# The Price Effects of Cash Versus In-Kind Transfers*

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**Abstract**

This paper compares how cash and in-kind transfers affect local prices. Both types of transfers increase the demand for normal goods, but only in-kind transfers also increase supply. Hence, in-kind transfers should lead to lower prices than cash transfers, which helps consumers at the expense of local producers. We test and confirm this prediction using a program in Mexico that randomly assigned villages to receive boxes of food (trucked into the village), equivalently-valued cash transfers, or no transfers. The pecuniary benefit to consumers of in-kind transfers, relative to cash transfers, equals 11% of the direct transfer.

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## 1. Introduction

A central question in anti-poverty policy is whether transfers should be made in kind or as cash. The oft-cited rationales for in-kind transfers are to encourage consumption of certain goods (Besley, 1988) or to induce less needy individuals to self-select out of the program (Nichols and Zeckhauser, 1982; Besley and Coate, 1991; Bearse, Glomm, and Janeba, 2000). These potential benefits of in-kind transfers are weighed against the fact that cash transfers typically have lower administrative costs and give recipients greater freedom over their consumption.

Another important, but less often discussed, aspect of this policy tradeoff is the effect that in-kind and cash transfers have on local prices. Cash transfers increase the demand for normal goods, and if supply is not perfectly elastic, the price of these goods should rise. In-kind transfers have a corresponding cash value, so they similarly shift demand through an income effect. But, in addition, an in-kind transfer program increases local supply. If the government injects supply into a partially-closed economy (e.g., a village), then relative to cash transfers, local prices should fall when transfers are provided in-kind.[1]

These pecuniary effects shift wealth between producers and consumers. With a cash transfer, the price increase for normal goods hurts consumers and favors producers. With in-kind transfers, the increase in local supply lowers prices and helps consumers at the expense of producers. For example, a transfer of packaged food—the in-kind transfer we study in this paper—should result in a lower price for the packaged food in the local economy, relative to a cash transfer. If the poor are net consumers of these goods, then in-kind transfers, via their price effect, will increase the overall transfer to the poor more than cash transfers will.

When there is perfect competition among local producers, these effects are pecuniary externalities. However, if there is imperfect competition among local suppliers—and prices are above the first-best level—then the lower prices induced by in-kind transfers could also reflect an increase in efficiency. In addition, a further effect of the lower prices is that they encourage consumption of the in-kind goods (for both program recipients and non-recipients); if boosting consumption of these items was precisely the paternalistic motive for using in-kind transfers, then the price effects will reinforce the program's goals.

[1]Transfers can also take the form of vouchers, as in the U.S. Food Stamp and WIC programs. In this case the program increases demand for certain goods but local supply is not affected. We are considering in-kind transfers in which the government delivers the goods or services (e.g., public housing projects in the U.S., the Head Start program), rather than providing vouchers. In addition, the type of transfer we consider is one in which the supply is sourced from outside the economy that receives the transfer.

Understanding the size of these price effects is especially important in developing countries, where most of the poor live in rural, often isolated villages (IFAD, 2010). In these partially-closed economies, not characterized by the infinitely elastic supply of small open economies, large transfer programs are likely to have quantitatively important price effects. These pecuniary effects are a potentially useful policy lever; for example, the price declines caused by in-kind transfers can be viewed as a second-best way to tax producers and redistribute to consumers (Coate, Johnson, and Zeckhauser, 1994). Similarly, Coate (1989) discusses how price effects could make an in-kind famine-relief program more effective than a cash program, depending on the market structure. Moreover, even when the main rationale for in-kind transfers is paternalism or self-targeting and the pecuniary effects are an unintended consequence, they might significantly enhance or diminish the program goal of assisting the poor.[2]

This paper tests for price effects of in-kind transfers versus cash transfers and compares both to the status quo of no transfers. We study a large food assistance program for the poor in Mexico, the Programa de Apoyo Alimentario (PAL). When rolling out the program, the government selected around 200 villages for a village-level randomized experiment. The poor in some of the villages received monthly in-kind transfers of packaged food (rice, vegetable oil, canned fish, etc.) that was trucked in by the government. The market price of the food transfer was about 200 pesos (20 US dollars) per household per month. In other villages, the poor households received monthly cash transfers of similar value to the in-kind transfer. A third set of villages served as a control group. Most households in the villages, 89 percent on average, were eligible for the program.

A comparison of the cash-transfer villages to the control villages provides an estimate of the price effect of cash transfers, which should be positive for normal goods since the income effect shifts the demand curve outward. The in-kind transfer that we study has a higher nominal value than the cash transfer, and its actual value to recipients is very similar to the cash transfer; therefore, the *income effect* in the in-kind villages should be similar to that in the cash villages. Thus a comparison of in-kind and cash villages isolates the *supply effect* of an in-kind transfer—the change in prices caused by the influx of goods into the local economy. This supply effect should cause a decline in prices, according to the standard

[2]Another rationale for in-kind transfers is to insulate consumers from price volatility. The welfare effects of insurance against price fluctuations are more often discussed in the context of price stabilization policies (Massell, 1969; Deaton, 1989; Newbery, 1989).

demand-supply framework. This in-kind-versus-cash estimate is relevant to policy makers deciding whether to provide transfers in kind or as cash. Using pre- and post-program data from households and food stores in the experimental villages, we find support for these predictions.

Furthermore, the pecuniary effects of transfers are not restricted to just the transferred items. A cash transfer should affect demand for all goods (there are no "transferred items" in this case). In addition, the supply effect of an in-kind transfer should dampen demand and lead to lower prices for goods that are substitutes of the in-kind items. The cash transfers indeed appear to have caused an increase in overall food prices, and the in-kind transfers to have caused a decline in prices for goods that are close substitutes of the transferred items.

The price effects we estimate are not negligible in magnitude. For the in-kind transfers, the price effect represents an additional indirect benefit for a consumer (relative to no transfer) equal to 5 percent of the direct benefit. For cash transfers, the price increase offsets the direct transfer by 6 percent for a consumer. Choosing in-kind rather than cash transfers in this setting thus generates extra indirect transfers to consumers that are worth 11 percent of the direct transfer itself.

For a producer, these welfare effects are of course reversed. The items provided in-kind are procured from outside the recipient villages, but households that grow crops, which are substitutes for the in-kind goods, see the prices of their products fall. We find that the increase in household welfare from cash (in-kind) transfers indeed seems to be relatively larger (smaller) for agricultural households than for non-agricultural households.

Finally, we examine how these price effects differ depending on how geographically isolated the village is. First, isolated villages are typically less integrated with the world economy, so local supply and demand should matter more in the determination of prices (i.e., supply curves are steeper). Second, there is likely to be less competition on the supply side (i.e., among grocery shops) in these remote and typically smaller villages, which can make prices more responsive to transfers. For both of these reasons, the price effects of transfers may be more pronounced in remote villages, and we indeed see this pattern in the data. Since poorer villages are also typically more isolated (World Bank, 1994), these findings suggest that transfer programs targeting the ultra-poor may inherently have important pecuniary effects.

This paper is related to the literature on in-kind transfers in developed and developing countries, which has mostly focused on the consumption effects of in-kind transfers and on

the political economy of transfer programs. (See Currie and Gahvari (2008) for a nice review of this literature.) For example, several studies examine how the U.S. Food Stamp program affects consumption patterns (Moffitt, 1989; Hoynes and Schanzenbach, 2009). Two studies have examined this question for the PAL program in Mexico (Skoufias, Unar, and Gonzalez-Cossio, 2008; Cunha, 2011). Other work examines whether in-kind transfers are effective at self-targeting (Reeder, 1985; Currie and Gruber, 1996; Jacoby, 1997). Another branch of the literature examines the political economy of in-kind programs, including their degree of voter support and how they affect producer rents (De Janvry, Fargeix, and Sadoulet, 1991; Jones, 1996).

Fewer studies provide evidence on the question this paper addresses, namely the price effects of in-kind transfers, and most previous studies examine voucher programs in which the government does not act as a supplier (Murray, 1999; Finkelstein, 2007; Hastings and Washington, 2010).[3] Levinsohn and McMillan (2007) use estimates of the supply and demand elasticity of food from the literature to calculate the potential price effect of food aid, but no paper to our knowledge measures the price effects of food aid or other in-kind programs in developing countries.

This paper is also related to two other literatures, one on equilibrium effects of social programs (Lise, Seitz, and Smith, 2004; Angelucci and De Giorgi, 2009; Attanasio, Meghir, and Santiago, 2009; Kaboski and Townsend, 2011) and another on price effects in isolated markets in developing countries (Jayachandran, 2006; Donaldson, 2010).

Finally, our findings also contribute to an active area of policy debate. One of the largest and most prominent in-kind programs worldwide, the World Food Programme, is increasingly shifting toward cash transfers (World Food Programme, 2011). Meanwhile, other major programs are moving away from cash toward in-kind transfers. For example, in the United States much of the welfare support under the Temporary Assistance for Needy Families program is now in the form of child care, job training, and other in-kind services (Pear, 2003). Our work highlights two related lessons for policy makers choosing between cash and in-kind transfers. First, their policy choice could have important implications for local prices, particularly in the poorest communities. Second, the communities that have high eligibility for transfer programs may also be the ones with less competition among local

[3] Murray (1999) examines the response by private suppliers in a market where the government does provide supply, U.S. public housing. Finkelstein (2007) finds that the Medicare program caused healthcare prices to rise, and Hastings and Washington (2010) find that grocery stores in the U.S. set prices higher at the time of the month when demand from Food Stamp recipients is higher.

suppliers; in this case, changes in local prices are not just pecuniary externalities, but have efficiency implications.

The remainder of the paper is organized as follows. Section 2 lays out the theoretical predictions. Section 3 describes Mexico's PAL program and our data. Section 4 presents the empirical strategy and results. Section 5 offers concluding remarks.

## 2. Conceptual Framework

In this section, we use a basic supply and demand framework to discuss how cash and in-kind transfers should affect prices. We do not present a formal model but instead informally derive the predictions that we take to the data.

We begin by describing the case where local suppliers are perfectly competitive (and then discuss imperfect competition below). In a small open economy, changes in the local demand or supply should have no effect on prices since supply is infinitely elastic (horizontal supply curve) with prices set at the world level. However, the rural villages that are our focus are more typically partially-closed economies in which prices depend on local conditions. When the supply curve is positively sloped, shifts in the demand for or supply of a good will affect its price (as well as those of substitutes and complements).

In our empirical application, an economy is a Mexican village, and the main goods we examine are packaged foods. The local suppliers are shopkeepers in the village, and they procure the items from outside the village. In effect, we are focusing on the short-run equilibrium of the market, where we assume that local suppliers cannot adjust capacity instantaneously and procuring more supply entails increasing marginal costs. The remoteness of the villages (i.e., high transportation costs to other markets) is one reason that inventory in local stores is unlikely to adjust instantaneously; for example, to meet higher demand, a shopkeeper might need to travel to a neighboring village to buy supply from a shop there.[4] In the long run, one might expect the supply curve to be flatter; at the end of the section, we discuss in more detail how the market would likely adjust in the longer run.

Figure 1 depicts the market for a normal good in a village. The figure shows the effect of a cash transfer: The demand curve shifts to the right via an income effect, and the equilibrium price, $p$, increases.[5] Denoting the amount of money transferred in cash by $X_{Cash}$, our first

[4]In our qualitative interviews of shopkeepers in the program villages, they reported that they meet unexpected demand by traveling to a neighboring village or town to buy goods.

[5]For inferior goods, demand will shift to the left with the opposite price effect. In related ongoing work, we formally estimate the income elasticities of the goods in our data and our results suggest that food items in our

prediction is that a cash transfer will cause prices to rise.

$$\frac{\partial p}{\partial X_{Cash}} > 0 \tag{1}$$

In-kind transfers also generate an income effect, so demand will again shift to the right. We define the in-kind transfer amount $X_{InKind}$ in terms of its equivalent cash value.[6] Thus the demand shift caused by a transfer amount $X$ is by definition the same for either form of transfer. With an in-kind transfer, however, there is also a shift in the supply curve. For a transferred good, supply shifts to the right by the quantity added to the local economy, as shown in Figure 2. While the net price effect of an in-kind transfer relative to the original market equilibrium is, in general, theoretically ambiguous, one can sign the price effect of in-kind transfers relative to cash transfers.[7] For transferred goods, the price should be lower under in-kind transfers:

$$\frac{\partial p}{\partial X_{InKind}} - \frac{\partial p}{\partial X_{Cash}} < 0. \tag{2}$$

In our empirical application, we examine the predictions above in two ways. First, we compare villages that received different forms of transfers (extensive margin) and, second, for Prediction (2) only, we also compare different goods that were transferred in-kind in larger versus smaller amounts (intensive margin).

**Imperfect competition**

Predictions (1) and (2) can also hold in the case of imperfect competition. To see this graphically, it is helpful to depict just the quantity demanded *from local suppliers*. Cash and in-kind transfers have an income effect that shifts demand to the right. The additional supply effect of an in-kind transfer is equivalent to a reduction in the demand facing local suppliers, since a portion of consumer demand is now met by the government transfer. Thus,

sample are by and large normal goods. See also Attanasio, DiMaro, Lechene, and Phillips (2009) for evidence from Mexico that food items are typically normal goods.

[6]If either the transfer is inframarginal (that is, it is less than the household would have consumed had it received the transfer in cash, valued at the market prices) or resale is costless, the cash value of the transferred goods is simply the market value. If, instead, the transfer is "extramarginal" and resale is costly, then the extramarginal quantity would be valued at between the market price and the resale price. Note that if this latter case pertained (costly resale), then the effective supply influx into the economy from an in-kind transfer would be the actual influx net of any extramarginal transfers that are consumed.

[7]For many standard classes of preferences, such as homothetic preferences, prices are predicted to decline with an in-kind transfer relative to no transfer. For the price to increase, an in-kind transfer of a good with aggregate value $X$ would need to increase aggregate demand for the good by more than $X$; in other words, the good would have to be a strong luxury good.

an in-kind transfer entails an income effect (demand shifts to the right) and a supply effect (demand shifts back to the left), so a smaller total demand shift than a cash transfer (see Appendix Figure 1).[8]

To assess how the price effects vary with the degree of competition, consider a Cournot-Nash model with $N$ firms that have constant marginal cost $c$ and face linear demand $p = d - Q$. The equilibrium price is $p = (d + Nc)/(N + 1)$. Suppose the transfer changes the amount demanded from the local firms by an amount $\Delta d$; $\Delta d$ is positive for a cash transfer and negative or less positive for an in-kind transfer. Then the change in price is given by $\Delta p/p = \Delta d/(d + Nc)$, which has the property that the higher $N$ is (more competition), the smaller the magnitude of the price effects.

More generally, the price effects under imperfect competition depend on the shape of the demand curve.[9] Appendix A presents a Cournot model with a generalized demand function and shows conditions under which an increase in demand leads to a higher price. A sufficient condition is a downward-sloping demand curve where the transfers represent an additive shift in demand. We then have the following comparative statics for how the price effects vary with the degree of competition:

$$\frac{\partial^2 p}{\partial N \partial X_{Cash}} < 0, \tag{3}$$

and

$$\frac{\partial}{\partial N}\left(\frac{\partial p}{\partial X_{InKind}} - \frac{\partial p}{\partial X_{Cash}}\right) > 0. \tag{4}$$

The higher $N$ is (more competition) the smaller the price effect of a demand shift.

While the comparative statics may be the same with perfect or imperfect competition, the efficiency implications differ. If lack of competition causes prices to be above their efficient level, then in-kind transfers can increase total surplus (assuming that there are not inherent production inefficiencies in the government sector). Less consumer demand is met inefficiently by the local suppliers because part of the demand is now met by the welfare-maximizing (not profit-maximizing) government. Another difference is that even if the marginal costs are constant, with imperfect competition, shifts in demand can affect

[8] Another potential response to the program is that firms might change their degree of price discrimination. In our qualitative interviews with shopkeepers, we found that surprisingly few engage in price discrimination. Most use posted prices and do not vary the price for different customers.

[9] For example, if the program causes a multiplicative shift in demand, then there would be no effect on prices in the standard Cournot model (Cowan, 2004). In other cases, an increase in demand can cause oligopolistic prices to fall; greater competition would still dampen the magnitude of the price effects.

prices. Thus, even in the long run, the price effects would likely persist.

**Openness of the economy**

Returning to the benchmark competitive case, another testable comparative static is that the more inelastic supply is (i.e., the steeper the supply curve is or the lower the elasticity, $\eta_S$, is), the more prices will respond to shifts in supply and demand. One factor affecting the elasticity of supply is the degree of openness of the local economy. For example, in our setting, if a shopkeeper responds to an increase in demand by obtaining extra supply from a neighboring village, then the more remote the location of the village, the higher the marginal cost of procuring additional supply, or the steeper the supply curve (see Appendix Figure 2).

For a cash transfer, when the demand curve shifts to the right, the price increase should be smaller the higher $\eta_S$ is (the more open the economy is or the flatter the supply curve).

$$\frac{\partial^2 p}{\partial \eta_S \partial X_{Cash}} < 0 \tag{5}$$

Comparing in-kind to cash transfers, the (relative) price response should be smaller in magnitude (less negative) when $\eta_S$ is higher.

$$\frac{\partial}{\partial \eta_S}\left(\frac{\partial p}{\partial X_{InKind}} - \frac{\partial p}{\partial X_{Cash}}\right) > 0 \tag{6}$$

For an in-kind transfer relative to no transfer, the net effect of the income and supply effects is ambiguous as discussed above, but the magnitude of the net effect will be smaller in more open economies.

In our empirical analysis, to test both the predictions about imperfect competition and about openness, we compare more geographically isolated villages (longer travel time to larger markets) to less isolated villages. Geographic isolation is our proxy for both how closed an economy is (lower $\eta_S$) and for how uncompetitive the market is (lower $N$).

**Goods not in the transferred bundle**

There are also price effects for goods not in the in-kind bundle. With cash transfers, demand and prices for all normal goods should increase. Using the superscript $NX$ to denote goods not transferred, we have the following additional prediction for normal goods:

$$\frac{\partial p^{NX}}{\partial X_{Cash}} > 0 \tag{7}$$

With in-kind transfers, the influx of supply for certain goods will affect the demand for and prices of substitutes and complements. If the price of the transferred good falls, then demand for its complements should increase and demand for its substitutes should fall. Let $D^{NX}$ be the demand for a non-transferred good, which is a function of the price $p$ of the transferred good (among other prices and factors). We can define the cross-price elasticity for a non-transferred good with respect to the transferred good as $\eta_D^{NX} \equiv \frac{\partial \ln D^{NX}(p)}{\partial \ln p}$. If a good is a substitute (complement) for the transferred goods, then $\eta_D^{NX}$ is positive (negative).[10] The prediction is that demand for substitutes—and hence their price—should decrease under an in-kind transfer program relative to a cash transfer program:

$$\frac{\partial}{\partial \eta_D^{NX}} \left( \frac{\partial p^{NX}}{\partial X_{InKind}} - \frac{\partial p^{NX}}{\partial X_{Cash}} \right) < 0. \tag{8}$$

The above are the main testable implications we take to the data. We now discuss some of the assumptions above in the context of the program we study.

**Assumption of identical income effects for cash and in-kind transfers**

Above we define the in-kind transfer amount as its cash equivalent, so the income effect is the same for a cash and in-kind transfer. In our setting, the Mexican government set the cash transfer equal to its wholesale cost of procuring the in-kind goods, which was about 27 percent lower than the cost at consumer prices. (The cash transfer was 150 pesos per month, but the market value of the in-kind transfer in the recipient villages averaged 206 pesos.) Therefore, the in-kind bundle would have a higher cash-equivalent value than the cash transfer *if* the transfer was inframarginal to consumption or resale was costless, i.e., the in-kind nature of the transfers did not distort recipients' consumption choices. However, some of the transfers were in fact binding on consumption patterns.

Cunha (2011) finds that for some of the transferred goods, the transfer was larger than counterfactual consumption under a cash transfer. In total, 90 pesos of the in-kind transfer were "extramarginal," and recipients consumed an extra 35 pesos' worth of these goods. If consumers valued the extramarginal consumption at half its market value, the deadweight loss would be 17.5 pesos. Not all of the extramarginal transfer was binding on consumption; the remaining 55 pesos (90 - 35) of goods were presumably resold. If the transaction costs of resale eroded half the value, this represents 27.5 pesos of loss. Thus, under these rough

[10] When a bundle of goods is transferred, the cross-price elasticity would be treating the bundle as a single aggregate good with a single aggregate price.

assumptions, the in-kind transfer was worth 161 pesos (206 - 17.5 - 27.5).[11]

In short, while it is difficult to pinpoint the precise value of an in-kind transfer to recipients—its nominal value minus the deadweight loss relative to an unconstrained transfer—the value of the in-kind transfer was likely quite similar to but somewhat larger than the value of the cash transfer to which we compare it. This extra income effect for the in-kind transfer (161-150 = 11 pesos per month) will bias us *against* finding a price decline for in-kind transfers relative to cash transfers.

Another consideration is that the effect of government transfers on demand might differ from the standard income elasticity of demand. There might be a flypaper effect whereby a cash transfer labeled as food assistance stimulates the demand for food more than a generically-labeled transfer would have. This type of effect is likely especially strong when transfers are made in-kind: by giving households particular goods, the government might signal the high quality of these goods (e.g., their nutritional value) and also make these items more salient to households. In other words, with an in-kind transfer relative to a cash transfer, not just the supply but also the demand for the transferred goods might increase. This extra effect of in-kind transfers would counteract the result given in (2), and the magnitude we estimate would then represent a lower bound for the pure supply-shift effect of in-kind transfers.

**Supply side of the local economy**

In our setting, the items in the in-kind bundle are packaged foods that are produced industrially in urban areas. The *local* supply side of the market comprises small stores within the program villages that stock these packaged foods plus other food products and sundry items.[12] Small villages typically have one to six of these types of stores.[13] Note that when we examine effects on substitute goods—other food items that were not transferred in the bundle—some of these substitutes are produced locally (e.g. vegetables).

[11] Households might also store the goods, but since the program is expected to continue indefinitely, perpetual storage and an accumulating amount of stored goods seems unlikely. In any case, there would also be some deadweight loss from storage.

[12] There is also a supply side of the market that is outside the local economy, namely the packaged food manufacturers. If by increasing the total demand from food manufacturers, the government is driving up manufacturers' marginal cost (because they have decreasing returns to scale), then there would also be Mexico-wide price effects of the program. These effects would be very small since the program households represent less than 1 percent of Mexican households, but these small effects would apply to many people. Our focus is the price effects within the villages that receive the program; we examine only the local general equilibrium effects in the recipient villages, and not the total general equilibrium effect of the program.

[13] The distributors that truck supplies into the village are another type of supplier. They often have market power, so they may be the source of imperfect competition and the effective price setter in some cases.

In the long run, local supply could react to the transfer program. Sellers could scale back their procurement of the food items in the transferred bundle, or local food producers could cut back production. In the short run, there is limited scope for this adjustment unless the suppliers anticipate the policy. In the longer term, it is possible that the price effects would diminish as local supply adjusts.[14] Since the goods in our setting are mainly storable (e.g., vegetable oil, rice), even in the short run, shopkeepers might be able to adjust supply by allowing inventory to build up. In treating the short-run market as a spot market, the implicit assumption is that inventory costs are high. One potential reason for high inventory costs is that shopkeepers are credit constrained and have limited working capital. Other factors cited by shopkeepers in our qualitative fieldwork were the risk of theft or damage to inventory and limited storage capacity.

## 3. Description of the PAL Program and Data

### 3.1 PAL program and experiment

We study the Programa de Apoyo Alimentario (PAL) in Mexico. Started in 2004, PAL operates in about 5,000 very poor, rural villages throughout Mexico. 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 receive aid from either Liconsa, the Mexican subsidized milk program, or Oportunidades, the conditional cash transfer program (formerly known as Progresa). Therefore PAL villages are typically poorer and more rural than the widely-studied Progresa/Oportunidades villages.[15] Households within program villages are eligible to receive transfers if they are classified as poor by the national government.

PAL provides a monthly in-kind allotment consisting of seven basic items (corn flour, rice, beans, pasta, biscuits (cookies), fortified powdered milk, and vegetable oil) and two to four supplementary items (including canned tuna fish, canned sardines, lentils, corn starch, chocolate powder, and packaged breakfast cereal). All of the items are common Mexican brands and are typically available in local food shops. The basic goods are dietary staples for poor households in Mexico. The supplementary goods are foods typically consumed by

[14] According to the program administrators, the start of the PAL program was a surprise to the local communities (private communication). Note that another potential long-run impact is that the market structure could change in response to the program, with stores going out of business or new stores opening.

[15] Villages could be "too poor" to receive Progresa/Oportunidades because a requirement was that they had the capacity to meet the extra demand for prenatal visits and school attendance induced by the program; villages that lacked adequate health facilities, for example, were ineligible for Progresa/Oportunidades.

fewer households in a village or less frequently; one goal of the program was to encourage households to add diversity to their diet and consume more of these goods.[16]

PAL is administered by the public/private agency, Diconsa. The Diconsa agency also maintains subsidized grocery shops in some villages (38 percent of the villages in our sample), which are run by a resident of the village. Diconsa stores have latitude to set their own prices, but less latitude than privately-owned stores. The government provides suggested prices to Diconsa store operators; the Diconsa stores are not obliged to use the suggested prices, but they must maintain prices that are 3 to 7 percent lower than market prices. Thus, prices at these stores should be responsive to market conditions, but to a lesser degree than fully private stores.[17]

Concurrent with the national roll-out of the program, 208 villages in southern Mexico were randomly selected for inclusion in an experiment.[18] The randomization was at the village level, with eligible households in experimental villages receiving either (i) a monthly in-kind food transfer (50 percent of villages), (ii) a 150 peso per month cash transfer (25 percent of villages), or (iii) nothing, i.e., the control group (the remaining 25 percent of villages).[19] About 89 percent of households in the in-kind and cash villages were eligible to receive transfers (and received them). A woman (the household head or spouse of the head) was designated the beneficiary within the household, if possible.

The impact of the PAL program on village consumption was large, both because the eligibility rate was high and because the transfer per household was sizeable. The in-kind transfer represented 18 percent of a recipient household's baseline food expenditures on average and 11 percent of total expenditures. Including the ineligible households, the injection of food into the village through the program was equivalent to 16 percent of baseline aggregate food expenditures and 11 percent of total expenditures. Similarly, the cash transfer represented an 8 percent increase in total village income.

[16]Appendix Figures 4 to 7 show the PAL box, a truck transporting the boxes to a village, the unloading of the boxes in the village, and examples of the grocery shops in the villages.

[17]Diconsa stores receive a government subsidy to cover transportation costs. Unlike fully private shops, they do not allow purchases on credit. After our study period, the government changed the discount that Diconsa stores are supposed to offer to 20 percent (private communication with program administrators).

[18]The experiment was implemented in eight states: Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz, and Yucatan. See Appendix Figure 3 for the locations of the experimental villages.

[19]The rationale for having a larger in-kind treatment arm was that there was an orthogonal randomization among the in-kind villages under which half were provided nutrition education classes. We abstract from this component of the experiment in our analysis because a substantial fraction of the villages that should have been excluded from the nutritional classes received them (for details see Cunha (2011)).

In the in-kind experimental villages, the transfer comprised the seven basic items and three supplementary goods: lentils, breakfast cereal, and either canned tuna fish or canned sardines. However, there is some ambiguity about whether the in-kind villages always received these three supplementary items. Thus, in our analysis, we separate the basic PAL goods from the supplementary ones. A second reason to examine the basic goods separately is that they isolate the simple income and supply effects of in-kind transfers; if the government succeeded in increasing households' taste for the supplementary goods, then the supplementary goods would have an additional effect of changing preferences (that goes in the direction of increasing demand and prices).

Of the 208 villages, 14 are excluded from the analysis. Eight villages do not have follow-up price data; in two villages, the PAL program began before the baseline survey; two villages are geographically contiguous and cannot be regarded as separate villages/economies; and two villages were deemed ineligible for the experiment because they were receiving the conditional cash program, Oportunidades, contrary to PAL regulations. Observable characteristics of the excluded villages are balanced across treatment arms. (Results available upon request.) Of the remaining 194 villages, three received the wrong treatment (one in-kind village did not receive the program, one cash village received both in-kind and cash transfers, and one control village received in-kind transfers). We include these villages and interpret our estimates as intent-to-treat estimates.

Both the in-kind and cash transfers were, in practice, delivered bimonthly, two monthly allotments at a time per household. The transfer size was the same for every eligible household regardless of family size. Resale of in-kind food transfers was not prohibited, nor were there purchase requirements attached to the cash transfers. As mentioned above, the monthly box of food had a market value of about 206 pesos in the program villages, and the cash transfer was 150 pesos per month, based on the government's wholesale cost of procuring the in-kind items.[20]

The items included in the in-kind transfer are not produced locally.[21] Thus, the main

[20]The government should have included its transportation and administrative costs when calculating the in-kind program's costs. This oversight attenuates the in-kind-versus-cash price differential that is our main focus; a 206 peso cash transfer would have led to a larger price increase in cash villages, so a larger relative price decline in in-kind villages.

[21]We do not observe actual food production, but rather draw this conclusion from household survey data on consumption of own-produced foods. The only PAL good that has auto-consumption in any appreciable quantity is beans (10 percent of households consume own-produced beans at baseline). There is also relatively little auto-consumption of non-PAL foods. Only 7 out 60 foods in our analysis have more than 10 percent of the population producing the good, the largest of which is corn kernels, which 27 percent of households produce.

welfare effects on the producer side of the market will be felt by shopkeepers. There will also be welfare effects for local producers in cases where there is a high degree of substitutability (or complementarity) between the in-kind goods and the local products.

### 3.2 Data

The data for our analysis come from surveys of stores and households conducted in the experimental villages by the Mexican National Institute of Health both before and after the program was introduced. Baseline data were collected in the final quarter of 2003 and the first quarter of 2004, before villagers knew they would be receiving the program. Follow-up data were collected two years later in the final quarter of 2005, about one year after PAL transfers began in these villages.

Our measure of post-program prices comes from a survey of local food stores. Enumerators collected prices for fixed quantities of 66 individual food items, from a maximum of three stores per village, though typically data were collected from one or two stores per village.[22] Some of the stores surveyed were part of the Diconsa agency (21 percent) while the majority were independent stores (79 percent).

We also use measures of pre-program food prices. Unfortunately, the baseline data collection on store prices was incomplete. Data were collected for only 40 of the food items, and among these, there is extensive missing data. Therefore, we use the household survey to construct the pre-program unit value (expenditure divided by quantity purchased) for each food item and take the village median unit value as our measure of price. In each village, a random sample of 33 households was interviewed about purchase quantities and expenditures on 60 food items.[23] Unlike the post-program prices where we have multiple observations per village-good (one for each store-good), the pre-program prices do not vary within a village.

[22]Most of the shops had posted prices. If prices were not posted, the enumerators were instructed to choose the lowest price available for a given good in order to maintain consistency. The data for prices that were not posted is likely noisier, but this applies to all of the treatment arms so should reduce the precision of the estimates but should not change the coefficients.

[23]Unit values are observed for households that purchased the good in the past seven days. We do not use unit values for post-program prices because the program changes the number and composition of households that purchase items. (Results available upon request.) If the quality of a good does not vary, then unit values could still be used as a proxy for post-program prices; however, if quality varies, then treatment effects estimated with post-program unit values would reflect changes in both price and quality. While quality is quite homogenous for manufactured items where there are few brands sold, it is heterogeneous for other goods (e.g., fresh food). See also McKelvey (2011) on the effect of income and price changes on the interpretation of unit values. Note also that for some goods, there are very few household-level observations of the baseline unit value (e.g., lentils, cereal, corn flour), while for others, most households purchased the good (e.g., beans, corn kernels, onions). The noisiness of our pre-period price measure will vary with the number of observed unit values.

In cases where the pre-program village median unit value is missing, we impute the price using the median price in other villages within the same municipality (or within the same state in the few cases where there are no data for other villages in the municipality).

We exclude some food items from the analysis due to missing data. Among the PAL goods, the store price survey did not include biscuits; for the non-PAL items, chocolate powder, nixtamalized corn flour, salt, and non-fortified powdered milk were not included in the household survey and corn starch was not included in the store survey.[24] Finally, two pairs of goods were asked about jointly in the household survey (beef/pork and canned fish) but separately in the store survey (beef, pork, canned tuna, canned sardines). To address this discrepancy, we use the aggregated category and take the median across all observed store prices for either good as our post-program price measure. Our final data set contains 6 basic PAL goods (corn flour, rice, beans, pasta, oil, fortified milk), 3 supplementary PAL goods (canned fish, packaged breakfast cereal, and lentils), and 51 non-PAL goods. Appendix Table 1 lists all of the goods used in our analysis.

Table 1 presents descriptive statistics for the PAL goods. Column 2 shows the quantity per good of the monthly household transfer, and column 3 shows its monetary value measured using our pre-program measure of prices. Column 4 presents each good's share of the total calories in the transfer bundle. As can be seen, the supplementary items were transferred in smaller amounts with lower value and fewer calories than the basic goods.

There is considerable variation across the PAL goods in the size of the aggregate village-level transfer. One measure of the size of this supply shift is listed in column 5. Here, the village change in supply, $\Delta Supply$, is constructed as the average across in-kind villages of the total amount of a good transferred to the village (i.e., average number of eligible households per village times allotment per household) divided by the average consumption of the good in control villages in the post-program period. For example, there was almost exactly as much corn flour delivered to the villages each month as would have been consumed absent the program ($\Delta Supply = 1.00$ for corn flour), while there was over eight times as much fortified powdered milk delivered as would have been consumed absent the program ($\Delta Supply = 8.62$ for fortified milk powder). We use this $\Delta Supply$ measure, which we discuss in more detail in the following section, to test for effects along the "intensive margin" of the in-kind program.

Our final data set contains 360 stores in 194 villages and 12,940 good-village-store ob-

[24]The price of biscuits was intended to be collected, but a mistake in the survey questionnaire led enumerators to collect prices for crackers ("galletas saladas" in Spanish) rather than for biscuits ("galletas" in Spanish).

servations. The number of goods varies by store since many stores sell only a subset of goods. Table 2 presents summary statistics by treatment group. The comparison of baseline characteristics across treatment groups suggests that the randomization was successful; the baseline characteristics are for the most part indistinguishable across groups. For three variables, there are significant differences across groups: The presence of a Diconsa store differs between control and in-kind; the share of producer households differs between control and cash and between in-kind and cash; and farm revenues differs between control and cash and between control and in-kind. For our primary comparison—between the cash and in-kind treatments—only one variable is unbalanced at baseline (and with a p-value above 0.05).

In some of our auxiliary analyses, we use household-level data to either construct village-level variables or to estimate household-level regressions. For example, we calculate the median household expenditures per capita in a village at baseline as a measure of the income level in the village. Also, when we test for heterogeneous welfare effects for households that produce agricultural goods, we use household-level outcomes such as farm profits and expenditures per capita. We present more detail on the relevant data as we introduce each analysis in the next section.

Note that the data collection was designed to measure the PAL program's impact on food consumption, not its general equilibrium effects. Therefore some data that ideally we would have are unavailable, e.g., the number of grocery shops in a village. We conducted follow-up qualitative fieldwork in 2011 in 16 of the program villages (see Appendix B for further details), interviewing several shopkeepers per village, in order to better understand the market structure and the price-setting behavior of grocery shops. We did not collect retrospective quantitative data, as we found that respondents could not reliably remember details about the market structure from eight years before.

# 4. Empirical Strategy and Results

## 4.1 Price effects of in-kind transfers and cash transfers

Our analysis treats each village as a local economy and examines food prices as the outcome, using variation across villages in whether a village was randomly assigned to in-kind transfers, cash transfers, or no transfers. We begin by focusing on the food items included in the in-kind program. Our first prediction is that prices will be higher in cash villages relative to control villages since a positive income shock shifts the demand curve out (under the assumption that the items are normal goods). The second prediction is that relative to cash

villages, prices will be lower in in-kind villages because of the supply influx.

We estimate the following regression where the outcome variable is $\ln p_{gsv}$, the log price for good $g$ at store $s$ in village $v$.

$$\ln p_{gsv} = \alpha + \beta_1 InKind_v + \beta_2 Cash_v + \phi \ln p_{gv,t-1} + \sigma I_{gv} + \varepsilon_{gsv} \tag{9}$$

Our two predictions correspond to $\beta_2 > 0$ (cash transfers increase prices), and $\beta_1 < \beta_2$ (prices are lower under in-kind transfers than cash transfers). The regression pools the effects for the different PAL food items; to adjust for the different price levels of different goods, and more generally to improve the precision of the estimates, we control for the baseline log price, denoted $\ln p_{gv,t-1}$. (The subscript $t-1$ is shorthand for the variable being constructed from the baseline data; the estimation sample is cross-sectional, not a panel over time.) The variable $I$ is a dummy variable for whether the pre-program price is imputed from the municipality or state because the village median unit value is missing. We cluster standard errors at the village level, the level at which the treatment was randomized.

Table 3, column 1, presents the main specification using the basic PAL goods. (See Appendix Table 2 for the results separately for each PAL good.) For cash villages, the point estimate suggests that the transfer program caused prices to increase by 3.9 percent ($\widehat{\beta_2}$), though the coefficient is not statistically significant. In in-kind villages, prices fell by 5.5 percent relative to the cash villages ($\widehat{\beta_1} - \widehat{\beta_2}$), with a p-value of 0.01; the bottom of the table reports the difference between the in-kind and cash coefficients and the statistical significance of this difference. As mentioned above, theory is ambiguous about whether the supply or demand effect is bigger in magnitude, but for most standard classes of preferences, the supply effect should dominate. Empirically we find that the supply effect (in-kind coefficient minus cash coefficient) is about 50 percent larger in magnitude than the income effect (cash coefficient), and thus the net effect of the in-kind transfer on prices is negative.

In column 2 we include the supplementary PAL goods. The fact that canned fish, cereal, and lentils may not have been the supplementary goods in some experimental villages should not affect the cash or control villages but might attenuate our estimates of the in-kind-versus-cash effect. In addition, there is low consumption at baseline for the supplementary goods, and for very thin markets, prices are noisier and the neoclassical model might not fit as well. We find an in-kind-versus-cash coefficient that is somewhat smaller in magnitude when we include the supplementary goods (magnitude of -0.044 with a p-value of 0.04). The fact that

the price decline in in-kind versus cash villages is smaller for the supplementary goods is also consistent with the program having any additional effect of increasing households' taste for the supplementary in-kind goods.

As described in the previous section, the public/private Diconsa stores could adjust prices according to market conditions but with some restrictions. Thus, one expects the price effects to be stronger for the fully private stores than for the full sample of stores. Columns 3 and 4 estimate equation (9) for the subsample of non-Diconsa stores. We find that the positive effect of cash transfers is somewhat larger in this subsample (and significant at the 10 percent level for basic PAL goods); private stores seem to raise prices more than Diconsa stores when demand goes up. The in-kind-versus-cash effect is similar in magnitude to the full sample. As shown in columns 5 and 6, when we use the full sample and estimate interaction effects for the Diconsa stores, we cannot reject that the Diconsa stores have the same price responses to the transfer programs as non-Diconsa stores.

### 4.2 Robustness of the main results

The results above indicate that relative to cash transfers, in-kind transfers lead to significantly lower prices. The point estimates suggest a net negative effect of in-kind transfers on prices and a positive effect of cash transfers on prices. Table 4 presents a series of robustness checks of these main results. (Appendix Table 3 reports these robustness checks for the subsample of non-Diconsa stores.)

In columns 1 and 2 of Table 4 we estimate a first-differences model. The coefficient on the lagged price in Table 3 was 0.86 and statistically less than 1, but the estimate is consistent with a true coefficient of 1 that is downward biased due to measurement error: A rough calculation of attenuation bias suggests that the coefficient on the lagged price is downward biased by a factor of 0.84.[25] This suggests that the true coefficient is 1, in which case a preferred specification might be to estimate the model in first differences, comparing before and after the program. Since our treatment variables are equal to zero in the pre-period, a model in first differences is equivalent to using the after-minus-before change in log prices (denoted $\Delta \ln p_{gsv}$) as the outcome variable.

$$\Delta \ln p_{gsv} = \alpha + \beta_1 InKind_v + \beta_2 Cash_v + \sigma I_{gv} + \varepsilon_{gsv} \tag{10}$$

[25]This calculation uses the between-village variation in baseline unit values for a good, which is 0.129, as the estimate of the actual variance (signal) and the within-village variance in prices for a good, which is 0.024, as the estimate of measurement error (noise). The attenuation factor is thus $0.129/(0.129+0.024) = 0.84$.

These results are somewhat larger in magnitude than the ones in Table 3, but are generally quite similar.

In columns 3 and 4 of Table 4, we use an alternative functional form for the price variable. The theoretical predictions are for price levels, but we use a log specification as our main specification so that we can pool goods with different price levels; if one good is ten times the price of another good, we would not expect the program to have the same effect in levels for these two goods, but we would expect it to have the same proportional effect, all else equal. An alternative way to enable an apples-to-apples comparison across goods is to normalize the price for each good so that all the goods have the same mean price. Thus, columns 3 and 4 show estimates from a version of equation (9) that uses normalized prices constructed as level prices divided by the average price for the good in the control group villages. (The results are nearly identical if we use the mean value across all the villages.) As can be seen, the results are similar to our main specification. The net negative effect of the in-kind transfer for the basic PAL goods is -0.033 (3.3 percent decline in prices) and significant at the 10 percent level. The in-kind-versus-cash effect (4.8 percent) is significant at the 5 percent level. The cash effect (1.5 percent) is positive but insignificant.

In columns 5 and 6, we include good fixed effects and find a similar in-kind-versus-cash point estimate, though the coefficient difference loses significance in column 6 when the supplementary goods are included; the cash coefficient, which is imprecisely estimated in most of the specifications, is negative but insignificant in column 6. Finally, columns 7 and 8 use only the post-program data and do not control for baseline prices. These estimates are considerably noisier than our main estimates but follow similar patterns.

In short, our finding that the influx of supply from in-kind transfers causes prices to fall relative to prices under cash transfers is robust to several alternative specifications. We also consistently find point estimates suggesting that in-kind transfers have a net negative effect on prices, and we generally find that cash transfers cause price inflation.

### 4.3 Using variation in the size of the supply influx

A larger influx of supply will cause a larger fall in the price, all else equal. In our setting, the supply shift associated with each good in the PAL basket varied in magnitude. Some of the goods were provided in large quantity, measured relative to the baseline market size (e.g., powdered milk) whereas for other goods, a small quantity was transferred (e.g., vegetable oil). We can thus also examine variation across goods in the intensity of treatment.

We quantify the size of the supply shift as the average across all in-kind villages of the

total amount of good $g$ transferred to the village divided by the average consumption of the good in control villages in the post-period.[26] We use consumption in the control villages in the post-period as a proxy for the equilibrium market size for the good, absent the program (using pre-program consumption in in-kind villages or in all villages gives similar results). This normalization gives us a measure of the supply shock that is relative to the market size. For each good, the intensity of the treatment is measured as $\Delta Supply_g \equiv InKindAmount_g / TotalMarketSize_g$, as reported in Table 1, column 5. Using this measure of the size of the in-kind transfer by good, we can test whether the price effects vary by good accordingly.

The variable $\Delta Supply$ measures the intensity of the *in-kind* treatment, and there is no a priori reason that the effects of the cash treatment will vary with it. Thus, in principle, we could compare the in-kind villages to the pooled cash and control villages. However, since the income effect could be spuriously correlated with $\Delta Supply$, we again compare in-kind villages to cash-transfer villages. We set $\Delta Supply$ equal to the same value in all villages and construct an interaction term for each of the treatment arms. Thus, we estimate the following equation.

$$\begin{aligned} \ln p_{gsv} &= \alpha + \theta_1 \Delta Supply_g \times InKind_v + \theta_2 \Delta Supply_g \times Cash_v \\ &\quad + \beta_1 InKind_v + \beta_2 Cash_v + \rho \Delta Supply_g + \phi \ln p_{gv,t-1} + \sigma I_{gv} + \varepsilon_{gsv} \end{aligned} \tag{11}$$

The prediction is that $\theta_1 < \theta_2$, or that the larger the supply shock, the more prices fall in in-kind versus cash villages.

Columns 1 and 2 of Table 5 show the results on treatment intensity. The point estimate of interest is the difference in the coefficients for $\Delta Supply \times InKind$ and $\Delta Supply \times Cash$. This difference of -0.033 (shown in the bottom rows of the table) suggests that the larger the supply shock, the bigger the price decline, consistent with the prediction. The magnitude implies that when the supply shock increases in size by 10 percentage points measured relative to the baseline market size, the price falls by 0.33 percent more in in-kind villages relative to cash villages. When we expand the sample to include the supplementary PAL goods (column 2), the estimated effect remains negative and similar in magnitude, but is no

[26] There is also between-village variation in the size of the transfer; villages differ in their baseline consumption of goods and the proportion of households that are program-eligible. We average across villages because of the endogeneity of this between-village variation (for example, it depends on the village's poverty and its taste for a good).

longer significant.[27]

These results using $\Delta Supply$ are identified off of a different source of variation than the earlier results using the treatment indicators. Here we are examining the intensive margin of treatment across goods, whereas earlier we examined the extensive margin of treatment across villages. We find it reassuring that the hypotheses about the price effects of in-kind versus cash transfers are confirmed in two independent ways.

### 4.4 Substitute goods

**Effects on close substitutes of PAL foods**

We next test predictions related to substitute goods. We first look at goods that are especially substitutable with the PAL foods. We must consider substitutability with the aggregate bundle since there are no instances where, say, vegetable oil is transferred but corn flour is not. The larger in magnitude the cross-price elasticity of a good is with one of the PAL items and the more of that PAL item that is transferred through the program, the more the price of the substitute good should fall.

To construct a set of hypothesized close substitutes, we first identified corn flour, fortified powdered milk, biscuits, and pasta soup as goods that were transferred in large and extra-marginal quantities by the PAL program. We then classified the following goods as their close substitutes: corn grain, corn tortillas, liquid milk, cheese, yogurt, potatoes, and plantains. We made the classification based on our understanding of diets in Mexican villages and verified the classification with Mexican colleagues.

Column 3 of Table 5 examines the price effects for the close substitutes. As expected, for goods that the in-kind allotment should crowd out, we find a price decline in in-kind villages. The in-kind-versus-cash effect is -0.073 and significant at the 5 percent level. It is surprising that this effect of 7.3 percent is larger than the effect of 5.5 percent for the PAL goods (though they are not statistically distinguishable). One possible explanation, though it is speculative, is the effect on preferences mentioned earlier: If the government transfer made salient the PAL goods or signaled their nutritional quality, then the in-kind transfer might have boosted demand for the PAL goods in addition to increasing their supply in the

[27] There is no theoretical prediction on $\Delta Supply \times Cash$, which measures how the income effect varies by good, but we find a positive coefficient. The in-kind transfers are, by definition, large relative to the market size (high $\Delta Supply$) when a good is not a staple but is instead less common in the diet, e.g., lentils, breakfast cereal, fortified milk; these non-staples are very likely luxury goods with a high income elasticity. The main effect of $\Delta Supply$ suggests that prices, by happenstance, were increasing over time more for the goods that were transferred in larger amounts by PAL.

village.

**Effects on all non-PAL food items**

We next examine all of the non-PAL food items in our data. By and large, other food items are substitutes for the PAL bundle, so non-PAL food prices are predicted to fall in in-kind villages relative to cash villages. (The price of non-food items, which should not be close substitutes with the PAL bundle, should respond less; unfortunately, the prices of non-food items are not available to test this prediction.) The point estimate in Table 5, column 4 suggests that such a relative price decline in in-kind villages occurred. This coefficient difference of 1.7 percent is smaller in magnitude than we found for the PAL goods or the close substitutes, as expected. The estimates also suggest that prices rise modestly in the cash villages for the non-PAL goods. Note that for the cash transfer, unlike the in-kind transfer, nothing distinguishes the PAL goods from other food items, so one would predict similar price increases for both sets of goods.

### 4.5 Total pecuniary effects of the program

The estimated price effects for the PAL goods reported in Table 3 combined with the results for non-PAL goods in Table 5 allow us to quantify the indirect transfer that occurs through the pecuniary effects. We convert the percent changes in prices into the corresponding indirect transfer, measured in pesos, for a consumer household; for example, a price decrease is a positive transfer, the magnitude of which depends on the percent decline in prices and on the amount households spend on the goods. We then compare the magnitude of the indirect pecuniary transfers to the direct transfer provided by PAL.

We begin with the PAL goods. Expenditure on the items in the in-kind bundle was on average 206 pesos per household per month in the control villages at follow-up. The value of the in-kind bundle also happens to be 206 pesos. (For some of the PAL goods, e.g. powdered milk and corn flour, the households' counterfactual consumption was less than the in-kind transfer, so the transfer was extramarginal; for other goods, e.g. beans and vegetable oil, the transfer was much less than counterfactual consumption and fully inframarginal. Summing across the PAL goods, counterfactual consumption coincidentally has the same value as the PAL bundle.) Thus, recipient households did not receive any additional pecuniary transfer due to price changes for the PAL goods in the in-kind villages. Note that we exclude the increase in demand induced by the transfer's income effect when calculating the quantity to which to apply the price change.

The price changes affect all households, though, not just program recipients. Non-recipient households spent 206 pesos a month on the food items contained in the PAL bundle, and the 3.8 percent price decrease in in-kind villages (Table 3, column 2) represents a transfer of 7.8 pesos (206*.038) for every non-recipient household that is a pure consumer of these items. For the cash transfers, our point estimate suggests that the price effect is equivalent to a -1.3 peso transfer (206*.006) for each recipient or non-recipient consumer household.

The total pecuniary effect of the program also includes spillover effects on the prices of non-PAL food items. Expenditure on the non-PAL items was 1096 pesos per month in the control villages. The 0.8 percent price decrease for in-kind transfers (Table 5, column 4) is thus equivalent to an 8.5 peso transfer to a consumer (program recipients and non-recipients alike), and the 0.9 percent increase in prices in cash villages is equivalent to about a -10.2 peso transfer.

Combining the PAL and non-PAL goods, we find that pecuniary effects decrease the aggregate transfer size by 6.3 percent to a food consumer in the cash program. In other words for every 100 pesos the government transfers, 6.3 pesos are offset for a consumer because of inflation. Meanwhile, compared to the control group, pecuniary effects increase the value of in-kind transfers for consumers by 5.2 percent. Thus, for the policy decision of whether to provide transfers in kind or in cash, in-kind transfers deliver 11 percent more to consumer households, based on our estimates. Conversely, for a net-producing household, cash transfers deliver an extra pecuniary benefit compared to in-kind transfers. There are of course many other costs and benefits of in-kind transfers that factor into the policy decision, e.g. administrative costs and paternalistic objectives, but the pecuniary effects would appear to be important in the decision, given their magnitude.

### 4.6 Remoteness of the village

We next turn to examining heterogeneity in the price effects based on the isolation of the village. There are two reasons why the price effects might be amplified in more geographically remote villages. The first is that these villages are more closed economies. In the extreme of a perfectly open economy (horizontal supply curve), prices are exogenous to the village, but if the local supply at least in part determines prices, then one expects that the more disconnected the village is from other markets, the steeper the supply curve will be and the more prices will adjust to supply or demand shocks (see Appendix Figure 2).

The second reason is that the supply side of the market is likely to be less competitive in smaller, geographically remote villages. (There is a strong negative correlation between

remoteness and village population in our sample.) In the standard oligopoly model, the less competition there is, the more prices will respond to changes in the amount demanded from local suppliers.

Using a measure of how geographically remote the village is, we test whether $\gamma_1 < \gamma_2$ and $\gamma_2 > 0$ in the following model.

$$\begin{aligned} \ln p_{gsv} &= \alpha + \gamma_1 Remoteness_v \times InKind_v + \gamma_2 Remoteness_v \times Cash_v + \\ &\quad \beta_1 InKind_v + \beta_2 Cash_v + \rho Remoteness_v + \phi \ln p_{gv,t-1} + \sigma I_{gv} + \varepsilon_{gsv} \end{aligned} \tag{12}$$

Our measure of *Remoteness* is the time required to travel to a larger market that sells fruit, vegetables, and meat. The measure captures the difficulty of transporting supply to the village and therefore the village's lack of integration with the outside economy. In addition, remote villages are likely to have more market concentration (e.g., fewer shops selling groceries). *Remoteness* is constructed from household-survey self-reports on the travel time to a medium-sized market. (See the Appendix for details on the construction of this variable.)

Table 6 reports the results on how the pecuniary effects vary with remoteness. Column 1 examines the basic PAL items. For the in-kind villages, the price effects are negative overall and negative relative to the cash villages, though the interaction terms are insignificant. The coefficient difference ($\widehat{\gamma_1} - \widehat{\gamma_2}$) of -0.025 implies that for every extra hour of driving time, prices fall by 2.5 percentage points more under in-kind transfers than under cash transfers.

The travel time to the market is likely correlated with other characteristics of the village. For example, the more remote villages in our sample are also poorer. To partly address this omitted variable problem, column 2 includes interaction terms (and the main effect) of the median expenditure per capita in the village. Somewhat surprisingly, controlling for this measure of the village's income level makes the results stronger. The coefficient difference is -0.037 though still insignificant.

In columns 3 and 4, we examine all of the PAL goods and find qualitatively similar results. In this case, the in-kind-versus-cash effect (that is, the interaction with *Remoteness*) is larger in magnitude and statistically significant.

Finally, in columns 5 and 6, we repeat the specifications using the non-PAL goods. Note that the predictions should hold equally strongly for PAL and non-PAL goods for the cash villages since no good has special status, but for the in-kind villages, the predictions should hold for non-PAL goods only insofar as they are substitutes for the PAL goods. We find

coefficients with the predicted signs, but they are imprecisely estimated.

To summarize, we find suggestive support for the hypothesis that the price effects of transfers are larger in magnitude in villages that are more isolated from other villages and towns.[28] Because more remote areas also tend to be poorer, the results imply that pecuniary effects will often be more pronounced in poorer areas. Thus, for transfer programs aimed at the very poorest of communities, pecuniary effects are likely to be an important component of the total welfare impact of the program. This point applies not just to Mexico, but to developing countries broadly.[29]

Ideally, we would be able to distinguish whether the larger price effects in isolated villages are due to these areas having fewer grocery shops so less competition on the supply side or to these villages being more closed economies. While both have the same implication that price effects are larger in less developed areas, they have different efficiency implications. In addition, under the perfect-competition, closed-economy explanation, one expects the supply curve to be flatter in the long run and thus the price effects to dissipate, while the imperfect competition explanation would predict more persistent effects. Unfortunately we lack the data to distinguish these explanations; for example, data on the number of grocery shops per village is not available.[30] We therefore leave this question for future work.

### 4.7 Effects on producer households

Our last analysis examines effects on households engaged in agricultural production. Households in the village are consumers of the packaged goods in the in-kind bundle, and most are net consumers of food overall. However, many households produce some agricultural products, and for their production the welfare implications of price changes are the opposite of those for their consumption: A price increase (decrease) for food raises (lowers) the value of their production. (Ideally, we would also examine effects on food store owners, but the occupation variable in the survey is not specific enough to identify the store owners.)

We begin by examining how farm revenues and profits in the past year vary by treatment

[28] Angelucci and De Giorgi (2009) do not find significant price effects of Progresa, consistent with price effects being less pronounced in larger, more integrated communities.

[29] This point may also be relevant in developed countries. For example, in the U.S., inner cities are particularly poor. Enrollment in transfer programs such as Food Stamps and WIC is high, and these neighborhoods are often characterized as having few grocery stores (imperfect competition). If transportation costs to other neighborhoods are high, then these markets are also relatively closed. These factors suggest that there could be important pecuniary effects of transfer programs in these neighborhoods.

[30] According to program administrators, the number of stores in the price survey is not a good indicator of the number of stores in the village and is more a reflection of how thorough the data collection was.

type, estimating the following equation using household-level data:

$$FarmProduction_{hv} = \alpha + \beta_1 InKind_v + \beta_2 Cash_v + \phi FarmProduction_{hv,t-1} + \varepsilon_{hv}. \quad (13)$$

The subscript $h$ indexes the household and, as before, $v$ indexes the village. We cluster the standard errors by village and, analogous to our earlier analyses, control for the pre-period outcome variable.

As shown in column 1 of Table 7, we find, as predicted, a positive coefficient on *Cash*: Farm revenues are higher in villages where households received cash transfers (and hence where food prices rose) relative to control villages by 490 pesos. Similarly, we find that farm revenues are lower in in-kind villages relative to cash villages by 290 pesos. The effect of the transfers on revenues appears to be due partly to the direct price change, holding quantities fixed, and also to adjustments in production. We do not have data on quantity produced, only the monetary value of production, but the fact that profits change by a smaller amount than revenues (column 2) suggests that farmers expanded or contracted the quantity they produced in response to the price changes. In other words, in cash villages, a farmer receives higher revenues both because she earns more per unit sold and because she sells more units.

Of course, price effects are not the only reason that transfers might affect farm production. If farmers are credit constrained, then the income effect of the program might lead to more investment and increased production. Through this channel, for both the cash and in-kind treatment, one expects an increase in farm revenues (and either an increase or decrease in profits depending on whether long-run investments were also made), though there is no obvious reason that the credit-constraint channel would cause differential effects for cash versus in-kind villages.

The results in columns 1 and 2 indicate that the PAL transfer program, through its pecuniary effects, has different implications for producer households. To examine the overall welfare effect of the program for different types of households, we first classify households as agricultural producers if, at baseline, they either own a farm or consume food from their own production; 75 percent of households meet one of these two criteria. We then examine the program impacts on total expenditures per capita, which serves as a proxy for household

welfare and is meant to capture the total program effect for the household:

$$\begin{aligned} ExpendPC_{hv} &= \alpha + \theta_1 Producer_h \times InKind_v + \theta_2 Producer_{hv} \times Cash_v \\ &\quad + \beta_1 InKind_v + \beta_2 Cash_v + \rho Producer_{hv} + \phi ExpendPC_{hv,t-1} + \varepsilon_{hv} \end{aligned} \tag{14}$$

The predictions are $\theta_1 < \theta_2$ and $\theta_2 > 0$; in-kind transfers compared to cash transfers are relatively less beneficial to producer households, and cash transfers are relatively more beneficial to producer households. While the results (column 3) are imprecise, they line up with the predictions that cash transfers are more valuable to producer households than to non-producer households (by 8.7 percentage points), and in-kind transfers are relatively less valuable to producer households than to non-producer households (by 8.6 percentage points). Also note the main effect of *Producer*: Producer households are poorer than the non-producer households in our sample, so the fact that the cash program, relative to the in-kind program, helps producer households more than non-producer households is a progressive effect.

Finally, in column 4 we examine a second measure of welfare, an asset index that measures how many of the following items the household owns: radio or TV, refrigerator, gas stove, washing machine, VCR, car or motorcycle. Again, the point estimates suggest that cash transfers are differentially beneficial for producers (p-value=.06) and cash transfers, relative to in-kind transfers, are more helpful for producers (p-value = .13). (We find qualitatively similar estimates when we examine asset ownership for each asset type separately.) To summarize, due to their different price effects, the welfare effects of cash versus in-kind transfers appear to differ for producer households versus consumer households. That is, cash transfers are more beneficial to producers, while in-kind transfers are more beneficial to consumers.

## 5. Conclusion

As most of the world's poor live in rural, often isolated villages, large welfare transfer programs are likely to have quantitatively important price effects. This paper tests for price effects of in-kind transfers versus cash transfers using the randomized design and panel data collected for the evaluation of a large food assistance program for the poor in Mexico, the Programa de Apoyo Alimentario (PAL).

The price effects we find are quite sizeable. The price increase caused by cash transfers, based on the point estimates, offsets the direct transfer by 6 percent for recipients who are

consumers of these goods. Meanwhile, for in-kind transfers, the price effects represent an indirect benefit to consumers equal to 5 percent of the direct benefit. Thus, choosing in-kind rather than cash transfers in this setting generates extra indirect transfers to the poor equal to 11 percent of the direct transfer. Of course, the welfare implications are reversed if transfers recipients are producers rather than consumers.

We also find that agricultural profits increase in cash villages, where food prices rose, more so than in in-kind villages where prices fell. These effects are due both to the change in the price of goods sold, but also to households responding by producing more (less) when the price of what they produce increases (decreases).

The fact that producer households adjust supply in response to the transfer program raises the question of how long-lasting the price effects would be. It is likely that supply would further adjust in the longer run, at least if there are no barriers to expansion or entry. We leave the question of the long-run effects of the program for future work since the available data do not allow for such an analysis.

Another key finding is that the price effects seem to be particularly pronounced for very geographically isolated villages, where the most impoverished people live. This finding is consistent with these villages being less open to trade and having less market competition. While we cannot empirically test between these explanations, the fact that the price effects persist a year after the program is in place is suggestive that imperfect competition may be at play; even if marginal costs are flat in the long run, with imperfect competition there would be long-run price effects of in-kind transfers since the residual demand facing local suppliers is lower. Note also that if there is imperfect competition, then when the government acts as a supplier and provides in-kind transfers, it may not only be creating a pecuniary externality in these villages but also reducing the inefficiency associated with imperfect competition.

The decision of whether to provide transfers in-kind or as cash includes many other considerations besides price effects. For example, in-kind transfers constrain households' choices, which has costs, but also might help policy makers achieve a paternalistic objective. Another important consideration is how efficiently the government can provide supply. It could still be the case that an uncompetitive private sector creates more surplus than if the government were to enter as a supplier, if it would do so inefficiently. In that case, the best way for the government to alleviate supply constraints in poor villages while providing income support to households might be cash transfers combined with alternative supply-side policies.

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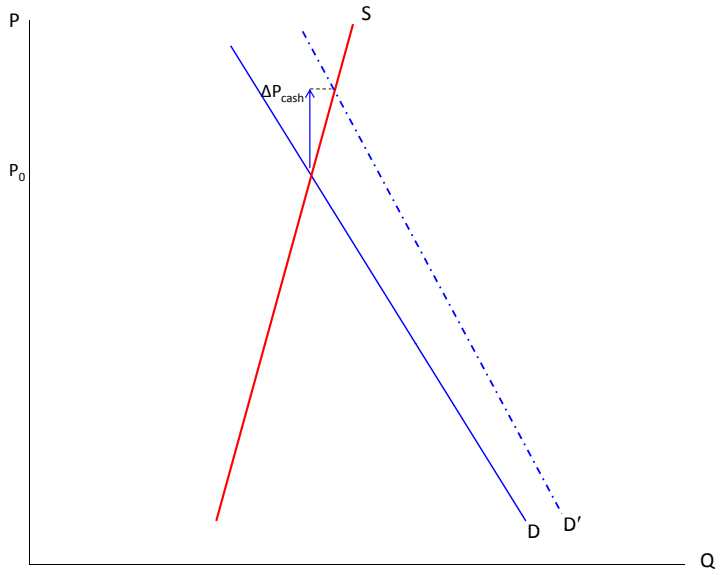
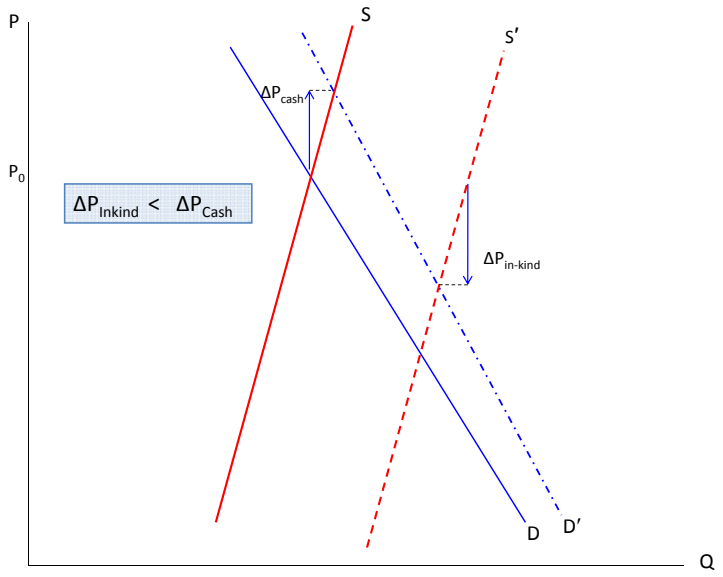
Figure 1: Effect of cash transfers on prices of normal goods




A cash transfer shifts demand to the right from D to D′ for a normal good.

Figure 2: Effect of government-provided supply on prices




An in-kind transfer shifts demand from D to D′ and also shifts supply to the right by the amount of new supply transferred to the economy, from S to S′.

Table 1: PAL food box summary

| Item | Type | Amount per box (kg) | Value per box (pre-program, in pesos) | Calories, as % of total box | Village change in supply (ΔSupply) |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Corn flour | basic | 3 | 15.7 | 20% | 1.00 |
| Rice | basic | 2 | 12.7 | 12% | 0.61 |
| Beans | basic | 2 | 21.0 | 13% | 0.29 |
| Fortified powdered milk | basic | 1.92 | 76.2 | 17% | 8.62 |
| Packaged pasta soup | basic | 1.2 | 16.2 | 8% | 0.93 |
| Vegetable oil | basic | 1 (lt) | 10.4 | 16% | 0.25 |
| Biscuits | basic | 1 | 18.7 | 8% | 0.81 |
| Lentils | supplementary | 1 | 10.3 | 2% | 3.73 |
| Canned tuna/sardines | supplementary | 0.6 | 14.8 | 2% | 1.55 |
| Breakfast cereal | supplementary | 0.2 | 9.3 | 1% | 0.90 |

Notes:
(1) Value is calculated as the across-village average of pre-treatment village-level median unit values. 10 pesos ≈ 1 USD. 194 villages.
(2) ΔSupply is a measure of the PAL supply influx into villages, relative to what would have been consumed absent the program. It is constructed as the average across all in-kind villages of the total amount a good transferred to the village divided by the average consumption of the good in control villages in the post-period.
(3) We do not know whether a household received canned tuna fish (0.35kg) or canned sardines (0.8kg) - the analysis assumes the mean weight and calories throughout.
(4) Biscuits are excluded from our analysis as post-program prices are missing.

Table 2: Baseline characteristics by treatment group

| | Control | In-kind | Cash | (1)=(2) p-value | (1)=(3) p-value | (2)=(3) p-value |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | **Price of basic PAL goods** | | | | | |
| ln(median village unit-value) | 2.39 | 2.37 | 2.37 | 0.44 | 0.41 | 0.81 |
| | (0.015) | (0.013) | (0.021) | | | |
| Observations (village-good level) | 282 | 575 | 306 | | | |
| | **Price of all PAL goods** | | | | | |
| ln(median village unit-value) | 2.58 | 2.60 | 2.58 | 0.40 | 0.89 | 0.52 |
| | (0.017) | (0.013) | (0.019) | | | |
| Observations (village-good level) | 423 | 863 | 459 | | | |
| | **Prices of all goods** | | | | | |
| ln(median village unit-value) | 2.68 | 2.70 | 2.68 | 0.46 | 0.82 | 0.28 |
| | (0.016) | (0.010) | (0.014) | | | |
| Observations (village-good level) | 2799 | 5707 | 3064 | | | |
| | **Village level characteristics** | | | | | |
| Diconsa store in the village | 0.26 | 0.45 | 0.39 | 0.03** | 0.16 | 0.51 |
| | (0.071) | (0.049) | (0.068) | | | |
| Travel time to nearest market (hours) | 0.86 | 0.77 | 0.84 | 0.52 | 0.91 | 0.60 |
| | (0.114) | (0.080) | (0.110) | | | |
| Observations (village level) | 47 | 96 | 51 | | | |
| | **Household level characteristics** | | | | | |
| Monthly per capita expenditure (pesos) | 570.48 | 535.06 | 529.51 | 0.31 | 0.26 | 0.85 |
| | (29.02) | (18.89) | (21.77) | | | |
| Producer household | 0.68 | 0.75 | 0.82 | 0.11 | 0.00*** | 0.05* |
| | (0.04) | (0.02) | (0.03) | | | |
| Farm revenue (pesos) | 480.85 | 760.23 | 980.51 | 0.06* | 0.00*** | 0.12 |
| | (121.56) | (78.70) | (119.01) | | | |
| Farm profits (pesos) | 118.43 | 176.40 | 212.84 | 0.31 | 0.13 | 0.42 |
| | (50.60) | (24.89) | (37.33) | | | |
| Asset index | 2.24 | 2.18 | 2.27 | 0.78 | 0.87 | 0.59 |
| | (0.16) | (0.10) | (0.13) | | | |
| Indigenous household | 0.21 | 0.18 | 0.15 | 0.66 | 0.39 | 0.56 |
| | (0.06) | (0.03) | (0.04) | | | |
| Household has a dirt floor | 0.32 | 0.31 | 0.32 | 0.77 | 0.95 | 0.70 |
| | (0.04) | (0.03) | (0.03) | | | |
| Household has piped water | 0.65 | 0.57 | 0.50 | 0.23 | 0.06 | 0.33 |
| | (0.05) | (0.04) | (0.06) | | | |
| Observations (household level) | 1290 | 2807 | 1471 | | | |

Notes: *** p<0.01, ** p<0.05, * p<0.1

(1) Standard errors in parentheses. For ln(median village unit-value) and household level characteristics, standard errors are clustered at the village level. Some household level variables have fewer observations than listed due to missing data.

(2) Median village unit values are imputed geographically if missing.

(3) Travel time to the nearest market is the time in hours needed to travel to a larger market that sells fruit, vegetables, and meat. It is constructed as the village median of household self-reports.

(4) Producer households are those that, at baseline, either auto-consume their production or own a farm.

(5) Revenues and profits are for the preceding year; both are trimmed of outliers greater than 3 standard deviations above the median. Expenditure is the value of all food and non-durable, non-food items consumed in the preceding month.

(6) The asset index is the sum of binary indicators for whether the household owns the following goods: radio or tv, refrigerator, gas stove, washing machine, VCR, and car or motorcycle.

(7) A household is defined as indigenous if one or more members speak an indigenous language.

Table 3: Price effects of in-kind and cash transfers, for all stores and by store type

| | All stores | | Non-Diconsa stores only | | All stores | |
|---|---|---|---|---|---|---|
| | Basic PAL goods only | All PAL goods | Basic PAL goods only | All PAL goods | Basic PAL goods only | All PAL goods |
| *Outcome =* | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) |
| | (1) | (2) | (3) | (4) | (5) | `(6) |
| In-kind | -0.016 | -0.038 | -0.003 | -0.026 | -0.002 | -0.026 |
| | (0.022) | (0.025) | (0.025) | (0.028) | (0.025) | (0.028) |
| Cash | 0.039 | 0.006 | 0.049* | 0.027 | 0.050* | 0.027 |
| | (0.026) | (0.028) | (0.027) | (0.030) | (0.028) | (0.030) |
| Diconsa store x In-kind | | | | | -0.032 | -0.022 |
| | | | | | (0.041) | (0.047) |
| Diconsa store x Cash | | | | | -0.029 | -0.060 |
| | | | | | (0.044) | (0.052) |
| Diconsa store | | | | | -0.056 | -0.081* |
| | | | | | (0.035) | (0.042) |
| Lagged ln(price) | 0.859*** | 0.856*** | 0.826*** | 0.857*** | 0.864*** | 0.859*** |
| | (0.037) | (0.025) | (0.049) | (0.029) | (0.037) | (0.025) |
| Observations | 1,616 | 2,334 | 1,216 | 1,766 | 1,616 | 2,334 |
| ***Effect size:* In-kind - Cash** | **-0.055*** ** | **-0.044** ** | **-0.051** ** | **-0.053** ** | **-0.052** ** | **-0.053** ** |
| **$H_0$: In-kind = Cash (p-value)** | **0.01** | **0.04** | **0.03** | **0.02** | **0.03** | **0.02** |
| ***Effect size:* Diconsa Store x In-kind - Diconsa store x Cash** | | | | | **-0.003** | **0.038** |
| **$H_0$: Diconsa Store x In-kind = Diconsa store x Cash (p-value)** | | | | | **0.92** | **0.32** |

Notes: *** p<0.01, ** p<0.05, * p<0.1

(1) The outcome is the logarithm of post-treatment store prices, which varies at the village-store-good level.

(2) Lagged ln(price) is the village median unit-value, imputed geographically if missing, and varies at the village-good level.

(3) Regressions in all columns include an indicator for imputed pre-program prices (see text).

(4) Standard errors are clustered at the village level. 194 villages.

Table 4: Price effects of in-kind and cash transfers, alternative specifications

| | First differences | | Normalized price in levels | | Good fixed effects | | No baseline controls | |
|---|---|---|---|---|---|---|---|---|
| | Basic PAL goods only | All PAL goods | Basic PAL goods only | All PAL goods | Basic PAL goods only | All PAL goods | Basic PAL goods only | All PAL goods |
| *Outcome =* | Δln(price) | Δln(price) | price | price | ln(price) | ln(price) | ln(price) | ln(price) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| In-kind | -0.015 | -0.042 | -0.033* | -0.037* | -0.031 | -0.033 | -0.020 | -0.016 |
| | (0.023) | (0.027) | (0.020) | (0.020) | (0.019) | (0.020) | (0.030) | (0.026) |
| Cash | 0.043 | 0.008 | 0.015 | 0.002 | 0.007 | -0.009 | 0.018 | -0.005 |
| | (0.027) | (0.030) | (0.027) | (0.023) | (0.022) | (0.023) | (0.033) | (0.028) |
| Lagged normalized price | | | 0.130*** | 0.027 | | | | |
| | | | (0.042) | (0.021) | | | | |
| Lagged ln(price) | | | | | 0.154*** | 0.073*** | | |
| | | | | | (0.035) | (0.025) | | |
| Good fixed effects | | | | | yes | yes | | |
| Observations | 1,616 | 2,334 | 1,616 | 2,334 | 1,616 | 2,334 | 1,617 | 2,335 |
| ***Effect size:* In-kind - Cash** | **-0.058**** | **-0.050**** | **-0.048**** | **-0.040**** | **-0.037**** | **-0.025** | **-0.039** | **-0.011** |
| **$H_0$: In-kind = Cash (p-value)** | **0.01** | **0.04** | **0.03** | **0.02** | **0.03** | **0.15** | **0.15** | **0.66** |

Notes: *** p<0.01, ** p<0.05, * p<0.1

(1) All columns: Standard errors are clustered at the village level. 194 villages.

(2) Regressions in columns (1)-(6) include an indicator for imputed pre-program prices (see text).

(3) Columns (1)-(2): The outcome is the difference between the logarithm of the post-treatment store price and the village median unit-value (imputed geographically if missing).

(4) Columns (3)-(4): The outcome is the post-treatment store price normalized by the good-specific mean of post-treatment store prices in the control group. These regressions control for the village median unit-value (imputed geographically if missing) normalized by the good-specific mean of the village median unit-value (imputed geographically if missing) in the control group.

(5) Columns (5)-(6): The outcome is the logarithm of the post-treatment store price. These regressions control for the logarithm of the village median unit-value (imputed geographically if missing).

(6) Columns (7)-(8): The outcome is the logarithm of the post-treatment store price.

Table 5: Price effects using "intensive margin" variation and for substitute goods

| | Intensive margin variation | | Substitute goods | |
|---|---|---|---|---|
| | Basic PAL goods only | All PAL goods | Set of PAL substitutes | All non-PAL goods |
| *Outcome =* | ln(price) | ln(price) | ln(price) | ln(price) |
| | (1) | (2) | (3) | (4) |
| ΔSupply x In-kind | -0.004 | -0.005 | | |
| | (0.018) | (0.016) | | |
| ΔSupply x Cash | 0.031 | 0.018 | | |
| | (0.022) | (0.021) | | |
| In-kind | -0.024 | -0.039 | -0.019 | -0.008 |
| | (0.023) | (0.028) | (0.027) | (0.021) |
| Cash | -0.006 | -0.026 | 0.054 | 0.009 |
| | (0.027) | (0.032) | (0.039) | (0.024) |
| ΔSupply | 0.055*** | 0.031** | | |
| | (0.018) | (0.014) | | |
| Lagged ln(price) | 0.749*** | 0.854*** | 0.957*** | 0.439*** |
| | (0.045) | (0.027) | (0.011) | (0.016) |
| Observations | 1,616 | 2,334 | 1,440 | 10,606 |
| ***Effect size:* ΔSupply x In-kind - ΔSupply x Cash** | **-0.033*** | **-0.022** | | |
| ***$H_0$:* ΔSupply x In-kind = ΔSupply x Cash (p-value)** | **0.09** | **0.25** | | |
| ***Effect size:* In-kind - Cash** | | | **-0.073**** | **-0.017** |
| ***$H_0$:* In-kind = Cash (p-value)** | | | **0.04** | **0.38** |

Notes: *** p<0.01, ** p<0.05, * p<0.1

(1) All columns: The outcome is the logarithm of post-treatment store prices, which varies at the village-store-good level. Lagged ln(price) is the village median unit-value, imputed geographically if missing, and varies at the village-good level. Regressions include an indicator for imputed pre-program prices (see text).

(2) All columns: Standard errors are clustered at the village level. 194 villages.

(3) ΔSupply is a measure of the PAL supply influx into villages, relative to what would have been consumed absent the program. It is constructed as the average across all in-kind villages of the total amount a good transferred to the village divided by the average consumption of the good in control villages in the post-period.

(4) Column (3) includes 7 non-PAL goods that we identified as PAL substitutes: corn tortillas, corn kernels, liquid milk, cheese, yogurt, potatoes, and plantains.

(5) Column (4) includes all 51 non-PAL goods included in the sample.

Table 6: Price effects as a function of the remoteness of the village

| | Basic PAL goods | | All PAL goods | | Non-PAL goods | |
|---|---|---|---|---|---|---|
| *Outcome =* | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| ln(Remoteness) x In-kind | -0.037 | -0.030 | -0.051 | -0.045 | -0.021 | -0.017 |
| | (0.035) | (0.034) | (0.040) | (0.039) | (0.035) | (0.032) |
| ln(Remoteness) x Cash | -0.013 | 0.007 | 0.002 | 0.018 | 0.007 | 0.017 |
| | (0.039) | (0.037) | (0.042) | (0.039) | (0.039) | (0.036) |
| ln(Village Expenditure) x In-kind | | 0.025 | | 0.013 | | 0.002 |
| | | (0.060) | | (0.069) | | (0.072) |
| ln(Village Expenditure) x Cash | | 0.132* | | 0.101 | | 0.069 |
| | | (0.077) | | (0.080) | | (0.081) |
| Observations | 1,441 | 1,441 | 2,089 | 2,089 | 9,472 | 9,472 |
| ***Effect size:* ln(Remoteness) x In-kind - ln(Remoteness) x Cash** | **-0.025** | **-0.037** | **-0.052*** | **-0.063**** | **-0.027** | **-0.035** |
| ***$H_0$:* ln(Remoteness) x In-kind = ln(Remoteness) x Cash (p-value)** | **0.50** | **0.28** | **0.09** | **0.03** | **0.36** | **0.26** |

Notes: *** p<0.01, ** p<0.05, * p<0.1
(1) The outcome is the logarithm of post-treatment store prices, which varies at the village-store-good level.
(2) Remoteness is defined as the village median time required to travel to a larger market that sells fruit, vegetables, and meat. It is constructed as the village median of household self-reports.
(3) Standard errors are clustered at the village level. 194 villages.
(4) Village expenditure is the median per capita household value of all food and non-durable, non-food goods consumed in the preceding month.
(5) Regressions control for the main effects of the interaction terms reported, as well as for the pre-period log price and an indicator for imputed pre-program prices (see text).

Table 7: Effects for food producers

| *Outcome =* | Farm revenues | Farm profits | ln(Expenditure per capita) | Asset index |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| In-kind | 199.78 | 95.06** | 0.115** | 0.084 |
| | (130.412) | (40.437) | (0.046) | (0.075) |
| Cash | 489.96*** | 147.79** | 0.064 | -0.040 |
| | (154.156) | (59.424) | (0.052) | (0.106) |
| Producer x In Kind | | | 0.001 | 0.077 |
| | | | (0.060) | (0.115) |
| Producer x Cash | | | 0.087 | 0.266* |
| | | | (0.068) | (0.142) |
| Producer | | | -0.161*** | -0.308*** |
| | | | (0.050) | (0.092) |
| Control for pre-period outcome? | yes | yes | yes | yes |
| Observations | 4,821 | 4,851 | 5,534 | 5,571 |
| ***Effect size:* In-kind - Cash** | **-290.18**** | **-52.73** | **0.050** | **0.124** |
| **$H_0$: In-kind = Cash (p-value)** | **0.04** | **0.40** | **0.25** | **0.20** |
| ***Effect size:* Producer x In-Kind - Producer x Cash** | | | **-0.086** | **-0.189** |
| **$H_0$: Producer x In-Kind = Producer x Cash (p-value)** | | | **0.13** | **0.13** |

Notes: *** p<0.01, ** p<0.05, * p<0.1
(1) All columns: Observations are at the household level. Standard errors are clustered at the village level. 194 villages.
(2) Producer is an indicator for households that, at baseline, either auto-consume their production or own a farm.
(3) Revenues, profits, and consumption are measured in pesos. Revenues and profits are for the preceeding year; both are trimmed of outliers greater than 3 standard deviations above the median. Expenditure is the value of all food and non-durable, non-food items consumed in the preceding month.
(4) The asset index in Column (4) is the sum of binary indicators for whether the household owns the following goods: radio or tv, refrigerator, gas stove, washing machine, VCR, and car or motorcycle.

## FOR ONLINE PUBLICATION ONLY

## Appendix A. Price effects with imperfect competition

Consider a simple Cournot-Nash model with $N$ identical stores and indirect market demand for a homogenous good, $p(Q;X)$. Total demand is $Q = \sum_f q_f = Nq$ where $f = 1,...,N$ indexes the store. Each store faces constant marginal costs, $C = cq$. We assume that the demand curve is downward sloping, i.e., $\frac{\partial p}{\partial Q} < 0$.

Both an in-kind and cash injection can be represented by a shift in demand. A cash transfer has only an income effect and is equivalent to a positive demand shift (for a normal good). An in-kind transfer entails this income effect and an additional decrease in demand due to the external influx of goods; consumers receive some items for free from the government, so they now demand less from local firms. In this model, such an exogenous change in demand is represented by a change in the demand shifter $X$, where we define $\frac{\partial Q}{\partial X} > 0$.

Stores maximize profits with respect to quantities taking others' behavior as given (Nash equilibrium):

$$max_q \Pi = p(Q)q - cq.$$

The first-order condition is $p'q + p - c = 0$, which yields by substitution and differentiation:

$$p = c - \frac{Q(p;X)}{N\frac{\partial Q(p;X)}{\partial p}} \equiv \frac{N\varepsilon c}{N\varepsilon - 1}$$

where $\varepsilon \equiv -\frac{\partial Q}{\partial p}\frac{p}{Q}$ is the price-elasticity of demand.

The above equilibrium condition is useful for studying the effect of a shift in demand, i.e. $\partial X > 0$, on the equilibrium price. For the class of demand functions that are additive in $X$ of the form $Q = g(p) + X$, we can immediately see that

$$\frac{dp}{dX} = -\frac{1}{N\frac{\partial g(p)}{\partial p}} > 0$$

since $\partial g/\partial p < 0$ from the assumption of a downward-sloping demand curve. A simple example in this class of demand curves is linear demand, e.g., $Q = X - \alpha p$.

Thus, for any downward-sloping demand with an additive shifter, we can sign the price effect of a demand shift. For demand functions in this class, a cash transfer will lead to higher prices of normal goods and an in-kind transfer will lead to lower prices than a cash transfer, just as in the case of perfect competition.

The price effect of a demand shift will in general be given by $\frac{dp}{dX} = -Nc\frac{d\varepsilon}{dX}/(N\varepsilon - 1)^2$. The sign of $\frac{dp}{dX}$, and hence the sign of the price effects of transfer programs, will depend on the sign of $\frac{d\varepsilon}{dX}$. For example, if transfers have a multiplicative effect on demand (e.g., $Q = Xp^{-\alpha}$), there would be no price effects of transfers ($\frac{dp}{dX} = 0$) since the elasticity of demand is independent of $X$.

# Appendix B. Data appendix

## *Variable construction*

**Post-program prices**

Post-program prices come from a survey of local stores; a maximum of three stores were surveyed per village in each survey wave. Prices were collected in common units, for example the price of a 150ml container of yogurt, a "small" loaf of bread, or a kilo of corn flour. For non-standard units, we converted prices to either kilos (for solids) or liters (for liquids) using conversion factors supplied by the Mexican government for non-standard units (e.g., a "small" loaf of bread weighs 0.68kg).

**Pre-program prices**

Pre-program prices are constructed as the village-median household unit value. Households reported both expenditure and quantity purchased by good in a seven-day food recall survey, and the household unit-value is defined as the ratio of the two measures. For some goods in some villages, there was no expenditure on a good by any household during the seven-day recall period, and therefore the village-median unit-value for that good is missing. In these cases, we impute the pre-program price using the median pre-program price in other villages within the same municipality (or within the same state in the few cases where there are no data for other villages in the municipality).

**Presence of a Diconsa store**

We identify the presence of a Diconsa store in experimental villages from the names of stores that were surveyed for their prices, coding this variable by hand.

**Supply measure**

$\Delta Supply$ is a ratio that measures the size of the supply influx of in-kind goods into program villages, relative to what would have been consumed in the absence of the PAL program. It is constructed as the average, across in-kind villages, of the village aggregate amount of a good transferred to the village divided by the average consumption of the good in control villages in the post-program period. Thus, $\Delta Supply$ varies only at the good level.

**Remoteness measure**

*Travel Time* is constructed from household self-reports on the time it takes to travel to the nearest market where fresh fruit, vegetables, and meat are sold. Households were first asked if these fresh foods were sold in the village; then they were asked to state the time to get to the nearest market, regardless of mode of transportation. *Travel Time* is thus the village median among households that report leaving the village to purchase fresh foods.

**Total household consumption**

*ExpendPC*—monthly per capita expenditure—is constructed as the sum of monthly household food expenditure, non-food expenditure, and expenditure on food away from home, divided by the number of household members. Food expenditure is the value of food consumed; consumption amounts were collected with a seven-day food recall module (con-

verted to monthly amounts), covering 61 food items, and we use village median household unit-values (imputed geographically if missing) to value consumption. Non-food expenditure was reported at the monthly level and covers 26 categories designed to capture the extent of non-durable, non-food expenditure (non-food consumption quantities were not collected). Weekly expenditure on food away from home was self-reported by the household, and we convert to monthly amounts. In some analyses, we use the median village monthly per capita expenditure at baseline, *Village Expenditure*.

**Farm production measures**

We use two measures of *Farm Production*: farm revenues and farm profits. Both measures are self-reports from the household surveys. Households were first asked whether, within the last year, any household member planted or reaped produce or grain, or raised animals. If yes, they were asked the total costs involved in these activities and the how much money was left over after these costs had been paid (i.e., farm profits). We add costs to profits in order to construct farm revenues.

**Producer household indicator**

The variable *Producer* equals one if, at baseline, a household either auto-consumed their production or owned a farm. Farm ownership was assumed if the household answered that, within the last year, any household member had planted or reaped produce or grain, or raised animals. Auto-consumption data was collected for 61 food items in a seven-day food recall module. Household were asked to state the quantities consumed of each item, and how much of that consumption was from own production (auto-consumption). If a household auto-consumed any positive amount of at least one good, we also classify them as a producer.

**Household asset index**

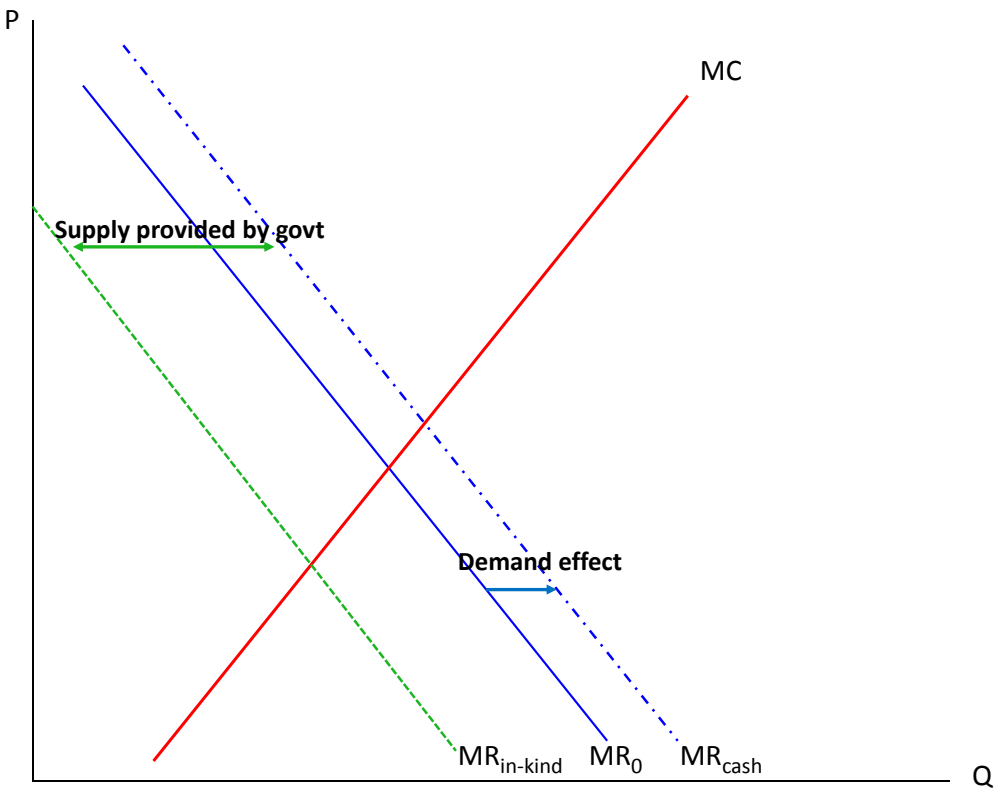
We construct an index of the durable assets a household owns from self-reports in the household questionnaire. Households were asked if they owned each of the following six items: a radio or TV, a refrigerator, a gas stove, a washing machine, a VCR, and a car or motorcycle. We sum the number of items the household reports owning to create the variable *Asset Index*; thus, *Asset Index* ranges from zero to six.

## *Qualitative surveys of food stores*

We conducted follow-up qualitative surveys of shopkeepers in 20 villages in the spring of 2011 in the Mexican states of Veracruz, Oaxaca, and Puebla. Eleven of the villages were PAL experimental villages and another five are currently PAL villages that were incorporated in the program in the past two years. A research assistant interviewed several shopkeepers per village (Diconsa and non-Diconsa) in these 16 villages. One of the coauthors (Jayachandran) conducted similar interviews with shopkeepers in the other 4 villages, which were poor, rural villages but not part of the PAL program.

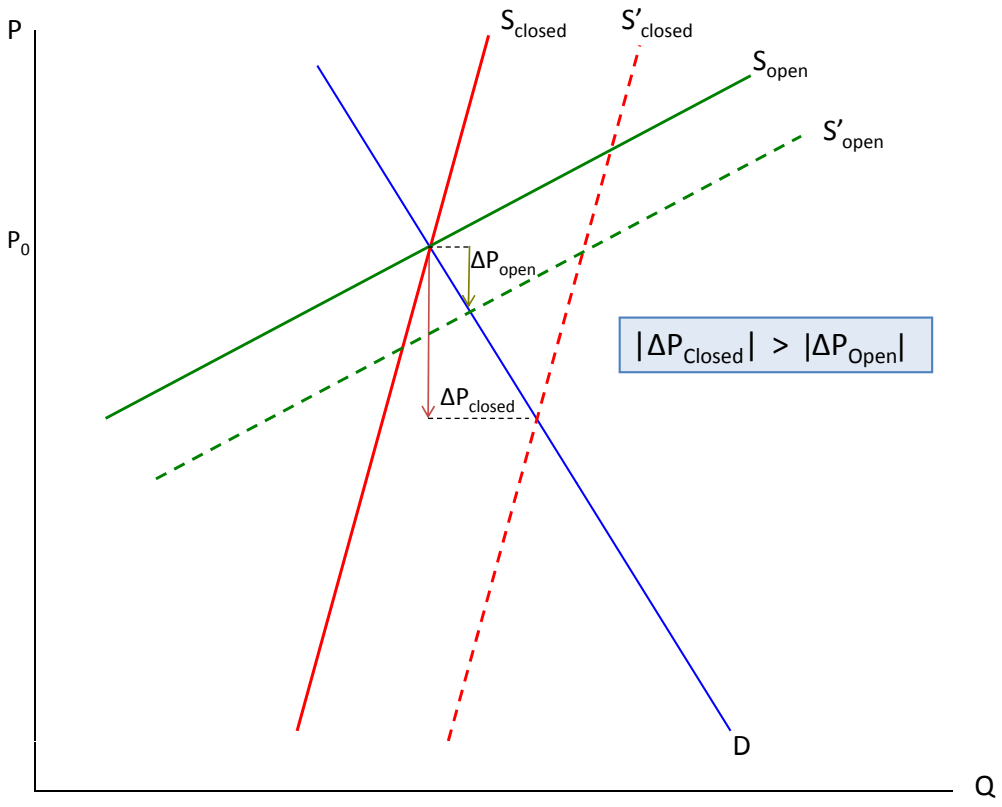
Shopkeepers were asked how they procured supply, how they responded to unexpected changes in demand, when they adjusted prices, whether prices varied by customer (i.e., price discrimination), why they did not stock more inventory, and other questions related to the market structure and pricing.

Appendix Figure 1: Cash and in-kind transfers as changes in the residual demand facing local suppliers



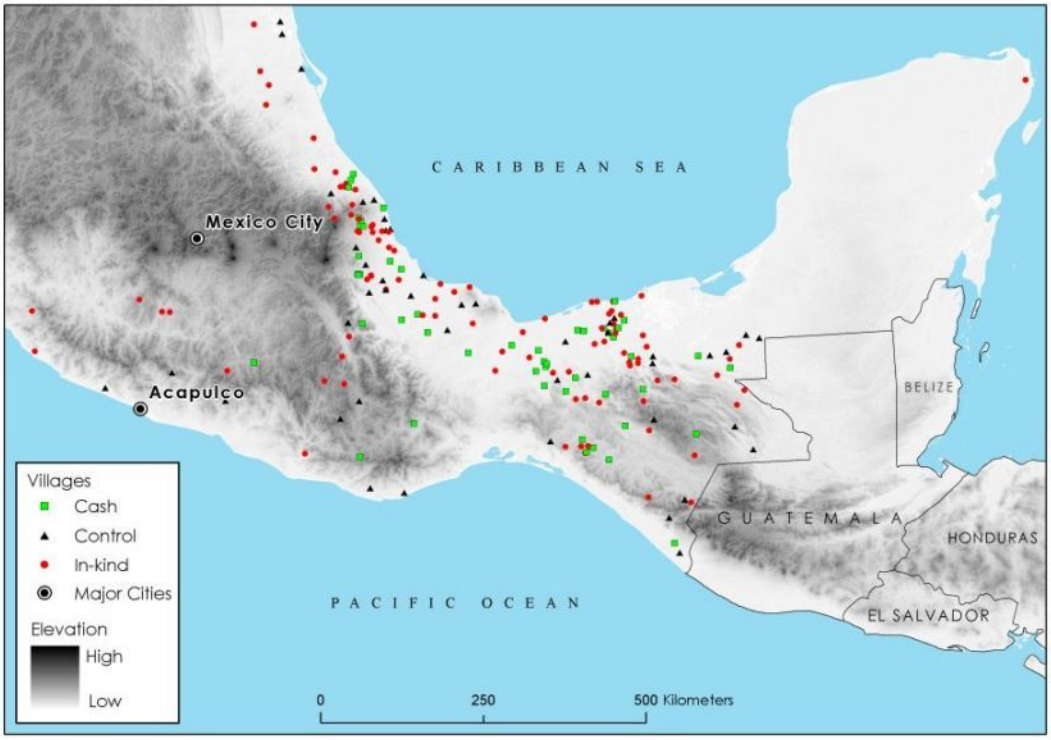

An in-kind transfer has two effects, an increase in the residual demand facing local suppliers due to an income effect, and a decrease in residual demand because the government meets some of the demand with its transfer. The net effect if that the marginal revenue curve shifts from $MR$ to $MR_{in-kind}$. A cash transfer has only the income effect, and the marginal revenue curve shifts to $MR_{cash}$.

Appendix Figure 2: Heterogeneous effects for open versus closed economies

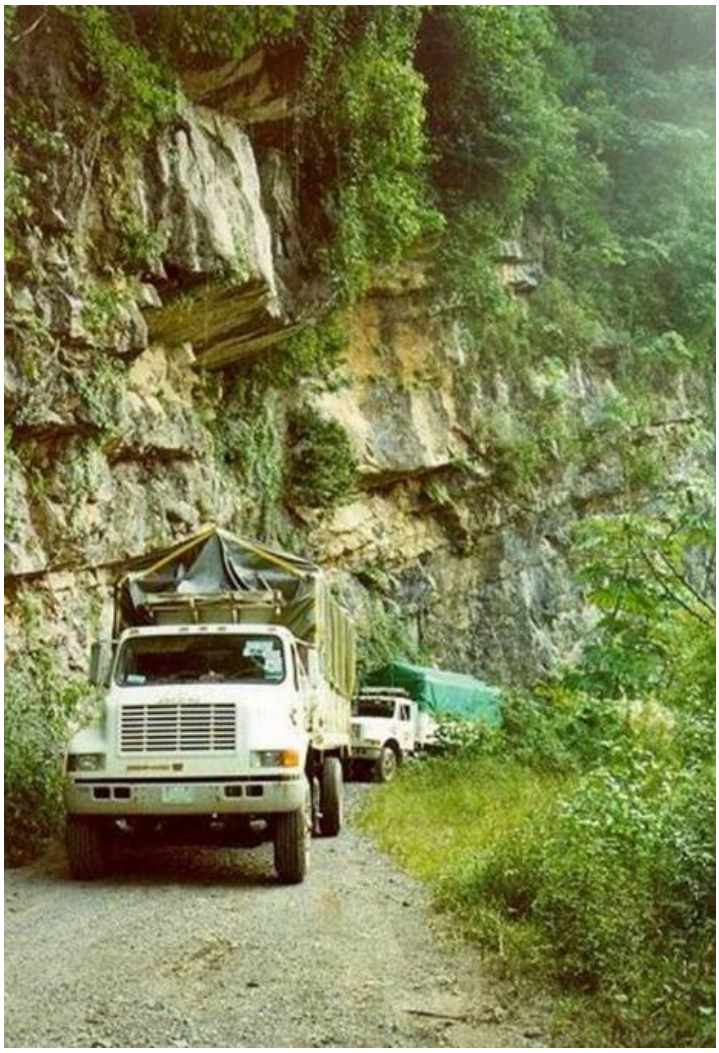



The more closed economy is depicted as having a steeper supply curve. Thus given the same demand curve and the same-sized shift in supply, the price effects will be larger the more closed the economy.

Appendix Figure 3: Villages in the PAL experiment



Appendix Figure 4: Trucks transporting PAL boxes



Appendix Figure 5: PAL box of food

Appendix Figure 6: Unloading PAL boxes in the village

Appendix Figure 7: Grocery shops in PAL villages

Appendix Table 1: List of goods used in the analysis

| | Goods used in analysis | PAL goods | PAL substitutes | | Goods used in analysis | PAL goods | PAL substitutes |
|---|---|---|---|---|---|---|---|
| 1 | tomato | | | 31 | oats | | |
| 2 | onion | | | 32 | soy | | |
| 3 | potato | | x | 33 | chicken | | |
| 4 | carrot | | | 34 | beef and pork | | |
| 5 | leafy greens | | | 35 | goat and lamb | | |
| 6 | squash | | | 36 | seafood (fresh) | | |
| 7 | chayote | | | 37 | canned tuna / sardines | x | |
| 8 | nopale (cactus) | | | 38 | eggs | | |
| 9 | fresh chili | | | 39 | milk (liquid) | | x |
| 10 | guava | | | 40 | yogurt | | x |
| 11 | mandarin | | | 41 | cheese | | x |
| 12 | papaya | | | 42 | lard | | |
| 13 | oranges | | | 43 | fortified powdered milk | x | |
| 14 | plantains | | x | 44 | processed meats | | |
| 15 | apple | | | 45 | pastelillo (snack cakes) | | |
| 16 | lime | | | 46 | soft drinks | | |
| 17 | watermelon | | | 47 | alcohol | | |
| 18 | corn tortillas | | x | 48 | coffee | | |
| 19 | corn kernels | | x | 49 | sugar | | |
| 20 | corn flour | x | | 50 | corn or potato chips | | |
| 21 | bread rolls | | | 51 | chocolate | | |
| 22 | sweet bread | | | 52 | candy | | |
| 23 | loaf of bread | | | 53 | vegetable oil | x | |
| 24 | wheat flour | | | 54 | mayonnaise | | |
| 25 | wheat tortillas | | | 55 | fruit drinks | | |
| 26 | dry pasta soup | x | | 56 | consome (broth) | | |
| 27 | rice | x | | 57 | powdered fruit drinks | | |
| 28 | breakfast cereal | x | | 58 | atole (corn based drink) | | |
| 29 | beans | x | | 59 | tomato paste | | |
| 30 | lentils | x | | 60 | canned chilis | | |

Note:
(1) We identified this set of PAL substitutes prior to estimating the models discussed in the text. The choice of goods was based solely on our knowledge of Mexican food consumption practices and through discussion with Mexican colleagues.

Appendix Table 2: Main specification separately by PAL good

| | Corn flour | Rice | Beans | Fortified powdered milk | Packaged pasta soup | Vegetable oil | Lentils | Canned tuna / sardines | Breakfast cereal |
|---|---|---|---|---|---|---|---|---|---|
| *Outcome =* | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) | ln(price) |
| In-kind | -0.012 | -0.011 | -0.041 | -0.005 | -0.076** | 0.002 | -0.014 | -0.045* | -0.019 |
| | (0.019) | (0.027) | (0.035) | (0.124) | (0.032) | (0.022) | (0.065) | (0.024) | (0.102) |
| Cash | -0.007 | 0.007 | -0.026 | 0.090 | -0.002 | 0.037 | -0.066 | -0.025 | -0.020 |
| | (0.023) | (0.030) | (0.040) | (0.148) | (0.048) | (0.029) | (0.075) | (0.027) | (0.131) |
| Lagged ln(price) | 0.080 | 0.382*** | 0.396*** | 0.015 | 0.474*** | 0.474*** | 0.026 | 0.058** | 0.000 |
| | (0.051) | (0.092) | (0.079) | (0.045) | (0.106) | (0.125) | (0.077) | (0.024) | (0.035) |
| Observations | 249 | 317 | 309 | 102 | 316 | 323 | 202 | 313 | 203 |
| ***Effect size:* In-kind - Control** | **-0.005** | **-0.019** | **-0.015** | **-0.095** | **-0.072*** | **-0.035** | **0.052** | **-0.021** | **0.001** |
| **$H_0$: In-kind = Control (p-value)** | **0.77** | **0.47** | **0.70** | **0.25** | **0.10** | **0.13** | **0.41** | **0.36** | **0.98** |

Notes: *** p<0.01, ** p<0.05, * p<0.1
(1) The outcome is the logarithm of post-treatment store prices, which varies at the village-store-good level.
(2) Lagged ln(price) is the village median unit-value, imputed geographically if missing, and varies at the village-good level.
(3) Regressions in all columns include an indicator for imputed pre-program prices (see text).
(4) Standard errors are clustered at the village level. 194 villages.

Appendix Table 3: Alternative specifications using the subsample of non-Diconsa stores

| | Non-Diconsa Stores Only | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | First differences | | Normalized price in levels | | Good fixed effects | | No baseline controls | |
| | Basic PAL goods only | All PAL goods | Basic PAL goods only | All PAL goods | Basic PAL goods only | All PAL goods | Basic PAL goods only | All PAL goods |
| *Outcome =* | Δln(price) | Δln(price) | price | price | ln(price) | ln(price) | ln(price) | ln(price) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| In-kind | 0.000 | -0.030 | -0.019 | -0.027 | -0.018 | -0.023 | -0.014 | -0.000 |
| | (0.026) | (0.030) | (0.021) | (0.020) | (0.021) | (0.020) | (0.033) | (0.028) |
| Control | 0.056* | 0.031 | 0.018 | 0.014 | 0.013 | 0.009 | 0.015 | 0.007 |
| | (0.029) | (0.033) | (0.025) | (0.023) | (0.022) | (0.023) | (0.034) | (0.031) |
| Lagged normalized price | | | 0.094** | 0.022 | | | | |
| | | | (0.043) | (0.021) | | | | |
| Lagged ln(price) | | | | | 0.124*** | 0.064*** | | |
| | | | | | (0.032) | (0.024) | | |
| Good fixed effects | | | | | yes | yes | | |
| Observations | 1,216 | 1,766 | 1,216 | 1,766 | 1,216 | 1,766 | 1,217 | 1,767 |
| ***Effect size:* In-kind - Control** | **-0.056**** | **-0.061**** | **-0.037*** | **-0.041**** | **-0.031*** | **-0.032*** | **-0.028** | **-0.007** |
| **$H_0$: In-kind = Control (p-value)** | **0.04** | **0.02** | **0.08** | **0.02** | **0.07** | **0.06** | **0.32** | **0.79** |

Notes: *** p<0.01, ** p<0.05, * p<0.1

(1) All columns: Standard errors clustered at the village level. 194 villages.

(2) Regressions in columns (1)-(6) include an indicator for imputed pre-program prices (see text).

(3) Columns (1)-(2): The outcome is the difference between the logarithm of the post-treatment store price and the village median unit-value (imputed geographically if missing).

(4) Columns (3)-(4): The outcome is the post-treatment store price normalized by the good-specific mean of post-treatment store prices in the control group. These regressions control for the village median unit-value (imputed geographically if missing) normalized by the good-specific mean of the village median unit-value (imputed geographically if missing) in the control group.

(5) Columns (5)-(6): The outcome is the logarithm of the post-treatment store price. These regressions control for the logarithm of the village median unit-value (imputed geographically if missing).

(6) Columns (7)-(8): The outcome is the logarithm of the post-treatment store price.