last week. Anemia is caused by an iron deficiency and its prevalence is high (18%), especially amongst younger children.[34]

I estimate equation 7 for each outcome, pooling all children and including age fixed effects.

[33]The 24-hr food recall was a rolling module for children aged 1 to 4 in the baseline and 2 to 6 in the followup. Anthropometric measurements were made for children aged 0 to 4 in the baseline and 0 to 6 in the followup. Sickness was asked of all children in both waves. Anemia prevalence data is only available for the follow-up, ages 2 to 6.

[34]The statistics on anemia reported in Table 7 are for the control group in the follow-up, as blood tests for anemia are not available in the baseline.

The only exception is for anemia prevalence which uses a single differenced version of 7 as only follow-up data was available for this outcome. Again, I am interested in the effects of equal-valued cash and in-kind transfers, so I report $ATT^{EQ}(Cash)$ for the levels of calories and micro-nutrients in Panel A of Table 7. However, as mentioned above, the extrapolation is not well-defined for the distribution of treatment effects, so I instead report $ATT(Cash)$ for the percentage of children that move above the RDA for micro-nutrients in Panel B.

Nutrition

$ATT^{EQ}(Cash)$ and $ATT(IK)$ for caloric intake are nosily centered around zero with point estimates suggesting small positive program effects; however, the effects are not significantly different (p-value=0.59).[35] Caloric intake alone, however, does not imply a nutritious diet is being consumed.

In fact, Table 7 shows that equal-valued cash and in-kind transfers both led to increased consumption of essential micro-nutrients. There is a clear indication that more iron (p-value=0.09), and possibly more zinc (p-value=0.14), were consumed under the in-kind transfer than would have been consumed under an equal-valued cash transfer. Vitamin C intake increased by similar magnitudes under each transfer type and Panel B of Table 7 shows these increases were meaningful. The probability of consuming above the RDA of vitamin C increased by 19.9 and 13.7 percentage points for the in-kind and cash groups, respectively. Recall that this outcome is likely a lower bound on the positive effects of an equal-valued cash transfer. The increases in iron and zinc consumption under the in-kind transfer was similarly meaningful; the probability of consuming above the RDA for iron increased by 9.6 percentage points and by 10.8 percentage points for zinc. The larger increase in iron and zinc consumption is likely reflecting increased milk consumption by the in-kind group, as the PAL milk is enriched with iron and zinc.

Health

Treatment effects on health in column (1) of Table 8 are in general more muted than for micro-nutrient intake. This may, however, be partly due to the fact that on average PAL aid, in either form, was only received for about one year between survey waves. Pooling ages, child height did not increase significantly over the control for either the in-kind or cash transfer. Although we might expect to only see short term effects of either transfer on the youngest cohorts, column (2) shows there are no significant effects of either transfer over the control, and importantly no difference between transfer type. The incidence of sickness is significantly lower for both in-kind and cash transfers as compared to the control, at 7 and 9 percentage points, respectively, but again there is

[35] Pooling all ages masks some heterogeneity across ages, but there is still no consistent difference between transfers type. In particular, children aged 2 in the follow-up in both In-kind and Cash groups show large increases in caloric intake compared to the Control.

no difference between transfer types.[36] Finally, there is no trend in changes in the prevalence of anemia for either transfer type.[37]

The results of Tables 7 and 8 suggest that there were small positive program effects on nutrition and health for both cash and in-kind transfers, but differences across transfer types are small or non-existent. There is some evidence that the positive nutrition effects for the in-kind group are coming through milk consumption, as evidenced by the larger intake of iron and zinc. If the goal of the PAL transfers was to have more children consuming adequate amounts of iron and zinc, these results show that in-kind transfers were slightly more effective than cash transfers.

6 Cost Effectiveness

Other motivations certainly motivate the choice to make welfare transfers in-kind rather than in-cash, one of them being transaction costs. While the main focus of this paper is to test whether the paternalistic motivation is justified, it behooves us to examine the differential costs between in-kind and cash PAL transfers. In-kind transfers, when goods are provided rather than vouchers, require extra procurement, storage, and transportation costs, relative to cash.[38] For the PAL in-kind transfer, per package distribution costs are estimated to be about 30 pesos (Yarahuán et. al. 2006). However, this 30 peso-per-box cost is a lower-bound on the total costs of making transfers in-kind, as it is does not include salaries for staff to assemble the packages, facilities operations for warehouses where the boxes were packaged and stored, and transportation of the boxes to the villages[39]. With a wholesale cost of the food in each in-kind package of about 150 pesos, this implies an in-kind operating cost of at least 20% of the value of the basket to the government.

No specific information is available on the administration costs for PAL cash transfers. However, given that many of the unmeasured costs mentioned above apply to both cash and in-kind transfers, it is reasonable to assume that cost differential between transfers mechanisms is no less than 30 pesos per box.

[36]The decreased sickness may be a result of the increased vitamin C intake which has been shown to improve immune system function (Hemila 1992).

[37]This conclusion is robust to using blood hemoglobin levels, rather than anemia prevalence, as an outcome.

[38]Corruption is another potential cost, and in-kind and cash transfers are certainly susceptible to different types of corruption and to varying degrees. However, there is no a priori reason to believe that corruption in the PAL program would be greater under one type of transfer than another.

[39]It proves difficult to account for non-distribution costs of the PAL food transfers as many costs were born by PAL's parent organization Diconsa. For example, Diconsa maintains a system of subsidized rural food stores in most PAL localities and it offered PAL all the benefits of its well organized distribution network, storage spaces, supply networks, and administrative capacities.

7 Conclusion

This paper identifies the differential costs and benefits of cash and in-kind food transfers under the Mexican governments' *Programa de Apoyo Alimentario*. More generally, it offers a clear test of the predictions of the canonical theory of consumer demand under potentially distorting in-kind transfers. In terms of total food, the in-kind transfer is completely infra-marginal and, as the theory predicts, there is no differential impact on total food consumption as compared to an equal-valued cash transfer. However, considering individual food items in the basket separately, there is clear evidence of over-provision. Importantly, households receiving cash transfers increased their consumption of nutritious foods, such as fruits and vegetables, while not indulging in vices.

This paper finds minimal evidence that can justify the paternalistic motivation of this in-kind food transfer program. Furthermore, the cost savings of replacing the PAL food transfers with cash would be sizeable. This paper demonstrates that a properly designed randomized controlled trial is a powerful tool that allows policy makers to shed light on the necessity of paternalistically motivated in-kind transfers, as opposed to unrestricted cash.

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A The Education Treatment

This appendix details the unsuccessful randomization of PAL experimental villages into educational classes. This treatment was motivated by a desire to test if information on nutrition, hygiene, and health is an important compliment to the receipt of in-kind food transfers. While orthogonal randomizations of this type are a cost-effective way to test multiple hypotheses within the context of one field experiment, the education treatment was in practice contaminated as some households in the "no education" in-kind treatment group did in fact receive classes.

Data on class attendance was collected in the post-treatment survey; no administrative attendance data is available. All households, regardless of their treatment status, were asked the number of classes they attended and what themes were covered. They were allowed to list up to 4 themes from the choices of: organization of PAL, nutrition, health, and hygiene. Table A.2 displays attendance rates on the extensive (Panel A) and intensive (Panel B) margins, by treatment group. Columns 2 and 4 exclude attendance at introductory classes on the organization and operation of PAL, as every experimental village, regardless of treatment group, was instructed to hold these classes.

Several departures from the experimental design are of note. First, amongst households in the "In-kind" group that were not supposed to attend educational classes, over half did in fact attend non-organizational classes (column 2). Second, of the households in the "In-kind plus Education" and "Cash plus Education" groups that were supposed to receive educational classes, over one quarter did not receive any non-organizational classes (again, column 2). Qualitative evidence from non-experimental regions in Mexico suggests that this observed non-compliance with the educational component of PAL was not unique to the experimental villages (Rodríguez 2005). Importantly, program administrators confirmed that the conditionality of the transfers was never enforced.

Third, column 3 shows that, conditional on attendance at to at least one class, only about 4 or 5 sessions were attended per household. Furthermore, the mean number of classes attended is not significantly different across treatment groups. This attendance pattern is much less than the one

class per month specified in PAL rules and, given that households received on average 12 months of aid between survey rounds, it represents an attendance rate of about 40 percent. Attendance is even lower upon excluding organizational classes (column 4).

I can not conclude whether households were not attending classes or whether the classes were not held by the Committee of Beneficiaries. In either case, the evidence strongly suggests that randomization into educational classes was not successful, vastly reducing the usefulness of this part of the experimental design for causal inference.

B Sample and Receipt of Treatment

B.1 Receipt of Treatment

All households were asked in the follow-up survey if they were incorporated in PAL. If so, enumerators asked to see their identification card and then asked, month-by-month for the past 2 years, whether they received a package and how many packages were received. A household is classified as treated if they report receiving a PAL transfer within the last 3 months (this excludes less than 1% of respondents). On average 90.9% and 86.3% of households in In-kind and Cash treatment groups, respectively, received aid. While this difference is significantly different from zero ($p-value=0.04$), there is no observable difference in the pre-treatment characteristics of participating households across Cash and In-kind treatment groups (results available upon request).

There is a slight imbalance between In-kind and Cash groups in the number of aid packages received, conditional on receiving any package. In-kind households received an average of 12.8 transfers while Cash households received a significantly lower 11.7 transfers. However, this difference is explained by the fact that in-kind villages began receiving packages slightly earlier. Defining the number of *expected packages* as the difference in months between the follow-up interview and the receipt of the first package, the coverage rate is then the ratio of received packages to expected packages (González-Cossío et. al. 2006). Coverage rates for In-kind and Cash households are insignificantly different at 91.1% and 89.1%, respectively.

Of those treated households that had a woman aged 20-60 in the household, 77% of recipients were female. Theories of intra-household allocation suggest that transfers may have different effects depending on the gender of the recipient (Duflo 2003). Importantly, the gender of the recipient of PAL transfers did not vary by transfer type ($p-value=0.95$).

B.2 Identifying Counterfactual Treated Households in the Control Group

In order to estimate Average Treatment on the Treated parameters, I must know which households in the Control group would have received the program in experimental years. Fortunately, the majority of Control villages were incorporated into PAL in at the conclusion of the experiment in 2006. As eligibility rules did not change between 2004 and 2006, I assume that the households that received the program in 2006 would have received the program in 2004 in forming the proper counterfactual comparison group.

For those households that could not be matched by administrative data (due to significantly mis-spelled names, having had moved, or the village not being incorporated in PAL by 2006), I estimate the marginality index used by Sedesol in assigning household eligibility in In-kind and

Cash groups, and use this index to assign the counter-factual treatment status to as-yet unassigned households in the Control group. In this exercise, I use the same observable characteristics used by Sedesol to create their nation-wide marginality index.

B.3 Sample

Excluding incomplete surveys and split-off households, the entire sample (including treated and untreated households) contains 6,706 baseline and 5,851 follow-up households in 208 villages. Excluding the 10 villages as described in the paper drops an additional 306 baseline and 216 follow-up households. 35 baseline and 78 follow-up households with more than half of the consumption categories missing were then dropped, as were 11 more baseline households with no individual level information. One control household that reported receiving PAL is dropped from both waves. 143 baseline households report that a meal was prepared in the last week for a special event. As this does not reflect normal consumption patterns, I exclude these baseline observations.

Further excluding untreated households in the in-kind and cash groups and ineligible households in the control group (as described above) leaves 5,028 baseline and 4,923 follow-up households in 198 villages. I do not use data from any atritted households. 10% of the remaining households are missing information on one or more food items and thus various empirical exercises use fewer observations.

C Data

C.1 Food Consumption and Unit values

Households reported for each of 61 food items the quantity consumed (from all sources, whether purchased, donated, or self-produced), the quantity purchased, and the value of purchased quantities in the past seven days. Enumerators were instructed to convert reported units into either kilograms or liters; however, the option to record units as "pieces", "packets", or "other" were also available and were used in a minority of cases (this happened more often in the baseline than in the follow-up). Thus, I convert all reported units to kilograms or liters using conversion factors complied by the INSP. Monthly quantities are obtained from the reported weekly quantities using a conversion factor of 4.35. I also calculate calories, micro-nutrients, and macro-nutrients consumed using a separate conversion table from the INSP.[40]

The value of food consumption is obtained as follows. First, unit-values are computed by dividing the monetary value of purchases by the quantity purchased, for all households with non-zero purchases.[41] The village level price is defined as the median observed unit-value in the village. Consumption values are thus the product of the quantity consumed and the village price. If there are fewer than 8 observed unit-values within a village, I use the municipality median unit-value to value consumption. If there are still fewer than 8 observations at the municipality level, I use the state median. Consumption in the follow-up is valued using baseline village prices.

[40] I am grateful to Orazio Attanasio and Vincenzo di Maro for providing me with the INSP's calorie/micro-nutrient and unit conversion factor tables.

[41] Households purchased an average of 15 items out of the 61 items asked about in the survey.

C.2 Non-food Consumption

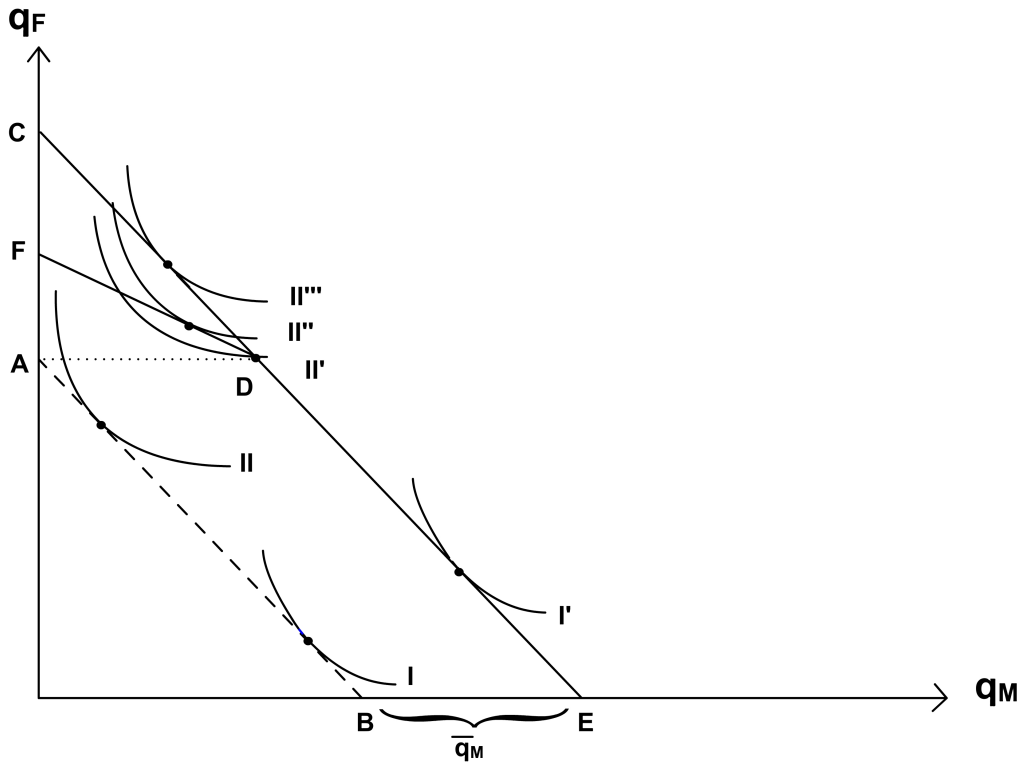
Households also reported consumption expenditures, but not quantities, in the following categories: school and non-school transportation, tobacco, personal hygiene products, household cleaning products, medicine, doctor fees, school fees, fuel for cooking and heating, electricity, rent, household items, clothes, shoes, ceremonies, and hospitalizations. Some items were asked about at the weekly or semi-annual level and I convert them to monthly levels. Expenditures in the follow-up are deflated to baseline levels using the monthly CPI from the Bank of Mexico.

In defining total non-food consumption, I exclude three variables: rent, ceremonies, and hospitalizations. Rent is excluded as data is only available on monetized rent payments and I can not value the informal rental agreements that are likely to be present in these rural villages. Furthermore, only 1% of the sample reports any rent payments. Ceremonies and hospitalizations are excluded as they happen infrequently, often unexpectedly, and therefore do not represent normal consumption patterns. This is evidenced in that fewer than 5% of households report consumption on these items.

C.3 Child Nutrition and Health

Child-level nutrient and caloric consumption were obtained through a 24-hour food recall, in which the respondent (usually the female head of the household) listed the quantities of foods consumed by the household in the past day and how much was consumed by each child. This diet was converted into calories and micro-nutrients levels, and then compared to Recommended Dietary Allowances (RDAs) in order to assess the relative extent of under-nourishment. Anemia is diagnosed through a safe and simple finger prick blood test. A child is classified as anemic If the altitude-adjusted concentration of hemoglobin in the blood is lower than 11 grams per deciliter (g/dL) for ages 1 to 4, and 11.5 g/dL for ages 5 and 6. Height, in centimeters, and weight, in kilograms, were measured by the survey team in accordance with international standards (González-Cossío et. al. 2006). Finally, the survey respondent was asked if the each person in the household was sick in the last four weeks and for how many days.

Figure 1: In-kind milk vs. an equivalent-valued cash transfer.



In-kind transfers will only distort consumption, compared to an equal valued cash transfer, if the transfer is extra-marginal and re-sale is costly or prohibited.

Figure 2: Villages in the PAL experiment.

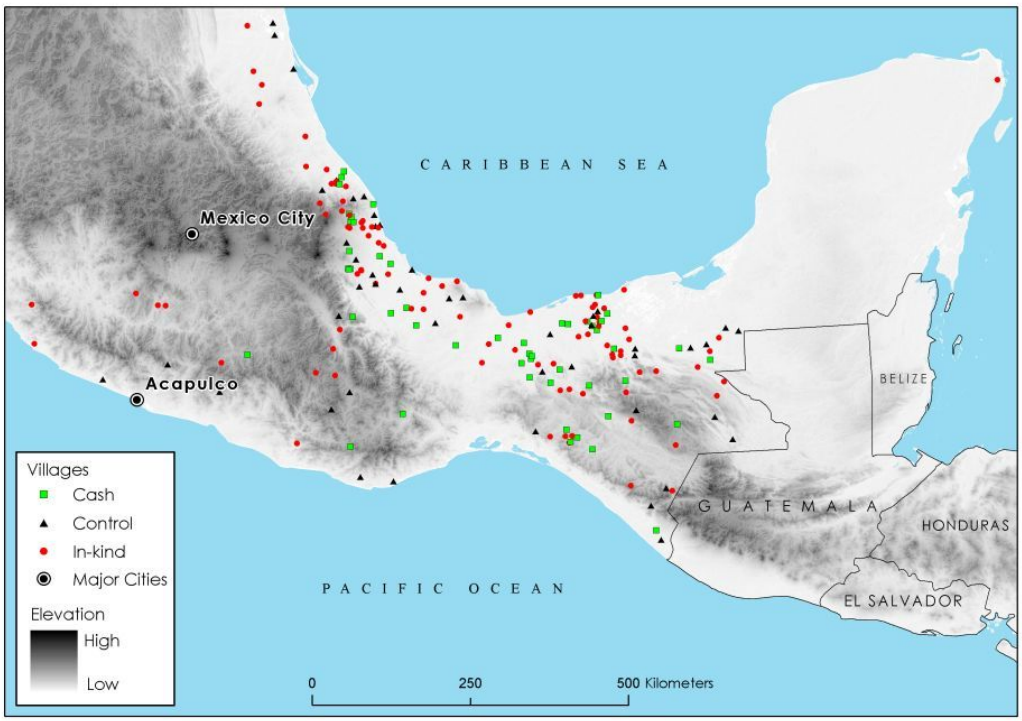
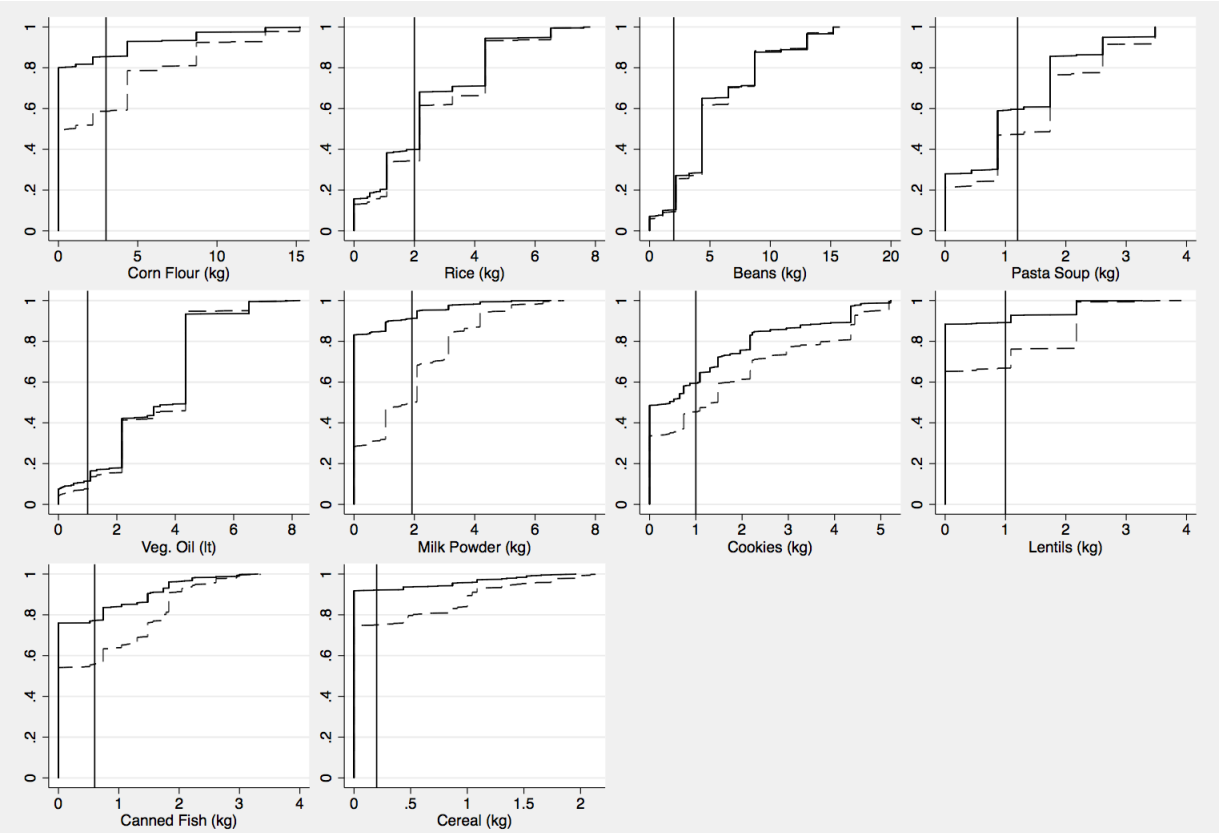


Figure 3: Extra-marginal and non-binding in-kind transfers. CDFs of household consumption quantities. [Solid = Cash, Dashed = In-kind]



Notes: Vertical lines denote in-kind transfer quantities. Data is from treated, post-transfer households. Each good is truncated at the 95th percentile.

Figure 4: Extra-marginal and non-binding value of in-kind basket. Kernel densities of household consumption of in-kind items as a percentage of the basket monetary value.

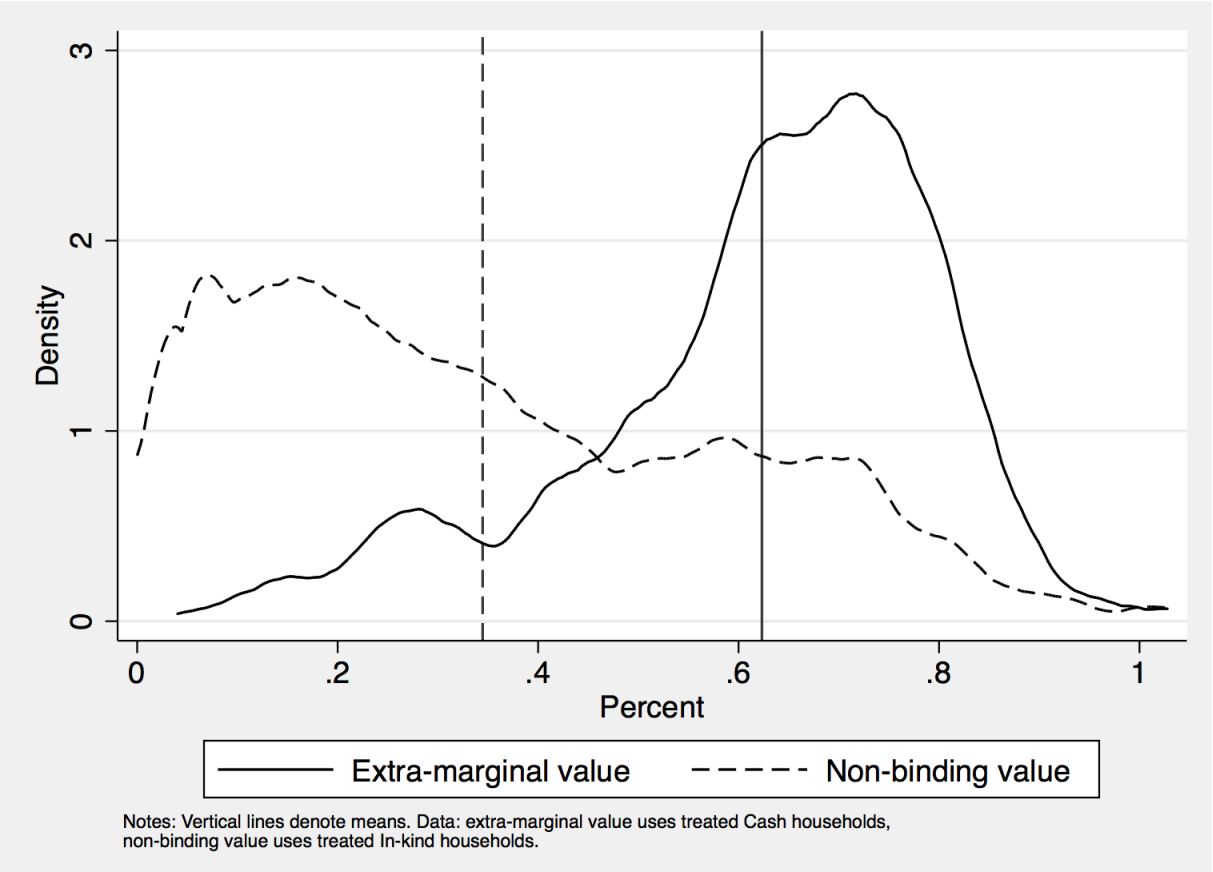


Table 1: Summary of PAL in-kind food box.

Item	Details	Amount (kg)	Value (pesos)				Calories
			Mean	*C.V.*	*25th p-tile*	*75th p-tile*	% of total
Corn Flour	--	3	15.0	0.06	15.0	15.0	20%
Rice	--	2	12.8	0.13	12.0	14.0	12%
Beans	--	2	21.0	0.17	20.0	24.0	13%
Pasta Soup	6 packets	1.2	16.2	0.13	15.0	18.0	8%
Veg. Oil	--	1 (lt)	10.5	0.09	10.0	11.0	16%
Fortified Milk	6 packets	1.92	69.7	0.26	52.1	76.8	17%
Biscuits	--	1	18.5	0.23	15.0	20.6	8%
Lentils	--	1	9.6	0.12	9.0	10.0	2%
Canned Fish	2 cans	0.6	14.4	0.25	11.4	16.2	2%
Cereal	--	0.2	8.1	0.10	7.6	8.0	1%
Total	--	--	191.0	0.11	171.7	202.8	100%

Notes: Items are valued using baseline village level median unit-values. It is unclear whether a household received canned tuna fish (0.35kg) or canned sardines (0.8kg) - the analysis assumes the mean weight and calories throughout. Number of villages = 198. C.V.= Coefficient of Variation. 10 pesos ≈ 1 U.S. dollar.

Table 2: Pre-treatment characteristics by treatment group.

	Treatment group				P-value on tests of equality of means		
	Control	In-kind	Cash	Obs.	Control = In-kind	Control = Cash	In-kind = Cash
Household Demographics							
Adult equivalents (AE)	4.20	4.04	3.98	4,767	0.27	0.16	0.65
	(0.11)	(0.08)	(0.10)				
Number of children aged 0 to 5	0.77	0.70	0.65	4,767	0.24	0.09	0.43
	(0.05)	(0.03)	(0.05)				
Male household head	0.85	0.86	0.87	4,767	0.46	0.19	0.41
	(0.02)	(0.01)	(0.01)				
Education of head (yrs)	4.24	4.35	3.96	4,767	0.65	0.25	0.07
	(0.18)	(0.14)	(0.16)				
Speak indigenous language	0.21	0.17	0.13	4,767	0.59	0.24	0.38
	(0.06)	(0.03)	(0.04)				
Total food consumption per AE	352.43	336.33	334.65	4,758	0.41	0.37	0.92
	(16.01)	(10.92)	(11.81)				
Total non-food consumption per AE	192.88	192.19	196.99	4,760	0.97	0.82	0.76
	(13.56)	(9.52)	(12.51)				
Food consumption outside the home per AE	16.72	13.18	10.73	4,764	0.19	0.04	0.27
	(2.26)	(1.41)	(1.73)				
Budget Shares							
Food (out of total)	0.68	0.68	0.67	4,738	0.88	0.82	0.68
	(0.01)	(0.01)	(0.01)				
Corn (out of food)	0.17	0.17	0.18	4,691	0.78	0.54	0.71
	(0.01)	(0.01)	(0.01)				
Fruit and vegetables (out of food)	0.18	0.18	0.19	4,724	0.38	0.54	0.14
	(0.01)	(0.00)	(0.01)				
Milk (liquid and powdered) (out of food)	0.05	0.05	0.05	4,706	0.55	0.54	0.19
	(0.00)	(0.00)	(0.00)				
Meat (out of food)	0.18	0.19	0.19	4,719	0.62	0.73	0.93
	(0.01)	(0.01)	(0.01)				
Received Program?							
Liconsa	0.02	0.03	0.02	4,767	0.67	0.66	0.31
	(0.01)	(0.01)	(0.01)				
Oportunidades	0.10	0.05	0.06	4,767	0.14	0.24	0.71
	(0.03)	(0.01)	(0.01)				
Household Characteristics							
Has dirt floor	0.33	0.29	0.31	4,767	0.44	0.69	0.71
	(0.04)	(0.03)	(0.03)				
Piped water in home	0.64	0.58	0.50	4,767	0.40	0.09	0.27
	(0.05)	(0.04)	(0.06)				
Temporary walls or roof	0.15	0.18	0.16	4,767	0.46	0.87	0.54
	(0.03)	(0.02)	(0.03)				
Toilet in the home	0.62	0.62	0.61	4,767	0.98	0.86	0.82
	(0.05)	(0.03)	(0.05)				
Electric lights	0.81	0.91	0.90	4,767	0.08	0.13	0.87
	(0.05)	(0.02)	(0.03)				
Owns refrigerator	0.40	0.46	0.51	4,767	0.22	0.04	0.24
	(0.04)	(0.03)	(0.03)				
Owns washing mach.	0.22	0.22	0.21	4,767	0.99	0.80	0.73
	(0.03)	(0.02)	(0.02)				
Owns home	0.83	0.82	0.82	4,767	0.74	0.67	0.87
	(0.02)	(0.01)	(0.02)				
Farms or raises animals	0.31	0.37	0.43	4,767	0.24	0.03	0.17
	(0.04)	(0.03)	(0.04)				
Village Characterictics							
Kilometers to municipal head	226.93	232.60	260.65	4,767	0.88	0.42	0.40
	(32.39)	(19.85)	(26.45)				
Village population	675.95	584.18	557.44	4,767	0.39	0.32	0.77
	(92.34)	(52.98)	(73.78)				
Price of In-Kind basket	188.48	190.99	192.83	4,767	0.51	0.34	0.63
	(3.18)	(2.02)	(3.25)				

Notes: Sample includes all treated households in Cash and In-kind groups, and all matched treatment households in the Control group. Robust (s.e.) clustered at the village level. Expenditure is measured in Mexican Pesos (~10 pesos / 1 U.S. dollar). Receipt of programs Liconsa (milk subsidies) and Oportunidades (conditional cash transfers) are self-reported and included if any household member recieved the program in the past year.

Table 3: Extra-marginal and non-binding transfers. The percent of households consuming below in-kind transfer amounts.

Food Item	In-kind amount	Panel A Extra-marginal Transfers	Panel B Non-binding Transfers	Panel C Distortion Effects
Corn Flour	3 (kg)	82.7%	55.0%	27.7%
Rice	2 (kg)	36.7%	30.5%	6.2%
Beans	2 (kg)	9.6%	8.8%	0.8%
Pasta Soup	1.2 (kg)	57.7%	44.5%	13.2%
Oil	1 (lt)	10.2%	6.7%	3.5%
Milk Powder	1.92 (kg)	90.2%	46.0%	44.1%
Biscuits	1 (kg)	55.8%	43.3%	12.5%
Lentils	1 (kg)	87.1%	61.4%	25.8%
Canned Fish	0.6 (kg)	75.2%	51.6%	23.6%
Cereal	0.2 (kg)	88.5%	70.3%	18.3%

Notes: % of households consuming below In-kind amount
Panel A data is from treated, post-transfer Cash households. An item is considered extra-marginal if observed monthly consumption is less than the in-kind PAL quantity. Sample sizes range from 1,237 to 1,254.
Panel B data is from treated, post-transfer In-kind households. An item is considered non-binding if observed monthly consumption is less than the in-kind PAL quantity. Sample sizes range from 2,463 to 2,515.
Panel C is the difference between Panels A and B.

Table 4: Average treatment effects on treated households for aggregated consumption categories. OLS difference-in-differences.

	Total (Food + Non-food)	Food Only	PAL In-kind food items	Non-food Only
	(1)	(2)	(3)	(4)
Estimated Coefficients				
In-Kind	-18.41	-18.58	-0.69	-5.14
	(25.98)	(15.44)	(2.20)	(13.13)
Cash	1.40	-6.55	-0.49	6.85
	(31.82)	(18.09)	(2.52)	(15.96)
POST	140.66	46.15	4.79	93.07
	(22.82)***	(14.54)***	(1.87)**	(10.51)***
In-kind x POST: ATT(In-kind)	69.60	60.65	40.07	8.37
	(23.57)***	(15.15)***	(3.10)***	(11.29)
Cash x POST: ATT(Cash)	53.61	34.72	7.18	18.84
	(27.33)*	(17.39)**	(2.39)***	(13.48)
H_{01}: ATT(IK) = ATT(Cash), p-value	0.44	0.06	0.00	0.33
Equal-valued transfers: Extrapolation				
ATT^{EQ}(Cash)	68.95	44.66	9.23	24.23
	(35.14)*	(22.37)**	(3.07)***	(17.33)
H_{02}: ATT(IK) = ATT^{EQ}(Cash), p-value	0.98	0.34	0.04	0.18
Observations	9994	9997	9943	9861
R-squared	0.225	0.188	0.182	0.165

Notes: Dependent variables measured in aduly equivalents. Hypotheses H01 & H02 are tested with F-tests. All regressions include baseline village level controls (the presense of a Diconsa store, state indicators, and month of interview indicators).The top and bottom 1% of outliers are trimmed for each dependent variable. PAL In-kind food items include: corn flour, rice, beans, pasta soup, vegetable oil, milk powder, biscuits, lentils, canned fish, and breakfast cereal. Robust (s.e.) clustered at the village level. ***p<0.01, ** p<0.05, * p<0.1

Table 5: Average treatment effects on treated households for disaggregated consumption categories. OLS difference-in-differences.

	Main category	Sub-categories						
	Fruit & Vegetables	Fruit	Vegetables					
ATT(In-kind)	12.13	8.83	4.15					
	(3.55)***	(2.21)***	(1.81)**					
ATT^{EQ}(Cash)	16.56	11.56	7.03					
	(5.35)***	(3.26)***	(2.90)***					
H_0 (p-value)	0.25	0.26	0.22					
	Grains	Corn Flour†	Corn Grain & Tortillas	Rice†	Pasta†	Biscuits†	Cereal†	Other grains
ATT(In-kind)	13.57	3.07	0.44	1.08	1.81	4.90	3.29	0.53
	(3.62)***	(0.63)***	(2.29)	(0.30)***	(0.29)***	(0.74)***	(0.64)***	(0.95)
ATT^{EQ}(Cash)	8.47	0.64	2.22	0.24	0.14	2.77	0.27	1.09
	(5.04)*	(0.82)	(3.76)	(0.42)	(0.40)	(0.87)***	(0.69)	(1.38)
H_0 (p-value)	0.25	0.00	0.59	0.01	0.00	0.01	0.00	0.61
	Pulses	Beans†	Lentils†					
ATT(In-kind)	2.47	0.81	1.90					
	(0.75)***	(0.72)	(0.17)***					
ATT^{EQ}(Cash)	1.17	1.06	0.18					
	(1.02)	(0.98)	(0.19)					
H_0 (p-value)	0.10	0.74	0.00					
	Dairy	Milk powder†	Liquid milk	Cheese & Yogurt				
ATT(In-kind)	13.60	21.91	-10.57	0.30				
	(3.07)***	(1.42)***	(2.02)***	(1.30)				
ATT^{EQ}(Cash)	4.37	3.86	-0.42	1.82				
	(4.25)	(0.98)***	(2.71)	(2.03)				
H_0 (p-value)	0.01	0.00	0.00	0.32				
	Animal	Chicken	Beef & Pork	Seafood	Canned fish†	Eggs		
ATT(In-kind)	6.49	-0.56	4.94	0.37	4.37	-0.61		
	(3.87)*	(1.92)	(1.42)***	(1.76)	(0.59)***	(0.57)		
ATT^{EQ}(Cash)	7.32	2.61	3.68	2.99	1.51	-0.91		
	(6.05)	(3.00)	(2.19)*	(3.01)	(0.71)**	(0.87)		
H_0 (p-value)	0.87	0.23	0.47	0.30	0.00	0.67		
	Fats	Oil†	Mayonnaise & Lard					
ATT(In-kind)	0.55	1.03	-0.08					
	(0.60)	(0.48)**	(0.34)					
ATT^{EQ}(Cash)	-0.10	-0.25	0.59					
	(0.84)	(0.59)	(0.51)					
H_0 (p-value)	0.32	0.00	0.12					
	Other food	Other starch	Alcohol	Coffee	Sugar	Junk food & Sweet drinks		
ATT(In-kind)	5.79	0.90	1.73	-1.47	0.50	3.37		
	(3.38)*	(0.30)***	(0.89)*	(0.97)	(0.44)	(2.52)		
ATT^{EQ}(Cash)	3.45	1.61	2.89	-3.07	1.40	1.11		
	(4.83)	(0.42)***	(1.42)**	(1.38)**	(0.70)**	(3.40)		
H_0 (p-value)	0.55	0.06	0.39	0.16	0.10	0.39		
	Non-food	School	Medicne & Hygiene	Transpor-tation	Clothes	Household items	Tobacco	Toys
ATT(In-kind)	9.48	2.72	4.81	1.25	0.87	2.27	-0.50	0.31
	(11.26)	(2.79)	(3.66)	(4.34)	(1.46)	(4.46)	(0.44)	(0.25)
ATT^{EQ}(Cash)	26.98	5.35	13.66	5.69	1.48	0.32	-1.15	0.17
	(17.19)	(4.46)	(6.53)**	(5.94)	(2.40)	(6.48)	(0.72)	(0.32)
H_0 (p-value)	0.19	0.46	0.14	0.29	0.77	0.69	0.24	0.50

Notes: Dependent variables are expenditure per adult equivalent in the given category. H_0 is the hypotheseis that ATT(IK) = ATT^{EQ}(Cash), tested with an F-test, p-values reported. All regressions include baseline village level controls (the presense of a Diconsa store, state indicators, and month of interview indicators). The top 1% of each dependent variable is trimmed. Sample sizes range from 9,429 to 9,645. † indicates in-kind item. Main food categories are mutually exclusive and exhasstive subsets of the "total food" variable used in previous table; sub-categories are mutually exclusive and exhaustive subsets of goods in the respective main category. Robust s.e. clustered at the village level. ***p<0.01, ** p<0.05, * p<0.1

Table 6: Child nutrition and health, summary statistics.

		Pooled	Age						
			0	1	2	3	4	5	6
Calories	*Mean*	--	--	744	862	901	957	--	--
	RDA	--	--	900	1000	1300	1300	--	--
Micro-nutrients									
Iron	*% < RDA*	32%	--	47%	27%	20%	34%	--	--
Vitamin C	*% < RDA*	47%	--	45%	41%	41%	58%	--	--
Zinc	*% < RDA*	41%		37%	31%	33%	62%	--	--
Under-weight	*%*	9%	5%	13%	12%	7%	9%	--	--
Under-height	*%*	18%	6%	25%	19%	18%	22%	--	--
Sick in last 4 weeks	*%*	36%	40%	46%	41%	38%	33%	33%	22%
Anemic*	*%*	18%	--	--	24%	20%	15%	19%	14%

Notes: Baseline summary statistics, except for anemia prevelance for which only follow-up Control group data is reported. Calories & micro-nutrients converted from food intakes collected in the 24-hr recall, and compared to US Department of Agriculture Recommended Dietary Allowences (RDA). Under-weight and under-height defined as less than 2 s.d. from the mean of the US Center for Disease Control reference groups, by age (2000). Sickness is reported by the survey respondent. Anemia is asessed through a finger blood prick test, adjusted for alititude: for ages (2,4), anemia=1[Hb≤11g/dL], for ages=(5,6), anemia=1[Hb≤11.5g/dL].

Table 7: Average treatment effects on child caloric and nutritional intake. OLS difference-in-differences.

Panel A - Levels			Panel B - Relative to RDAs		
Calories	ATT(In-kind)	58.41			
		(39.29)			
	ATT^{EQ}(Cash)	48.9			
		(66.34)			
	Ho (p-value)	0.86			
Iron (mg)	ATT(In-kind)	0.840**	**Iron (> RDA)**	ATT(In-kind)	0.096**
		(0.371)			(0.041)
	ATT^{EQ}(Cash)	0.135		ATT(Cash)	0.006
		(0.60)			(0.043)
	Ho (p-value)	0.15		Ho (p-value)	**0.01**
Vit C (mg)	ATT(In-kind)	15.71***	**Vit C (> RDA)**	ATT(In-kind)	0.199***
		(3.852)			(0.040)
	ATT^{EQ}(Cash)	15.96**		ATT(Cash)	0.137***
		(7.09)			(0.047)
	Ho (p-value)	0.97		Ho (p-value)	0.16
Zinc (mg)	ATT(In-kind)	0.86***	**Zinc (> RDA)**	ATT(In-kind)	0.108**
		(0.27)			(0.053)
	ATT^{EQ}(Cash)	0.45		ATT(Cash)	0.046
		(0.43)			(0.053)
	Ho (p-value)	0.22		Ho (p-value)	0.16
Protein (g)	ATT(In-kind)	1.407	**Protein (> RDA)**	ATT(In-kind)	0.014
		(1.717)			(0.036)
	ATT^{EQ}(Cash)	1.72		ATT(Cash)	-0.014
		(2.74)			(0.041)
	Ho (p-value)	0.88		Ho (p-value)	0.47

Notes: OLS dif-in-dif estimates including all ages (1 to 4 in the baseline, 2 to 6 in the followup). Age dummies and household and village controls included. Panel A reports treatment effects for levels consumed of equal-valued transfers. The independent variable in Panel B is an indicator if the child is above the Recommended Dietary Allowance (RDA), and no extrapolation is made to compare equal-valued transfers. (s.e.) clustered at the village level. Sample size = 3606

Table 8: Average treatment effects on child health. OLS difference-in-differences.

		Pooled Ages	Ages 0 and 1
		(1)	(2)
Height (cm)	ATT(In-kind)	0.33	0.63
		(0.27)	(0.97)
	ATT(Cash)	0.13	0.49
		(0.34)	(1.13)
	Ho (p-value)	0.49	0.89
	Obs.	5420	1655
Weight (kg)	ATT(In-kind)	0.24**	0.22
		(0.11)	(0.23)
	ATT(Cash)	0.10	0.07
		(0.12)	(0.28)
	Ho (p-value)	0.18	0.56
	Obs.	5520	1699
Sickness (indicator)	ATT(In-kind)	-0.07*	-0.04
		(0.04)	(0.06)
	ATT(Cash)	-0.09*	-0.04
		(0.05)	(0.08)
	Ho (p-value)	0.68	0.98
	Obs.	6916	1812
Anemia (indicator)	ATT(In-kind)	-0.01	--
		(0.03)	
	ATT(Cash)	-0.03	--
		(0.03)	
	Ho (p-value)	0.48	--
	Obs.	2071	--

Notes: Panel A: Height and Weight: OLS dif-in-dif estimates including all ages (0 to 4 in the baseline, 0 to 6 in the followup). Age dummies and household and village controls included. Sickness is self-reported, and includes all children aged 0 to 6 in both survey waves. Anemia uses only follow-up data for children aged 2 to 6. Panel B OLS dif-in-dif estimates including only ages 0 and 1 in both survey waves. No extrapolation is made to compare equal-valued transfers. (s.e.) clustered at the village level.

Table A.1: Pre-teatment characteristics by treatment group amongst non-attrited households.

	Treatment group				P-value on tests of equality of means		
	Control	In-kind	Cash	Obs.	Control = In-kind	Control = Cash	In-kind = Cash
Household Demographics							
Adult equivalents (AE)	4.17	4.06	4.01	5,605	0.41	0.27	0.69
	(0.11)	(0.08)	(0.10)				
Number of children aged 0 to 5	0.74	0.69	0.66	5,605	0.30	0.23	0.70
	(0.05)	(0.03)	(0.05)				
Male household head	0.84	0.86	0.87	5,605	0.30	0.07	0.28
	(0.01)	(0.01)	(0.01)				
Education of head (yrs)	4.21	4.24	3.95	5,601	0.88	0.27	0.18
	(0.17)	(0.14)	(0.17)				
Speak indigenous language	0.21	0.17	0.14	5,605	0.56	0.31	0.54
	(0.06)	(0.03)	(0.04)				
Total food consumption per AE	361.88	340.09	333.73	5,593	0.26	0.16	0.69
	(16.19)	(10.66)	(11.99)				
Total non-food consumption per AE	201.70	191.32	198.08	5,592	0.53	0.84	0.65
	(13.86)	(9.17)	(11.80)				
Food consumption outside the home per AE	16.84	13.52	10.36	5,599	0.21	0.02	0.14
	(2.26)	(1.38)	(1.63)				
Budget Shares							
Food (out of total)	0.67	0.68	0.67	5,565	0.64	0.76	0.42
	(0.01)	(0.01)	(0.01)				
Corn (out of food)	0.17	0.17	0.18	5,514	0.84	0.42	0.50
	(0.01)	(0.01)	(0.01)				
Fruit and vegetables (out of food)	0.18	0.18	0.19	5,550	0.36	0.68	0.17
	(0.01)	(0.00)	(0.01)				
Milk (liquid and powdered) (out of food)	0.05	0.05	0.05	5,532	0.73	0.63	0.36
	(0.00)	(0.00)	(0.00)				
Meat (out of food)	0.18	0.19	0.19	5,540	0.53	0.87	0.67
	(0.01)	(0.01)	(0.01)				
Received Program?							
Liconsa	0.03	0.03	0.02	5,605	0.75	0.63	0.38
	(0.01)	(0.01)	(0.01)				
Oportunidades	0.10	0.06	0.06	5,605	0.20	0.17	0.87
	(0.02)	(0.01)	(0.01)				
Household Characteristics							
Has dirt floor	0.32	0.30	0.32	5,605	0.63	0.99	0.61
	(0.04)	(0.03)	(0.03)				
Piped water in home	0.63	0.58	0.51	5,605	0.42	0.13	0.35
	(0.05)	(0.04)	(0.06)				
Temporary walls or roof	0.15	0.18	0.16	5,605	0.28	0.71	0.48
	(0.03)	(0.02)	(0.02)				
Toilet in the home	0.61	0.61	0.60	5,605	0.93	0.91	0.82
	(0.04)	(0.03)	(0.05)				
Electric lights	0.83	0.91	0.89	5,605	0.12	0.32	0.64
	(0.05)	(0.02)	(0.04)				
Owns refrigerator	0.42	0.46	0.50	5,605	0.49	0.16	0.31
	(0.05)	(0.03)	(0.04)				
Owns washing mach.	0.24	0.21	0.21	5,605	0.51	0.50	0.96
	(0.03)	(0.02)	(0.02)				
Owns home	0.84	0.83	0.83	5,605	0.70	0.67	0.91
	(0.02)	(0.01)	(0.02)				
Farms or raises animals	0.32	0.37	0.44	5,605	0.31	0.03	0.14
	(0.04)	(0.03)	(0.04)				
Village Characterictics							
Kilometers to municipal head	228.46	229.37	253.02	5,605	0.98	0.56	0.47
	(32.66)	(19.73)	(26.25)				
Village population	679.50	579.51	548.12	5,574	0.32	0.24	0.72
	(86.04)	(52.82)	(71.22)				
Price of In-Kind basket	189.24	190.71	193.39	5,605	0.70	0.37	0.48
	(3.26)	(1.99)	(3.27)				

Notes: Sample includes all baseline households with completed follow-up surveys. Raw attrition rates were 14.9%, 10.5%, and 10.5% for Control, In-kind, and Cash groups respectively; a significant difference between Control and both In-kind (p-value=0.01) and Cash (p-value=0.03) . Robust (s.e.) are clustered at the village level. Expenditure is measured in Mexican Pesos (~10 pesos / 1 U.S. dollar). Receipt of programs Liconsa (milk subsidies) and Oportunidades (conditional cash transfers) are self-reported and included if any household member recieved the program in the past year.

Table A.2: Receipt of education classes by treatment group.

	Panel A		Panel B	
	Percent of housholds that attended one or more classes		Average number of classes attended, conditional on attending at least one class	
Treatment Group	Including Organizational Classes (1)	Excluding Organizational Calsses (2)	Including Organizational Classes (3)	Excluding Organizational Calsses (4)
In-kind	0.76	0.63	4.2	3.7
	(0.03)	(0.04)	(0.4)	(0.4)
In-kind plus Education	0.85	0.75	5.0	4.6
	(0.02)	(0.02)	(0.3)	(0.3)
Cash plus Education	0.79	0.67	4.4	4.0
	(0.04)	(0.04)	(0.4)	(0.4)
Observations	3,785	3,785	3,549	3,549
P-value on Tests of Equality of Means				
In-kind = In-kind plus Education	0.03	0.01	0.11	0.11
In-kind = Cash plus Education	0.59	0.44	0.73	0.68
In-kind plus Education = Cash plus Education	0.16	0.10	0.21	0.22

Notes: Data is from self-reports in the post-treatment survey. The sample includes only households that report receiving cash or in-kind PAL transfers. Households were asked the total number of classes attended and were allowed to list up to 4 themes that were covered in those classes from the choices of: organization of PAL, health, hygiene, and nutrition. If "organization of PAL" was listed as a theme, I exclude one class in columns (2) and (4). Robust s.e. in parentheses, clustered at the village level.