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The impact of large-scale social protection interventions on grain prices in poor countries

Evidence from Ethiopia

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ABSTRACT

There has long been concern that cash and in-kind transfers might affect prices in developing country food markets. While there have been a number of studies at highly aggregated levels, much less is known about the effects of cash transfers on local food prices and even less about how they compare to food transfers. We consider this issue in the context of a large social protection intervention, Ethiopia's Productive Safety Net Programme. Using 12 months of price data from 233 localities and controlling for temporal, location, and market characteristics we find:

1. Cash transfers have no effect on food prices.
2. There is some evidence that food transfers reduce food prices. Maize transfers reduce aggregate grain prices, wheat transfers reduce the price of maize, and the negative effect of food transfers on food prices is larger in more remote markets.
3. However, the magnitudes of these effects are trivially small, both in absolute and percentage terms.

Keywords: food transfers, cash transfers, food prices, Ethiopia, Productive Safety Net Programme

JEL classification: D40, I38, O12

1. INTRODUCTION

Social protection programs such as social assistance – non-contributory transfer programs targeted to the poor – serve a number of functions for beneficiary households. They reduce poverty and food insecurity, prevent transitory shocks from having long-term adverse consequences, and potentially provide a platform for asset accumulation. Moreover, they have been implemented in a large number of developed and developing countries, having reached about 1.5 billion people (Alderman et al. 2017) and are estimated to have lifted between 136 and 165 million people out of extreme poverty (Fiszbein et al. 2014).

Nevertheless, there are persistent concerns about the adverse impacts that these interventions may have. At the household level, these revolve around three issues: reduced labor effort, reduced private transfers, and increased fertility.[1] A further concern relates to the impact that social protection transfers may have on food markets. Such impacts may well have welfare implications. On the demand side, significant price increases due to transfers may adversely affect not only program beneficiaries by eroding their purchasing power, but also non-beneficiaries who also end up paying more for food. On the supply side, price decreases due to transfers may create disincentives for local food-selling households to produce for the market.

Schultz (1960) made an early statement on this topic, suggesting that US food aid might depress food prices in recipient countries. While many studies using data on aggregate food aid flows and/or national markets find negligible price effects (Gelan 2007; Garg et al. 2013; Mabuza et al. 2009; Tadesse and Shively 2009), some find the large negative impacts (Levinsohn and McMillan 2007; Tschirley, Donovan, and Weber, 1996) feared by Schultz (1960).[2] The last ten years has seen a shift in transfer modalities, with

[1] The literature on all these topics is voluminous. With respect to Ethiopia's Productive Safety Net Programme (PSNP), Hoddinott et al. (2012) find no evidence that participation created disincentive effects in agricultural production; instead, it led to increased use of fertilizer and higher levels of investment in agriculture. Berhane et al. (2014) find that the PSNP had no impact on private transfer flows such as remittances. Hoddinott and Mekasha (2017) find that the PSNP participation reduces fertility.

[2] A related literature looks at the impact of monetizing food aid – the practice by which food produced in the United States is purchased by the American government and shipped to a developing country where it is sold by a U.S.-based non-governmental organization or a recipient government. Monetized food aid decreases food prices in recipient countries (Barrett & Maxwell 2005).

social assistance programs increasingly providing cash, though food and other in-kind transfers remain prevalent (Alderman, Gentilini, and Yemtsov 2017, p. 6). Much less is known about the effects of cash transfers on local food prices and even less about how they compare to food transfers. Using data from rural Mexico, Cunha, Di Giorgi, and Jayachandran (2017) find that prices are lower under in-kind transfers compared with cash transfers. Relative to their control group, in-kind transfers lead to a 4 percent fall in prices while cash transfers lead to a positive but small increase in prices. Both effects were more pronounced in more remote villages. In work most closely related to ours, Arega and Shively (2014) use Ethiopian price data aggregated to the zonal level to assess the impact of aggregate cash and food transfers provided under the country's Productive Safety Net Programme (PSNP) on the prices of three grains (teff, wheat, and maize). They find that food transfers have no effect on grain prices, while cash transfers exert modest upward pressure on grain prices, most notably teff. They caveat their findings by noting that their zonal analysis "may nevertheless mask important effects that may be occurring at the woreda level that we fail to discern. Uncovering sufficient data to conduct a more disaggregated analysis may be difficult, if not impossible, and is left for future efforts" (Arega and Shively 2014, p. 23).

We contribute to this literature by examining the impact of cash and food transfers provided as part of Ethiopia's PSNP on local grain prices at a more disaggregated level than Arega and Shively (2014). The PSNP is of particular interest because it is one of the largest social protection programs in sub-Saharan Africa, providing assistance to more than seven million people living in rural areas across more than 300 woredas (districts).[3] Coverage levels vary, but in some localities more than 70 percent of households receive these transfers. Along with the transfer levels that average around 15 percent of household income, this means that meaningful amounts of transfers are being pumped into rural localities. While we do not have the advantage of a randomized design, food and cash transfers are provided in the same localities, allowing us to control for an array of locality characteristics. We resolved the data issue raised by Arega and Shively, and use locality (kebele) level price data that we match to locality (kebele) level transfer data. We find:

1. Cash transfers have no effect on food prices.
2. There is some evidence that food transfers reduce food prices. Maize transfers reduce aggregate grain prices, wheat transfers reduce the price of maize, and the negative effect of food transfers on food prices is larger in more remote markets.
3. However, the magnitudes of these effects are trivially small, both in absolute and percentage terms.

The structure of the paper is as follows. We begin in Section 2 with a conceptual discussion which explores, under different assumptions, the relative impacts of cash and food transfers. After describing the PSNP program in Section 3, we present our data and empirical model in Section 4. Results and robustness checks are discussed in Section 5, followed by concluding remarks.

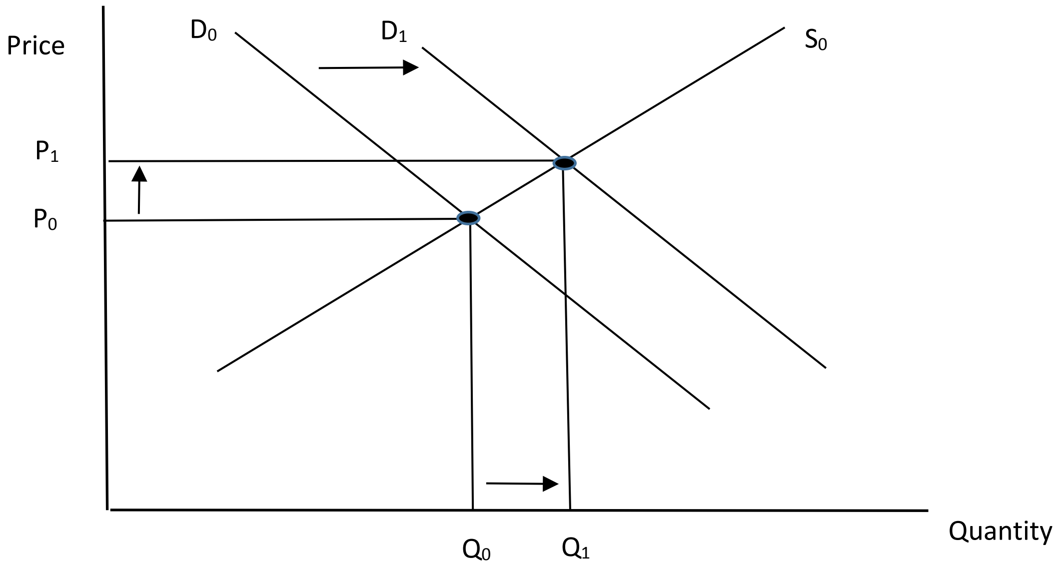
2. CONCEPTUAL FRAMEWORK

The relative impacts of cash and food transfers on local food prices depends on the assumptions we make about how well markets function, whether food transfers can be re-sold, and the magnitude of the income elasticity of demand. In addition, we need to be clear about whether we are assessing the impact on the price of a specific food commodity or on food prices in general. Given this, we begin with several models that illustrate some of these key issues before moving to a more general discussion.

[3] Ethiopia is administratively divided into 9 regions and two chartered cities. Each region is divided into zones and each zone further into woredas (districts). A woreda is formed of multiple kebeles (sub-districts) which is the lowest administrative unit.

We start with a simple model of a rural market for a specific grain (Figure 2.1). We use maize as the example here because it is one of the commodities included in PSNP food transfers and is consumed in many parts of Ethiopia. A cash transfer, C, is given. Under the assumption that maize is a normal good (i.e., $\frac{\partial QD_{Maize}}{\partial C} > 0$), the demand curve shifts rightward to D_1 yielding a higher equilibrium price, P_1.

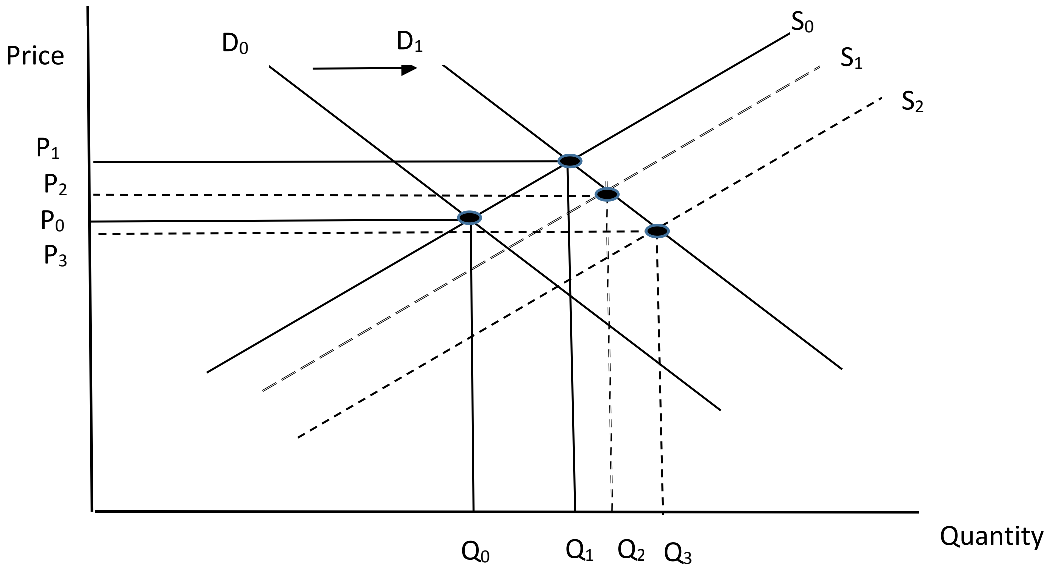
Figure 2.1. Impact of a cash transfer on a grain ("maize") market



Source: Authors

Now consider a food transfer of maize, F (Figure 2.2). If we assume that this can be costlessly re-sold and that maize is a normal good (i.e., $\frac{\partial QD_{Maize}}{\partial F} > 0$), the demand curve shifts rightwards to D_1. Note that the act of re-selling the food transfer increases the supply of grain on the local market, thus shifting the supply curve as well. If the supply curve shifts to S_1 we get a new equilibrium price P_2 that is above the pre-transfer (P_0) price but below the post-cash transfer price P_1. If the supply curve shifts to S_2 we get a new equilibrium price, P_3 that is below the pre-transfer (P_0) price *and* below the post-cash transfer price P_1.

Figure 2.2. Impact of an in-kind transfer on a grain ("maize") market



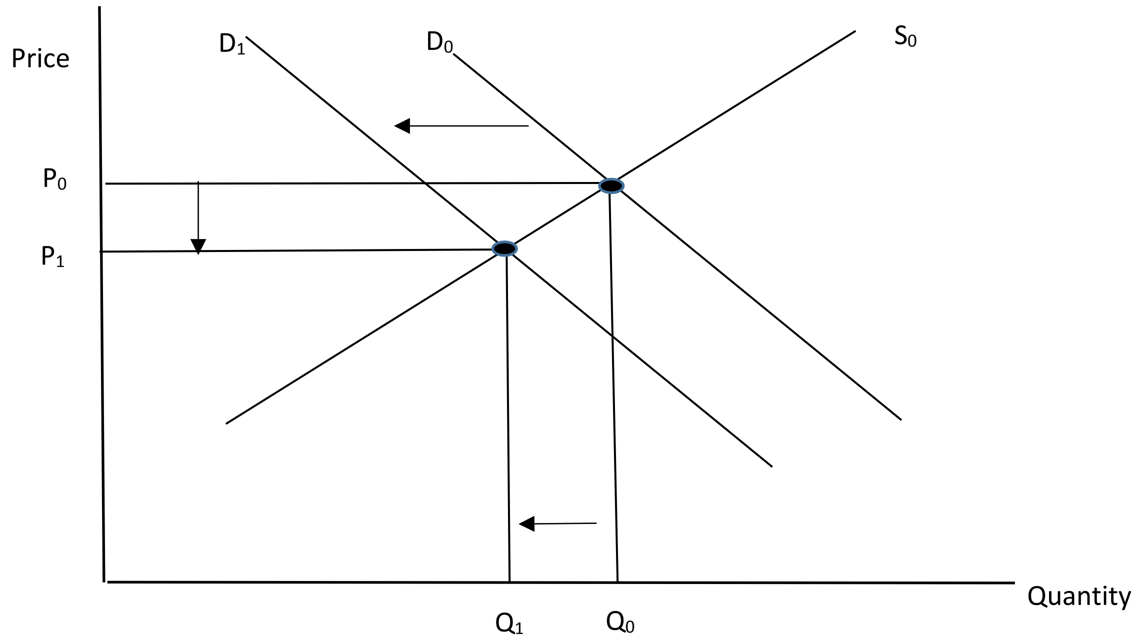
Source: Authors

These simple models give us an initial set of insights into the comparative effects of cash and food transfers on the price of a grain. We note the following.

1. The impact of both food and cash transfers on prices will depend on the size of the transfer.
2. The impact of both food and cash transfers on prices will also depend on the price elasticity of supply. In turn, this is a function of three characteristics of this market:
   - the extent to which the market is competitive;
   - the extent to which the market is open or closed; and
   - the extent to which farmers in this locality alter their production.

   With respect to the first characteristic, Cunha, Di Giorgi, and Jayachandran (2017) note that the greater the degree of competition in the market, the smaller the magnitude of the effect on prices. If the grain market is completely open – in the sense that higher prices will induce new traders to enter the market, existing traders to increase their food stocks (Cunha, Di Giorgi and Jayachandran 2017), or farmers to increase supply (Arega and Shively 2014) – the magnitude of the effect on prices will be smaller. Under perfect competition, or, alternatively, completely open markets, the supply curve is a horizontal line and, thus, there is no impact on prices of either cash or food transfers.
3. The impact of cash transfers on prices will depend on the sign and magnitude of the income elasticity of demand for the grain.
4. The impact of food transfers on prices will depend on whether the transfers are re-sold or whether they are consumed by the households. If re-sale does not occur and the food transfers are infra-marginal, as Cunha, Di Giorgi, and Jayachandran (2017) note, demand will fall – as they describe it, the effect of the food transfer is to pull food demand off the market. In this case, the food transfer causes the demand curve to shift leftwards and prices to fall as in Figure 2.3.

Figure 2.3. Impact of an in-kind transfer on a grain ("maize") market, no-resale



Source: Authors

What does this all imply for the relative impacts of cash and food transfers? These depend on the assumptions we make about the competitiveness and openness of markets, whether the food transfer can be re-sold, and the magnitude of the supply curve shift resulting from the re-sale. Note that the description of markets in terms of competitiveness and openness has both a static component – what does the market look like at the time of the transfer? – and a dynamic component – how does the market respond to the transfer? The dynamic component may be affected by the form of the transfer modality. For example, a cash transfer may induce new traders to enter the market while a food transfer has no such effect. Table 2.1 describes seven illustrative scenarios using different combinations of assumptions regarding markets and the re-sale of the transfer. For example, in scenario 3, cash transfers occur in fully competitive markets. Food is a normal good, so the income elasticity of demand is positive, but because the market is fully competitive, cash transfers have no effect on food prices. Food transfers occur in markets that are not fully competitive and food transfers are re-sold. This shifts the supply curve sufficiently far to the right that food prices fall. In relative terms, the zero effect of cash transfers on food prices is larger than the negative effect of food transfers on food prices.

Table 2.1. Relative effects of cash and food transfers on price by scenario

	Market is fully competitive or fully open							
Scenario	Cash transfer	Food transfer	Is food transfer re-sold?	Magnitude of supply curve shift	Income elasticity of demand	Impact of cash transfers on price	Impact of food transfers on price	Relative effects of cash and food transfers on price
1	Yes	Yes	Yes	None	$\frac{\partial QD_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial C} = 0$	$\frac{\partial P_{Maize}}{\partial F} = 0$	$\frac{\partial P_{Maize}}{\partial C} = \frac{\partial P_{Maize}}{\partial F}$
2	Yes	No	Yes	Small	$\frac{\partial QD_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial C} = 0$	$\frac{\partial P_{Maize}}{\partial F} > 0$	$\frac{\partial P_{Maize}}{\partial C} < \frac{\partial P_{Maize}}{\partial F}$
3	Yes	No	Yes	Large	$\frac{\partial QD_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial C} = 0$	$\frac{\partial P_{Maize}}{\partial F} < 0$	$\frac{\partial P_{Maize}}{\partial C} > \frac{\partial P_{Maize}}{\partial F}$
4	Yes	No	No	None	$\frac{\partial QD_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial C} = 0$	$\frac{\partial P_{Maize}}{\partial F} < 0$	$\frac{\partial P_{Maize}}{\partial C} > \frac{\partial P_{Maize}}{\partial F}$
5	No	No	Yes	Small	$\frac{\partial QD_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial F} > 0$	$\frac{\partial P_{Maize}}{\partial C} > \frac{\partial P_{Maize}}{\partial F}$
6	No	No	Yes	Large	$\frac{\partial QD_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial F} < 0$	$\frac{\partial P_{Maize}}{\partial C} > \frac{\partial P_{Maize}}{\partial F}$
7	No	No	No	None	$\frac{\partial QD_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial C} > 0$	$\frac{\partial P_{Maize}}{\partial F} < 0$	$\frac{\partial P_{Maize}}{\partial C} > \frac{\partial P_{Maize}}{\partial F}$

The discussion to this point has focused on a single grain market. But in rural Ethiopia, as in many developing countries, it is not uncommon for several grains – along with other non-grain foods – to be sold in the same market. [4] Consider a second grain market for wheat. How does a cash transfer and a maize transfer affect the price of wheat?

If markets are fully competitive or open, the price of wheat is unaffected by either a cash or maize (food) transfer. If markets are not fully competitive or open, the price of wheat is a function of the income elasticity of demand for wheat ($\frac{\partial QD_{Wheat}}{\partial C}$) and the cross price elasticity of wheat and maize, ($\frac{\partial QD_{Wheat}}{\partial P_{Maize}}$). Assume, as is the case in Ethiopia (Tafere et al. 2012), that wheat is a normal good and that the cross-price elasticity is positive, i.e., wheat and maize are substitutes. Start with the cash transfer. Because wheat is a normal good, a cash transfer increases demand for wheat, which pushes up its price. Because wheat and maize are substitutes, and because cash transfers cause maize prices to rise, the cross-price effect also causes wheat demand to rise. Therefore, cash transfers will also push up the price of wheat. Aggregating across the wheat and maize markets, prices for all grains rise. Next, consider food transfers. When food transfers increase the price of maize, the cross-price effect causes the demand for wheat to rise and also its

[4] There are five main grains consumed by households in rural areas of Ethiopia: barley, maize, sorghum, teff, and wheat. Out of these, maize is the most important in terms of expenditure as well as quantity, followed by wheat, sorghum, and teff (Worku et al. 2017). Maize, sorghum, and wheat are more common among poor households, whereas teff is more often, though not exclusively, consumed by richer households.

price. When food transfers cause the price of maize to fall, the cross-price effect causes the demand for wheat to fall and also its price.

3. THE PRODUCTIVE SAFETY NET PROGRAMME

Ethiopia's PSNP "… provides transfers to the food insecure population in chronically food insecure *woredas* in a way that prevents asset depletion at the household level and creates assets at the community level" (Government of Ethiopia 2004; 2010). Unlike the annual emergency appeals that it largely replaced, the PSNP was conceived as a multi-year program designed to provide recipients with predictable and reliable transfers. Most beneficiary households receive payments for undertaking public works. A small proportion of beneficiaries (largely households with elderly or disabled members) receive unconditional payments called direct support and a few receive both payments for public works and direct support. Public works payments typically account for 80 to 85 percent of all PSNP payments (Berhane et al. 2015). Most PSNP activities and transfers are made during the non-agricultural season, the months *Tir* to *Sene* in the Ethiopian calendar (approximately mid-January to mid-July). The PSNP uses a mix of geographic and community-based targeting to identify chronically food-insecure households in chronically food-insecure *woredas*[3]. Multiple evaluations of the program have shown that it is well-targeted (Coll-Black et al. 2012), has reduced household food insecurity and distress sales of assets, and has increased household expenditures and uptake of agricultural inputs (Berhane et al. 2014, Berhane et al. 2016; Hoddinott et al. 2012).

PSNP payments are made to beneficiaries in the form of food or cash. Food payments consist of three kilograms of cereals for each day worked. Generally, these payments are made in the form of wheat or maize (Government of Ethiopia 2010) that are almost exclusively sourced from the international market (Government of Ethiopia 2016). Cash payments are intended to be approximately equal the value of the food payments. When the PSNP began operations, cash payments were set at a uniform six birr per day, but by 2015, they had risen to between 14 and 18 birr per day in real terms (Berhane et al. 2015).

There are two features of PSNP implementation that are crucial to our analysis: the decision process underlying the provision of cash and/or food; and the allocation of employment. First, the PSNP's Program Implementation Manual (PIM) (Government of Ethiopia 2004; 2010; 2014) provides details of how cash and/or food allocations are determined.[5] For example, planning for a given year's operation begins with the development of a woreda food-security plan. This includes the number of beneficiaries, the amount of cash and food requested, and the timing of the payments. The PSNP operates on a 'cash-first' principle. An initial goal of the PSNP was "to shift the financing of the program from food aid to cash" (Government of Ethiopia 2004; 2014), motivated in part by the hope that cash transfers would create positive spill-over effects to smallholder farmers stimulating local agricultural production and food markets (Devereux and Guenther 2009).[6] Woredas are encouraged to request payments in cash if there are local food markets with food available and when they have the capacity (e.g. finance officers; cashiers; safes) to disburse cash. These requests are first passed to region officials for review and then to the Federal Food Security Coordination Directorate (FSCD) for further review and approval. The FSCD decides on the cash-food split for each region based on region requests and the predicted availability of food and cash. It also produces a "food flow requirements" analysis indicating when food will be made available to woredas for

[5] The Program Implementation Manual has been revised several times as the PSNP has evolved. This description reflects program design for the year in which our price data were collected, 2016.

[6] Filipski et al. (2016) illustrated the sizeable nationwide spillovers of PSNP. They found that the program increased national value added by 0.99%.

payment (a similar plan is made for cash payments). Once these plans are finalized, the decision to provide food and/or cash is effectively locked in for the upcoming year.[7]

A second component of the planning process is the set of decisions relating to the allocation of public works employment to woredas and kebeles, and to the number of households that receive direct support payments. With input from kebele officials, woredas develop plans for implementing public works such as road construction and maintenance and natural resource management (for example, erosion and water control activities), and determine the number of households eligible for public works employment and direct support payments. These plans are passed on to regional officials who consolidate them into regional implementation plans that are submitted to the FSCD. The FSCD makes decisions about how funds are to be allocated to the regions, and the regions then allocate them to woredas. Crucially for our purposes, this planning process occurs in the four-to-six month time period (August-December) prior to the annual implementation of PSNP public works. Households selected for public works employment are limited in terms of the number of days they can work on PSNP activities. Under what is called “full family targeting”, each household member is allowed to work five days per month. So the total number of days that households can work is five times the household size. If a household member is unable to work, other members can work on his/her behalf and parents can undertake the work entitlement of children. Berhane et al. (2015) show that households with two to five members receive payments consistent with “full family targeting”. Payments to larger households, however, tend to be less than what they are supposed to receive under “full family targeting”. Interviews with program officials and beneficiaries suggest that this reflects decisions by local government implementers to limit payments to large households so that they can include more eligible households in the program than they otherwise could have (Berhane et al. 2015).

4. DATA AND MODEL

On a bi-annual basis, the International Food Policy Research Institute (IFPRI) has undertaken surveys at the household and kebele level in woredas where the PSNP is operational. The household survey consists of a random sample of PSNP beneficiaries, and includes data on a variety of topics including payments received for public works and for direct support. Survey enumerators recorded payment data directly from “client cards”, a document held by PSNP beneficiaries that lists their monthly payments. When these cards were not available, respondents were asked to recall their payments by month. Payment information includes whether the payment is made as cash or as food – and if food, what type of food – as well as the total amount of payment received. Comparisons of payment data based on client cards and from self-reports show that levels, distributions, and timing of payments are comparable. Further, limited access to PSNP payroll data confirms that the self-reported data correlate with the payroll data (Berhane et al. 2011; Berhane et al. 2013). In addition, surveys are conducted at the kebele level using structured focus group discussions with kebele leaders and other people who are knowledgeable about the locality. The information collected in these discussions includes kebele characteristics, such as infrastructure and population size, and aspects of PSNP implementation, including the number of PSNP beneficiaries in the kebele. As a part of this survey, retrospective price data were also collected on monthly prices on grains consumed by households in that locality.[8] Moreover, the survey teams also visited local food markets to collect information on their characteristics, including how frequently the markets operates, what infrastructure is available (electricity and mobile phone access), the number of traders present, and the latitude and longitude, which allow us to assess how remote are the markets.

[7] In principal, these allocations can be revised after PSNP operations commence. However, the process of doing so is so disruptive – in particular, it leads to significant delays in making payments – that this only occurred in 2008.

[8] We discuss the validity of the recall-based price data in Section V.

Data for this paper are taken from the PSNP surveys conducted in the four highland regions of Ethiopia – Tigray, Amhara, Oromia, and the Southern Nations, Nationalities and Peoples' Region (SNNP) – between February and March 2016. We match PSNP payments made between January and December 2015 collected in this survey with food price data collected from the same localities over the same retrospective time period. In each kebele, retail prices are available over the prior 12 months for the three grains most commonly consumed in the area. In total, the survey included 88 woredas and 264 kebeles, i.e., three kebeles in each surveyed woreda. The PSNP operated in 233 of these kebeles in 2015. PSNP operations were scheduled to start in the remaining 31 kebeles in 2016. As such, they are not included in this analysis. Our primary unit of observation is a grain price observed in a given kebele in a given month. Our sample size consists of 233 kebeles *x* 12 months *x* 2.37 prices per kebele per month (on average) yielding 6,633 kebele-month-price observations.[9]

In our analysis, we use price levels measured in z-scores. We calculate price z-scores for each grain by subtracting the sample mean price for that grain from the observed price and dividing this difference by the sample standard deviation of the price for that grain. In order to assess the impact of PSNP transfers on grain prices in general, we also use aggregated price z-scores for all grains in the analysis. These are simply the combined grain-specific z-scores. That is, rather than using the mean price and standard deviation of prices for all grains combined, we use grain-specific mean prices and standard deviations to construct the aggregated price z-score. This allows us to interpret changes in z-scores as standard deviations that apply appropriately to prices for each of the grains in the analysis.

We calculate monthly PSNP payments at the kebele level as follows. For cash transfers, we have a random sample of PSNP beneficiaries. We sum the total amount of cash payments these households received from both public works employment and direct support and divide this sum by the number of PSNP households in our sample. This gives us the average monthly payment per PSNP household for each kebele. We multiply this figure by the number of PSNP beneficiaries in the kebele to get total PSNP payments per kebele. We then divide this product by the number of households in the kebele, giving us (by kebele) the average monthly payment per household. We use the same approach for food transfers with the food transfer amount expressed (separately) in kilograms of wheat and maize, the principal in-kind commodities provided by the PSNP. Figures 4.1 and 4.2 show the distribution of these average monthly payments per household.

[9] We do not have three monthly price observations for all of the kebeles in our sample because only one cereal type was consumed in 15 kebeles, and only two were consumed in 71 kebeles. The most commonly consumed cereals in the PSNP localities were maize, teff and wheat.

Figure 4.1. Mean value of cash and in-kind transfers, by month

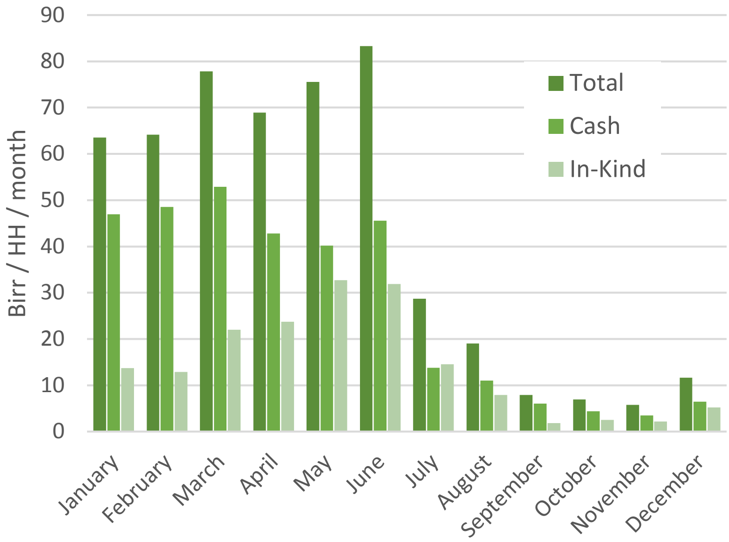
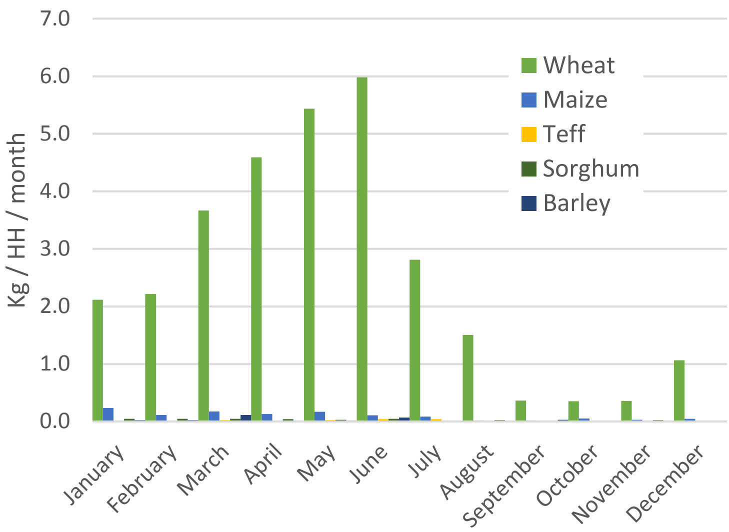


Figure 4.2. Mean level of in-kind transfers (kg), by commodity and month



With this information, following Cunha et al. (2017), we treat each kebele as a local economy and examine kebele-level grain prices as our outcome variable. We estimate the following for price level (z-score) *p* of grain *i* in kebele *k* located in woreda *w* at time (month) *t:*

$$p_{iwkt} = \alpha + \beta_1 TRCash_{wkt} + \beta_2 TRKind_{wkt} + X'_{wk}\gamma + \theta_i + \delta_t + \mu_w + \varepsilon_{iwkt},$$

Where $TRCash_{wkt}$ is the average cash transfer per household in kebele *k* located in woreda *w* at time (month) *t* and $TRKind_{wkt}$ is the average in-kind (food in kg) transfer per household in kebele *k* located in woreda *w* at time (month) *t*. The observable time-invariant characteristics of the food market in the kebele are captured by vector X_{wk}. These include variables indicating whether there is a daily market (as opposed to a periodic one), the size of the market in terms of number of traders and food items, the infrastructure surrounding the market (whether the market has permanent structures, access to good roads, cell phone networks, and electricity) and distance to a nearest city. The term θ_i is a vector of dummy variables denoting the grain price being considered (barley, maize, sorghum, and teff, with wheat being the omitted category). Both PSNP payments (see Figure 2.3) and grain prices (see Gilbert, Christiaensen, and Kaminski 2017) in Ethiopia follow distinct seasonal trends. To control for such seasonality effects, we include a vector of binary variables for each calendar month (δ_t). Observed and unobserved characteristics fixed to the woreda are captured by μ_w that are implemented using a within-transformation. ε_{iwkt} represents the disturbance term. Finally, we cluster the standard errors at the woreda level.

In essence, we estimate a three way (commodity, month, and woreda) fixed effects model. Provided that the identifying assumptions that $E(TRCash_{wkt}, \varepsilon_{iwkt}) = 0$ and $E(TRKind_{wkt}, \varepsilon_{iwkt}) = 0$ hold, our parameters of interest, β_1 and β_2, represent unbiased estimates of the impact of PSNP cash and food payments on local (kebele) food prices.

One objection to our identifying assumptions is that the payment modality (food or cash) is a choice made by program implementers, and this choice may depend on observed prices. But recall that the unit of observation over which this choice is made is the woreda, and this choice is made prior to the annual implementation of the PSNP. As noted above, program administrators are unable to adjust the composition of the payments in response to price changes over the course of the year. The unobservable characteristics that led to the choice of payment type are thus fixed over the twelve-month time period of our data and are therefore captured in μ_w, giving us a consistent estimator for β_1 and β_2. Further, we also control on observables using kebele-level market characteristics.

A second objection is that causality might run from food prices to the level of payments. This could occur if program administrators allocated more employment to localities where food prices were higher or if participants in the public works component of the PSNP worked more (less) days in localities where food prices were higher (lower). But as we explain above, these allocations are also fixed prior to the observation of prices as is the amount of work participants can undertake.

Descriptive statistics are found in Table 4.1. The mean price per kg of grain was 7.82 birr, or (using 2015 exchange rates) about $0.35 US. The prices vary, as more preferred grain, such as teff and wheat, have higher prices and less preferred grain, such as barley, have lower prices. Our price data are fairly equally distributed across these grain, with slightly higher numbers of observations for teff prices and slightly fewer for barley prices. Most kebeles are served by periodic markets; only 13 percent have a food market operating daily. The markets are typically situated on good (all-weather) roads and have access to electricity and cell phone coverage. Most offer a relatively large number of foods and are large, with 72 percent having 50 traders or more. But they are relatively distant from urban centers – on average, the nearest city with a population of 20,000 people or more is 46 km away (median: 40 km).

Finally, the survey instrument also included a question on whether the food transfer recipients ever sold the food they received. Such practice is rare. In 2015, 93 percent of the households that received food transfers reported that they never sold any of them. Most of the remaining 7 percent who reported re-selling their food transfer, did so rarely.

Table 4.1. Descriptive statistics

	Mean	Standard Deviation
Grain prices		
All grain (birr / kg)	7.83	4.26
All grain (z-score)	-0.12	0.96
Wheat (birr / kg)	7.51	2.52
Maize (birr / kg)	5.42	1.85
Teff (birr / kg)	12.27	4.92
Sorghum (birr / kg)	6.58	3.17
Barley (birr / kg)	6.11	3.20
Proportion of observations		
Wheat prices	0.20	0.40
Maize prices	0.22	0.41
Teff prices	0.24	0.43
Sorghum prices	0.20	0.40
Barley prices	0.13	0.34
Transfer levels (kebele means)		
PSNP cash transfer (birr / HH)	27.1	50.5
PSNP In-kind (wheat & maize kg / HH)	2.86	8.24
PSNP In-kind (wheat kg / HH)	2.71	7.71
PSNP In-kind (maize kg / HH)	0.10	0.92
Market characteristics		
Daily market (share)	0.13	0.33
Market has 50+ traders (share)	0.72	0.45
Number of food items in market	25.3	6.5
Market has permanent structures (share)	0.58	0.49
Market has cell phone reception (share)	0.94	0.24
Market has electricity (share)	0.71	0.45
Market has good road (share)	0.85	0.36
Distance to city with 20,000 inhabitants (km)	46.5	30.1
Regional distribution of price observations		
Tigray	0.30	0.46
Amhara	0.28	0.45
Oromia	0.26	0.44
SNNP	0.16	0.37
Sample size		
Number of kebeles	233	
Number of price observations	6,633	

5. RESULTS

Estimates for our price equation are reported in Table 5.1. Column (1) reports estimates of the effects of cash and all food transfers on grain prices, controlling for the grain price being considered, month and woreda fixed effects, and a host of market level characteristics. [10] The coefficient on the cash transfer variable is practically zero and not statistically significant (p = 0.585), as is the coefficient on food transfers (p = 0.168). [11] Consequently, we cannot reject the null hypothesis that cash and overall in-kind transfers

[10] These are: Number of food items in market; Number of food items in market – squared; Daily market; Market has 50 traders or more; Market has permanent structures; Market has cell phone reception; Market has electricity; Market has good road; Market has bad road; Distance to city with 20,000 inhabitants (km); and Distance to city with 20,000 inhabitants (km) – squared.

[11] The 95% confidence interval is [-0.0007, 0.0004] for the former, and [-0.0082 birr, 0.0015 birr] for the latter.

have no effect on food prices. Further, the impacts of cash and food transfers are not statistically different from each other (p=0.191). In column (2) we separate the in-kind transfer variable into wheat and maize transfers and find that maize transfers reduce food prices (p = 0.001) while wheat transfers do not (p = 0.251). Given that 93 percent of food transfer recipients report that they did not re-sell their food transfers, these results are consistent with scenario 4 in Table 2.1. Maize transfers, being infra-marginal, have the effect of reducing food demand and in markets not fully competitive or open, this causes food prices to fall. But while the effect of maize transfers is statistically significant, the magnitude is small. Using the marginal effects[12] reported in column (2), an additional one kg in grain transfers reduces grain prices by 0.099 birr, [13] which is a 1.3 percent reduction. Put another way, the effect of an average PSNP transfer of 0.10 kg of maize to each household in a kebele (see Table 4.1) is to reduce grain prices by 0.01 birr or 0.1 percent. [14]

Table 5.1. Impact of PSNP transfers on grain prices (z-scores)

	(1)		(2)		(3)		(4)	
Point Estimates (∂Std Dev / ∂transfer)	**Coeffi-cient**	**t-stat**	**Coeffi-cient**	**t-stat**	**Coeffi-cient**	**t-stat**	**Coeffi-cient**	**t-stat**
PSNP cash transfer (birr)	-0.0002	-0.55	-0.0001	-0.50	-0.0002	-0.76	-0.0001	-0.67
PSNP In-kind (wheat & maize kg)	-0.0030	-1.39	-	-	-0.0030	-1.63	-	-
PSNP In-kind (wheat kg)	-	-	-0.003	-1.16	-	-	-0.0030	-1.28
PSNP In-kind (maize kg)	-	-	-0.023	-3.60**	-	-	-0.0270	-2.99**
Marginal Effect (∂birr / ∂transfer)			**Marginal Effects**					
PSNP cash transfer (birr)	-0.0007		-0.0006		-0.0007		-0.0006	
PSNP In-kind (wheat & maize kg)	-0.014				-0.0150			
PSNP In-kind (wheat kg)	-		-0.013		-		-0.013	
PSNP In-kind (maize kg)	-		-0.099**		-		-0.115**	
Effect of Average Transfer (birr)			***∆Price***					
PSNP cash transfer (birr)	-0.0178		-0.0161		-0.0193		-0.017	
PSNP In-kind (wheat & maize kg)	-0.041				-0.041			
PSNP In-kind (wheat kg)	-		-0.036		-		-0.035	
PSNP In-kind (maize kg)	-		-0.010**		-		-0.011**	
Controls:								
Grain type dummies	Yes		Yes		Yes		Yes	
Month dummies	Yes		Yes		Yes		Yes	
Woreda fixed effects	Yes		Yes		No		No	
Kebele market characteristics	Yes		Yes		No		No	
Kebele fixed effects	No		No		Yes		Yes	

Notes: Marginal effects are calculated by multiplying the point estimates by the standard deviation of the prices (Table 4.1). Effects of average transfers are calculated by multiplying the marginal effects by the average respective transfers (Table 4.1). Standard errors clustered at the woreda level in columns 1 and 2 and at the kebele level in columns 3 and 4. Statistical significance denoted at ** p < 0.01, * p < 0.05. N = 6,633 kebele-month-price observations.

In columns (3) and (4) we replace the woreda fixed effects and kebele market characteristics variables with kebele fixed effects. This specification yields nearly identical coefficients implying that unobserved characteristics fixed to the kebeles – including the kebele food markets – are not driving the results obtained in columns (1) and (2).

[12] Marginal effects are calculated by multiplying the point estimates by the standard deviation of the prices (see Table 4.1).

[13] The 95% confidence interval for this estimate is [-0.152 birr, -0.045 birr].

[14] Effects of average transfers are calculated by multiplying the marginal effects by the average respective transfers (see Table 4.1).

Table 5.2. Impact of PSNP transfers on grain prices (z-scores), by cereal type

Point Estimates (∂Std Dev / ∂transfer)	Wheat		Maize		Teff		Sorghum		Barley	
	Coefficient	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**
PSNP cash transfer (birr)	0.000	-0.14	-0.0003	-0.59	-0.00003	-0.15	0.0006	1.15	-0.0005	-1.74
PSNP In-kind (wheat kg)	0.003	1.47	-0.018	-3.26**	-0.002	-0.47	-0.005	-1.48	0.002	1.38
PSNP In-kind (maize kg)	-0.009	-0.91	-0.018	-1.89	-0.025	-1.77	-0.015	-1.72	-0.007	-0.91
Marginal Effect (∂birr / ∂transfer)					***Marginal Effects***					
PSNP cash transfer (birr)	-0.0001		-0.0006		-0.0003		0.002		-0.002	
PSNP In-kind (wheat kg)	0.007		-0.033**		-0.010		-0.015		0.006	
PSNP In-kind (maize kg)	-0.024		-0.033		-0.124		-0.047		-0.040	
Effect of Average Transfer (birr)					***∆Price***					
PSNP cash transfer (birr)	-0.003		-0.016		-0.009		0.054		-0.043	
PSNP In-kind (wheat kg)	0.019		-0.057**		-0.028		-0.045		0.020	
PSNP In-kind (maize kg)	-0.001		-0.005		-0.014		-0.004		-0.003	
Controls:										
Month dummies	Yes		Yes		Yes		Yes		Yes	
Woreda fixed effects	Yes		Yes		Yes		Yes		Yes	
Kebele market characteristics	Yes		Yes		Yes		Yes		Yes	
Number of observations	1,330		1,472		1,607		1,342		881	

Notes: See Table 5.1. Standard errors clustered at the woreda level.

Next, we consider commodity specific effects (Table 5.2) by estimating separate models for each of the grain prices. We use the same specification as in Table 5.1, except that we drop the grain dummies. Not surprisingly given the results of Table 5.1, cash transfers have no effect on the prices of the five grains sold in local markets: wheat, maize, teff, sorghum, and barley. Although we find that wheat transfers lower the price of maize, this result is the only statistically significant impact. The magnitude of this effect is small whether measured in terms of the marginal effect (a 0.033 birr reduction in the price) or in terms of the effect of the average transfer (a reduction of 0.057 birr).

We wondered if these effects differed by market characteristics. Markets located further away from medium to large urban centers (defined as having a population of 20,000 people or more) have fewer traders and typically offer less choice in terms of the number of food items available for sale. We define two "market remoteness" dummy variables equaling one if the kebele market is located more than 25 and 40 kilometers away from a medium/large urban center, respectively. Note that in our sample, 40 km is the median distance from the kebele market to these cities. We estimate our price models using commodity, month, and woreda fixed effects, and market characteristics which now includes this binary measure of remoteness instead of the continuous distance measure (quadratic) that was in the previous models. We also interact these remoteness dummy variables with the levels of cash and in-kind transfers respectively. The coefficients on the interaction terms are our parameters of interest.

Table 5.3. Impact of PSNP transfers on grain prices (z-scores), by remoteness

	Remote > 25 km		Remote > 40 km	
Point Estimates *(∂Std Dev / ∂transfer)*	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**
PSNP cash transfer (birr)	0.00002	0.02	-0.00003	-0.06
PSNP In-kind (wheat & maize kg)	-0.0031	-0.69	0.0001	0.07
Cash transfer *x* remoteness dummy	-0.0002	-0.18	-0.0003	-0.60
In kind transfer *x* remoteness dummy	-0.0003	-0.06	-0.0080	-1.96*
Marginal Effect (∂Birr / ∂transfer)		**Marginal Effects (birr)**		
Close to cities				
PSNP cash transfer (birr)	0.0001	0.02	-0.0001	-0.06
PSNP In-kind (wheat & maize kg)	-0.013	-0.69	0.0000	0.07
Remote				
PSNP cash transfer (birr)	-0.0008	-0.617	-0.0016	-1.04
PSNP In-kind (wheat & maize kg)	-0.015	-1.220	-0.0330	-2.01*
Effect of Average Transfer (birr)		**∆Price (birr)**		
Close to cities				
PSNP cash transfer (birr)	0.002		-0.003	
PSNP In-kind (wheat & maize kg)	-0.038		0.001	
Remote				
PSNP cash transfer (birr)	-0.021		-0.042	
PSNP In-kind (wheat & maize kg)	-0.042		-0.095*	
Controls:				
Month dummies	Yes		Yes	
Woreda fixed effects	Yes		Yes	
Grain type dummies	Yes		Yes	
Kebele market characteristics	Yes		Yes	

Notes: See Table 5.1. Standard errors clustered at the woreda level. Remoteness is defined as being 25 km ("remote > 25 km") or 40 km ("remote > 40 km") from the nearest city with a population of 20,000. N = 6,633 kebele-month-price observations.

Table 5.3 reports these remoteness results for the aggregated price models. Column (1) shows that there are no statistically significant effects when remoteness is defined in terms of being more than 25 km from medium/large urban centers. However, for markets further than the median distance (40 km), increased remoteness leads to a negative and statistically significant impact of in-kind transfers on grain prices (column 2). But again the magnitude is small. Using the results from column (2) together with the descriptive statistics reported in Table 4.1, the average grain transfer reduces grain prices by only 1.2 percent (-0.095 / 7.81) in more remote areas. Consistent with Table 5.2, these small, statistically significant impacts are found for maize and sorghum in remote areas (Table 5.4). There is no differential effect of cash transfers on prices (either aggregate or cereal-specific prices) in more or less remote markets.

We wondered if traders changed prices in anticipation of PSNP payments being made to beneficiaries. To test this idea, we replaced contemporaneous prices with one and two-month lead prices, but found no statistically significant impacts. In addition, restricting our analysis to the first six months of the year when most payments are received (see Figure 4.1) had little impact on our results; in fact, aside from the statistically significant but economically small point estimates in Table 5.1 becoming insignificant, they are nearly identical to those that appear in Tables 5.1 and 5.2 (see Tables A1 and A2 in Appendix A).

The retrospective price data used in the analysis may raise a concern that these insignificant coefficients are due to measurement (recall) error in our outcome variable. We note three points. First, the respondents providing information on prices - kebele leaders and other people who are knowledgeable about the locality - are both producers and consumers of cereals and, thus, are well-informed about price movements over time. Second, random measurement error in the outcome variable only affects the standard errors, not the estimated coefficients. Since our confidence intervals are narrow, and since we have no reason to believe that the measurement error is systematic, the recall nature of the price data does not seem to be a major concern in our application. Third, as discussed in Appendix B, these retrospective price trends closely track the monthly price data collected by the Central Statistical Agency of Ethiopia.

Finally, we wondered if our nonsignificant coefficients, and significant but small coefficients could be a result of signals being swamped by noise. In our results, however, the point estimates are relatively precise, as reflected in the small standard errors and small confidence intervals. Indeed, the fact that the statistically significant effects are economically insignificant is an indicator of this precision. Nonetheless, the insignificant estimates could follow from the use of woreda-month-grain fixed effects. After removing these fixed effects, the remaining price variation pertains only to monthly within-woreda deviations from grain specific means. To assess how much of an issue this might be, we follow Fisher et al. (2012) and regress prices against different sets of fixed effects: (i) an intercept; (ii) woreda (kebele) fixed effects; and (iii) woreda (kebele) plus month fixed effects. The reasonably low R^2 and high standard deviations of the residuals (compared to the non-FE models) from the different regressions reported in Table A3 in Appendix A indicate that there remains sufficient within-group variation left in the models to detect effects.

Table 5.4. Impact of PSNP transfers on grain prices (z-scores), by remoteness and cereal type

	Wheat		Maize		Teff		Sorghum		Barley	
Point Estimates *(∂Std Dev / ∂transfer)*	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**
PSNP cash transfer (birr)	0.0000	-0.02	-0.0001	-0.23	-0.0004	-0.76	0.0006	0.85	-0.0009	-1.54
PSNP In-kind (wheat & maize kg)	0.0026	1.08	-0.007	-1.84	0.002	0.94	-0.001	-0.19	0.001	1.02
Cash transfer *x* remoteness dummy	-0.0001	-0.11	-0.0007	-0.62	0.0005	0.78	0.0001	0.19	0.0005	0.64
In kind transfer *x* remoteness dummy	-0.0022	-0.61	-0.015	-2.42*	-0.009	-1.39	-0.008	-1.62	-0.001	-0.26
Marginal Effects (∂Birr / ∂transfer)					**Marginal Effects (birr)**					
Close to cities										
PSNP cash transfer (birr)	0.0000	-0.02	-0.0003	-0.23	-0.0020	-0.76	0.0018	0.85	-0.0029	-1.54
PSNP In-kind (wheat & maize kg)	0.0065	1.08	-0.0132	-1.84	0.008	0.94	-0.002	-0.19	0.004	1.02
Remote										
PSNP cash transfer (birr)	-0.0003	-0.26	-0.0015	-0.95	0.0005	0.21	0.0022	1.08	-0.0013	-0.94
PSNP In-kind (wheat & maize kg)	0.001	0.15	-0.042	4.61**	-0.036	-1.14	-0.026	2.13*	0.002	0.28
Effects of Average Transfer (birr)					**∆Price (birr)**					
Close to cities										
PSNP cash transfer (birr)	0.00		-0.01		-0.06		0.05		-0.07	
PSNP In-kind (wheat & maize kg)	0.02		-0.03		0.03		-0.01		0.02	
Remote										
PSNP cash transfer (birr)	-0.01		-0.04		0.02		0.06		-0.03	
PSNP In-kind (wheat & maize kg)	0.00		-0.08**		-0.11		-0.08*		0.01	
Controls:										
Month dummies	Yes		Yes		Yes		Yes		Yes	
Woreda fixed effects	Yes		Yes		Yes		Yes		Yes	
Number of observations	1,330		1,472		1,607		1,342		881	

Notes: See Table 5.1. Standard errors clustered at the woreda level. Remoteness is defined as being 40 km from the nearest city with a population of 20,000.

6. SUMMARY

Since Schultz (1960), there has been concern that cash and in-kind transfers might affect prices in developing country food markets. While there have been a number of studies at highly aggregated levels, much less is known about the effects of cash transfers on local food prices and even less about how they compare to food transfers. We consider this issue in the context of a large social protection intervention, Ethiopia's Productive Safety Net Programme. Using 12 months of price data from 233 localities (kebeles), and controlling for temporal, location, and market characteristics we find:

1. Cash transfers have no effect on food prices.
2. There is some evidence that food transfers reduce food prices. Maize transfers reduce aggregate grain prices (Table 5.1), wheat transfers reduce the price of maize (Table 5.2), and the negative effect of food transfers on food prices is larger in more remote markets (Table 5.3). Given that food transfers are not re-sold, this is consistent with infra-marginal transfers having the effect of reducing food demand in markets not fully competitive or open, consistent with scenario 4 (Table 2.1).
3. However, the magnitudes of these effects are trivially small, both in absolute and percentage terms.

Unlike Cunha, Di Giorgi and Jayachandran (2017), we rely on observational data, not a randomized design. One might worry that the payment modality (food or cash) is a choice made by program implementers, and this choice may depend on observed prices. But as we document, the unit of observation over which this choice is made is the woreda, not the kebele, and this choice is made prior to the annual implementation of the PSNP. Program administrators are unable to adjust the composition of the payments in response to price changes over the course of the year. The unobservable characteristics that led to the choice of payment is thus captured in our woreda fixed effects. It could also be argued that causality runs from food prices to the level of payments if, for example, program administrators allocated more employment to localities where food prices were higher or if participants in the public works component of the PSNP worked more (less) days in localities where food prices were higher (lower). But as we explain above, these allocations are also fixed prior to the observation of prices, as is the amount of work participants can undertake.

Our data are taken from a single year and from selected regions of one country and so, as with all such studies, caution is needed in drawing broader conclusions. That caveat noted, the fact that the price effects of both cash and food transfers are so small in such a large intervention in Ethiopia – the largest social protection program in Africa except for South-Africa – suggests that worries about pecuniary externalities of these social protection programs on local grain markets, through disincentives for local producers or food price inflation for buyers of food, may not be warranted.

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APPENDIX A: ROBUSTNESS CHECKS

We wondered if our results were sensitive to the time period when payments were received. To assess this, we restricted our analysis to the first six months of the year when most payments are received. As Tables A1 and A2 show, this had little impact on our results. In fact, aside from the statistically significant but economically small point estimates in Table 5.1 becoming insignificant, they are nearly identical to those that appear in Tables 5.1 and 5.2.

Table A1. Impact of PSNP transfers on grain prices (z-scores), for sample of first 6 months (January to June)

	(1)		(2)		(3)		(4)	
Point Estimates (∂Std Dev / ∂transfer)	**Coeffi-cient**	**t-stat**	**Coeffi-cient**	**t-stat**	**Coeffi-cient**	**t-stat**	**Coeffi-cient**	**t-stat**
PSNP cash transfer (birr)	-0.0002	-0.52	-0.0001	-0.50	0.00003	0.26	0.0001	0.45
PSNP In-kind (wheat & maize kg)	-0.002	-1.31	-	-	-0.0001	-0.20	-	-
PSNP In-kind (wheat kg)	-	-	-0.002	-1.08	-	-	0.0003	0.34
PSNP In-kind (maize kg)	-	-	-0.008	-0.99	-	-	-0.009	-1.55
Marginal Effect (∂birr / ∂transfer)				**Marginal Effects**				
PSNP cash transfer (birr)	-0.0007		-0.0006		-0.0001		0.0002	
PSNP In-kind (wheat & maize kg)	-0.008				-0.0007			
PSNP In-kind (wheat kg)	-		-0.007		-		0.001	
PSNP In-kind (maize kg)	-		-0.032		-		-0.036	
Effect of Average Transfer (birr)				**∆Price**				
PSNP cash transfer (birr)	-0.032		-0.031		-0.007		-0.012	
PSNP In-kind (wheat & maize kg)	-0.037				-0.003			
PSNP In-kind (wheat kg)	-		-0.035		-		-0.005	
PSNP In-kind (maize kg)	-		-0.005		-		-0.006	
Controls:								
Grain type dummies	Yes		Yes		Yes		Yes	
Month dummies	Yes		Yes		Yes		Yes	
Woreda fixed effects	Yes		Yes		No		No	
Kebele market characteristics	Yes		Yes		No		No	
Kebele fixed effects	No		No		Yes		Yes	

Notes: Marginal effects are calculated by multiplying the point estimates by the standard deviation of the prices (Table 2.1). Effects of average transfers are calculated by multiplying the marginal effects by the average respective transfers (Table 2.1). Standard errors clustered at the woreda level in columns 1 and 2 and at the kebele level in columns 3 and 4. Statistical significance denoted at ** $p < 0.01$, * $p < 0.05$.

Table A2. Impact of PSNP transfers on grain prices (z-scores), by cereal type for sample of first 6 months (January to June)

	Wheat		Maize		Teff		Sorghum		Barley	
Point Estimates ***(∂Std Dev / ∂transfer)***	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**
PSNP cash transfer (birr)	0.0003	0.75	-0.001	-1.75	0.0002	0.36	0.007	0.83	-0.0004	-1.08
PSNP In-kind (wheat kg)	0.001	0.80	-0.018	-3.45**	-0.001	-0.25	-0.001	-0.59	0.001	0.61
PSNP In-kind (maize kg)	-0.033	-1.40	0.001	0.12	-0.023	-1.70	0.0003	0.05	-0.026	-1.37
Marginal Effect (∂birr / ∂transfer)					**Marginal Effects**					
PSNP cash transfer (birr)	0.0001		-0.002		0.001		0.002		-0.001	
PSNP In-kind (wheat kg)	0.003		-0.024**		-0.004		-0.004		0.003	
PSNP In-kind (maize kg)	-0.078		0.002		-0.107		0.001		-0.079	
Effect of Average Transfer (birr)					**ΔPrice**					
PSNP cash transfer (birr)	0.036		-0.107		0.045		0.094		-0.058	
PSNP In-kind (wheat kg)	0.015		-0.067**		-0.019		-0.019		0.020	
PSNP In-kind (maize kg)	-0.005		0.0004		-0.020		0.0001		-0.009	
Controls:										
Month dummies	Yes		Yes		Yes		Yes		Yes	
Woreda fixed effects	Yes		Yes		Yes		Yes		Yes	
Kebele market characteristics	Yes		Yes		Yes		Yes		Yes	
Number of observations	664		737		803		670		441	

Notes: See Table A1. Standard errors clustered at the woreda level.

We wondered if our nonsignificant coefficients, and significant but small coefficients could be a result of signals being swamped by noise. To assess this, we followed Fisher et al. (2012), regressing prices against different sets of fixed effects: (i) an intercept; (ii) woreda (kebele) fixed effects; and (iii) woreda (kebele) plus month fixed effects. The reasonably low R^2 and high standard deviations of the residuals (compared to the non-FE models) from the different regressions reported in Table A3 indicate that there remains sufficient within-group variation left in the models to detect effects.

Table A3. PSNP transfer variation under various sets of fixed effects

	Dependent variable: PSNP transfers			
	Cash transfers, birr		In-kind transfers, kg	
	R^2	Std Dev	R^2	Std Dev
No fixed effects (FE)		50.5		8.26
Woreda FE	0.308	42.0	0.300	6.91
Woreda + month FE	0.468	36.8	0.376	6.52
Kebele FE	0.384	39.6	0.351	6.65
Kebele + month FE	0.544	34.1	0.427	6.25

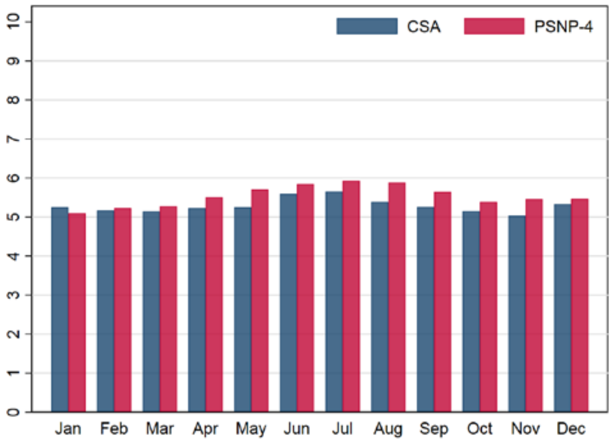
Notes: This table summarizes regression of per capita PSNP transfers on various sets of fixed effects and how much of the variation they absorb. We report the R^2 and the standard deviation of the residuals (remaining transfer variation). These results are for the full sample (Table 5.1). Similar regressions run on the crop- specific subsamples (Table 5.2) yield qualitatively similar results.

APPENDIX B: COMPARING RETROSPECTIVE PRICE DATA TO MONTHLY PRICE DATA COLLECTED BY THE CENTRAL STATISTICAL AGENCY OF ETHIOPIA

Our results rely on the use of retrospective price data. This may raise a concern that these insignificant coefficients are due to measurement (recall) error in our outcome variable. In the main body of the paper, we noted that respondents providing information on prices - kebele leaders and other people who are knowledgeable about the locality - are both producers and consumers of cereals and thus are well-informed about price movements over time. Second, random measurement error in the outcome variable only affects the standard errors, not the estimated coefficients. In this appendix, we assess the quality of the 12-month retrospective price data by comparing them to monthly retail prices collected contemporaneously by the Central Statistical Agency (CSA). Below we show month-by-month price comparisons for 2015 for the five main cereals. Since our survey records prices from smaller rural markets, and since the CSA collects prices from monthly visits to large urban markets, we aggregate the prices to the zonal level for the 28 zones that are available in both datasets for as much overlap as possible.

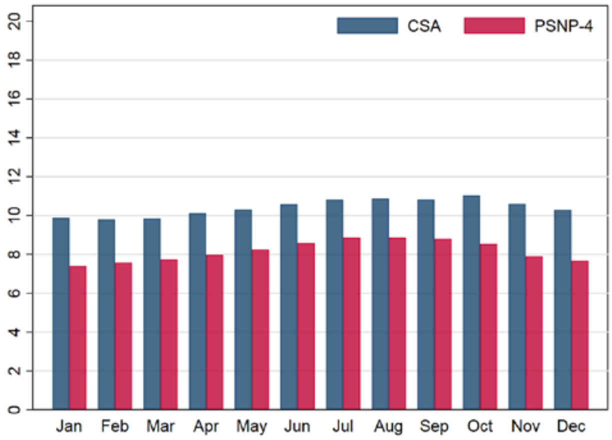
As illustrated in Figures B1 to B5, the trends for each of the five cereal prices from the retrospective data closely track those of the CSA monthly prices. Further, the average price levels are very similar for maize (Figure B1) and teff (Figure B3), two of the most important crops in Ethiopia for calories (maize) and income (teff), as well as sorghum (Figure B5). The CSA prices for wheat are roughly 15 to 20 percent higher than those recorded in our survey (Figure B2). However, this comparison may be confounded by comparability issues as PSNP in-kind transfers are primarily sourced from imports (Government of Ethiopia 2016), whereas the CSA collects prices for domestically produced wheat. Given the different characteristics of imported and domestic wheat, where the former is perceived by consumers to be of lower quality (Minot et al. 2016), it is not entirely surprising that we observe this difference in the price levels. What is reassuring for wheat prices as well as for barley prices, however, is that our use of z-scores effectively differences out the different average price levels, while leaving intact the similar variation that we observe.

Figure B1. Maize prices in 2015 by survey, birr/kg



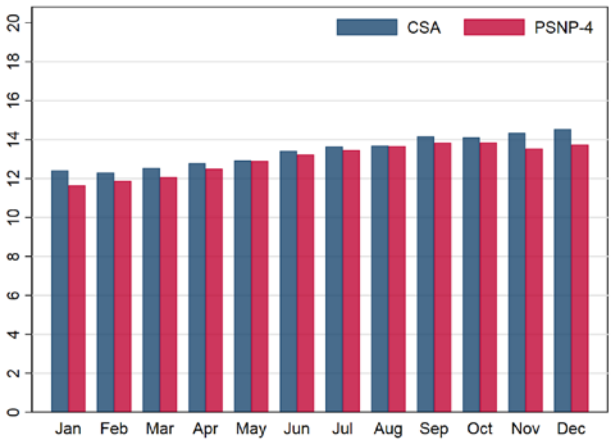
Note: CSA prices are for white un-milled maize.

Figure B2. Wheat prices in 2015 by survey, birr/kg



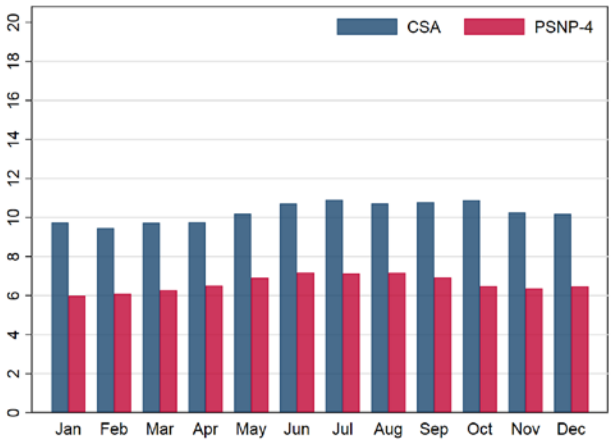
Note: CSA prices are for white un-milled wheat.

Figure B3. Teff prices in 2015 by survey, birr/kg



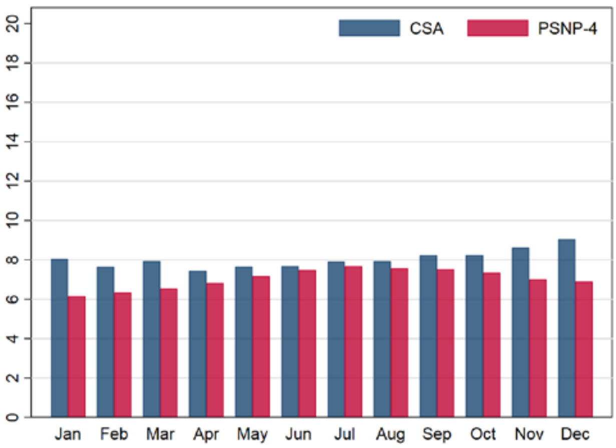
Note: CSA prices are for mixed un-milled teff.

Figure B4. Barley prices in 2015 by survey, birr/kg



Note: CSA prices are for white un-milled barley.

Figure B5. Sorghum prices in 2015 by survey, birr/kg



Note: CSA prices are for white un-milled sorghum.

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The Ethiopia Strategy Support Program is an initiative to strengthen evidence-based policymaking in Ethiopia in the areas of rural and agricultural development. Facilitated by the International Food Policy Research Institute (IFPRI), ESSP works closely with the government of Ethiopia, the Ethiopian Development Research Institute (EDRI), and other development partners to provide information relevant for the design and implementation of Ethiopia's agricultural and rural development strategies. For more information, see http://www.ifpri.org/book-757/ourwork/program/ethiopia-strategy-support-program; http://essp.ifpri.info/; or http://www.edri-eth.org/.

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