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CASH TRANSFERS ENABLE HOUSEHOLDS TO COPE WITH AGRICULTURAL PRODUCTION AND PRICE SHOCKS: EVIDENCE FROM ZAMBIA

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Abstract

Climate change is projected to dramatically disrupt rainfall patterns and agricultural yields in Sub-Saharan Africa. These shocks to food production can mire farming households in poverty traps. This study investigates whether unconditional cash transfers can help households cope with agricultural production and price shocks. We find that cash empowers poor, rural households facing these negative shocks to employ coping strategies typically used by the non-poor and enables them to substantially increase their food consumption and overall food security. Extending relatively small cash payments unconditionally to the rural poor is a powerful policy option for fostering climate-resilient development.

Keywords

impact evaluation; cash transfers; poverty; climate change adaptation; resilience; shock-coping; rural livelihoods

1. Introduction

Climate change is projected to dramatically disrupt rainfall patterns and agricultural yields in Sub-Saharan Africa (IPCC, 2014). Given the large share of Africa's population living in rural areas (World Bank, 2013(a)) and these communities' dependence on rain-fed agriculture, climate change has the potential to stall and even reverse gains that have been made in the region's fight against poverty (Shepherd et al., 2013). Frequent exposure to failed harvests and other negative shocks is a reality of life for the world's rural poor and many of these communities have developed strategies for coping with such shocks (Baez et

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al., 2013). However, some of these coping strategies can lead to poverty traps – the self-reinforcing conditions that cause poverty to persist. For example, coping with shocks by reducing food consumption, pulling children out of school, selling off productive assets, and adopting risk-averse livelihood strategies that discourage growth can negatively affect human capital formation and prospects for escaping poverty in the long run (Dasgupta, 1997; Carter and Barrett, 2006; Wood, 2011). The likelihood of households employing coping strategies that can lead to poverty traps may be greater in the face of weather shocks, given their impact on agricultural production and prices -- and thus food supplies and income. Additionally, weather shocks' covariance across a community weakens informal safety nets, such as borrowing, further increasing household vulnerability (Skoufias, 2003; Baez et al., 2013; Boone et al., 2013). Avoiding detrimental coping strategies that degrade households' capabilities (per Sen, 1999), and thus ability to escape poverty, is essential for building resilience to climate change (Barrett and Constan, 2014).

This study investigates whether cash transfers enable households facing agricultural production and price shocks to avoid adverse coping strategies that can lead to poverty traps. To test this hypothesis, we harness panel data from the randomised rollout of the Zambian Child Grant Programme, an unconditional cash transfer programme. The study tracks 2,515 households in rural Zambia between 2010 and 2012. During this time, the study regions experienced widespread droughts and floods, in addition to many other negative shocks. We investigate whether the cash transfer programme fostered household resilience in the face of these myriad shocks and examine the impacts of cash on both stated and revealed (i.e., behavioural) coping strategies. We also examine whether the extent of shock covariance within a community heterogeneously affects the impacts of cash on shock coping.

While there exists a large literature on how households in developing countries respond to negative shocks as well as a large literature on the impacts of cash transfer programmes, the relationship between cash transfers and shock responses has gone relatively unexamined (Wood, 2011), particularly in the African context. Those studies that have investigated the relationship between cash transfers and shock-coping focus on households' use of child labour as a shock response and impacts on schooling [see studies of cash transfer programmes in Mexico by de Janvry et al. (2006(a)) and in Nicaragua by Gitter and Barham (2009) and Maluccio (2005)], rather than the array of coping strategies households might pursue and ultimate impacts on food security. Further, all of these studies examine programmes in Latin America. Given greater dependence on subsistence farming, weaker infrastructure and social services, and more severe poverty in Sub-Saharan Africa, results from Latin America are likely not generalizable to the African context.

Additionally, evaluations of national-level cash transfer programmes led by *governments* (as opposed to NGOs) in Africa are sparse, as are studies of *unconditional* cash transfers (as those on the African continent tend to be). This study is the first to provide econometric evidence of how unconditional cash transfers could help households in rural Africa cope with extreme weather events, such as droughts and erratic rainfall, which threaten agricultural production and food security. It is also the first study to provide such evidence from a cash transfer programme implemented by a government (as opposed to an NGO) in Africa.

We find that cash enables households coping with agricultural production and price shocks to not only *smooth*, but to *increase* their food consumption and overall food security over time. This result holds when the impact of negative shocks is expanded to include shocks to assets, labour, and income. We also find that cash has even more positive impacts amongst households living in communities experiencing widespread agricultural production and price shocks.

However, our analysis suggests that the timing of the transfer may matter. Our data allow us to disentangle the effects of cash on shock coping amongst those experiencing agricultural production and price shocks (1) only at baseline, prior to programme implementation; (2) only after the programme began; (3) both rounds; and (4) not at all. The effect of cash on group (1) is akin to receiving cash as *ex-post* disaster aid, while the effect of cash on group (2) [and somewhat group (3)] is akin to receiving cash *ex-ante* as part of a proactive, climate-resilient development programme. We find that cash has strong, positive impacts on food security when the transfer is received prior to shock exposure, but some evidence that its impact may be weakened when received *ex-post*.

Taken together, these results have significant implications for the design of climate change adaptation programmes. While cash transfers are not routinely considered in the policy discourse concerning climate adaptation programming, because *ex-ante* transfers enable households to avoid the negative coping strategies of decreasing food consumption in the face of covariate shocks to agricultural production and prices, cash transfers offer a sound approach for building climate-resilience amongst the world's most vulnerable and facilitating their "autonomous adaptation" to a changing environment (as suggested by Wood, 2011). And because cash also enables households to productively cope with the many other idiosyncratic shocks the rural poor routinely face, cash transfers offer a "no-regrets" approach for climate adaptation programmes (Wood, 2011).

2. Poverty traps, shock coping, and cash transfers

On average, households tend to respond to negative income shocks by employing strategies that allow them to maintain their typical level of consumption (World Bank, 2013(b)). However, because poor households often lack access to mechanisms that facilitate consumption smoothing, such as insurance and credit, the poor's strategies for coping with shocks tend to differ from those of wealthier households (Morduch, 1995; Zimmerman and Carter, 2003; Carter et al., 2007; World Bank, 2013(b)). Evidence shows that the rich are likely to use savings, obtain credit, or work more in response to negative shocks, whereas the poor are more likely to sell off productive assets or reduce consumption (World Bank, 2013(b)). Moving children from school to the labour force is another coping strategy commonly employed by the poor (Beegle et al., 2004; de Janvry et al., 2006(a) and 2006(b)). The poor may also resort to increased harvesting of common-pool resources (e.g., firewood, bushmeat, etc.) to satisfy consumption and income needs in the face of shocks (Pattanayak and Sills, 2001).

All of these coping strategies commonly used by the poor can weaken their potential for escaping poverty in this generation or the next by reducing household production, hindering

the cognitive development of young children via malnutrition, limiting household members' future schooling and work possibilities, or degrading the productivity of natural assets. This theory of 'poverty traps' is articulated most eloquently by Dasgupta (1997), Barrett and Swallow (2005), and Carter and Barrett (2006), and supported by numerous studies analysing long-run poverty dynamics (e.g., Glewwe et al., 2000; Carter et al., 2007; Hoddinott et al., 2008; and as summarised by Barrett et al., 2007 and World Bank 2013(b)).

Cash transfer programmes aim to help households escape poverty traps by providing cash that can be used to increase consumption of food, schooling, and health services, thereby increasing adults' capacity for work and preventing the intergenerational transmission of poverty to children. Cash transfers should also foster resilience in the face of shocks and enable households to avoid coping strategies that lead to poverty traps (Blank et al., 2010).

Cash transfer programmes can make payments to recipients unconditional, or conditional on households' compliance with specific requirements regarding children's health and schooling. Unconditional cash transfer programmes, such as the one examined in this paper, face scepticism regarding their effectiveness in reducing poverty. Some worry that the poor won't use the money to increase consumption of nutritious foods, protect children's human capital, or increase agricultural production and that the transfers will instead foster dependency and idleness (Blattman and Niehaus, 2014). Beyond protecting households' consumption and children's human capital, unconditional cash transfer programmes also have significant potential to contribute to poverty reduction more broadly. For example, if households use the cash grants to increase agricultural production and sell their production and labour in markets, cash transfers could push households onto self-propelled growth trajectories that allow them to effectively cope with shocks and escape poverty. Particularly in Africa, where the depth of poverty is especially severe¹ and there are few employment opportunities, these small infusions of cash have the potential to be transformative.

3. The Zambia Child Grant Programme

The Zambia Child Grant Programme is an unconditional cash transfer programme being implemented by Zambia's Ministry of Community Development, Mother and Child Health. The goals of the programme are to reduce extreme poverty and the intergenerational transmission of poverty to children. The only eligibility criterion for the programme is that households have a child under the age of five. Enrolled households receive the equivalent of about \$12 per month, which is estimated to be the cost of purchasing one meal per day for an average-sized household for a month. Payments are received every other month from a local pay point manager.

The Ministry of Community Development, Mother and Child Health began implementing the programme in 2010, in three districts with the highest rates of child mortality and malnutrition in Zambia: Kalabo, Kaputa, and Shangombo. These districts are extremely remote, situated more than two days car travel from the country's capital, Lusaka, and share

¹Nearly half of Sub-Saharan Africa's population lives in extreme poverty (measured as living on less than \$1.25/day) (World Bank (2013(a))). Rural poverty remains particularly severe on the continent; in some African countries 90% of those living below the poverty line reside in rural areas (Chen and Ravallion, 2007).

borders with Angola and the Democratic Republic of Congo. During the rainy season, Shangombo and Kaputa become cut off from the rest of the country by a floodplain and can only be reached by boat.

4. Conceptual framework

We examine whether receiving cash transfers affects households' shock coping and consider the wide range of possible strategies suggested in the literature to be commonly used by the poor. We distinguish between (1) coping strategies hypothesised in the literature to lead to poverty traps, including reducing food consumption, selling assets, sending children away or to work, and doing casual labour for others²; and (2) other coping strategies, many of which are generally considered to be positive, such as starting a business, spending savings, and reducing non-food consumption. We examine households' stated coping strategies as well as their revealed coping strategies (i.e., behavioural responses measured in the data). For the revealed coping strategies, we focus on food consumption, given the centrality of this outcome to avoiding poverty traps and building human capital. We use two measures of this outcome: per capita monthly food consumption and whether a household ranks as severely food insecure, based on their response to a series of questions commonly used to measure food security.³

Like most shock coping studies in the environment and development economics literature, our study harnesses self-reported shock data [for example, see studies by, Pattanayak and Sills (2001), Carter and Maluccio (2003), Takasaki et al. (2004), de Janvry et al. (2006(a)), Beegle et al. (2006), Debela et al. (2012), and Jack and Suri (2014)]. While many of these studies take self-reports of negative shocks, particularly those related to weather and crop failure, to be plausibly exogenous, we explicitly consider the potential for endogeneity bias with self-reported shock data. For example, certain characteristics, such as poverty or poor farming skills, might make a household both more likely to report a weather or agricultural production shock (because they are more susceptible to weather variability) and more likely to be negatively affected by such an event. We discuss how our estimation strategy addresses potential endogeneity concerns in Section 6.1.

A key challenge for shock coping studies concerns how to identify the impact of a specific shock (such as a drought) when households experience multiple shocks at once (e.g., a drought, illness, and job loss in the same year). Some choose to only examine one type of shock (e.g., Beegle et al., 2006; Jack and Suri, 2014) or examine shocks separately (e.g., de Janvry et al., 2006), even though households might have experienced multiple shocks. How to classify and group together the numerous specific shocks households experience is another challenge, with no one framework consistently used in the literature. For example, Carter and Maluccio (2003) group together all reported shocks, including illness, job loss,

²Casual labor for others ("piece work") is often considered a negative coping strategy in this region. Boone et al. (2013) note that in Malawi such casual labor ("*ganyu*") is often a coping strategy of last resort that can lead to poverty traps. This is because the labor on others' farms is very low-wage and typically results in farmers delaying planting time on their own fields, which reduces yields. They argue farmers engage in such a sub-optimal allocation of off-farm labor because farmers in subsistence economies are severely cash-constrained.

³Based on the FANTA food security scoring system.

crop failure, and theft, by converting them into monetary values of loss; while Debela et al. (2012) distinguish between labour and non-labour shocks.

We develop a new framework for categorizing shocks that allows us to distinguish the weather-related (and generally more covariate and plausibly exogenous) shocks from the non-weather (and generally more idiosyncratic, possibly endogenous) shocks. Agricultural households in rural developing economies tend to be both sellers and consumers of their own production. Weather shocks can therefore impact not only households' *production* of agricultural goods for both home consumption and market sales, but also the *price* of agricultural goods that might be purchased or sold by affecting their supply and demand. Additionally, weather shocks can increase crops' susceptibility to disease and pests, as well as damage crop storage facilities. For these reasons, we create two categories of shocks: those affecting agricultural production and prices and those affecting households' assets, labour supply, and non-farm income.

Following Dercon (2002), Carter and Maluccio (2003), Takasaki et al. (2004), and Debela et al. (2012), we distinguish between covariate and idiosyncratic shocks in our analysis, as the available strategy sets for dealing with each type of shock should differ, with covariate shocks posing greater risk of poverty trap coping (Skoufias, 2003). The literature reflects various strategies for distinguishing between covariate and idiosyncratic shocks: (1) use of the household-specific community mean (e.g., Debela et al., 2012); (2) use of the general community mean (e.g., de Janvry et al., 2006(a)); or (3) establishing a (somewhat arbitrary) cut off for what constitutes "covariate" (e.g., Carter and Maluccio, 2003). We employ the common strategy of using the household-specific community mean, which is the percentage of the sample community that experienced a shock, exclusive of the household. This community mean measure is useful for investigating how a marginal increase in shock covariance across a community affects shock coping.

Finally, we compare the impacts of two policy design options: (1) extension of the cash transfer prior to experiencing a negative shock and (2) extension of the transfer in the wake of the shock. This allows us to estimate the difference between what an *ex-post* disaster aid cash transfer programme might be able to accomplish with one that is focused on building households' climate resilience *ex-ante*.

5. Data

Zambia's Child Grant Programme is being rolled out in phases, enabling the programme to first conduct a rigorous evaluation of the pilot phase before scaling up. The evaluation employs a multi-site, clustered randomised design. Thirty communities from each of three districts were first randomly assigned to either treatment or control status. All eligible households within treatment communities were then enrolled in the programme. Next, 28 households from each control and treatment community were randomly selected to participate in the study. Baseline surveys were administered prior to randomly assigning communities to treatment or control status and the start of the programme. In sum, in 2010, baseline data were collected from 2,515 households living in 90 communities (45 control, 45

treatment) across Kaputa, Kalabo, and Shangombo. A second round of data was collected in 2012.

In addition to collecting detailed information on children's health and schooling, households were asked about their consumption, income, assets, agricultural production, and other livelihood activities. Households were also surveyed about their exposure to a long list of potential negative shocks as well as their specific coping strategies. Households in the sample are quite poor, with 92% living below the poverty line⁴ and 90% ranking as severely food insecure (see Table 2). The vast majority are subsistence farmers, farming, on average, less than 1 hectare of land. At baseline, only 22% of households sold crops and only 13% purchased agricultural inputs (i.e., seeds, fertiliser, or pesticides). On average, households live 19 km from food markets, though there is considerable variation in the study sample.

There were 221 households that migrated out of the study area after the collection of baseline data (see Table 1). Handa et al. (2014) examine the effect this attrition had on the sample and find no differential attrition between the control and treatment groups in terms of rates or their observable household characteristics. These authors also investigate whether out-migration led to overall attrition bias (i.e., whether those that remain in the sample are, on average, different from the overall baseline sample). They find that the sample stays generally the same over time, in terms of observable household characteristics, with the principal difference being that those who remained in the sample were less likely to report a weather shock at baseline. This follows from the observation that 72% of the households that left the study lived in Kaputa district at baseline, where a lake important for fishing and farming livelihoods is drying up, causing mass migration out of the area. While this out-migration due to weather shocks does not bias our results, it does have implications for external validity.

There was a sharp increase in the percentage of households reporting negative weather shocks (droughts, floods, or storms) between the survey waves – from 42% in 2010 to 71% in 2012 (Table 3).⁵ When the shocks to crop production and prices, which are likely knock-on effects of the weather shocks, are factored in, a total of 81% of the sample experienced agricultural production and price shocks in 2012. Droughts as well as changes to food and crop prices were the only negative shocks that doubled or more in reported frequencies over time. [These self-reports of weather shocks are supported by objective reports of droughts and erratic rainfall affecting farming across Zambia in 2011–2012 (see The Times of Zambia, 2012; Sunday Times, 2012; Financial Gazette, 2012; and Reuters, 2011).] Shocks to households' assets, labour, and non-farm income show much lower frequency in the sample (experienced by 36% of the sample in 2012) and their prevalence did not increase as sharply over time. We investigate the covariance of each specific shock within communities by calculating the percentage of the sample that experienced the shock for each community (Table A1). The average covariance levels for communities do not differ much from the

⁴Households with total expenditures less than 93.37 kwacha per person per month in 2010 are considered to be severely poor.

⁵In the survey households were asked about 21 specific shocks. If they said they experienced the shock, they were then asked whether the effect was positive or negative. We limit our analysis to those shocks reported by households to have a negative effect.

averages for the overall sample, indicating that the agricultural production and price shocks are indeed much more covariate than the asset, labour, and other negative shocks.

We asked households about their primary as well as secondary coping strategy for each shock they reported. Households employed a wide range of shock coping strategies (Table A2). All of the principal coping strategies identified in the literature as leading to poverty traps are represented in our dataset. The most common coping strategy reported by households at baseline was “did nothing” (42%). We classify “did nothing” as a coping strategy associated with poverty traps based on analysis of household characteristics at baseline, which shows that households who “did nothing” in the wake of a negative shock had significantly lower food consumption than those who reported a different coping strategy, although they were similar along all other observable characteristics. At baseline, doing nothing, doing piecework for others, and reducing food consumption were the dominant poverty trap coping strategies. Amongst coping strategies not associated with poverty traps, receiving loans and growing/selling more crops were the dominant strategies.

6. Estimation strategy

6.1. Testing assumptions of the impact estimates' econometric models

Due to random assignment of the programme, treatment status should not be correlated with observed or unobserved characteristics of participating households or communities. We confirm whether randomisation yielded similar observable characteristics between treatment and control households by testing for their equivalence at baseline. We test for equivalence at baseline in terms of basic characteristics of the recipient/respondent and household (Table 2), self-reported shocks, and our key outcomes of interest (stated and revealed coping strategies). We restrict our analysis to just the panel of households that remained in the survey for both rounds and cluster robust standard errors at the community-level (and do so for all subsequent models). We examine equivalence at baseline for all variations of the sample used in subsequent impact estimates: the full panel as well as the four shock sub-groups.

For the full panel, we find that randomisation succeeded in producing balanced treatment and control groups. We find no significant differences between treatment and control households along observable characteristics, general shock exposure, and our key outcomes of interest – per capita food consumption and overall food security. Households in treatment communities, however, were 7 percentage points less likely to report an agricultural production or price shock at baseline. We discuss the implications of this difference in Section 8.

Our analysis of revealed coping strategies (food consumption and food security) breaks the full panel down into four shock sub-groups, based on the temporal trends of shock experience. We test for equivalence at baseline for these four shock sub-groups and find that they are generally balanced in terms of observable characteristics and our key outcomes of interest (Table 2). This equivalence at baseline allows us to attribute any estimated differences in revealed coping strategies to the cash transfer programme. However, for those shocked at round 1 only, the control group has significantly lower per capita food

consumption. This suggests that in response to shocks amongst households in the control group, it was the better off households who migrated out of the area and the poorer households who stayed. This lack of equivalence at baseline prevents us from examining the impact of cash on food consumption amongst those shocked only at baseline.

Next, we examine whether treatment and control households are experiencing the same time trend with respect to shock exposure. The time trend could be different due to either (1) differential weather patterns between treatment and control communities over time or (2) actual impacts of cash on the likelihood of experiencing or perceiving a shock (i.e., cash might reduce the likelihood of falling ill by improving nutrition or it might cause one to not notice a change in prices that other perceive as significant). To test for differential time trends, we run a difference-in-difference model, specified in Equation (1) as follows:

$$Y_{igt} = B_0 + B_1 Post_{igt} + B_2 Cash_{ig} + B_3 (Post_{igt} * Cash_{ig}) + B_4 X_{ig} + B_5 Z_g + W_g + E_{igt} \quad (1)$$

where Y_{igt} measures whether a shock was reported by household i in district g in period t , $Post_{igt}$ is a dummy variable equal to 1 if the observation is in 2012, $Cash_{ig}$ is a dummy variable equal to 1 if the household is in the treatment group, X_{ig} represents a vector of household and recipient characteristics measured at baseline, Z_g is a vector of baseline prices for food and other important consumption goods, W_g is a district fixed effect, and E_{igt} is the error term. We include controls for baseline characteristics and prices and district fixed effects to increase the precision of our estimates (Bruhn and McKenzie, 2009). The coefficient of interest in this model is B_3 , which captures the effect of being in a treatment community on self-reported shocks. We find that control and treatment households experienced the same time trends with respect to agricultural production and price shocks as well as other negative income shocks.

6.2. Identification strategy for impact estimates

To understand the impact of cash on households' stated coping strategies, we run a series of first difference models using the 2012 survey data and restricted to those who reported an agricultural production and price shock. This model can be written as:

$$Y_{igt} = B_0 + B_1 Cash_{ig} + B_2 X_{ig} + B_3 Z_g + W_g + E_{igt} \mid Shock_{2012} = 1 \quad (2)$$

where all terms are defined as they were in Equation (1), but now Y_{igt} is a dummy variable coded as 1 if a household reported using the specific coping strategy in question. The identifying assumption for this model is that both the treatment and control groups would have had, on average, similar, shock coping strategies in 2012, had the treatment group not received cash. However, our equivalence at baseline tests shows that this assumption does

not hold for certain shock coping strategies. Therefore, we focus our discussion of results on those strategies balanced at baseline.

To further probe household coping strategies, we use both rounds of data and examine whether cash may have affected households' food consumption and overall food security score. We run the model specified in Equation 3 below on four sub-groups of agricultural production and price shocks: (1) those avoiding such shocks both rounds, (2) those shocked only prior to round one, (3) those shocked only prior to round two, and (4) those shocked both rounds. The general model is

$$Y_{igt} = B_0 + B_1 Post_{igt} + B_2 Cash_{ig} + B_3 (Post_{igt} * Cash_{ig}) + B_4 X_{ig} + B_5 Z_g + W_{gt} + (e_{igt} + \mu_{it} + v_i)$$

(3)

where terms reflect their definitions as described for Equations (1) and (2), though here Y_{igt} is, depending upon the series of models, monthly per capita food consumption or a dummy variable coded as 1 if the household ranks as severely food insecure. We also control for asset, labour, and other negative shocks. The error term is decomposed here into its various components, with e_{igt} representing truly random error and μ_{it} representing unobserved household characteristics that vary over time and v_i those that are time-invariant. Time-invariant characteristics at the level of the treatment group (i.e., on average) are removed in the differencing. And while, econometrically, unobserved time-varying characteristics at the level of the treatment group remain in the error (as well as μ_{it} and v_i), the randomised research design provides strong assurance that there are no systematic differences between the treatment and control groups along either observed or unobserved characteristics. Therefore, there is little reason to believe that our estimates are biased by unobserved heterogeneity.

Disaggregating the analysis according to the temporal experience of shocks allows us to answer an important policy design question: *Does it matter whether cash is extended before or after a household experiences an agricultural production and price shock?*

7. Results

We find some evidence that cash increases the likelihood of employing positive coping strategies and decreases the likelihood of employing negative coping strategies associated with poverty traps (Table 4). We find that amongst those that experienced an agricultural production or price shock, cash reduces the likelihood of “doing nothing” (which, again, based on analysis of the data, appears to be correlated with reducing food consumption) by 14 percentage points and increases the likelihood of spending savings by 6 percentage points. Cash also increases the likelihood of using social services by 2 percentage points in the case of agriculture and price shocks.

Analysis of the behavioural data yields stronger evidence that the cash transfer enables households to positively cope with agricultural production and price shocks (Tables 5 and 6). We find that cash increases monthly per capita food expenditures by 29% for those reporting such shocks only after programme implementation (round two) and by 34% for those shocked both prior to and during the programme. We see a similar trend with the food security scores for these two shock sub-groups. Cash decreases the probability of being severely food insecure by 22 percentage points amongst those shocked round 2 only and by 23 percentage points amongst those shocked both rounds. The cash transfer does not appear to have much impact on those households that avoided agricultural production and price shocks both rounds (no impact on food consumption and only a weakly significant impact on food security). For those shocked round one only, we do not find evidence that cash has any effect on food security.

We then test for impact heterogeneity by running a series of models that examine whether the covariance of agricultural production and price shocks experienced within a community in round two affects the impacts of cash on food consumption and food insecurity. We may expect that cash would have greater impacts on shock coping for those living in a community experiencing widespread drought, crop failure, and food price spikes, since such events weaken informal safety-nets (e.g., borrowing, gifts). The shock covariance variable is measured as the percentage in each community sample reporting a shock, exclusive of the household. The average community mean of agricultural production and price shocks reported in round one was quite high -- 81%. We use this average community mean to split the sample into high and low shock covariance groups. We then use both rounds of panel data to run the same series of regressions used for our impact estimates amongst these high and low shock covariance groups.⁶

The results of these impact heterogeneity tests (Table 7) generally conform to our expectations that cash has a greater and more positive impact on shock coping for those living in communities experiencing a high covariance of agricultural production and price shocks. We find that cash allows households living in high shock covariance communities to increase their food consumption by 35% for those experiencing shocks both rounds and in round two only. These households are also between 21 and 27 percentage points less likely to be food insecure than the control households. The impacts on food consumption for the high shock covariance group are greater than those found in our initial impact estimates (see Table 5). And while we see that cash also has positive impacts on food consumption and food security for those living in communities experiencing lower shock covariance, the results across models are less consistent.

Finally, we run a set of models that expands the analysis beyond agricultural and price shocks to examine the effect of any type of negative shock, using our four shock sub-group difference-in-difference models (Table A3). After testing for balance at baseline and again finding that all models save the food consumption shock round one only model are balanced, we find a pattern of results similar to those for the agricultural and price shock models: Cash positively impacts food consumption and food security for those coping with shocks in both

⁶We thank an anonymous reviewer for suggesting this estimation strategy.

rounds or just round two, with effect sizes similar to what we see in the agricultural and price models. However, now that we examine impacts for those that avoid negative shocks completely (rather than just agricultural and price shocks), we detect a positive impact of cash on both of our key outcomes.⁷

8. Discussion

In addition to the effects of cash on shock coping, food consumption, and food security, the effects of several other control variables in our principal models (Tables 5 and 6) deserve discussion. There are large regional differences in per capita food consumption at baseline, with both Kaputa and Shangombo households having 23–40% less consumption than Kalabo households. In the case of food security, however, these large regional differences don't hold. Because food consumption is measured in price-weighted quantities, the large regional differences are reflective of the higher food prices in Kalabo.

It is also important to note that the control for asset, labour, or other negative shock at baseline does not have much of an impact on baseline food consumption or food security in any of our principal models. This finding, as well as the models that examine all negative shocks, suggest that shocks to agricultural production and prices are the principal shocks negatively impacting food consumption and food security in these rural landscapes.

There are some limitations of our study worth mentioning. First, we use self-reported shock data, which may be subject to some error. While self-reported data is necessary for identifying shocks to household assets and labour and certain agricultural production shocks, such as crop pests and crop damage, objective measures of weather shocks and price changes could also be used to identify such exogenous shocks. An advantage of using such objective data, of course, is that it is free of respondent bias, which may be influenced by the program or even the survey itself. However, because we do not find that the cash transfer program itself caused reporting of shocks to increase, our data appears to be free (statistically) from such bias. Additionally, an advantage of using self-reports of agricultural production and price shocks is that they may be able to better capture realities on the ground at a finer scale than can be detected by geographic analysis of changes in rainfall patterns (which will also rely on the researcher's subjective measure of variability and/or what constitutes a weather shock). Further research should be done to cross-check self-reports of agricultural production and price shocks with climate and rainfall data to assess the degree of alignment between the two approaches.

⁷Additionally, we run two sets of models that use the full sample to identify the effect of both receiving Cash and experiencing an agricultural production and price shock: Household fixed effects models, which control for all time-varying characteristics and include a fixed effect for time (we thank an anonymous referee for this suggestion), and pooled triple difference models, which include the same set of controls used in our principal estimates (Table A4). While these models do not allow us to investigate how the timing of the transfer affects shock coping, they do provide an alternative view of the data. Both sets of models find that cash decreases the likelihood of being food insecure by between 14 (pooled model) and 20 (fixed effects model) percentage points but has no impact on food consumption. The lack of impact on food consumption is not surprising. Because the fixed effects model uses only those who switch treatment status between rounds to estimate the parameters of interest, it uses just those shocked only in round one or only in round two. The lack of balance at baseline on food consumption amongst those experiencing shocks in round one only (Table 2) prevented us from analysing the impact of cash for this sub-group and likely drives the insignificant results for the triple difference and fixed effects models.

Finally, a few words about the lack of balance at baseline for those reporting agricultural and price shocks in round one only. As noted previously, there were 221 households who migrated out of the panel study and those who remained were less likely to report a weather shock at baseline. And while analysis of the full sample by Handa et al. (2014) finds this out-migration did not differentially affect the principal characteristics of the panel's treatment and control groups, we find that the panel treatment group was 7 percentage points less likely to have experienced an agricultural production and price shock at baseline and that this difference is driven by more reports of floods by the control group (Table 3). We also see that amongst those experiencing agricultural production and price shocks in round one only, the treatment group had significantly higher food consumption and lives much closer to markets than the control group (Table 2). Further examination of this shock sub-group, including those who migrated out of the panel, reveals the same pattern: the treatment group lives closer to markets and has higher food consumption. All of this suggests slight spatial variations between the control and treatment groups, rather than differential out-migration due to the program itself, drive the differences in baseline flood reporting and food consumption.

9. Conclusions and policy implications

We find that cash transfers enable households to cope with agricultural production and price shocks in ways that do not increase the likelihood of falling into a poverty trap. Cash empowers the poor, rural households in our study to employ shock coping strategies typically used by the non-poor, such as spending savings. The cash transfers provided by Zambia's Child Grant Programme enable households to substantially increase their food consumption and overall food security, even in the wake of negative shocks and even when weather shocks and food price spikes are widespread in their communities.

The most recent report from the Intergovernmental Panel on Climate Change (IPCC) states that

“Throughout the 21st century, climate-change impacts are projected to slow down economic growth, make poverty reduction more difficult, further erode food security, and prolong existing and create new poverty traps (p. 20) ...”

Our study provides evidence of a programme -- unconditional cash transfers -- that can work to help households avoid the poverty traps that climate change threatens to create and entrench. Moreover, we show that a specific programme design feature -- extending cash to households before severe shocks to agricultural production and prices occur -- achieves strong, positive impacts on food consumption and food security.

The international community concerned with climate change has become increasingly focused on developing adaptation strategies in recent years. Crop insurance (Barrett et al., 2007; Baez et al., 2013) and “ecosystem-based adaptation” (FAO and UNEP, 2013) are two potential adaptation strategies that have received a great deal of attention -- and for Africa in particular. However, the concept of using *ex-ante* cash transfer programmes (i.e., as opposed to *ex-post* cash or in-kind disaster relief) as an adaptation strategy for rural Africa has received little attention. This may be due to limited interaction between the environmental

policy community and the social protection community. There is clearly a need to link these two policy communities and their attendant literatures.

While Wood (2011) argues that cash transfers should be given a greater role in climate adaptation and the recent World Development Report (World Bank, 2013(b)) also highlights the value of cash transfers for risk management and shock-coping in the context of climate change, to date there have been no published evaluations of cash transfer programmes that focus on climate and adaptation questions.⁸ This study therefore fills an important gap in the literature and offers policy-relevant evidence that should inform the design of climate adaptation programmes.

One advantage unconditional cash transfers offer over other potential adaptation interventions is their unique ability to address the context of climate change, which is characterised by “deep uncertainty.” In their discussion of the economics of risk and uncertainty in the 2014 World Development Report, The World Bank describes problems of deep uncertainty as those where “...experts cannot agree on which models to use...; on the probability distributions of key uncertain parameters...; or on the values of alternative outcomes” (2013(b), p. 93). Climate change is one such problem, because while models converge on predictions of disrupted rainfall patterns in Africa, at the local level models diverge – some predict decreases in rainfall and droughts, others predict increased rainfall and floods. Given that cash transfers have already been demonstrated by numerous studies (Fiszbein and Schady, 2009) to reduce both short-term poverty and its long-term determinants, they therefore offer a “no regrets” (Woods, 2011) strategy for climate-resilient development policy. Further, as also argued by Woods (2011) cash transfers facilitate individuals’ autonomous adaptation and development decisions, making them both congruent with a human rights framework that recognises the importance of agency as well as adaptation frameworks that embrace locally-based and diverse solutions.

APPENDIX

Table A1.

Covariance of shocks: Average percent reporting shock within a community cluster, averaged across communities

Negative shocks	2010			2012		
	Full sample (n=90)	Treatment (n=45)	Control (n=45)	Full sample (n=90)	Treatment (n=45)	Control (n=45)
<u>Any shock</u>	63%	62%	65%	85%	85%	85%
<u>Agricultural production and price shocks</u>						
Flood	34%	30%	38%	29%	32%	26%
Food price change	15%	14%	15%	36%	35%	36%

⁸Asfaw et al. (2011), however, report they are currently studying the impact of Lesotho’s cash transfer programme on farmers’ adaptation strategies, with a particular focus on changes in a series of specific farming practices. The 2014 World Development Report also reports advance results from evaluations of how cash transfer programmes in Ethiopia and El Salvador have helped households cope with droughts and natural disasters (World Bank, 2013(b), p. 104–105).

Negative shocks	2010			2012		
	Full sample (n=90)	Treatment (n=45)	Control (n=45)	Full sample (n=90)	Treatment (n=45)	Control (n=45)
Drought	13%	13%	13%	47%	47%	47%
Crop disease/pests	7%	7%	7%	10%	10%	11%
Storms	4%	3%	4%	3%	2%	4%
Crop price change	3%	2%	4%	8%	7%	8%
Crops damaged in storage	2%	2%	3%	3%	2%	3%
Input price change	2%	2%	2%	5%	5%	5%
<u>Asset, labor, and other income shocks</u>						
Illness	19%	20%	18%	22%	18%	26%
Business collapse	4%	4%	4%	2%	2%	1%
Death other household member	3%	3%	3%	5%	5%	5%
Death household head	3%	2%	3%	1%	1%	1%
Livestock disease	2%	2%	2%	11%	11%	12%
Person joined household	2%	2%	1%	2%	2%	3%
Injury	1%	2%	1%	1%	1%	1%
Inability to pay back loan	1%	1%	1%	<1%	<1%	<1%
Less loans/gifts	<1%	<1%	<1%	<1%	<1%	<1%
Job loss	<1%	<1%	<1%	<1%	1%	<1%
Conflict	<1%	<1%	<1%	<1%	<1%	<1%

Table A2.

Coping strategies employed by households experiencing negative shocks^a

Coping strategy	2010			2012		
	Full sample (n=1,597)	Treatment (n=784)	Control (n=813)	Full sample (n=1,957)	Treatment (n=984)	Control (n=973)
<u>Coping strategies associated with poverty traps</u>						
Did nothing	664 (42%)	288 (37%)	376 (46%)	988 (62%)	457 (46%)	531 (55%)
Piece work for others (farm or non-farm)	642 (40%)	313 (40%)	329 (40%)	645 (33%)	314 (32%)	331 (34%)
Reduced food consumption	228 (14%)	113 (14%)	115 (14%)	223 (11%)	93 (9%)	130 (13%)
Sold assets	40 (3%)	20 (3%)	20 (2%)	64 (3%)	26 (3%)	38 (4%)
Sent children to relatives/friends	26 (2%)	14 (2%)	12 (1%)	18 (1%)	9 (1%)	9 (1%)
Sent children to work/sell	5 (<1%)	2 (<1%)	3 (<1%)	0	0	0
<u>Other coping strategies</u>						
Loans/gifts from family, friends, or lender	394 (25%)	174 (22%)	220 (27%)	274 (14%)	131 (13%)	143 (15%)
Worked more hours, grew/sold more crops, or started a business	325 (20%)	175 (22%)	150 (18%)	371 (19%)	208 (21%)	163 (17%)
Sought help from government, NGO, or clinic	244 (15%)	129 (16%)	115 (14%)	235 (12%)	95 (10%)	140 (14%)
Spent savings	185 (12%)	83 (11%)	102 (13%)	275 (14%)	169 (17%)	105 (11%)

Coping strategy	2010			2012		
	Full sample (n=1,597)	Treatment (n=784)	Control (n=813)	Full sample (n=1,957)	Treatment (n=984)	Control (n=973)
Work-for-food or Work-for-assets program	140 (9%)	64 (8%)	76 (9%)	72 (4%)	40 (4%)	32 (3%)
Reduced non-food expenses	136 (9%)	74 (10%)	62 (8%)	291 (15%)	160 (16%)	131 (13%)
Migrated for work or moved house/field	47 (3%)	16 (2%)	31 (4%)	16 (1%)	10 (1%)	6 (1%)
Used cash transfer	0	0	0	0	25 (3%)	0

^aPrimary and secondary coping strategies are combined to compute the above tallies. “Doing nothing” is classified as a poverty trap coping strategy based on empirical analysis of household characteristics at baseline, which shows that households who “did nothing” in the wake of a shock had significantly lower food consumption than those who reported a different coping strategy, although they were similar along all other observable characteristics.

Table A3.

The impact of cash on food consumption and food security amongst households experiencing and avoiding all negative shocks^{a,b,c}

	No shock either round	Shock round 1 only	Shock round 2 only	Shock both rounds
<u>Dependent variable: Per capita food consumption (logged)</u>				
Time	39% ***	--	26% ***	10%
Cash	7%	--	3%	4%
Cash * Time	31% *	--	35% ***	29% ***
N	240	--	1393	2455
<u>Dependent variable: Severely food insecure (1) – Linear Probability Model</u>				
Time	–5 pp	–8 pp	–4 pp	–7 pp **
Cash	5 pp	–1 pp	3 pp	1 pp
Cash * Time	–24 pp **	–.04 pp	–25 pp ***	–20 pp ***
N	240	428	1385	2445

^aSample restricted to those who remain in the panel survey in 2012; All regressions include the same set of control variables as the regressions reported in Tables 5 and 6.

*** indicates significant differences at the 99% level,

** at the 95% level, and

* at the 90% level.

^bAnalysis restricted to those shock groups balanced at baseline along outcomes of interest.

^c“Percentage points” abbreviated as “pp”

Table A4.

Household fixed effect and pooled triple difference models: The impact of cash and agricultural production and price shocks on food consumption and food security^{a,b}

	Per capita food consumption (logged)		Severely food insecure (linear probability model)	
	Household Fixed Effects	Pooled Triple Difference	Household Fixed Effects	Pooled Triple Difference
Time	17%	24% ***	–12 pp ***	–3 pp

	Per capita food consumption (logged)		Severely food insecure (linear probability model)	
	Household Fixed Effects	Pooled Triple Difference	Household Fixed Effects	Pooled Triple Difference
Cash	33% **	6%	-2 pp	3 pp
AgPrice Shock	9%	10% *	6 pp *	6 pp **
AgPrice Shock * Cash	-7%	-1%	-20 pp ***	-2 pp
AgPrice Shock * Time	--	-14% *	--	-6 pp
Cash * Time	--	24% **	--	-8 pp *
AgPrice Shock * Cash * Time	--	6%	--	-14 pp **
N	4573	4516	4555	4498

^aSample restricted to those who remain in the panel survey in 2012. All regressions include the same set of control variables as the regressions reported in Tables 5 and 6 (baseline measures for the pooled models; time-varying measures for the fixed effects models).

*** indicates significant differences at the 99% level,

** at the 95% level, and

* at the 90% level.

^b“Percentage points” abbreviated as “pp”

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Table 1.

Study sample sizes

	Treatment	Control	Total
2010	1,259	1,260	2,519
2012	1,145	1,153	2,298
Total	2,404	2,413	4,817

^a221 households migrated out of the sample

Table 2.

Mean characteristics and equivalence at baseline tests for full panel and four shock sub-group panels in 2010^{a,b}

	Full Panel		No AgPrice Shock either round		AgPrice Shock round 1 only		AgPrice Shock round 2 only		AgPrice Shocks both rounds	
	Treatment (1,153)	Control (1,145)	Treatment (109)	Control (106)	Treatment (105)	Control (126)	Treatment (470)	Control (396)	Treatment (469)	Control (517)
<i>Recipient characteristics</i>										
Age	30	30	30	30	30	30	30	29	30	30
Attended school	73%	70%	71%	62%	73%	79%	72%	67%	76%	72%
Married	74%	71%	72%	63%	75%	64%	78%	74%	70%	72%
Male	1.2%	0.5%	1.8%	<0.5%	1.9%	<0.5%	1.2%	0.5%	0.8%	0.7%
<i>Household characteristics</i>										
Wealth index	0.002	-0.04	.013	-.018	.133	-.057	.054	-.002	-.082	-.06
Below 2010 poverty line	92%	92%	93%	95%	85%	86%	94%	93%	91%	91%
Household size	6	6	6	6	6	6	6	6	6	6
Kilometres to food market	16	22	19	33	16**	33**	15	21	16	18
<i>Percentage from each district</i>										
Kaputa	30%	29%	36%	49%	26%	36%	38%	36%	21%	19%
Kalabo	35%	35%	25%	38%	54%	47%	20%	22%	48%	42%
Shangombo	35%	35%	39%	13%	20%	17%	41%	42%	31%	39%
<i>Revealed coping strategies</i>										
Monthly per capita food consumption (kwacha)	36.36	34.35	33.57	30.0	45.48**	39.19**	32.81	32.18	39.19	36.15
Severely food insecure	90%	90%	92%	90%	92%	94%	87%	86%	92%	92%

^a All samples restricted to those who remain in the panel survey in 2012. Means and tests for significant difference are regression-adjusted to account for clustered randomised design. Revealed coping strategy regressions include controls for recipient characteristics (age, education, marital status), household characteristics (wealth, household size and demographic composition, distance to food market, other type of shock at baseline), district fixed effects and a vector of baseline prices (maize/grain, rice, beans, fish, oil, sugar, salt, hand soap, liquid soap).

*** indicates significantly different from control group at the 99% level,

** at the 95% level, and

* at the 90%

^b Coefficients for household age composition controls not shown.

Table 3.

Negative shocks experienced during 12 months prior to collection of baseline data in 2010 and round 2 in 2012^a

	2010			2012		
	Full sample (n=2,519)	Treatment (n=1,260)	Control (n=1,259)	Full sample (n=2,298)	Treatment (n=1,153)	Control (n=1,145)
No negative shock	922 (37%)	476 (38%)	446 (35%)	341 (15%)	169 (15%)	172 (15%)
Any negative shock	1,597 (63%)	784 (62%)	813 (65%)	1,957 (85%)	984 (85%)	973 (85%)
<u>Agricultural production and price shocks</u>	1,319 (52%)	614 (49%)	705 (56%)	1,852 (81%)	939 (81%)	913 (80%)
<u>Weather shocks</u>	1,058 (42%)	484 (38%)	574 (46%)	1,632 (71%)	828 (72%)	804 (70%)
Flood	851 (34%)	375 (30%)	476 (38%)	690 (30%)	382 (33%)	308 (27%)
Drought	318 (13%)	160 (13%)	158 (13%)	1080 (47%)	536 (46%)	544 (48%)
Storms	95 (4%)	43 (3%)	52 (4%)	63 (3%)	17 (1%)	46 (4%)
<u>Crop and price shocks</u>	740 (29%)	352 (28%)	388 (31%)	1,404 (61%)	681 (59%)	723 (63%)
Crop disease/pests	172 (7%)	88 (7%)	84 (7%)	244 (11%)	115 (10%)	129 (11%)
Crops damaged in storage	62 (2%)	30 (2%)	32 (3%)	59 (3%)	27 (2%)	32 (3%)
Food price change	368 (15%)	180 (14%)	188 (15%)	813 (35%)	401 (35%)	412 (36%)
Crop price change	78 (3%)	25 (2%)	53 (4%)	174 (8%)	80 (7%)	94 (8%)
Input price change	60 (2%)	29 (2%)	31 (2%)	114 (5%)	58 (5%)	56 (5%)
<u>Asset, labour, and other shocks</u>	694 (28%)	357 (28%)	337 (27%)	822 (36%)	380 (33%)	442 (39%)
Illness	468 (19%)	243 (19%)	225 (18%)	504 (22%)	210 (18%)	294 (26%)
Injury	37 (1%)	20 (2%)	17 (1%)	13 (1%)	6 (1%)	7 (1%)
Death household head	65 (3%)	30 (2%)	35 (3%)	30 (1%)	15 (1%)	15 (1%)
Death other household member	74 (3%)	36 (3%)	38 (3%)	107 (5%)	55 (5%)	52 (5%)
Person joined household	39 (2%)	21 (2%)	18 (1%)	50 (2%)	24 (2%)	26 (2%)
Business collapse	97 (4%)	50 (4%)	47 (4%)	37 (2%)	22 (2%)	15 (1%)
Job loss	9 (<1%)	6 (<1%)	3 (<1%)	11 (<1%)	6 (1%)	5 (<1%)
Livestock disease	51 (2%)	23 (2%)	28 (2%)	250 (11%)	119 (10%)	131 (11%)
Inability to pay back loan	19 (1%)	10 (1%)	9 (1%)	4 (<1%)	3 (<1%)	1 (<1%)
Less loans/gifts	11 (<1%)	6 (<1%)	5 (<1%)	9 (<1%)	4 (<1%)	5 (<1%)
Conflict	8 (<1%)	1 (<1%)	7 (1%)	18 (1%)	12 (1%)	6 (1%)

^aBecause households experienced numerous shocks, the many specific shock types do not sum to their shock sub-group category.

Table 4.

The impact of cash on stated coping strategies amongst households experiencing agricultural production and price shocks^{a,b,c}

Stated Coping Strategy	Impact of Cash
<u>Strategies associated with poverty traps</u>	
Did nothing	-14 pp ***
Piece work for others (farm or non-farm)	1 pp
Reduced food consumption	-3 pp
<u>Other stated coping strategies</u>	
Loans/gifts from family, friends, or lender	Not balanced at baseline
Worked more hours, grew/sold more crops, or started a business	Not balanced at baseline
Sought help from government, NGO, or clinic	2 pp **
Spent savings	6 pp ***
Work-for-food or Work-for-assets program	0.04 pp
Reduced non-food expenses	Not balanced at baseline
n = 1823	

^a Sample restricted to those who remain in the panel survey in 2012. All regressions include the same set of controls and clustered robust standard errors as the regressions reported in Tables 5 and 6 (save the control for other negative shocks).

*** indicates significant differences at the 99% level,

** at the 95% level, and

* at the 90% level.

^b Analysis restricted to those coping strategies employed by 5% or more of households

^c "Percentage points" abbreviated as "pp"

Table 5.

The impact of cash on food consumption amongst households experiencing and avoiding agricultural production and price shocks^{a,b}

Dependent variable: Per capita food consumption (logged)			
	No AgPrice Shock either round	AgPrice Shock round 2 only	AgPrice Shock both rounds
Constant	10.23 *** (0.33)	10.29 *** (0.26)	10.85 *** (0.22)
Time	0.42 *** (0.07)	0.24 *** (0.08)	0.05 (0.06)
Cash	0.15 (0.11)	0.01 (0.06)	0.02 (0.06)
Cash *Time	0.16 (0.13)	0.29 *** (0.10)	0.34 *** (0.09)
<i><u>Recipient characteristics</u></i>			
Age	0.01 (0.004)	0.003 (0.002)	−0.0002 (0.002)
Attended school	0.18 ** (0.08)	0.08 ** (0.03)	0.12 *** (0.04)
Married	0.02 (0.08)	0.02 (0.05)	0.05 (0.04)
<i><u>Household characteristics</u></i>			
Wealth index	0.12 ** (0.06)	0.15 *** (0.02)	0.15 *** (0.02)
Household size	−0.19 (0.12)	−0.08 (0.06)	0.03 (0.04)
Kilometres to food market (log)	0.02 (0.04)	0.01 (0.02)	0.03 (0.02)
Asset, labour or other negative shock at baseline	0.15 (0.09)	0.03 (0.05)	0.02 (0.03)
<i><u>Regional characteristics</u></i>			
Kaputa	−0.23 * (0.12)	−0.19 ** (0.09)	−0.22 *** (0.07)
Shangombo	−0.40 *** (0.10)	−0.22 *** (0.06)	−0.32 *** (0.06)
N	418	1700	1944

^a Sample restricted to those who remain in the panel survey in 2012; robust standard errors are clustered at the community level to account for the clustered randomised design and included in parentheses below coefficients. Parameter estimates for vector of baseline prices (maize/grain, rice, beans, fish, oil, sugar, salt, hand soap, liquid soap) and household age composition controls not shown. Kalabo district omitted.

*** indicates significant differences at the 99% level,

** at the 95% level, and

* at the 90% level.

^b Analysis restricted to those shock groups balanced at baseline along per capita food consumption.

Table 6.

The impact of cash on food security amongst households experiencing and avoiding agricultural production and price shocks^a

Dependent variable: Severely food insecure (1) – Linear Probability Model				
	No AgPrice Shock either round	AgPrice Shock round 1 only	AgPrice Shock round 2 only	AgPrice Shock both rounds
Constant	1.19 *** (0.15)	0.88 *** (0.14)	1.16 *** (0.12)	1.05 *** (0.10)
Time	−0.03 (0.05)	−0.10 ** (0.04)	−0.02 (0.03)	−0.09 *** (0.03)
Cash	0.02 (0.04)	0.02 (0.05)	0.03 (0.04)	0.01 (0.03)
Cash * Time	−0.13 * (0.07)	−0.05 (0.06)	−0.22 *** (0.05)	−0.23 *** (0.04)
<i><u>Recipient characteristics</u></i>				
Age	0.001 (0.003)	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)
Attended school	0.02 (0.04)	−0.02 (0.03)	−0.03 (0.03)	−0.04 * (0.02)
Married	−0.03 (0.03)	0.02 (0.04)	−0.06 ** (0.03)	−0.03 (0.02)
<i><u>Household characteristics</u></i>				
Wealth index	−0.04 ** (0.02)	−0.05 ** (0.02)	−0.03 ** (0.02)	−0.05 *** (0.02)
Household size	−0.01 (0.05)	0.09 ** (0.03)	−0.01 (0.03)	−0.02 (0.03)
Kilometres to food market (logged)	−0.03 *** (0.01)	0.004 (0.02)	0.01 (0.01)	−0.02 ** (0.01)
Asset, labour or other negative shock at baseline	0.002 (0.03)	−0.001 (0.03)	−0.06 * (0.04)	−0.03 (0.02)
<i><u>Community characteristics</u></i>				
Kaputa	0.07 (0.06)	0.04 (0.06)	−0.004 (0.04)	−0.02 (0.04)
Shangombo	−0.07 (0.06)	−0.16 * (0.08)	−0.08 (0.06)	−0.08 ** (0.03)
N	418	453	1692	1935

^aSample restricted to those who remain in the panel survey in 2012; robust standard errors are clustered at the community level to account for the clustered randomised design and included in parentheses below coefficients. Parameter estimates for vector of baseline prices (maize/grain, rice, beans, fish, oil, sugar, salt, hand soap, liquid soap) and household age composition controls not shown. Kalabo district omitted.

*** indicates significant differences at the 99% level,

** at the 95% level, and

* at the 90% level.

Table 7.Impact heterogeneity: Effect of shock covariance on the impacts of cash^{a, b}

	Low covariance of agricultural production and price shocks (average community mean of 81% in round 2)				High covariance of agricultural production and price shocks (> average community mean of 81% in round 2)			
	No AgPrice Shock either round	AgPrice Shock round 1 only	AgPrice Shock round 2 only	AgPrice Shock both rounds	No AgPrice Shock either round	AgPrice Shock round 1 only	AgPrice Shock round 2 only	AgPrice Shock both rounds
Food consumption	12%	2%	15%	34% **	19%	32%	35% **	35% ***
Likelihood of being food insecure	-21 pp ***	-9 pp	-26 pp ***	-14 pp **	19%	6 pp	-21 pp ***	-27 pp ***
n (food consumption)	320	336	572	628	98	118	1128	1316
n (food insecurity)	320	336	569	625	98	117	1123	1310

^aSample restricted to those who remain in the panel survey in 2012. All regressions include the same set of control variables as the regressions reported in Tables 5 and 6.

*** indicates significant differences at the 99% level,

** at the 95% level, and

* at the 90% level.

^b“Percentage points” abbreviated as “pp”