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Cash transfers, time preference, and productive choices

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Abstract

Cash transfers are shown to improve production, increase investment and induce productive practices by farmers. Despite a rich literature showing these desired outcomes, less is known about the pathways that produce these impacts. We use a large-scale cash transfer program in Sub-Saharan Africa to study if cash transfers affect input use by farmers through their impact on intertemporal choice. We exploit the random assignment of treatment to identify the indirect and total effect of the program and to isolate the influence of the time discounting channel from other transmission channels. We find that a small part of the total effect of cash transfers on input use is mediated through the increase in the patience of recipients.

Keywords: Cash Transfers, Time Discounting, Input use, Mediation Analysis, RCT

JEL codes: C31, H24, O12, Q12

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1 Introduction

A growing body of literature establishes that cash transfers cause desirable outcomes for the poor. Cash transfers improve nutrition and reduce poverty (Fiszbein and Schady 2009; Skoufias and Di Maro 2006; Van den Berg and Cuong 2011) and have positive effects on education and health of the poor which results in improvements in future standard of living (Chakrabarti et al. 2020; Gertler 2004). Cash transfers can also stimulate production, especially for farmers (Todd et al. 2010; Prifti et al. 2019). A strand of literature investigates the channels that cash transfers have affected production. Cash transfers improve asset holdings of households in the form of livestock, durables, and productive tools (Haushofer and Shapiro 2016; Todd et al. 2010), alleviate credit constraints, provide insurance for possible crop loss, and improve production practices such as employment of household and hired labor, and utilization of inputs and tools (Skoufias et al. 2008; Ardington et al. 2009; Prifti et al. 2019), all of which can result in more production by the recipients.

Cash transfers also affect behavioral parameters such as time discounting and risk preferences. Bianchi and Bobba (2013) show that *Progresa* program in Mexico enhances willingness to bear risk. Studying separate cash transfer programs in Kenya and Zambia, Handa et al. (2014) and Prifti et al. (2019) find no impact on risk aversion that is caused by cash transfers, however, the latter study shows that the transfer had the effect of boosting output by

increasing the use of risk-increasing inputs. In addition to risk preferences, other studies highlight the role of cash transfers as an insurance instrument that promotes riskier productive choices by farmers (Karlán et al. 2014). A smaller but growing literature studies the impact of cash transfers on time discounting and time-preferences. Using the same programs in Kenya and Zambia, Handa et al. (2016) and Handa et al. (2020) find that cash transfers increase the probability to wait for future money. Although an important implication of this strand of literature is that the observed impact of cash transfers through the channels mentioned earlier is partly due to the effects on behavioral parameters, low emphasis has been placed on how and to what degree these personal traits affect the observed outcomes on productive choices.

In this paper we study the causal impacts of cash transfers on time-discounting and input use, and the degree by which the observed impact on input use is mediated through the willingness to wait for future money. We evaluate the data for Lesotho Child Grants Program (CGP), a large-scale cash transfer program, and employ the random assignment of treatment to find the impacts of the program on the utilization of inputs such as seeds, pesticides, and fertilizers in production as well as time discounting. Using a linear probability model, we find that the CGP program increased the use of pesticides and inorganic fertilizers by farmers. We measure time-discounting using a series of six questions, each of which asked the respondents if they prefer to receive M 1,000 today or a larger value in one month that varies

between M 1,050 and M 3,000. Employing the random assignment of treatment in a linear probability model and an ordered probit model, we show that cash transfers increased the patience of recipients for future money.

We also measure the contribution of the increase in patience on the observed impact on input use by employing mediation analysis. Using a linear probability model in which both the treatment and time-discounting variables are included, we measure the direct effect of treatment on input use. We also find the indirect impact of treatment mediated through the effect on time-discounting. Our results indicate that only a small part of the total effect (11-17 percent) is mediated through the impact on patience.

This paper contributes to the literature in several ways. First, we provide new evidence on the relationship between income and time-preferences using a large-scale program with random assignment of treatment. Although the determinants of time-preferences and time-discounting have been studied in the literature, most of the evidence is based on small sample sizes and/or selected populations such as young adults or students. Second, we contribute to the growing literature on the impacts of *unconditional* cash transfer programs in Africa. Unlike the widely studied conditional cash transfer programs in Latin America, the program we focus on is unconditional. Additionally, the program of focus in this study is in Africa, where the economic and social settings such as poverty and access to infrastructure are different from that of other parts of the world. Third, most of the studies in the cash transfer literature are focused on social outcomes, while this study is on a key behav-

ioral parameter that economists have studied extensively in other settings. Moreover, this paper is the first to measure how the impact of a cash transfer program is channeled through a behavioral trait.

2 Review of related literature

Intertemporal choices - decisions with consequences in different time periods - are important decisions that affect the well-being of individuals as well as the prosperity of nations. Economic models have incorporated this concept to explain the decisions involving growth, development, education, savings, etc. (Becker and Mulligan 1997; Bardhan and Udry 1999) In many economic models, the motives underlying intertemporal choice are captured by a single parameter, the discount rate (Frederick et al. 2002). The relationship between the discount rate and wealth is demonstrated in many studies from developed and developing countries. Lawrance (1991) identifies subjective rates of time preference by estimating consumption Euler equations using the data of the United States. She finds that the discount rate is three to five percentage points higher for households with low permanent income compared to those with high permanent income. Suen (2014) shows that the neoclassical growth model with heterogeneous time preferences is able to explain the observed distribution of income and wealth in the United States. Using a field experiment in Denmark, Harrison et al. (2002) show that the discount rate for individuals in the highest income levels is ten percentage points lower

than those in the lowest income levels. Yesuf and Bluffstone (2019) use a field experiment in rural Ethiopia to study discount rates and find that respondents who are part of wealthier households have lower discount rates. A more detailed study in developing countries is Tanaka, Camerer, and Nguyen (2010) which finds that people are more patient in villages with higher mean income and in households with higher income. In general, these studies find larger discount rates for developing countries compared to developed countries. Some other studies differentiate between the rate of time preference and the intertemporal elasticity of substitution. Ogaki and Atkeson (1997), for example, find that the rate of time preference is constant across poor and rich households, but the intertemporal elasticity of substitution is larger for the rich than it is for the poor.

The relationship between wealth and time discounting is important in development economics. Households with large time discounting factors or smaller time horizon for planning may invest less for their future and that can keep them in a behavioral poverty trap (Laajaj 2017). The situation is even worse for farmers in developing countries where uncertainty about the future and shocks limit the planning horizon. Haushofer et al. (2013), for example, show that negative income shocks increase the time discounting for University of Zurich students in a lab setting. Additionally, stress is also shown to reduce patience (Bickel et al. 2016; Mellis et al. 2018; Haushofer et al. 2021). Stressful lives of the poor can therefore increase their discount factor and eventually reduce their wealth. The effect of time discounting can

also affect the production practices of farmers and affect their income from this channel. Studying a sample of farmers in Burkina Faso, Le Cotty et al. (2018) show that more patient farmers use more fertilizer to crop maize. With this view of the effects of time preferences on wealth, cash transfers can improve the well-being of the recipients if these programs are effective in improving patience.

Recent literature on the effects of cash transfers has studied the impact of these programs on time discounting. Handa et al. (2016) study a cash transfer program in Kenya and find that individuals in the treatment group are more likely to wait for future money and that this effect is more pronounced for the poorest households. Martorano et al. (2015) study the same program and further shows that middle-aged groups are more patient than younger and older adults and women are less patient than men. Laajaj (2017) investigates a program in Mozambique where households were provided agricultural inputs and a savings program, not unconditional cash transfers. He finds that improvement in economic prospects resulted in an increase in the planning horizon of the beneficiaries. Handa et al. (2020) provide a more comprehensive assessment of the impacts of cash transfers on intertemporal choice by examining the impacts on self-assessed indicators such as happiness, perceived quality of life, and health. They find that even after controlling for these emotions that are influenced by cash transfers, the program still increased the propensity to wait. These studies benefit from large samples, which reduces the concerns of external validity that is inherent

in lab experiments with a small number of subjects. Our paper is similar to the former group in measuring the discount factor and adds to this literature by showing that how changes in patience work as a pathway for the effects of cash transfers on observed actions of the recipients.

The most widely used framework for analyzing intertemporal choices is the discounted utility theory (Samuelson 1937). This theory assumes that all of the motives for intertemporal choice can be summarized in one parameter that is usually referred to as the *discount rate*. The discount rate is parameter ρ in the commonly used discount function: $D(\tau) = (1/(1 + \rho))^\tau$. This function shows the relative weight that a person attaches now to her well-being in period τ . Despite the popularity of this theory in economic literature, this representation is not a comprehensive way of explaining all aspects of intertemporal choices. We, therefore, follow Frederick et al. (2002) and distinguish time discounting from time preference and we use the term time discounting to “encompass any reason for caring less about a future consequence.”

3 Description of the program

The Lesotho Child Grants Program (CGP) is designed to provide an unconditional quarterly cash transfer targeted at poor and vulnerable households with children in Lesotho. The primary objective of the CGP is to improve the living standards of families living with Orphans and Vulnerable Children

(OVCs) to reduce malnutrition, improve their health status, and increase their school enrollment(Pellerano et al. 2014). The program is operated by the Ministry of Social Development with financial support from the European Commission and technical support from UNICEF-Lesotho. The eligibility criteria for households to be included in the program are i) having at least one child age 0-17 and ii) being among the poorest households in their community. All of the selected households in the program are identified through a combination of proxy means testing and using the National Information System for Social Assistance (NISSA) registration and community leaders validation(Prifti et al. 2019).

The first phase of the program was included three rounds and the first quarterly CGP pilot payment was begun in round 1A in April 2009/July 2010 covering 1,250 households in three community councils (Thaba-Khubelu, Mathula, and Semonkong).In the last quarter of 2011, the second round of the CGP pilot was launched and was subsequently expanded to cover 10 Community Councils in five districts: Qacha's Nek, Maseru, Leribe, Berea, and Mafeteng, which the pilot program covered approximately 10,000 households by the end of 2012. By implementation and expansion of phase II, the CGP reached out to more than 20,000 households (50,000 children) across 37 Community Councils by the end of 2013.

As of December 2017, the program reached 26,000 households or covered approximately 65,000 children as the CGP beneficiaries across ten districts

in Lesotho. The value of the transfer was a flat rate of M360¹ (US\$36) at the beginning of the program in 2009 and the amount of transfer payment was increased to a range between M360 (US\$36) and M750 (US\$75) in 2013.² While the beneficiaries received the intended total amount of cash, but most often the quarterly payment made in lumpy disbursements especially the last payment before the follow-up survey.³ Although the CGP transfers are unconditional payment, the program has conveyed a very effective message to spend the cash on children's school enrollment, to achieve one of the intended objectives of the program (Davis et al. 2012). To strengthen food security among poor families, FAO Lesotho initiated a pilot program called Linking Food Security to Social Protection Program (LFSSP) in 2013 (Daidone et al. 2017). This program provided free vegetable seeds and training home gardening to beneficiaries of CGP to improve the productivity of their agricultural activities.

¹ M stands for Maloti, which is the plural form of Loti, Lesotho's currency. Loti is exchanged at a fixed rate of 1 with South African Rand, and both currencies are accepted legal tenders in Lesotho.

² The quarterly benefit size was indexed to the number of children in each household so that the benefit size of M360 (US\$36) for households with 1-2 children, M600 (US\$60) for households with 3-4 children, and M750 (US\$75) for households with more than 5 children.

³ More detailed information about the cash transfer program and impact evaluation was reported in Pellerano et al. (2014).

4 Data

The CGP program aimed to improve the basic needs of children by providing regular unconditional cash as a source of income for poor households. This quarterly regular payment of M360 is equivalent to 14% of the monthly consumption of eligible households in 2013 and about 10% of the updated poverty line. Oxford Policy Management (OPM) had undertaken the design of the CGP program evaluation to assess the welfare and economic impact of the CGP pilot program amongst beneficiary households in phase 1, round 2 (Pellerano et al. 2014). The evaluation study covered 10 Community Councils in five districts: Qacha's Nek, Maseru, Leribe, Berea, and Mafeteng.⁴ Half of all Electrical Divisions (ED) within these 10 communities councils were selected randomly as the treatment group and the other half were assigned as the comparison group. The baseline and follow-up surveys collected data from a sample of both eligible households and not eligible households for CGP cash transfer. The baseline survey interviewed more than 3,000 households (15,989 individuals) between June and August 2011 (before the CGP transfer payment began) across eligible households (48.7% of the baseline sample) and not eligible households (51.3% of the baseline sample) in both treatment and control groups. The follow-up survey took place 48 months

⁴ The program did not have enough resources to allocate to the whole eligible households in all 10 community councils in the expansion round of the program in 2009, which it provided the opportunity to design program evaluation and randomly assign half of 96 Electrical Divisions to the treatment group and to receive the cash and assigned the other half as the control group for the program impact evaluation study.

later in 2013 to interview 2,212 households (12,274 individuals) at the same time of the year to avoid the seasonality bias. The data in this study is used from the information of CGP eligible households through the two-wave baseline and follow-up panel dataset. Of the 3,054 households interviewed in the baseline, 1486 households were eligible for CGP and randomly assigned to treatment (747 households) and control (739 households) group. The sample size of non-eligible households was reduced in the follow-up survey due to budgetary restrictions and overall 2,300 households were interviewed in the follow-up wave including 1,484 eligible households and 800 non-eligible. Of these 1484 households, 91% were from the baseline survey and the sample size of the original eligible households reduced by 9% attrition which no replacements were available for this group (Pellerano et al. 2014). In this study, we use the data of panel households which include 1354 eligible households for each baseline and follow-up year. Table 1 provides the summary statistics for the data by treatment status.

4.1 Time discounting

Time discounting is measured using five questions of the form:

A) Receive M 1,000 (73.64 USD) now.

B) Receive M X in a month.

For the five questions, X is M 1,050 (77.32 USD), M 1,200 (88.37 USD), M 1,500 (110.46 USD), M 2,000 (147.28 USD), and M 3,000 (220.91 USD). In

the questionnaire, questions were sorted with the delayed rewards in ascending order. The instructions explained that participants need to imagine that they have to choose between the alternatives presented to them. As it is common in large multi-topic surveys, the choice tasks were not incentivized for financial reasons and because of time constraints (Handa et al. 2016). When a respondent chose a future value, the rest of the questions were not asked from them, as a result, the questionnaire is not prone to inconsistent choices in which a respondent makes a "double switch" and chooses a low future value but reverses his/her decision at a higher future value. Similar studies have shown that respondents in Sub-Saharan Africa were able to understand similar questions and as a result, rates of inconsistency in interpreting questions on time-preferences have been low (Handa et al. 2014).

In our sample, 30% of respondents chose the immediate payment for all levels of the future payments, and 20% of the respondents preferred the smallest future payment (M 1050). Table 2 presents the percentage of respondents who switched from immediate to future payments at each level of the future value. Based on these five questions, we construct a variable that captures the patience of respondents, or the time-preference variable. This variable takes values one through six, where one is for the least patient person who never waits for future payments, and 6 is for the most patient person who is willing to wait for M 1,050.

5 Empirical Strategy

The goal of this study is to show that unconditional cash transfers produce some desirable outcomes through their impact on the behavior of recipients. In order to do so, we first establish that households' use of inputs was affected by cash transfers. We use the linear probability model:

$$y_i = \alpha_0 + \alpha_1 T_i + \alpha_x \mathbf{X}_i + \epsilon_i, \quad (1)$$

where y_i is an indicator that takes value one if household i uses a specific input.⁵ T is the treatment dummy, and X includes household characteristics such as household size, ownership of land at baseline, decile of per capita income at baseline, and indicators for community council of residence, as well as head characteristics such as age, level of education, and indicators for female and having a disability. Identification in this model is based on the exogenous treatment assignment warranted by the random selection of treatment Electoral Divisions (ED).⁶

We also show, as a second step, that the Lesotho CGP program caused a change in a behavioral parameter of the decision-makers in households, namely time-preferences. As explained in Section 4, we use the information

⁵ The inputs are the use of seeds, pesticides, and fertilizers.

⁶ The impact on input use can also be found using a Difference-in-Differences framework, the results of which are presented in the appendix. Here, we use a linear probability model at endline to keep all empirical models at the same time horizon. The information for time-preferences was only collected at endline, so we can only use a model at endline to study the treatment effect on time-preferences.

in the questionnaire to build a variable that assigns ascending numbers that capture the patience of the respondents (variable m in the below equation). This variable takes value one for the least patient person who never waits for future payments, through six for the most patient person who waits for M 1,050. We then use the following linear model to find the program impact on time-preferences:

$$m_i = \beta_0 + \beta_1 T_i + \beta_x \mathbf{X}_i + v_i, \quad (2)$$

In this model m_i is the time-preference variable. Similar to the previous model, identification here is based on the random assignment of treatment. In Section 6, we also report the results for an ordered probit model with a comparable set up to equation 2.⁷

The main contribution of this paper is to show that the impact on the behavioral factor *discount rate* resulted in part to the observed effects on input use. We decompose the treatment effect on input use to the behavioral effect through discount rate and other unmeasured factors. This process is extensively used in econometrics, political sciences, psychology, and statistics

⁷ The ordered probit model to find the program impact on time-preferences is of the form:

$$m_i^* = \alpha_1 T_i + \beta \mathbf{X}_i + e_i, \quad (3)$$

where m_i^* is a latent variable that is related to the observed outcome m_i through the following criterion:

$$m_i = \text{inf} \gamma_{n-1} \leq m_i^* \leq \gamma_n, \quad (4)$$

for a set of threshold parameters $\gamma_1 - \gamma_3$. We do not directly estimate the $\gamma_1 - \gamma_3$ parameters since it is not necessary to have the specific parameter estimates for the purpose of this paper.

(Baron and Kenny 1986; Heckman, Pinto, and Savelyev 2013; Huber 2014; Heckman and Pinto 2015).⁸ Mediation analysis is established by the seminal paper of Baron and Kenny (1986) and is further developed since then. Our method is similar to that of Linden and Karlson (2013), and includes the estimation of the following equation at endline:

$$y_i = \gamma_0 + \gamma_1 T_i + \gamma_2 m_i + \gamma_x \mathbf{X}_i + u_i. \quad (5)$$

We then use equations 2 and 5 to find the direct effects of treatment on input use and the indirect effect of the treatment which is mediated through the discount rate. The average direct effect (ADE) of treatment on input use is given by γ_1 in equation 5. The average indirect effect (AIE) is the channel through the discount rate. AIE is estimated as the following: $\gamma_2 \beta_1$. (Vander-Weele and Vansteelandt 2014). The average indirect and direct effects sum up to the total causal effect (ATE), which can be found as: $ATE = \gamma_1 + \gamma_2 \beta_1$.

6 Results

In this section, we provide results for the identification strategy discussed above. We first study if the CGP program had any effect on the use of inputs for production by farmers. The inputs that we study are seed, pesticide, and fertilizer. Table 3 presents the results of the impact on input use based on

⁸ In economics, the method is usually referred to as decomposition, while in statistics and political science it is often referred to as mediation analysis.

equation 1. The coefficient of interest which shows the program impact is the coefficient for the *treatment* indicator. As can be seen in the table, recipients of the CGP program used more pesticides for production (column 2). The treated group is seven percent more likely to use pesticides. There is no significant impact on the use of seeds and fertilizer.

Our estimates also show that larger households are more likely to use fertilizer and pesticides, and older heads use more of all inputs in their farms. We also use a probit model similar to the linear regression used hereto find any differences that the choice of method has on our results. The results for the probit model are presented in Appendix Table 7. As can be seen in this table, the probit model estimates are very close to the linear regression estimates discussed in this paragraph.

Our results are with no surprise as other studies have also found an increase in input use for recipients of cash transfers. Daidone et al. (2019) find that treated households in the CGP program are eight percent more likely to use pesticides. They also find a reduction in the use of pesticides in response to cash transfer programs in Kenya and Zimbabwe (significant at 10% level), and no significant response in Malawi. For impact on the use of fertilizers, they find an increase in the use of organic fertilizers in Lesotho, a result which is statistically significant only at 10% level. For the Ethiopia cash transfer program, they also find an increase of six percent in the share of households that use fertilizers, however, they find no significant impact in the case of Malawi, Kenya, and Ghana.

As shown by our results and other studies, households change their use of farm inputs, and many studies show that farm production or profitability has increased due to cash transfer programs. In the case of Lesotho, Prifti et al. (2019) find that cash transfers have a sizable impact on farm production, but this impact is not mediated through the use of labor. Here, we explore the possibility of mediation through input use. As explained in section 4, the utilization rate of seeds and fertilizers are already very high in Lesotho before the program started. More than 98 percent of households use seeds and more than 65 percent use fertilizer on their farms. The input that was not used often before the program and households could explore to use more is pesticide. A more patient household may invest in their production practices in this manner and use more pesticides in order to increase their output.

The next test is for the impact of treatment on time discounting. The time discounting variable is defined in Section 4 and takes values one to six. The estimations based on equation 2 are presented in column 1 of Table 4. The program impact on time discounting is to increase the patience of recipients relative to the control group. The treated group is thirty percentage points more likely to be in a higher patience group relative to the control group with similar controlled characteristics. Based on the ordered probit model it is also more likely for the treated group to be in a more patient group. We also use another approach for estimating the impact of cash transfers on time discounting using the levels of future rewards as binary dependent variables. The results of this approach, which are consistent with our estimates here,

are provided in Appendix Tables 8 and 9.

The next step is to check whether any effect on input use is mediated through the effect of treatment on time discounting. Guided by equation 5, we now include both treatment and time discounting variables as controls in the regression of the program impact on input use. Table 5 presents the results of this model. We do not expect a mediated effect on seed and fertilizer use since there was no treatment effect on these inputs. For the effects on seed use, the relevant comparison is 7.3 percentage points in column 2 of table 3. The effect of time discounting on input use is to increase the probability of using pesticides by three percentage points for each level of increase in the time discounting. Moreover, the direct effect of treatment is now smaller, 6.5 percentage points compared to the 7.3, with the same sign and is statistically significant only at the 10% level. These facts show that there is a mediation effect through time discounting. We also measure the mediation effect of time discounting using another approach by including indicators for the levels at which future amounts are preferred by respondents. The results of this approach are provided in Appendix Table 10. This approach finds a smaller direct effect on pesticide use.

We next find the ratio of indirect (mediated) effect to total effect and test its statistical significance. In table 6 we present the results of the Average Direct Effect (ADE), Average Indirect Effect(AIE), and Average Total Effect (ATE) on input use based on the method described in Section 5. The ADE, as mentioned above, is 6.5 percentage points and the AIE is 0.8 percentage

points for pesticide use. The AIE, though small, is about 11 percent of the total effect in pesticide use, and this effect is statistically significant at 5% level. This is the only mediated effect that is significant among all the inputs studied in this paper. We also report the estimates of ADE, AIE, and ATE using the approach presented in Appendix Tables 8 and 10. The results of this approach are provided in Appendix Table 11. With this approach, the indirect effect is 17 percent of the total effect.

7 Conclusions

In this paper, we analyze the impact of Lesotho’s CGP cash transfer program on farm input use and provide evidence on the channels through which such transfers affect the observed outcomes. We use mediation analysis to decompose the effect of treatment that transmits through time discounting from other paths that cash transfers affect the use of inputs. Comparing the poor households in treated and control areas, we find that two years after the start of the program, treated households are seven percent more likely to use pesticides in their farms compared to households in control areas. We also show that cash transfers increase the patience of recipients. Hypothesizing that more patient households are willing to apply practices that increase their farm productivity, rather than consuming transfers as they receive them, we find that a small but statistically significant part of the observed increase in pesticide use is mediated through the program impact on time discounting.

We do not find a significant impact, direct or indirect, on the use of other inputs such as seeds and fertilizers, possibly because households already use an efficient level of them in their production.

While this study finds one channel for the effects of cash transfers on farming, more research is needed to disentangle other channels. There are other pathways that the literature has pointed out as possible mechanisms. The most important widely discussed channels are the effects on risk-taking behavior and transfers providing insurance for possible shocks and crop failures. Further studies are needed to find if these other pathways are significant contributors and to decompose their relative importance for poor households.

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Table 1: Summary statistics at the household level for treatment and control group in 2013

	Treatment	Control
Household size	5.97 (2.65)	5.68 (2.33)
Age of head	53.14 (15.47)	53.46 (15.44)
Head is female	0.48 (0.50)	0.52 (0.50)
Education of head	4.70 (3.70)	4.94 (3.83)
Per capita expenditure	19.97 (17.45)	19.74 (16.83)
Share of households:		
Planted land	0.92 (0.27)	0.90 (0.30)
Used fertilizer	0.67 (0.47)	0.65 (0.48)
Used pesticide	0.33 (0.47)	0.29 (0.46)
Used seed	0.99 (0.11)	0.98 (0.16)
<i>N</i>	706	648

Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

Table 2: Percentage of respondents that chose the future payment

	Future payment when switch took place	Percentage
1	Never chose future payment	30.48
2	M 3,000	3.75
3	M 2,000	10.99
4	M 1,500	18.18
5	M 1,200	16.37
6	M 1,050	20.04

Note: M = Lesotho's Maloti. Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

Table 3: The impact of treatment on input use

	(1)	(2)	(3)
Dependent variable (Type of input)	Seed	Pesticides	Fertilizer
Treatment	0.00 (0.01)	0.07** (0.03)	-0.02 (0.03)
Head disabled	0.02* (0.01)	-0.02 (0.05)	-0.16** (0.08)
Log Hhold size	-0.01 (0.02)	0.07* (0.04)	0.06* (0.03)
Age	0.00* (0.00)	0.00** (0.00)	0.00** (0.00)
Female	0.00 (0.03)	0.01 (0.06)	-0.11** (0.05)
Widow	-0.04 (0.03)	-0.13** (0.07)	-0.04 (0.05)
Divorced	-0.00 (0.02)	-0.10 (0.08)	0.01 (0.07)
Never married	0.02 (0.02)	-0.25*** (0.07)	-0.08 (0.07)
Planted crop baseline	-0.02 (0.03)	0.03 (0.08)	0.02 (0.08)
Constant	0.96*** (0.06)	0.01 (0.21)	0.32 (0.19)
R^2	0.069	0.211	0.221
Observations	1120	1117	1118

Notes: All regressions control for education level and marital status of the head, per capita expenditure deciles at baseline, log of household size, indicators for households owning a garden, growing any crop at baseline, having at least one member who works, had an economic shock in the last year, head is chronically ill, head is disabled, and district of residence fixed effects. Standard errors are in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$. Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

Table 4: The impact of treatment on time discounting

	(1)	(2)
	Linear Regression	Ordered Probit
Treatment	0.30*** (0.10)	0.18*** (0.06)
Head disabled	-0.51** (0.25)	-0.32* (0.17)
Log Hhold size	0.26 (0.16)	0.17* (0.10)
Age	0.00 (0.00)	0.00 (0.00)
Female	-0.04 (0.17)	-0.04 (0.10)
Widow	-0.29 (0.21)	-0.14 (0.12)
Divorced	0.08 (0.35)	0.05 (0.20)
Never married	-0.55** (0.25)	-0.35** (0.15)
Planted crop baseline	-0.20 (0.29)	-0.12 (0.17)
Decile 2	-0.20 (0.23)	-0.12 (0.14)
R^2	0.139	
Pseudo R^2		0.047
Observations	1345	1345

Notes: All regressions control for education level and marital status of the head, per capita expenditure deciles at baseline, log of household size, indicators for households owning a garden, growing any crop at baseline, having at least one member who works, had an economic shock in the last year, head being chronically ill, head is disabled, and district of residence fixed effects. Standard errors are in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$ Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

Table 5: The impact of treatment on input use with control for time discounting

	(1)	(2)	(3)
Dependent variable (Type of input)	Seed	Pesticides	Fertilizer
Treatment	0.00 (0.01)	0.07* (0.03)	-0.02 (0.03)
Time discounting	0.01 (0.00)	0.03*** (0.01)	0.01 (0.01)
Head disabled	0.02** (0.01)	-0.01 (0.05)	-0.15* (0.08)
Log Hhold size	-0.01 (0.02)	0.07 (0.04)	0.06 (0.04)
Age	0.00* (0.00)	0.00** (0.00)	0.00** (0.00)
Female	0.00 (0.03)	0.01 (0.06)	-0.11** (0.05)
Widow	-0.03 (0.03)	-0.13** (0.06)	-0.03 (0.05)
Divorced	-0.00 (0.02)	-0.10 (0.08)	0.01 (0.07)
Never married	0.02 (0.02)	-0.24*** (0.07)	-0.08 (0.07)
Planted crop baseline	-0.01 (0.03)	0.04 (0.08)	0.02 (0.08)
Constant	0.94*** (0.06)	-0.11 (0.22)	0.26 (0.20)
R^2	0.073	0.222	0.223
Observations	1120	1117	1118

Notes: All regressions control for education level and marital status of the head, per capita expenditure deciles at baseline, log of household size, indicators for households owning a garden, growing any crop at baseline, having at least one member who works, had an economic shock in the last year, head being chronically ill, head is disabled, and district of residence fixed effects. Standard errors in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$
Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

Table 6: Direct, indirect and total effects of treatment on input use

	ADE	AIE	ATE	Observations
Pesticide_use	0.065** (0.032)	0.008** (0.0003)	0.073** (0.032)	1117
Seed_use	0.002 (0.012)	0.001 (0.001)	0.003 (0.012)	1120
Fertilizer_org_use	-0.097*** (0.036)	0.003 (0.003)	-0.094*** (0.036)	1118
Fertilizer_inorg_use	0.075** (0.035)	-0.000 (0.002)	0.074** (0.035)	1117

Notes: All models control for education level and marital status of the head, per capita expenditure deciles at baseline, log of household size, indicators for households owning a garden, growing any crop at baseline, having at least one member who works, had an economic shock in the last year, head being chronically ill, head is disabled, and district of residence fixed effects. Standard errors in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$

Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

A Appendix

Table 7: The impact of treatment on input use, probit regression

	(1)	(2)	(3)
Dependent variable (Type of input)	Seed	Pesticides	Fertilizer
Treatment	0.33 (0.25)	0.23** (0.11)	-0.08 (0.12)
Log Hhold size	0.12 (0.33)	0.25* (0.14)	0.26** (0.12)
Age	0.02*** (0.01)	0.01* (0.00)	0.01** (0.00)
Female	0.03 (0.44)	0.00 (0.19)	-0.40** (0.18)
Widow	-1.17** (0.51)	-0.38* (0.21)	-0.12 (0.18)
Divorced	0.07 (0.54)	-0.30 (0.27)	0.08 (0.27)
Never married	0.18 (0.64)	-0.86*** (0.27)	-0.29 (0.23)
Planted crop baseline	-0.15 (0.43)	0.14 (0.26)	0.01 (0.25)
[1em] Constant	2.59** (1.02)	-5.93*** (0.57)	-0.08 (0.79)
Pseudo R^2	0.298	0.183	0.202
Observations	694	1117	1118

Notes: All regressions control for education level of the head, per capita expenditure deciles at baseline, indicators for households owning a garden, having at least one member who works, had an economic shock in the last year, head being chronically ill, head is disabled and district of residence fixed effects. Standard errors in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$

Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

Table 8: The impact of treatment on time discounting, linear regression

	(1)	(2)	(3)	(4)	(5)
	Always immediate payment	Will wait one month for:			
		M 3,000	M 2,000	M 1,500	M 1,200
Treatment	-0.09*** (0.02)	-0.08*** (0.02)	-0.06* (0.03)	-0.06** (0.03)	-0.02 (0.02)
Head disabled	0.16** (0.06)	0.16** (0.07)	0.13** (0.06)	0.04 (0.06)	0.02 (0.04)
Log Hhold size	-0.04 (0.04)	-0.03 (0.04)	-0.08* (0.04)	-0.08* (0.04)	-0.04 (0.03)
Age	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Female	-0.01 (0.05)	0.02 (0.04)	0.01 (0.05)	-0.04 (0.05)	0.06* (0.04)
Widow	0.08 (0.06)	0.09 (0.06)	0.08 (0.06)	0.06 (0.05)	-0.02 (0.04)
Divorced	-0.06 (0.09)	-0.06 (0.09)	0.02 (0.10)	0.04 (0.09)	-0.02 (0.07)
Never married	0.09 (0.06)	0.08 (0.07)	0.10 (0.07)	0.17** (0.07)	0.11*** (0.04)
Planted crop baseline	0.08 (0.07)	0.04 (0.07)	0.05 (0.07)	0.04 (0.08)	-0.01 (0.05)
Constant	0.09 (0.21)	0.11 (0.21)	0.42* (0.22)	0.78*** (0.22)	0.91*** (0.14)
R^2	0.113	0.122	0.115	0.130	0.111
Observations	1345	1345	1345	1345	1345

Notes: All regressions control for education level of the head, per capita expenditure deciles at baseline, indicators for households owning a garden, having at least one member who works, had an economic shock in the last year, head being chronically ill, head is disabled and district of residence fixed effects. Standard errors in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$

Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

Table 9: The impact of treatment on time discounting, probit regression

	(1)	(2)	(3)	(4)	(5)
	Always immediate payment	Will wait one month for:			
		M 3,000	M 2,000	M 1,500	M 1,200
Treatment	-0.25*** (0.07)	-0.23*** (0.07)	-0.15* (0.08)	-0.19** (0.08)	-0.07 (0.09)
Head disabled	0.45*** (0.17)	0.44** (0.18)	0.37** (0.17)	0.10 (0.20)	0.12 (0.19)
Log Hhold size	-0.12 (0.11)	-0.09 (0.11)	-0.22* (0.12)	-0.24** (0.12)	-0.17 (0.13)
Age	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Female	-0.02 (0.13)	0.07 (0.13)	0.03 (0.14)	-0.11 (0.15)	0.32** (0.16)
Widow	0.23 (0.17)	0.24 (0.16)	0.20 (0.16)	0.17 (0.17)	-0.15 (0.15)
Divorced	-0.20 (0.28)	-0.19 (0.26)	0.02 (0.26)	0.12 (0.26)	-0.18 (0.27)
Never married	0.26 (0.19)	0.22 (0.19)	0.26 (0.20)	0.52** (0.22)	0.58** (0.24)
Planted crop baseline	0.24 (0.20)	0.13 (0.20)	0.15 (0.20)	0.12 (0.23)	-0.05 (0.22)
Constant	-1.21* (0.66)	-1.14* (0.64)	-0.19 (0.62)	0.87 (0.63)	1.40** (0.60)
Pseudo R^2	0.091	0.097	0.087	0.108	0.122
Observations	1341	1341	1344	1344	1344

Notes: All regressions control for education level of the head, per capita expenditure deciles at baseline, indicators for households owning a garden, having at least one member who works, had an economic shock in the last year, head being chronically ill, head is disabled and district of residence fixed effects. Standard errors in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$

Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.

Table 10: The impact of treatment on input use with indicators for time discounting

	(1)	(2)	(3)
	Seed	Pesticides	Fertilizer
Treatment	0.00 (0.01)	0.06* (0.03)	-0.02 (0.03)
Always immediate payment	-0.05** (0.02)	-0.09 (0.07)	0.04 (0.09)
Wait for M 3,000	0.02 (0.01)	-0.06 (0.08)	-0.09 (0.10)
Wait for M 2,000	-0.00 (0.01)	0.10 (0.06)	-0.01 (0.05)
Wait for M 1,500	0.00 (0.01)	-0.04 (0.06)	-0.04 (0.05)
Wait for M 1,200	0.00 (0.01)	-0.05 (0.06)	0.08 (0.05)
Head disabled	0.03** (0.01)	-0.01 (0.05)	-0.15* (0.08)
Log Hhold size	-0.01 (0.02)	0.07* (0.04)	0.06 (0.04)
Age	0.00* (0.00)	0.00** (0.00)	0.00** (0.00)
Female	0.00 (0.03)	0.01 (0.06)	-0.12** (0.05)
Widow	-0.03 (0.03)	-0.12* (0.06)	-0.02 (0.05)
Divorced	-0.00 (0.02)	-0.11 (0.08)	0.01 (0.07)
Never married	0.02 (0.02)	-0.23*** (0.07)	-0.08 (0.07)
Planted crop baseline	-0.01 (0.03)	0.04 (0.08)	0.03 (0.08)
Constant	0.96*** (0.06)	0.04 (0.21)	0.29 (0.18)
R^2	0.076	0.228	0.227
Observations	36120	1117	1118

Notes: All regressions control for education level of the head, per capita expenditure deciles at baseline, indicators for households owning a garden, having at least one member who works, had an economic shock in the last year, head being chronically ill, head is disabled and district of residence fixed effects. Standard errors in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Table 11: Direct, indirect and total effects of treatment on input use

	ADE	AIE	ATE	Observations
Pesticide	.0608* (.0327)	.0127** (.0041)	.0734** (.0329)	1117
Seed	.0012 (.0126)	.0025* (.0014)	.0038 (.0122)	1120
Fertilizer	-.0238 (.0333)	.0057 (.0043)	-.0181 (.0341)	1118

Notes: All regressions control for education level of the head, per capita expenditure deciles at baseline, indicators for households owning a garden, having at least one member who works, had an economic shock in the last year, head being chronically ill, head is disabled and district of residence fixed effects. Standard errors in parentheses. *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$

Source: Lesotho CGP impact evaluation data set 2011-13 and authors' calculations.