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Making the right livelihood choice: how do cash transfers help?

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Abstract

This paper contributes to the literature on the determinants of livelihoods diversification and its impact on household welfare by examining the role of an unconditional cash transfer programmeme in affecting livelihoods strategies of poor, labour constrained households in Zimbabwe. The empirical strategy adopted consists of two steps. First, we investigate the impact of cash transfers on male and female headed households' engagement in different livelihood strategies consisting in diversification as opposed to specialization in a unique livelihood activity. Second, we analyze the impact of the chosen livelihood strategy on household welfare, proxied by consumption expenditure, as well as the direct impact of the cash transfers. We find that for households with a "mixed" diversification strategy at baseline, the cash transfer induces switching to opportunity-led diversification after 12 months after the start of the programmeme, abandoning casual labour. Results also show persistence of livelihood strategies overall. The cash transfer also positively affects the probability to switch to exclusive cash crop production and the probability to diversify at follow-up. Nevertheless, for female-headed households, the cash transfer does not induce switching of livelihood strategies. Lower level of education, smaller land size and higher labour constraints in this households may explain the lack of impact. Despite this, higher probability of increased non-food consumption in female-headed households is observed.

JEL Classification: D3, I3, O1,
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1 Introduction

Over the past twenty years, a growing number of African governments have launched cash transfers programmes to provide direct assistance to households that are ultra-poor, labour-constrained, and/or caring for orphan or vulnerable children. In most cases, these households are headed by women (FAO, 2015; Tirivayi et al., 2016). Usually these programmes aim at reducing poverty and vulnerability by improving consumption, nutrition, health status, school attendance and educational outcomes. Fizbein et al. (2009) and Tirivayi et al. (2016) provide a comprehensive overview of the impacts of cash transfers programmes on a variety of outcomes, including also productive activities which are likely to improve the living standards of ultra-poor and asset-poor households not only in the short run but also in the medium and long run. Whether cash transfers induce a change in livelihood strategies leading to a greater degree of diversification of the different potential sources of income or whether on the contrary, it induces a greater level of specialization into a particular livelihood, most commonly agriculture, remains an open question.

Cash transfer programmes targeted to resource-poor and labour-constrained households, alleviating credit constraints by means of immediate and regular liquidity, may have in principle an ambiguous impact on livelihood diversification. On the one hand, households have access to additional monetary resources to be invested in income generating activities other than subsistence agriculture. In this case, cash transfers will enhance income diversification, providing to poor households the means to engage also in other activities, potentially characterized by higher return. On the other hand, cash transfer programmes could contribute to a reduction of diversification, if households before the inclusion into the programme, for example, engage in many income generating activities by necessity, characterized by low return. In this case they may decide to specialize in agriculture, which might be more profitable if cash transfers are invested in agricultural input or assets which are likely to increase land and labour productivity.

This paper aims to address two main research questions. Does a cash transfers programme enhance or hinder livelihoods diversification versus specialization in a poor and rural setting in Zimbabwe? Furthermore, since diversification may lead to engagement in both low return and high return activities, does diversification increase household welfare, measured by consumption expenditure? The literature on diversification in rural Africa shows a positive relationship between non-farm income and household welfare indicators such as income, wealth, consumption and nutrition (Barrett et al., 2001; FAO, 1998; Ellis, 1998, 2005; Reardon, 1997; Davis et al. 2010; Alobo Loison, 2016). By addressing these two research questions we contribute to the literature on both the determinants of livelihood diversification and to the impact of diversification on household welfare. Moreover, we incorporate a gender dimension into our results by distinguishing between female headed households (FHHs) and male headed households (MHHs). Indeed, previous contributions show that FHH and MHH have different attitudes toward diversification and constraints with consequent impacts on income and nutrition (see for example Block and Webb, 2001).

The economic literature adopts two main approaches to study livelihood diversification behavior: the household economic model (Singh et al., 1986; Taylor and Adelman, 2003) and the livelihood approach (Ashley and Carney, 1999; Scoones, 2009). The former considers farm households as production units that maximize utility by combining time and other inputs to produce outputs,

subject to price and resource constraints (Becker, 1965). According to the household economic model approach, diversification is a function of returns to labour from farm activities compared to off-farm activities. This approach has been criticized for not taking the inter-temporal dimensions of livelihoods into account (Ellis, 2000a). Moreover, this approach simplifies reality by assuming that preferences are shared between household members. This approach further assumes that markets are perfectly functioning whereas in developing countries households frequently operate in incomplete or imperfect markets that limit their choices (De Janvry and Sadoulet, 2006). On the other hand, the livelihood approach adopts a more people-centered view on the study of rural livelihoods in different contexts. It commonly employs the "sustainable livelihoods framework" to assess people's livelihood assets and how the external environment of social relations, institutions and policies modify the ability to convert livelihood assets into livelihood strategies (Alobo Loison, 2016). This approach has several strengths, namely the fact that it accounts for the influence of institutions on livelihoods and the social and economic character of livelihood strategies (Ellis, 2000b). However, this approach has been criticized because it fails to account for prices and wages, which define the costs and benefits of different livelihood strategies (Barrett and Reardon, 2000). The theoretical framework adopted in this paper is the household economic model which, however as it will be clearer in the following sections, has been enriched to take into account the inter-temporal dimension of livelihoods and the role of policies, in particular a social protection policy, in modifying livelihood strategies.

Previous findings of the literature on income diversification suggest that households may diversify their livelihood strategies in response to incentives that may be classified in push and pull factors (Ellis, 2000a; Reardon et al. 2006; Davis et al. 2010). Push factors drive a 'survival-led diversification' (Alobo Loison, 2016). Indeed, they are negative circumstances that may force households to seek additional livelihood activities within or outside the farm. These are low-return, labour-intensive non-farm activities that leave households trapped in structural poverty. Push factors tend to dominate in high-risk and low-potential agricultural environments, subject to drought, flooding, and environmental degradation (Haggblade et al., 2007; Alobo Loison, 2016). The most common push factors are related to different sources of risk: seasonality, climatic uncertainty, land constraints driven by population pressure and fragmented land holdings, missing or incomplete input markets and market access problems due to poor infrastructure and high transaction costs (Barrett et al., 2001). In terms of gender, women in agricultural households are often more constrained than men in accessing land and other productive assets (Gladwin et al., 2001). For this reason, they often adopt multiple livelihood strategies in the off-farm economy (Andersson et al., 2013). On the contrary, pull factors are positive circumstances, such as the commercialization of agriculture and the emergence of improved non-farm labour market opportunities linked to better market access, improved infrastructures and proximity to urban areas, which may attract farm households to pursue additional livelihood activities to improve their living standard (Reardon et al., 2006; Winters et al., 2009). These factors provide incentives for people to expand their range of income activities outside farming by increasing the returns from non-farm activities. In this case, livelihood diversification becomes a deliberate strategy for an individual or household in order to generate as- sets for accumulation and reinvestment. Pull factors drive what has been called by the literature 'opportunity-led diversification' (Alobo Loison, 2016). Generally, only households with high endowments of assets such as land, livestock and buildings, are more likely to engage in high-return non-farm activities (Barrett et al., 2001; Lay et al., 2008).

In this paper, we use data collected for the impact evaluation of the Harmonized Social Cash Transfer (HSCT) programme in Zimbabwe. This programme provides every other month cash transfers ranging between US$10 to $25 per month, depending on household size, to the most vulnerable households across the country without imposing any kind of explicit conditionality. The objective of the HSCT programme is to foster the well-being of poor and vulnerable households in Zimbabwe. By supplementing additional income, the transfers aim to promote greater levels of education, health and nutrition, especially for children. However, there are good reasons to believe that the HSCT had also impact on productive activities and livelihood choices, indeed documented by several studies (Covarrubias et al., 2012; Asfaw et al., 2014; Daidone et al., 2014; Dewbre et al., 2015). The liquidity and security of regular and predictable cash transfers can increase productive and other income-generating investments, increase access to markets and inject resources into local economies. These impacts come through changes in individual and household behavior (labour supply, investments in risk management) and through impacts on the local economy of the communities where the HSCT operates (Thome et al., 2013). As for the gender differences, our data show that MHHs and FHHs are significantly different in several characteristics but are similar across treatment and comparison groups. Cash transfers are likely to lead to gendered differences, in response to these structurally different types of households[1], in selection into exclusive on-farm activities or into diversification strategies.

To the best of our knowledge, this paper is the first attempt to investigate both the impact of a cash transfer programme on livelihoods strategies and the consequent impact on household welfare, measured in terms of consumption expenditure. Moreover, our paper focuses on households belonging to the very bottom of the wealth distribution. These are asset-poor households, labour constrained, often living in remote rural areas. In such a context, changes in livelihood strategies towards higher return income generating activities is difficult since households have to cope not only with their own constraints, but also with the constraints that the surrounding economic environment poses to them.

The econometric method adopted is particularly suited for addressing both the impact of the HSCT programme on livelihoods strategies and the consequent impact of livelihood strategies on household welfare. It consists of two sets of equations, one for the choice of livelihood strategy and a second for household welfare, linked via observed and unobserved characteristics. Following Deb and Trivedi (2006), we develop a model for multinomial choice of livelihood strategies and a continuous choice of household consumption expenditure (our proxy of household welfare) with the view of evaluating the effect of the livelihood strategy choice on consumption expenditure. We specify a joint distribution of the endogenous choice of livelihood strategy and consumption expenditure using a latent factor structure. Latent factors are incorporated into the livelihood strategy choice and consumption expenditure equations to allow for idiosyncratic influences on livelihood strategy choices to affect consumption, thus enabling us to make a distinction between selection on unobservables and selection on observables (Heckman and Vytlacil, 2001). The livelihood strat-

[1]The extent to which FHHs are dis-advantaged relative to MHHs in terms of poverty, labour capacity, access to land and livestock, and lower credit and education vary greatly across studies and contexts (Quisumbing, 1996; Handa, 1996

egy choice equations and the consumption equations include an indicator for inclusion into the HSCT treatment group to investigate the impact of cash transfers on both changes in livelihood strategies and consumption expenditure. Our findings suggest that the HSCT treatment does not modify drastically the livelihood strategies of beneficiary households but it induces a positive switch from baseline to follow-up towards a diversification consisting of engagement in both on-farm and non-farm activities characterized by higher returns (opportunity-led diversification). The treatment induces households to abandon casual labour, which is a last resort solution to meet daily needs, in favor of a greater involvement in on-farm and non-farm activities. As far as the analysis of the livelihood strategy choices on household welfare is concerned, the estimates of the consumption expenditure equations suggest that the HSCT treatment increases non-food consumption expenditure for two groups of households: those that at baseline specialize in on-farm activities and those that diversify the most engaging in on-farm activities (crop production and livestock production), non-farm activities (wage labour and non-farm business) and supplying casual labour.

The paper further explores differences by gender of the household head showing a high degree of heterogeneity. While in FHHs the HSCT treatment does not seem to have any impact on changes in livelihood strategies, it induces a significant share of MHHs households to abandon casual labour in favor of a diversification consisting in both on-farm and non-farm activities. As far as the analysis of the livelihood strategy choices on household welfare is concerned, the impact of the HSCT treatment in FHHs is actually stronger than that on MHHs. In particular, our results suggest that the treatment has a positive effect on non-food consumption expenditure for FHHs that at baseline specialized in on-farm activities or were engaged in mixed-diversification. On the contrary treatment in MHHs does not seem to have any direct impact on consumption expenditure. In MHHs, the treatment seems to exert an effect on consumption only through its impact on livelihood strategies.

The rest of the paper is organized as follows. Section 2 describes the programme. Section 3 presents the econometric method adopted. Section 4 presents the data and the main descriptive statistics of livelihood strategies. Section 5 discusses the main results. Finally, section 6 concludes.

2 The Zimbabwe Harmonized Social Cash Transfer Program (HSCT)

The Zimbabwe HSCT programme provides unconditional cash transfers to labour constrained households living below the food poverty line, determined through census data collected by the Zimbabwe National Statistics Agency (Dewbre et al, 2015). Households are considered labour constrained if they: (i) had no able-bodied member aged 18-59; (ii) one able-bodied member aged 18-59 but has to care for more than three dependents; or (iii) has a dependency ratio between 2 and 3 but had a severely disabled or chronically sick household member requiring intensive care (American Institute of Research -AIR, 2014). The HSCT is implemented by the Ministry of Public Service, Labour and Social Welfare of the Government of Zimbabwe (GoZ) and it is funded jointly by the GoZ, the UK Department for International Development and the United Nations Children's Fund, with the latter also providing implementation and technical support. The programme was launched in 2012, covering 10 districts and 16,637 households. As of January 2015, the HSCT covered 52 500 house-

holds. Approximately 250 000 households in 65 districts are expected to be in the programme at full-scale, but given the re- cent fiscal crisis in the country the scale-up plans have been delayed. Households' receive a transfer between US$10 and US$25, bi-monthly, contingent on household size.[2] The amount of transfers corresponds to approximately 20% of sample median household consumption expenditure.

For additional information about the programme we refer to AIR (2014) and Dewbre et al. (2015) which both investigate the impacts on a large set of outcomes adopting a quantitative approach and OPM (2013) which adopts a qualitative approach. Dewbre et al. (2015) document five main findings. First, the HSCT had a significant impact on beneficiary agricultural activities. In particular, the programme led to a significant increase in the share of labour-constrained households producing groundnuts, pearl millet and roundnuts, and a decrease in finger millet production. Similar findings are shown in AIR (2014), with impact results of higher magnitude on groundnuts and roundnuts for smaller households. Second, the programme led to an increase in the share of households owning livestock. Third, the HSCT led to an increase of the share of households running a non-farm enterprise. More precisely, the HSCT encouraged families to engage in non-farm enterprises and increased the number of businesses they operate. Fourth, the HSCT had a positive impact on food security and nutrition and allowed households to have a more diverse diet. Fifth participation in wage labour and casual labour was not affected by the HSCT. This finding partially contradicts AIR (2014) and OPM (2013) which find that the programme has reduced the probability of casual labour participation (only in large households in AIR, 2014) and a reduction of engagement of children on casual labour. In terms of impact on consumption expenditure, AIR (2014) document a significant positive impact of the HSCT on FHHs, but no impact on MHHs.

3 Econometric methods

In this section we present the model adopted for the empirical analysis in a general form. We modify the econometric methods presented by Deb and Trivedi (2006) to take into account the potential direct impact of cash transfers in affecting both livelihood strategy choices and consumption expenditure, our proxy of household welfare. The model consists of two sets of equations, one for the choices of livelihood strategy and a second for consumption expenditure. The livelihood strategy-choice and consumption equations are linked via observed and unobserved characteristics. Then we discuss issues of estimation.

3.1 Model specification

The household chooses one livelihood strategy from a set of J choices, one of which typically refers to a reference category, a structure which implies a multinomial choice model.

Let EV_{ij}^{*} denote the indirect utility associated with the jth livelihood strategy, with $j = 0, 1, 2, ...J$ and

[2] One person household receives US$10; two person household receives US$15; three person household receives US$20; four or more person household receives US$25.

$$EV_{ij}^{*} = z_i'\alpha_j + CT_i\beta_j + \sum_{k=1}^{J}\zeta_{jk}l_{ik} + \eta_{ij} \tag{1}$$

where z_i denotes exogenous covariates with associated parameters α_j and η_{ij} are i.i.d. error terms. EV_{ij}^{*} also includes latent factors l_{ik} which incorporate unobserved characteristics common to individual i's livelihood strategy choice and consumption expenditure such as productivity, ability, risk attitude, etc..The l_{ik} are assumed to be independent of η_{ij}. Without loss of generality, let $j = 0$ denote the base livelihood strategy and $EV_{i0}^{*} = 0$.

Let d_j be binary variables representing the observed livelihood strategy choice and $d_i = [d_{i1}, d_{i2}, ..., d_{iJ}]$. Then the probability of choosing one specific livelihood strategy can be represented as

$$\begin{aligned} Pr(d_i|z_i, l_i) = g(&z_i'\alpha_1 + CT_i\beta_1 + \sum_{k=1}^{J}\zeta_{1k}l_{ik}, z_i'\alpha_2 + CT_i\beta_2 \\ &+ \sum_{k=1}^{J}\zeta_{2k}l_{ik}, ..., z_i'\alpha_J + CT_i\beta_J + \sum_{k=1}^{J}\zeta_{Jk}l_{ik}) \end{aligned} \tag{2}$$

where g is an appropriate multinomial probability distribution.

The expected outcome equation for individual i, $i = 1, ..., N$, is formulated as

$$E(y_i) = (x_i'\gamma + CT_i\beta + \sum_{j=1}^{J}\delta_j d_{ij} + \sum_{j=1}^{J}\lambda_j l_{ij}) \tag{3}$$

where x_i is a set of exogenous covariates with associated parameter vector γ and δ_j denotes the livelihood strategy effect on the outcome (consumption expenditure) relative to the reference category. $E(y_i)$ is a function of each of the latent factors l_{ij}, i.e. consumption expenditure is affected by unobserved characteristics that affect selection into a specific livelihood strategy. The density function for y_i is given by

$$f(y_i|x_i, d_i, l_i) = f(x_i\gamma + CT_i\beta + \sum_{j=1}^{J}\delta_j d_{ij} + \sum_{j=1}^{J}\lambda_j l_{ij}) \tag{4}$$

The form of $f(\cdot)$ is chosen to be consistent with the empirical characteristics of y_i. In our analysis y is a continuous variable therefore $f(\cdot)$ is the normal distribution function.

3.2 Estimation

The general model described above needs a set of normalization restrictions for identification of the parameters in estimation, discussed extensively in Deb and Trivedi (2006, page 311). After

applying these normalization restrictions the choice model can be written as

$$Pr(d_i|z_i, l_i) = g(z_i'\alpha_1 + CT_i\beta_1 + l_{i1}, z_i'\alpha_2 + CT_i\beta_2 + l_{i2}, ..., z_i'\alpha_J + CT_i\beta_J + l_{iJ}) \tag{5}$$

which is suitable for estimation.

The joint distribution of livelihood strategy choice and outcome variable, conditional on the common latent factors, can be written as

$$\begin{aligned} Pr(y_i, d_i|x_i, z_i, l_i) = f(x_i'\gamma + CT_i\beta + d_i'\delta + l_i'\lambda) \\ \times g(z_i'\alpha_1 + CT_i\beta_1 + l_{i1}, ..., z_i'\alpha_J + CT_i\beta_J + l_{iJ}) \end{aligned} \tag{6}$$

Following Deb and Trivedi (2006), we assume that l_{ij} are i.i.d. draws from standard normal distribution so their joint distribution h can be integrated out of the joint density, i.e.

$$\begin{aligned} Pr(y_i, d_i|x_i, z_i) = \int [f(x_i'\gamma + CT_i\beta + d_i'\delta + l_i'\lambda) \\ \times g(z_i'\alpha_1 + CT_i\beta_1 + l_{i1}, ..., z_i'\alpha_J + CT_i\beta_J + l_{iJ})]h(l_i)dl_i] \end{aligned} \tag{7}$$

The main computational problem is that the integral (7) does not have, in general, a closed form solution. This difficulty can be addressed using simulation-based estimation (Gourierou and Monfort,1996). The simulated log likelihood function is given by

$$\begin{aligned} lnL(y_i, d_i|x_i, z_i) = \sum_{i=1}^{N} ln(\frac{1}{S}\sum_{s=1}^{S}[f(x_i'\gamma + CT_i\beta + d_i'\delta + \tilde{l}_{is}'\lambda) \\ \times g(z_i'\alpha_1 + CT_i\beta_1 + \tilde{l}_{i1s}, ..., z_i'\alpha_J + CT_i\beta_J + \tilde{l}_{iJs})]) \end{aligned} \tag{8}$$

where S is the number of random draws and $\tilde{l}_{is}'$ is the sth draw of a pseudo-random number from the density h. With S sufficiently large, maximization of the simulated log likelihood is equivalent to maximizing the log likelihood. Because of the complexity of our model, in order to cope with the issue of slow standard simulation methods, we follow Deb and Trivedi (2006) adapting an acceleration technique that uses quasi random draws based on Halton sequences (Bhat 2001; Train 2002).

4 Data

We use data collected for the impact evaluation of the HSCT programme conducted by the AIR (2014). These data are based on a twelve-month, longitudinal, non-experimental design study.

The non-experimental design was chosen as the programme roll-out of the HSCT required that all households satisfying eligibility criteria within an eligible district were selected to receive the cash transfers at the same time. Eligible households in three districts, Binga, Mwenzi and Mudzi were selected to receive the treatment (AIR, 2014), as these were considered among some of the poorest in the country. No households within the treatment districts received the HSCT programme prior to the study period. Households in these districts were compared with eligible households in three comparison districts, UMP, Chiredzi and Hwange. The comparison districts neighbored the treatment districts, by design comparable in agro-ecological characteristics, culture and level of development. The sample is not nationally-representative, and includes 2630 households in each survey year, comprising of 1748 treatment (in 60 wards) and 882 comparison (in 30 wards) households. We use individual, household and community level survey data. At the individual level detailed information on labour allocation choices were collected, which was then transformed into household level. Data on consumption expenditures, aggregate, food and non-food, are used to measure consumption, as a representation of household welfare. We also use household level information on access to markets.

To minimize potential seasonality effects on consumption, both baseline and follow-up data collection occurred between May and June of the survey year (Dewbre et al., 2015). Sample attrition for the survey across baseline and follow-up was 14% but statistical tests in the follow-up report finds no differential attrition between treatment and comparison group (AIR, 2014). To correct for selective non-response at follow-up and baseline differences in the covariates between the treatment and comparison group we used an Inverse Probability Weighting (IPW) procedure.[3] Table 1 shows simple descriptive statistics by treatment groups and by gender of the households head at baseline. With only one exception in the sample of FHH (non-food expenditure significantly higher in the comparison group) and a different one in the sample of MHH (number of household members 60+ significantly greater in the treatment group), no statistically significant differences between treatment and comparison groups are detected. However, Table 1 shows that the subsample of FHHs and MHHs are significantly different in a number of indicators. The last two columns show the mean difference test between FHH and MHH by treatment arms. In both treatment and comparison group, FHH with respect to MHH are: i) significantly less likely to be educated, ii) significantly more likely to be widows, divorced or separated than MHH, and iii) significant less willing to spend in food consumption. Moreover, in the treatment group, FHHs also seem to live furthest from input market than MHHs. Given these baseline differences, an analysis on the whole sample would hide much of the heterogeneity existing between FHHs and MHHs, that's the reason why we will also report the results by gender of the household head.

[3]To implement the IPW we estimated a household-level probit model of continuation in the follow-up survey and inclusion in the treatment group using household background and outcome measures as explanatory variables. We first generated a binary variable for inclusion in the treatment group and continuation in the follow-up survey (equal to one if the household was a treated one and if was interviewed at both baseline and follow-up, equal to zero in all the other cases). With this binary variable, we run a probit model to estimate the probability of being included in the treatment group and being interviewed in both waves. With the inverse of that probability we then generated the inverse probability weights.

4.1 Livelihoods and Income Diversification

The data contain detailed information on all sources of income and household time allocation which provide a clear picture of household livelihood strategies. Moreover, given the longitudinal nature of the data, we are able to identify potential changes in livelihood strategies occurred from baseline to follow-up data collection. Following Davis et al. (2010), we first present the income generating activities in six basic categories: (1) *crop production*: a household engages in crop production if produced at least one crop in the past rainy season; (2) *livestock production*: a household engages in livestock production if household raised or owned any livestock in the past 12 months; (3) *casual employment* (*maricho*): it occurs if anyone in household is involved in casual labour, both off-farm or non-farm; (4) *non-agricultural wage employment*: a household is considered involved in non-agricultural wage employment if any household member was employed in wage, salary, commission or any payment in kind on a regular basis; (5) *non-agricultural self-employment*: it occurs if anyone in household operated a (non-farm) income generating enterprise which produces goods or services, or owned a shop, or operated a trading business[4]; (6) *remittances and other transfers* (not including the HSCT transfers): it includes remittances from relatives and friends and other public transfers such as pension, etc.. Table 2 shows the percentage of households grouped in the six categories for the whole sample, by gender of the household head, and by treatment group at baseline. These figures suggest that most of the households engage in more than one livelihood activity and, not surprisingly, the highest percentage is in group (1) and (2), i.e. crop production and livestock.

For the scope of our analysis, five categories of income generating activities (crop production, livestock, casual labor, wage labor, self-employment) are aggregated into a higher level grouping. We left out from this highest level grouping the category remittances for a specific reason. In the first part of the analysis, we are interested in assessing the impact of cash transfers on livelihood strategies, i.e. in the decision to engage in one or more income generating activities. In the context of a general agricultural household model (Singh, 1986) remittances do not constitute a deliberate choice made by the households.[5] In this analysis, we distinguish between on-farm activities (crop production and livestock), casual labor (maricho) and non-farm activities (non-agricultural wage employment and self-employment). Casual labor is a critical category: it includes both farm and non-farm activities, it is a low-return activity and it is generally viewed as a "poor" source of income and a last resort solution to meet daily needs. Table 3, Panel A, shows the percentages of households which specialize in one particular livelihood (exclusive engagement in on-farm activities, exclusive engagement in casual labor, and exclusive engagement in non-farm activities). On the contrary, Panel B shows three different livelihood diversification strategies. The first diversification strategy consists on engagement on both on-farm and non-farm activities. Since non-farm activities are likely to generate returns higher than those coming from on-farm activities, we define this diversification strategy "opportunity-led diversification". The second diversification strategy consists on engagement on both on-farm activities and casual labor. Given the characteristics of casual labor in the Zimbabwean setting, this strategy may be view as a diversification driven by

[4]Examples given of enterprise included making bricks, or charcoal, mason, firewood selling, metalwork, tailoring, repair work, food processing, petty trading, food selling or trading

[5]They might be potentially affected by the receipt of cash transfers through a crowding-out of private transfers but previous impact evaluation analysis conducted by the AIR (2014) do not support this view.

necessity. Therefore, we define it "survival-led diversification". The third diversification strategy is the most comprehensive as it consists on engagement in on-farm and non-farm activities and on involvement in casual labor. We call this strategy "mixed diversification".

Table A.1 and A.2 (in the Appendix) show simple descriptive statistics of total per capita consumption at baseline. Table A.1 clearly shows that baseline consumption for households engaged in wage labour and non-farm business is significantly higher than consumption expenditure generated by on-farm activities and casual labour. Table A.2 motivates our classification of diversification into "opportunity-led", "survival-led" and "mixed". Indeed, baseline average consumption for households which diversify engaging in both on-farm and non-farm activities is significantly higher than consumption of households that i) specialize in on-farm activities and ii) diversify opting for a mix of on-farm activities and casual labour. The diversification strategy consisting of on-farm activities and casual labour provides a baseline level of consumption expenditure not significantly different with respect to consumption of households specialized in on-farm activities, suggesting that, in this case, casual labour is a poor earning generating activity which is potentially used to compensate lower returns from agriculture. Finally, average baseline consumption expenditure for households which engage in "mixed diversification" is in between the level of consumption of the other two diversifying strategies. Table A.3 unpacks the livelihood "non-farm business" into twenty-four potential kinds of business and shows the baseline average consumption level for households that engage in each of the business. The table shows that, with the only exception of "home brewery", all kinds of non-farm business allows households to afford a level of consumption expenditure at baseline significantly greater than that of households specialized in on-farm activities.

Given the extremely small percentage of households which specialize in casual labour (0.9%) or in non-farm activities (1.4%), we restrict our focus on a single specialization strategy (exclusive engagement in on-farm activities) and on the three diversification strategies. We left out from this highest level grouping the category *remittances* for a specific reason. In the first part of the analysis, we are interested in assessing the impact of cash transfers on livelihood strategies, i.e. in the decision to engage in one or more income generating activities. In the context of a general agricultural household model (Singh, 1986) remittances do not constitute a deliberate choice made by the households. They might be potentially affected by the receipt of cash transfers through a crowding-out of private transfers but previous impact evaluation analysis conducted by the AIR (2014) do not support this view.

Before the core analysis, for exploratory purposes, we conducted a simple exercise. We investigate which are the determinants of specialization in on-farm activities, and the determinants of the three different diversification strategies at baseline. We regress the probability of being in one of the livelihood strategy over household demographic composition, characteristics of the household head, land size, labour constraints, and access to markets (input, output, banks and transports). The results are reported in Table 4. Land size increases significantly the probability of specialization into on-farm activities for FHH but has no effect for MHH. Labor constraints increase the probability of specialization in on-farm activities for FHH but they are not correlated for MHH. Education of the head of the household is a strong determinant of opportunity-led diversification for both FHH and MHH and it reduces the probability of specialization into on-farm activities. This result is consistent with previous findings of the literature. For example, Woldenhanna and Oskam (2001)

work in Ethiopia and Smith et al. (2001) in Uganda find that more educated households are more likely to be self- employed in non-farm activities and control more stable, higher earning types of employment like masonry, carpentry and petty trade. Distance to market seems to be a strong determinant of livelihood strategies for FHH but not for MHH. In particular, it reduces the probability of engagement in opportunity-led diversification and increases specialization in on-farm activities.

4.2 Independent variables and exclusion restrictions

Our choice of explanatory variables for livelihood strategy choices and for consumption expenditure is guided by previous contributions of the literature on both determinants of livelihood diversification/specialization and the determinants of household welfare. The main explanatory variable is the inclusion in the HSCT treatment group to assess the effects of a reduction of liquidity constraints on livelihood strategies and the effects on consumption expenditure. The impact of the cash transfers on consumption has two main channels: a direct one which consists on immediate and regular liquidity to increase expenditure in consumption goods and, potentially, productive activities, and an indirect one, through the impact on livelihood strategies. Moreover, since we are interested in understanding whether cash transfers induce a change of livelihood strategies from baseline to follow-up, we added the engagement in different livelihood strategies at baseline (specialization into on-farm activities as reference category, opportunity-led diversification, survival-led diversification, and mixed diversification) and their interactions with the treatment indicator. We include as control a set of household demographic characteristics (household demographic composition, and age, marital status, and education of the household head), lagged values of asset ownership (land size and labour constraints), and distance (in km) to the main markets (input, output, banks and transports). Previous contribution is the literature of income diversification document that distance to markets can actually be a strong determinant of engagement in low return activities (Barrett et al., 2001).

The determinants of livelihood strategies include all the controls that determine household consumption expenditure. In principle, the parameters of the semi-structural model we have described are identified even if all the variables in the livelihood strategies equations are included in the consumption equation (Deb and Trivedi, 2006). However, for more robust identification we use traditional exclusion restrictions by specifying instrumental variables in the livelihood strategies equations that are excluded from the consumption equation. We use price levels of selected agricultural products at baseline (maize, rice, beans, beef). Lagged price levels are used as instruments because they are likely to affect directly livelihood strategy choices at follow-up but not consumption expenditure which is otherwise affected by current prices. In particular, lagged agricultural price levels are supposed be a key determinant of the decision to specialize in on-farm activities or to diversify the income sources.

5 Results

In this section we discuss the results from the jointly estimated models (livelihood strategies and consumption expenditure equations). We first discuss the livelihood strategies choice equations. Then we discuss the impact of livelihood strategy choices and the HSCT impact on consumption, distinguishing food and non-food expenditure.

5.1 Livelihood strategy choices

The estimates of the livelihood strategy choice equations from each of the three equations for consumption (total, food and non-food expenditure) are very similar because they are all estimates for the same choices of livelihood strategies with the same set of covariates. Therefore, we present and discuss estimates from only one of these models, that from the joint model of livelihood strategy choices and total household consumption. Table 5 (column 1-6) presents the results for the whole sample of FHHs and MHHs. Table 6 (column 1-6) differentiated the results for FHHs and MHHs in the livelihood strategy choices (first stages). We report both coefficients and marginal effects.

We find that for the whole sample, the HSCT treatment induces a switching between mixed diversification at baseline to opportunity-led diversification at follow-up. Treatment increases by 9 percentage points the probability of engaging in opportunity-led diversification at follow-up for the group of households that engaged in mixed diversification at baseline, with respect to households that at baseline specialize in on-farm activities. This means that the treatment induces households to abandon casual labour in favor of a greater involvement in on-farm and non-farm activities. Treatment does not seem to have any significant impact on households engaged in opportunity-led diversification and survival-led diversification at baseline. The results also highlight a high degree of persistence in livelihood strategies. As expected, the choice of any of the diversification strategies at baseline positively affect the probability of being engaged in the same livelihood strategy at follow-up.

The results presented in Table 6 show that there is a gender differentiated impact of cash transfers on the livelihood strategy choices and on the probabilities to switch from one strategy to the other. In MHHs, the HSCT treatment increases by 40 percentage points the probability that households engaged in mixed diversification at baseline switch to opportunity-led diversification at follow-up. Moreover, the HSCT treatment reduces by 12 percentage points the probability that households engaged in survival-led diversification at baseline will maintain the same livelihood strategy at follow-up. In sum, the HSCT treatment in MHHs determines two kinds of changes in livelihood strategies: i) it induces households that engaged in on-farm and non-farm activities, and on casual labour at baseline (mixed diversification) to move toward an opportunity-led diversification at follow-up; ii) it reduces the probability to maintain a survival-led diversification. Both changes imply a reduction of casual labour which is considered a last resort solution to meet daily needs. This result is consistent with the findings of OPM (2013) which documents that the transfer received under the HSCT programme enabled many households to reduce casual labour. On the contrary, in FHHs the HSCT treatment does not seem to have any impact on changes in livelihood strategies. This result has two potential explanations. First, as shown in Table 1, FHH and MHH are different in several important aspects: in particular education and marital status may have played an important role. FHH are significantly less educated than MHH and may be therefore less able to take advantage of the additional money received under the HSCT for investment in new activities potentially characterized by higher return. Moreover, half of FHHs are widows (a figure five times greater than that for MHHs). They may therefore be the only economic adult member in the household as well as the unique member taking care of the house and of the garden or piece of land. Second, the gender differentiated impact of the HSCT may be explained by gender differences in both labour demand and supply. On the one hand, women may have less chances to be hired by local firms with respect

to men. On the other hand, women may be more reluctant to change their livelihood strategies with respect to men even after the receipt of regular additional income because they are usually more risk averse, as documented by a wide literature on gender differences in risk attitude (see for example, Di Cagno et al. 2015; Byrnes et al. 1999). Other variables seem to play a role: education of the household head which positively affect engagement in opportunity-led diversification, labour constraints which increase the probability of diversifying and land size which positively affect specialization in on-farm activities. The additional instruments included in the livelihood strategies choice equations (lagged prices of agricultural products) are tested for joint significance using the likelihood ratio statistics and are statistically significant in each case.

5.2 Consumption expenditure

For the whole sample, the estimates of the consumption expenditure equations (for total, food and non-food expenditure) are reported in Table 5 (column 7-9). Our findings suggest that cash transfers increase non-food consumption expenditure for households engaged in on-farm activities and on mixed diversification at baseline. With respect to a specialization strategy based on exclusive engagement in on-farm activities, opportunity-led diversification and mixed diversification at follow-up increase consumption even though the size of the effect of the latter is smaller in size and the coefficients are significant at 10%. Table 6 (column 7-9) shows the heterogeneous impact of cash transfers in FHHs and MHHs on consumption expenditure. The impact of treatment in FHHs is actually stronger than the impact on MHHs. In particular, our results suggest that the treatment has a positive effect on non-food consumption expenditure for FHHs that at baseline specialized in on-farm activities or were engaged in mixed-diversification. On the contrary treatment in MHHs does not seem to have any direct impact on consumption expenditure. In MHHs, the treatment seems to exert an effect on consumption only through its impact on livelihood strategies.

5.3 Diversification within agricultural activities

The results presented in section 5.1 suggest that the HSCT treatment has no effect on the group of households which specialized in on-farm activities at baseline. However, it might well be that households modify their agricultural production moving from exclusive production of staple crops to production of cash crop or both, staple and cash crops. In this section we try to answer to the questions of whether cash transfers affect diversification within the agricultural sector and what is the consequent impact on consumption expenditure.

To address these questions we distinguish between staple and cash crops. In the context of Zimbabwe, staple crops include maize, sorghum, miller, rapoko, wheat, rice, potatoes, beans, peas, lentils. Cash crops include grandnuts, roundnuts, sunflower, sugar cane, tobacco, cotton, peanuts. In this case we identify three potential strategies: i) exclusive production of staples, ii) exclusive production of cash crops, and iii) diversification within agricultural activities, i.e. engagement in both staple and crop production. The results for the whole sample are reported in Table 7. Column 1-6 show the first stage estimates for the choice of specialization/diversification within agricultural activities. Treatment has a strong effect on households that were exclusively engaged in staple production at baseline. Indeed, it positively affects the probability to switch to diversification at follow-up (it increases by 7 percentage points). Moreover, treatment increases the probability that

households that produced both staple and cash crops at baseline will maintain the same strategy at follow-up (by 10 percentage points). The second step estimates show that treatment did not have a strong impact on consumption expenditure. The only significant coefficient for treatment is related to the group of households that use to produce exclusively cash crops at baseline. For this category, treatment seems to reduce non-food consumption expenditure. As far as the direct impact of agricultural diversification strategies are concerned, specialization in cash crops at follow-up positively affect food and non-food consumption expenditure, and agricultural diversification at follow-up positively affect food consumption expenditure.

6 Conclusion

In this paper, we have examined the role of cash transfers in livelihood strategy choices in Zimbabwe and the consequent impact of these choices on household welfare, measured in terms of consumption expenditure. The longitudinal and quasi-experimental nature of the data and the specific econometric method adopted allow us to jointly estimate the causal impact of the cash transfers paid to households adopting different livelihood strategies at baseline on the probability of being engaged in the same livelihood strategies or to switch from one strategy to the other. We focus on four different livelihood strategies: specialization in on-farm activities, diversification potentially characterized by high-return - opportunity-led diversification - which occurs if the household engages in both on-farm and non-farm activities, diversification characterized by low-return -survival-led diversification - which occurs if the household engages in both on-farm activities and casual labour, and mixed diversification which occurs when the households do both on-farm and non-farm activities and supply casual labour.

Our findings suggest that the HSCT treatment induces a switching between mixed diversification at baseline to opportunity-led diversification at follow-up. Indeed, treatment increases the probability of engaging in opportunity-led diversification at follow-up for the group of households that engaged in mixed diversification at baseline. This means that cash transfers induce households already diversifying to abandon casual labour in favor of a greater involvement in on-farm and non-farm activities. Nevertheless, treatment does not seem to have any significant impact on households engaged in opportunity-led diversification and survival-led diversification at baseline. The results also highlight a high degree of persistence in livelihood strategies. As expected, the choice of any of the diversification strategies at baseline positively affect the probability of maintaining the same livelihood strategy at follow-up. As far as the analysis of the livelihood strategy choices on household welfare is concerned, the estimates of the consumption expenditure equations suggest that the cash transfers increase non-food consumption expenditure for households engaged in on-farm activities and on mixed diversification at baseline. Moreover, with respect to a specialization strategy based on exclusive engagement in on-farm activities, opportunity-led diversification and mixed diversification at follow-up increase consumption expenditure for both food and non-food. The estimates of the cash transfers impacts on the livelihood strategy choices by gender of the household head show a high degree of heterogeneity. In MHHs, the HSCT treatment increases the probability that households engaged in mixed diversification at baseline switch to opportunity-led diversification at follow-up. Moreover, the HSCT treatment reduces the probability that male-headed households engaged in survival-led diversification at baseline will maintain

the same livelihood strategy at follow-up. Both effects imply a reduction of casual labour which is considered a last resort solution to meet daily needs. On the contrary, in FHHs the HSCT treatment does not seem to have any impact on changes in livelihood strategies. Other variables seem to play a role: education of the household head which positively affect engagement in opportunity-led diversification, labour constraints which increase the probability of diversifying and land size which positively affect specialization in on-farm activities. As far as the analysis of the livelihood strategy choices on household welfare is concerned, the impact of the HSCT treatment in FHHs is actually stronger than that on MHHs. In particular, our results suggest that the treatment has a positive effect on non-food consumption expenditure for FHHs that at baseline specialized in on-farm activities or were engaged in mixed-diversification. On the contrary treatment in MHHs does not seem to have any direct impact on consumption expenditure. In MHHs, the treatment seems to exert an effect on consumption only through its impact on livelihood strategies.

The apparent lack of impacts on households that at baseline specialized in on-farm activities is furtherly investigated looking at whether the cash transfers induce specialization or diversification within agricultural activities. We categorize agricultural households in three groups: i) exclusive staple production, ii) exclusive cash crop production; and iii) both staple and cash crops production. Our findings suggest that the HSCT treatment has a strong effect on households that were exclusively engaged in staple production at baseline. Indeed, it positively affects the probability to switch to exclusive cash crop production and the probability to diversify at follow-up. Moreover, the second step estimates show that treatment did not have a strong impact on consumption expenditure which seems to be affected directly by livelihood strategies based on specialization in cash crops production or diversified production of staple and cash crops.

In conclusion, our paper provides a contribution to the literature on both the impacts of cash transfers programmes and the determinants of livelihood strategies. The first key result is that cash transfers induce MHHs to modify their livelihood strategy renouncing to casual labour with a switch from mixed diversification to opportunity-led diversification. The consequent impact on consumption is positive and significant confirming that a livelihood strategy based on on-farm (agriculture and livestock production) and non-farm (non-farm wage employment and small business) activities is characterized by higher returns. The second key result is that cash transfers do not seem to exert any impact on livelihood strategies for FHHs. From a policy perspective these two findings suggest that diversification is a desirable objective if it consists in on-farm and non-farm activities potentially characterized by high returns. Social protection policies aimed at relaxing credit constraints, such as the HSCT programme in Zimbabwe, positively contribute to this objective. However, the gender dimension needs to be taken into account and special attention needs to be devoted to FHHs which, even after the receipt of additional income, are reluctant or unable to modify their livelihood strategies thus self-selecting into less remunerative and less welfare-enhancing activities due to lower skill and labour constraints.

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Tables

Table 1: Descriptive statistics at baseline

	Whole Sample			Female Headed Households			Male Headed Households			Comparison	Treatment
	Comparison (n=830)	Treatment (n=1733)	Diff. in means	Comparison (n=539)	Treatment (n=1213)	Diff. in means	Comparison (n=291)	Treatment (n=520)	Diff. in means	Diff. in means FHH-MHH	Diff. in means FHH-MHH
	Mean	Mean	p-value	Mean	Mean	p-value	Mean	Mean	p-value	p-value	p-value
FHH (%)	67.45	69.99	0.36								
H size	5.08	4.88	0.33	4.96	4.68	0.20	5.33	5.34	0.96	0.05**	0.00***
HH age	57.07	57.43	0.77	55.53	55.20	0.79	60.25	62.63	0.21	0.01***	0.00***
HH widow (%)	36.73	37.28	0.82	49.50	48.97	0.85	10.25	10.00	0.93	0.00***	0.00***
HH divorced/sep (%)	8.85	9.69	0.63	10.78	12.12	0.49	4.86	4.04	0.76	0.04**	0.00***
HH highest edu	3.03	3.04	0.96	2.70	2.81	0.68	3.72	3.57	0.68	0.03**	0.00***
Num. HH members: 0-5	0.71	0.69	0.71	0.72	0.73	0.84	0.70	0.60	0.31	0.89	0.00***
Num. HH members: 6-17	2.24	2.15	0.37	2.21	2.13	0.54	2.32	2.20	0.53	0.61	0.51
Num. HH members: 18-59	1.27	1.16	0.29	1.27	1.08	0.13	1.26	1.35	0.44	0.94	0.00***
Num. HH members: 60+	0.85	0.88	0.62	0.76	0.74	0.72	1.04	1.19	0.09*	0.00**	0.00***
Land size (ha)	1.64	1.84	0.65	1.61	1.77	0.77	1.71	1.98	0.28	0.77	0.65
Sev. Labour Constraint(%)	42.78	45.53	0.39	43.38	46.83	0.33	41.55	42.50	0.85	0.67	0.15
Total Exp.	126.42	120.43	0.32	121.70	110.83	0.10	136.20	142.84	0.40	0.02**	0.00***
Total Food Exp.	80.06	76.20	0.42	76.08	70.09	0.24	88.32	90.44	0.73	0.00***	0.00***
Total Non Food Exp.	46.36	44.24	0.26	45.63	40.74	0.02**	47.88	52.40	0.17	0.40	0.00***
Distance input market (km)	12.31	13.92	0.57	12.13	14.04	0.75	12.70	13.64	0.49	1.00	0.00***
Distance bank (km)	45.93	45.30	0.93	44.80	45.17	0.70	48.28	45.59	0.96	0.36	0.183
Distance output market (km)	2.47	2.38	0.82	2.44	2.37	0.79	2.51	2.43	0.84	0.12	0.288
Distance transports (km)	1.57	1.33	0.44	1.50	1.29	0.37	1.71	1.41	0.49	0.50	0.692

Note: *** indicates p<.01; ** indicates p<.05; * indicates p<.10

Table 2: Participation in income generating activities at baseline, share

		(1) Agriculture Crops	(2) Agriculture Livestock	(3) Casual labor	(4) Non-farm wage employment	(5) Non-farm self-employment	(6) Remittances and other
Whole	Comparison	89.56	77.06	43.88	11.37	11.99	59.64
	Treatment	89.73	76.00	42.64	10.10	11.89	56.03
FHH	Comparison	89.16	75.94	44.22	12.34	12.81	64.32
	Treatment	89.73	76.00	42.64	10.10	11.89	56.03
MHH	Comparison	90.39	79.38	43.16	9.35	10.30	49.95
	Treatment	89.73	76.00	42.64	10.10	11.89	56.03

Notes:

(1) *crop production*: a household engages in crop production if produced at least one crop in the past rainy season;

(2) *livestock production*: a household engages in livestock production if household raised or owned any livestock in the past 12 months;

(3) *casual employment* (*maricho*): it occurs if anyone in household is involved in casual labor, both off-farm or non-farm;

(4) *non-agricultural wage employment*: a household is considered involved in non-agricultural wage employment if any household members were employed in wage, salary, commission or any payment in kind on a regular basis;

(5) *non-agricultural self-employment*: it occurs if anyone in household operated a (non-farm) income generating enterprise which produces goods or services, or owned a shop, or operated a trading business;

(6) *remittances and other transfers* (not including the HSCT transfers): it includes remittances from relatives and friends and other public transfers such as pension.

Table 3: Specialization and Diversification of income-generating activities at baseline, share

		Panel A: Specialization			Panel B: Diversification		
		On-Farm	Casual Labor	Non-farm	Opportunity-led	Survival-led	Mixed div.
Whole	Comparison	41.0	0.9	1.3	9.8	32.7	9.5
	Treatment	42.2	0.8	1.4	9.8	32.7	8.9
FHH	Comparison	39.7	0.9	1.7	10.2	32.0	10.4
	Treatment	42.8	0.7	1.2	8.6	33.3	8.5
MHH	Comparison	43.8	0.9	0.5	9.1	34.1	7.7
	Treatment	41.0	0.8	1.9	12.5	31.2	9.8

Notes:

On-Farm: it includes crop production and livestock;

Non-Farm: it includes non-farm wage employment and self-employment;

Opportunity-led diversification: it includes households engaged in both on-farm and non-farm activities;

Survival-led diversification: it includes households engaged in both on-farm activities and casual labor;

Mixed diversification: it includes households engaged in on-farm and non-farm activities and on casual labor

Table 4: Determinants of Livelihood Strategies at Baseline

	WHOLE SAMPLE				FHH				MHH			
VARIABLES	Only On-Farm	Opportunity-led	Survival-led	Mixed	Only On-Farm	Opportunity-led	Survival-led	Mixed	Only On-Farm	Opportunity-led	Survival-led	Mixed
HH_female	-0.015	0.012	-0.003	0.005								
	(0.026)	(0.018)	(0.039)	(0.017)								
land owned	0.001*	0.000	0.000	-0.000	0.001**	-0.000	-0.000	-0.000	-0.010	0.007	0.010	0.003
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.009)	(0.008)	(0.006)	(0.004)
Severely labor const.	0.133***	-0.079***	-0.098***	0.003	0.151***	-0.085***	-0.088**	-0.019	0.095	-0.081*	-0.109*	0.061
	(0.044)	(0.024)	(0.030)	(0.024)	(0.045)	(0.026)	(0.042)	(0.025)	(0.070)	(0.048)	(0.063)	(0.053)
HH_age	0.002*	0.001	-0.001	-0.002***	0.001	0.002**	-0.001	-0.003***	0.002	-0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
HH_widow	0.003	-0.002	-0.005	-0.013	0.041	-0.026	-0.022	0.002	-0.151**	0.043	0.061	-0.041
	(0.028)	(0.023)	(0.040)	(0.024)	(0.037)	(0.027)	(0.037)	(0.027)	(0.070)	(0.038)	(0.078)	(0.033)
HH_div_sep	0.047	-0.005	-0.018	-0.029	0.072	-0.034	-0.020	-0.019	0.020	0.077	-0.002	-0.092***
	(0.059)	(0.034)	(0.052)	(0.026)	(0.047)	(0.038)	(0.050)	(0.030)	(0.165)	(0.055)	(0.107)	(0.032)
HH_highest_grade	-0.013***	0.007**	0.002	-0.002	-0.012**	0.006*	-0.000	-0.003	-0.013**	0.010**	0.005	-0.003
	(0.004)	(0.003)	(0.006)	(0.004)	(0.005)	(0.004)	(0.006)	(0.004)	(0.006)	(0.004)	(0.009)	(0.006)
# members: 0-5	-0.052***	0.005	0.033*	0.021**	-0.057***	0.008	0.021	0.033**	-0.037	-0.008	0.062**	-0.006
	(0.014)	(0.018)	(0.019)	(0.009)	(0.021)	(0.015)	(0.020)	(0.013)	(0.025)	(0.023)	(0.030)	(0.018)
# members: 6-17	-0.019**	0.001	0.031***	0.003	-0.021*	0.015**	0.027**	-0.005	-0.017	-0.022**	0.040***	0.016
	(0.008)	(0.004)	(0.008)	(0.004)	(0.012)	(0.006)	(0.011)	(0.009)	(0.013)	(0.008)	(0.013)	(0.014)
BL0n1859	-0.001	0.000	-0.005	0.023**	0.001	-0.011	0.009	0.019	-0.016	0.028	-0.034	0.033*
	(0.014)	(0.013)	(0.013)	(0.010)	(0.019)	(0.012)	(0.019)	(0.014)	(0.020)	(0.025)	(0.030)	(0.019)
BL0n60	0.016	0.027*	-0.019	0.018	0.036	0.006	-0.035	0.026	-0.015	0.068**	0.006	-0.012
	(0.024)	(0.015)	(0.025)	(0.015)	(0.030)	(0.017)	(0.026)	(0.018)	(0.038)	(0.027)	(0.042)	(0.022)
km_input	-0.001	-0.001	0.001	0.000	-0.001	-0.001	0.001	0.001	-0.001	-0.001	0.001	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
km_bank	0.000	-0.000	0.000	-0.001*	0.000	-0.000	0.000	-0.001**	0.000	0.000	0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)
km_mkt	0.014	-0.013***	0.007	-0.007	0.024**	-0.016***	0.007	-0.011**	-0.011	-0.005	0.005	0.005
	(0.011)	(0.004)	(0.009)	(0.005)	(0.011)	(0.005)	(0.011)	(0.005)	(0.016)	(0.007)	(0.015)	(0.010)
km_transport	-0.012	0.010	0.005	0.000	-0.012	0.011	-0.003	0.006	-0.011	0.010	0.016	-0.017
	(0.013)	(0.006)	(0.012)	(0.008)	(0.014)	(0.007)	(0.013)	(0.008)	(0.019)	(0.009)	(0.022)	(0.011)
Constant	0.351***	0.045	0.302***	0.207***	0.322***	0.026	0.326**	0.270***	0.451***	0.035	0.268**	0.093
	(0.095)	(0.053)	(0.107)	(0.056)	(0.099)	(0.059)	(0.131)	(0.086)	(0.131)	(0.097)	(0.128)	(0.082)
Observations	2,563	2,563	2,563	2,563	1,752	1,752	1,752	1,752	811	811	811	811

Notes: Standard errors clustered at the community level, in parentheses. *** indicates p<.01; ** indicates p<.05; * indicates p<.

Table 5: Joint estimates of livelihood strategies choice and consumption expenditure - Whole sample

	First Steps: Multinomial Logit						Second steps: Ordinary Least Squares		
	Opportunity-led diversification at follow-up		Survival-led diversification at follow-up		Mixed diversification at follow-up		Total consumption	Food consumption	Non-Food consumption
	Coeff.	Marginal eff.	Coeff.	Marginal eff.	Coeff.	Marginal eff.	Marginal eff.	Marginal eff.	Marginal eff.
Treatment (On-farm at base)	0.15	0.003	0.276	0.041	0.448	0.014	0.169	-1.202	**1.380****
	(0.311)		(0.191)		(0.342)		(2.516)	(2.153)	**(0.607)**
Treatment (Opp-led div. at base)	0.170	0.014	-0.036	-0.010	-0.177	-0.003	1.252	-0.657	-0.965
	(0.389)		(0.397)		(0.791)		(4.903)	(2.478)	(1.883)
Treatment (Surv-led div. at base)	-0.345	-0.019	-0.255	-0.046	0.201	0.014	0.769	0.433	0.311
	(0.347)		(0.227)		(0.302)		(1.703)	(1.179)	(0.633)
Treatment (Mixed div. at base)	**0.990***	**0.085**	0.317	0.020	0.816	0.029	**3.467***	1.559	**1.923****
	(0.600)		(0.427)		(0.577)		**(2.112)**	(1.637)	**(0.954)**
Opp.-led div. at follow-up							**9.224*****	**5.598*****	**2.821****
							(2.238)	**(1.178)**	**(1.149)**
Surv-led div. at follow-up							0.299	0.695	1.643
							(1.670)	(1.158)	(1.101)
Mixed div. at follow-up							**3.685***	**3.085***	1.267
							(2.233)	**(1.783)**	(0.866)
Opp.-led div. at base	**1.249*****	**0.095**	0.405	0.012	1.203	0.056	2.474	0.355	2.109
	(0.418)		(0.407)		(0.839)		(2.490)	(1.531)	(1.685)
Surv-led div. at base	0.474	0.005	**1.437*****	**0.242**	**1.179*****	**0.030**	-1.769	-1.533	**-0.610***
	(0.347)		**(0.328)**		**(0.336)**		(2.022)	(1.528)	**(0.709)**
Mixed div. at base	0.307	0.012	**1.096****	**0.174**	**1.416****	**0.057**	**-4.321***	-3.103	-1.495
	(0.667)		**(0.398)**		**(0.554)**		**(2.635)**	(1.999)	(0.838)
$\lambda_{opportunity-led\_div}$							-0.462**	-0.313**	-0.166
							(0.188)	(0.145)	(0.216)
$\lambda_{survival-led\_div}$							0.825*	0.538	-2.103***
							(0.451)	(0.358)	(0.603)
λ_{mixed_div}							-4.585**	-3.164*	-1.987***
							(2.010)	(1.691)	(0.626)

Notes: Standard errors clustered at the community level, in parentheses. *** indicates p<.01; ** indicates p<.05; * indicates p<.10.
First stage and second stages equations include as additional controls: household demographic composition (number of household members 0-5, 6-17, 18-59, 60+), characteristics of the household head (age, marital status, education), land size, binary variable for labor constraints (1 defines a household affected by labor constraints), distance to markets (input, banks, output, transports). First stage equations additionally include lagged price levels of selected agricultural products.

Table 6: Joint estimates of livelihood strategies choice and consumption expenditure - Gender differentiated impact

	First Steps: Multinomial Logit						Second steps: Ordinary Least Squares		
	Opportunity-led diversification at follow-up		Survival-led diversification at follow-up		Mixed diversification at follow-up		Total consumption	Food consumption	Non-Food consumption
	Coeff.	Marginal eff.	Coeff.	Marginal eff.	Coeff.	Marginal eff.	Marginal eff.	Marginal eff.	Marginal eff.
Treatment FHH (On-farm at base)	0.204	0.008	0.229	0.038	0.452	0.021	0.317	-1.732	**2.019****
	(0.335)		(0.171)		(0.356)		(2.978)	(3.203)	**(0.797)**
Treatment FHH (Opp-led div. at base)	-0.040	-0.002	-0.484	-0.019	-0.321	-0.008	2.994	-0.102	-1.582
	(0.528)		(0.540)		(1.080)		(7.013)	(2.650)	(2.495)
Treatment FHH (Surv-led div. at base)	-0.155	-0.011	-0.010	0.033	0.249	0.014	0.591	0.725	-0.242
	(0.445)		(0.274)		(0.357)		(2.075)	(1.514)	(0.781)
Treatment FHH (Mixed div. at base)	0.301	0.343	0.047	-0.173	0.943	0.020	5.399	2.770	**2.727****
	(0.692)		(0.418)		(0.787)		(2.842)	(1.996)	**(1.086)**
Treatment MHH (On-farm at base)	-0.034	-0.014	0.277	0.041	0.326	0.007	-0.480	-0.670	0.226
	(0.408)		(0.272)		(0.485)		(2.368)	(1.853)	(1.063)
Treatment MHH (Opp-led div. at base)	0.419	-0.002	0.932	0.218	0.037	-0.018	-1.730	-1.644	-0.049
	(0.585)		(0.619)		(0.938)		(5.601)	(3.949)	(2.832)
Treatment MHH (Surv-led div. at base)	-0.604	-0.010	-0.703*	-0.118	0.131	0.019	1.867	0.339	1.637
	(0.595)		(0.408)		(0.536)		(2.892)	(1.901)	(1.120)
Treatment MHH (Mixed div. at base)	**2.654****	**0.397**	0.963	-0.025	0.636	-0.013	-1.068	-1.187	-0.089
	(1.372)		(0.815)		(0.861)		(4.295)	(3.104)	(2.092)
Opp.-led div. at follow-up							**9.348*****	**5.688*****	**2.881****
							(2.189)	**(1.183)**	**(1.147)**
Sur-led div. at follow-up							0.460	0.752	1.709
							(1.645)	(1.158)	(1.048)
Mixed-div. at follow-up							**3.667***	**3.123***	1.244
							(2.180)	**(1.754)**	(0.871)
$\lambda_{opportunity-led\_div}$							-0.447**	-0.314**	-0.134
							(0.194)	(0.146)	(0.201)
$\lambda_{survival-led\_div}$							0.780	0.533	-2.097***
							(0.484)	(0.364)	(0.596)
λ_{mixed_div}							-4.563	-3.162*	-1.989***
							(2.012)	(1.692)	(0.628)

Notes: Standard errors clustered at the community level, in parentheses. *** indicates p<.01; ** indicates p<.05; * indicates p<.10.
First stage and second stages equations include as additional controls: household demographic composition (number of household members 0-5, 6-17, 18-59, 60+), characteristics of the household head (age, marital status, education), land size, binary variable for labor constraints (1 defines a household affected by labor constraints), distance to markets (input, banks, output, transports). First stage equations additionally include lagged price levels of selected agricultural products.

Table 7: Joint estimates of diversification within agricultural activities and consumption expenditure

	First Steps: Multinomial Logit				Second steps: Ordinary Least Squares		
	Specialization in cash crops		Diversification staple and cash crops		Total consumption	Food consumption	Non-Food consumption
	Coeff.	Marginal eff.	Coeff.	Marginal eff.	Marginal eff.	Marginal eff.	Marginal eff.
Treatment (staple crop at baseline)	1.224	0.000	0.541**	0.071	0.006	-0.622	0.722
	(0.844)		(0.205)		(1.091)	(0.764)	(0.484)
Treatment (cash crop at baseline)	-0.042	0.000	0.426	0.067	-27.431	-17.979	-10.152*
	(1.745)		(1.440)		(17.078)	(11.810)	(6.150)
Treatment (agr. diversification at baseline)	0.192	0.000	0.672**	0.104	-0.705	-1.905	-0.205
	(1.227)		(0.276)		(4.713)	(3.988)	(1.075)
Specialization in cash crops at follow-up					29.875**	21.789***	7.983*
					(13.357)	(9.459)	(4.569)
Agr. diversification at follow-up					8.663***	5.915***	1.187
					(2.319)	(1.763)	(0.756)
Specialization in cash crops at baseline	8.405***	0.029	2.949**	0.530	-2.351	-6.104	4.320
	(2.146)		(1.136)		(6.921)	(5.633)	(3.140)
Agr. diversification at baseline	2.528**	0.000	1.350***	0.203	2.995	2.143	1.312
	(0.884)		(0.322)		(3.860)	(3.330)	(1.080)
$\lambda_{specialization-cash\_crop}$					-5.046**	-3.520**	-1.405***
					(2.495)	(2.151)	(0.270)
$\Lambda_{agr\_diversification}$					0.464	0.399	1.551**
					(0.448)	(0.296)	(0.544)

Notes: Standard errors clustered at the community level, in parentheses. *** indicates p<.01; ** indicates p<.05; * indicates p<.10.
First stage and second stages equations include as additional controls: household demographic composition (number of household members 0-5, 6-17, 18-59, 60+), characteristics of the household head (age, marital status, education), land size, binary variable for labor constraints (1 defines a household affected by labor constraints), distance to markets (input, banks, output, transports). First stage equations additionally include lagged price levels of selected agricultural products.

Appendix

Table A.1: Total per capita consumption by livelihood strategies (baseline data)

Livelihood strategies	Mean	(sd)	Median	Min	Max
Crop production	126.3	(76.2)	108.5	18.0	854.0
Livestock activities	134.3	(79.2)	114.9	18.0	1382.1
Casual labor (*Maricho*)	130.4	(72.0)	112.7	19.1	623.9
Wage labor	180.3	(114.2)	147.4	40.3	1382.1
Non-farm business	148.2	(106.9)	118.3	30.0	1382.1

Table A.2: Total per capita consumption by exclusive livelihood strategies (grouping – baseline data)

Livelihood strategies grouping (exclusive participation)	Mean (sd)		Median	Min	Max
Only On-Farm (crop/livestock)	107.7	(66.3)	93.5	18.0	854.0
Only Non-Farm (wage labor/business)	182.4	(140.8)	131.1	55.0	560.6
Only Casual labor	69.4	(51.9)	54.7	23.2	323.2
On-Farm & Non-Farm	172.5	(116.3)	141.5	30.0	1382.1
On-Farm & Casual labor	127.5	(68.9)	110.0	19.1	623.9
On-Farm & Non-Farm & Casual labor	148.1	(80.8)	133.5333	30.0	496.5
Kruskal-Wallis equality-of-population test: P-value	0.00				

Table A.3: Total per capita consumption by non-farm business (baseline data)

Non-Farm businesses	Obs	Mean (std. dev.)		Min	Max
Tuck Shop	4	241.07	(122.8)	109.92	460.90
Petty trader	117	158.61	(122.3)	41.08	1382.08
Butchery					
Bottle shop/grocery	2	258.82	(6.8)	253.87	263.50
Clothing/shoe store	2	123.93	(17.4)	111.65	136.22
Harward store					
Ag input store	1	164.52	.	164.52	164.52
Selling airtime	2	262.65	(61.4)	228.75	318.25
Mill	4	346.00	(199.7)	118.71	514.27
Charcoal					
Mechanic/tire repair	1	389.27	.	389.27	389.27
Traditional healer	2	118.86	(89.7)	55.42	182.30
Taxi/transportation					
Bar/restaurant					
Electronics/phone repair	2	210.06	(131.4)	123.25	309.45
Agricultural inputs	1	117.08	.	117.08	117.08
Seamstress/tailor/clothes repair	8	243.47	(159.2)	78.33	618.00
Hairdresser/barber	4	160.33	(56.1)	99.00	217.58
Making bricks	18	158.79	(93.1)	40.60	487.42
Home brewery	22	86.16	(33.5)	30.00	153.50
Construction	10	173.76	(54.2)	74.60	256.25
Carpenter	13	161.19	(65.8)	70.50	303.77
Crafts	87	130.04	(71.7)	34.17	568.90
Other	20	136.26	(116.7)	30.00	489.04