

From Protection to Production: The Productive Impacts of Cash Transfers and Health Insurance in Ghana

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Abstract

In this paper, we examine the relationship between LEAP 1000, an integrated cash transfer and health insurance programme and asset accumulation, asset commercialization and non-farm employment in Ghana. To explain further the causal linkage, we explore the role behavioral factors. We employ a two-wave panel data set and estimate a difference in difference model and panel fixed effects regression models. Using livestock ownership as an indicator for asset accumulation, we show a positive association between LEAP 1000 and livestock ownership at the extensive, but not at the intensive margin. We also show a positive association between LEAP 1000 and non-farm employment. Exploring livestock heterogeneity, we further demonstrate a positive association between LEAP 1000 and the ownership of goats and poultry. In terms of livestock commercialization, show a positive association between LEAP 1000 and livestock purchase and sales, with a higher prevalence of purchases compared to sales. Exploring what could be driving the positive association between LEAP 1000 and productive livelihoods, we consider the role of psychological factors such as impatience and future orientation where we establish a positive association between LEAP 1000 and future orientation and a negative association between LEAP 1000 and impatience. That is, cash transfers have the potential to reduce impatience and make households value the future. We find evidence of a positive association between future orientation and livestock ownership, both at the extensive and intensive margins as well as with the different livestock types.

Keywords: LEAP 1000; cash transfers; livestock; employment; future orientation, psychology

1. Introduction

A growing empirical literature supports the premise that social assistance programs, especially cash transfers have lifted many households out of poverty and boosted shared prosperity (Skoufias and Di Maro 2008; Alderman and Yemtsov 2014; Banerjee et al. 2015; Fisher et al. 2017; Handa et al. 2018; Daidone et al. 2019). Despite these advancements, it is also increasingly accepted that single social assistance interventions are not the panacea and that concerted integrated will be required to lift more people from poverty. As such, there is an increase in integrated social assistance programs that target multiple vulnerabilities. For instance, In Ethiopia, the Productive Safety Net Program (PSNP) and community-based health insurance are increasingly combined (Shigute et al., 2017; Shigute et al., 2020) and in Rwanda, extremely poor households benefit from both health insurance premium waivers and are targeted for cash transfers and other interventions under the country's flagship Vision2020 Umerenge Program (VUP). Nonetheless, there is still a dearth of evidence on the progressive, additive impacts of these integrated programs on welfare and graduation from poverty. This paper is about one such program, the Ghana Livelihood Empowerment against Poverty (LEAP) 1000 program.

In this study, we investigate the productive impacts of this joint unconditional cash transfer and health insurance program on productive livelihoods. The LEAP1000 is an extension of the flagship Livelihood Empowerment Against Poverty (LEAP) cash transfer program which targets pregnant women and families with children between 0-1 years in Ghana. This extension, on top of providing households (with children under 2 years or pregnant women) with cash transfers also provided health insurance support through paying for their enrolment in the Ghana National Health Insurance Scheme. Specifically, the paper examines the association between LEAP 1000 and (1) livestock rearing ; (2) livestock commercialization, and (3) non-farm employment. The paper also investigates the potential heterogeneity in different livestock types. In making investment decisions, we hypothesize that psychological factors such as future orientation as well as socio-emotional skills such as patience mediate the interplay and decision making between program participation and household investment decision in livestock. To test this hypothesis, we undertake non-parametric estimation without imposing a prior functional form to understand the role of future-orientation in livestock production. We thus explore how the different livestock types respond to future orientation.

Our analysis offers several contributions to different strands in the empirical literature on cash transfers and welfare improvements in developing countries. First, we offer additional insights on the productive impacts of cash transfers by highlighting its association with both livestock production as well as non-farm employment. Here, we move beyond the literature that has established that cash transfers build household resilience in times of income shocks and reduce poverty to look at another dimension of cash transfers. While cash transfers can be protective, they can also be very productive and lead to sustainable investments in the future (Devereux and Sabates-Wheeler 2004; Schüring and Loewe 2021).

Second, we look at one of the very contested but also wrong perceptions about cash transfers, dependency, that is cash transfers lead to less participation in productive work. This perception on welfare dependency and associated disincentive to work has mostly been promulgated by some press and media teams and this seem to be gaining public grounds (Lindert and Vincensini 2010). This view has also been promoted by sections of the public who also share the thought that cash transfers induce dependence and reduce motivation to work (Kalebe-Nyamongo and Marquette 2014). Previous analysis on this relationship exists but they do not look at livestock investments or non-farm or wage employment (Covarrubias et al. 2012; Boone et al. 2013). Some of these are based on evaluations in Latin America which forms the bulk of the literature on cash transfers (Todd et al. 2010; Gertler et al. 2012). Two studies are closely related to what we do (Asfaw et al. 2014; Daidone et al. 2019). While Asfaw et al. (2014) examine the productive impacts of cash transfers in Kenya, Daidone et al. (2019) look at these effects from many more countries (Ethiopia, Ghana, Kenya, Lesotho, Malawi, Zambia, and Zimbabwe). Although Daidone et al. (2019) offer some insights on Ghana, their analysis is based on the mainstream LEAP program. One addition that our study contributes to these is that specific focus of our intervention – pregnant mothers and households with children under 2 years. This is very important since productive livelihoods may be gendered and negatively biased towards women. In this regard, understanding ways of boosting rural employment has deep implications for women who usually spend a lot of their time on unproductive household activities. Our analysis provides impacts of an anti-poverty program from a gendered point of view (Peterman et al. 2022).

Third, we also look at the relationship between cash transfers and psychological wellbeing which is relatively understudied. Specifically, we look at effect of the program on future oriented

behaviors elicited through a time preferences survey experiment. Beyond economic and productive impacts, cash transfers could also have large impacts on psychological well-being (Correa et al. 2023). To our knowledge, these aspects have only been explicitly considered by a few studies (Haushofer and Shapiro 2017; Kosec and Mo 2017; Handa et al. 2020). We add to this literature by looking at future orientation as well as patience which is a socio-emotional skill. We examine the impacts of cash transfer on behavioral outcomes especially pertaining to the ability of households to delay present level gratification for investments with future-oriented benefits. Relatedly, we also examine whether future orientation could explain the relationship between program participation and investments leading to asset accumulation. Our insights here contribute to the growing literature on the psychology of poverty that looks at behavioral drivers of poverty (Haushofer & Fehr, 2014; Molotsky & Handa, 2021; Ibrahim et al., 2023). Here, we test whether future-orientation also follows an inverse U-shaped (non-monotonic) relationship like other behavioral constructs such as aspirations. Estimating this is informative about whether there is a threshold point beyond which future orientation leads to disinvestments in livestock as has been shown in the growing aspirations-investments literature (Correa et al. 2023; Tabe-Ojong et al. 2023c).

Insights from this study are very informative and relevant for developing countries given high poverty and inequality incidence. This is usually compounded with low employment rates for many individuals especially women and youth. All these lead to high poverty both in terms of income, assets, wealth, and psychology which also reflects capability. Of course, high income poverty is correlated with asset poverty as most of the income poor lack material resources such as land and other productive resources which they could use for investments to evade poverty traps. Given this, it may thus be relevant for policies and measures seeking to reduce poverty and improve livelihoods to focus on improving rural productivity and productive (self) employment through giving them a big push and transiting households from unpaid to paid productive activities. This would involve some form of targeting repurposing such that cash transfers are transitioned from being mostly viewed as a form of social protection to covering aspects of production by being promotive. This transition is in line with the poverty graduation programs that are increasingly being highlighted to be relevant for stirring productive impacts in developing countries (Balboni et al. 2022). Low wages and the mostly informal jobs in most rural areas, especially in developing

countries may prevent households from undertaking savings, consequently making it difficult to purchase some productive assets such as livestock and establish small and medium size enterprises (petty business).

The rest of the paper is structured as follows. Section two presents a brief overview of the literature covering cash transfers and productive activities and thus lays the conceptual framework of the study. Section 3 is an overview of the LEAP1000 cash transfer program and its evaluation design. Section four delves directly into the methods and highlights the data, measurement of various variables used in the analysis and the empirical strategy. It also contains some additional analysis and some different robustness checks. The results are then presented and discussed in section four with some triangulation carried out based on the empirical literature. The thesis concludes with a summary, policy implications and recommendations, limitations of the study and potential gaps for future analysis in section five.

2. Literature: Cash Transfers and Productive Activities

To structure the thinking of the relationship between cash transfer and productive livelihoods, we specify a brief conceptual framework highlighting some important pathways and potential mechanisms. Given our interest in production livelihoods where we examine both the production and commercialization of livestock as a key household asset. It provides us with a starting point to understand this through the conventional non-separable agricultural household model (Singh et al. 1986). In this framework, the production and consumption decisions of households are non-separable in such a manner that production and consumption are mutually determined. Under this scenario, households would only participate in markets to the extent that the household food demands are met. The assumption of non-separability is expected to be held in many developing countries where markets face many constraints to effective functioning. These include credit, insurance, labour, product, and factor markets which could all lead to market failures for the most parts (Dillon et al., 2019; Tabe-Ojong et al. 2022b).

Given this, households face a myriad of constraints in their desire to maximize utility from say production, consumption, and commercialization. Providing cash to households and relaxing the budget burdens of some of their other needs such as healthcare, may relax the binding liquidity

constraints and overcome some aspects of market failure. Particularly, providing cash to households may directly improve the liquidity portfolio of households, but it could also increase their credit worthiness such that they could have access to credits and other income support. This could lead to greater productive investments such as investing in livestock. Cash could also lead to labor reallocation to other important income generating activities (Daidone et al. 2019). Furthermore, depending on the size of the cash, households may decide to save this cash for future purposes. However, since formal banking facilities are missing in many rural areas, they may just invest the cash into livestock as a precautionary saving instrument (Tabe-Ojong et al. 2023c; Moyo et al., 2010). Such ex-ante strategies may be important for hedging against risk and make households less risk averse (Daidone et al. 2019). Households that are less risk averse would freely engage in productive investments such as livestock production. This goes to highlight that cash transfers could serve as an informal insurance mechanism. Relatedly, they may also improve the way households manage risks in the framework of the “safety first or eat first” ideology. In line with this, there exists evidence from Mexico that households who received cash from the Oportunidades program did not consume all of this (Gertler et al. 2012). They invested a quarter of this cash after consuming three quarters, allowing the authors to conclude that cash transfers could have long term impacts and be self-sustaining when households invest in productive activities which could further increase consumption (Gertler et al. 2012; Hidrobo et al. 2018).

From another perspective, households that receive cash could diversify their production portfolio to participate in non-farm employment which could also be income generating (Daidone et al. 2019). In the face of weak and non-enforceable labour markets, cash transfers could reduce labour supply. For instance, the existence of credit constraints coupled with fixed cost to work may be easily overcome by cash transfers, which could then result to labour reallocation to self-employment and non-farm business activities such as petty trading, handicraft and other small business enterprises which could add to the income stream of households (Asfaw et al. 2014; Daidone et al. 2019). Beyond these market inefficiencies, transaction cost could also play a role and make households to not participate in markets either as buyers or sellers as transaction costs may create a wedge between the market price and the actual price paid by households (Tabe-Ojong et al. 2022b).

Cash transfers could also change behaviors through impacts on socio-emotional skills hence influence the psychology of how people think about poverty, their current situation and their valuation of the future. For instance, in Zambia, cash transfers were shown to affect intertemporal decision making and future-oriented behaviors of households (Handa et al. 2020). Shocks to income such as natural disasters but also ecological shocks which have been shown to decimate households assets and livelihoods and portend future losses may also reduce aspirations and non-cognitive skills such as locus of control and self-efficacy (Kosec and Mo 2017; Tabe-Ojong 2022). Social protection has the potential to mitigate not only material losses but also negative effects on psychological outcomes. With insights from the 2010 devastating floods in Pakistan, Kosec and Mo (2017) showed that providing households with relief assistance in the form of cash after the floods reduced some of the adverse effects on aspirations and relaxed the mental burden of households. In this regard, the value of cash transfers may be underestimated if these psychological factors are ignored. Some of these psychological factors such as aspirations have been shown to be associated with livestock investments. In Kenya, livestock investments are associated with the aspiration gap and locus of control with cattle and poultry showing the most significant response (Tabé-Ojong et al. 2023c). In this regard, one could think of these psychological factors as a pathway or mechanism explaining the relationship between cash transfers and productive livelihoods.

Evidence from developing countries points to the fact that women spend many hours per day on domestic activities and household chores such as cooking, cleaning, fetching water, and caring for their children (Hyde et al. 2020). For the most part, this may be due to cultural norms and gender expectations which usually hold women accountable for such household activities. Most of these household chores and activities that occupy women are usually unpaid and could act as a hindrance to women's empowerment and sustainable development. It is estimated that women in developing countries spend about 3.4 times on unpaid labour as compared to men (Hyde et al. 2020). For instance, in Guinea and Guatemala, women spend 3.6 hours and 3.3 hours per day respectively on domestic unpaid activities. In Mozambique, caregiving and household domestic chores were generally left in the hands of women (Arora 2015).

Providing cash transfers have the potential to reduce the workload of women and make them more productive as they reallocate their time to other productive enterprises. It is plausible that cash

transfers can increase outsourcing of various women's tasks and chores, reducing caregiving tasks. These reduction in caregiving activities and other tasks can relax the time constraints of women and make them participate in different productive activities. Furthermore, providing cash transfers as highlighted earlier could be productive beyond being protective. especially in rural and agrarian settings where households could invest this cash in their farm production activities and generate profits and surpluses (Daidone et al. 2019). Also, this relationship may depend on other factors such as the program design (size, frequency and duration of transfer), the targeted group of the transfers, recipient of the transfers (women, men), conditionalities and interdependencies and system linkages (Peterman et al. 2022).

3. Design of the Ghana LEAP 1000 Programme

LEAP 1000 is an extension of the Livelihood Empowerment Against Poverty (LEAP) programme which started in 2008. LEAP is Ghana's flagship poverty alleviation program and is implemented under the guidance of the Ministry of Gender, Children, and Social Protection (MoGCSP) (Tabe-Ojong et al. 2020). The programme provides cash assistance to poor and vulnerable households on a bimonthly basis. Originally targeted to households with orphans, vulnerable children, persons with disability, and the elderly with little or no productive capacity, LEAP birthed LEAP1000 in 2015 with the inclusion of pregnant women and families with children who are less than one year old. Although targeted to women, it implicitly was also addressing families with children between less than 12 months of age. LEAP1000 was rolled out in Northern Ghana with seven districts in the main Northern regions and three districts in the Upper East region as shown in Figure 2.

The selection of these districts was based on both income and food poverty which is highly prevalent here. In the selected districts, targeting of beneficiaries followed a demand approach whereby eligible women were encouraged to apply for the programme. Selected women had to show an antenatal card if pregnant and birth certificates for those with children less than one-year-old (Transfer Project. 2020). Women who applied were then subjected to go through the LEAP proxy means test (PMT) to minimize targeting errors. Eligible women based on the PMT scores were subsequently enrolled in the program and started receiving transfers. In total, about 6124 households with eligible women had been enrolled by 2015 (Transfer Project. 2020). The payments to households were different based on the number of eligible women as shown in Table 1.

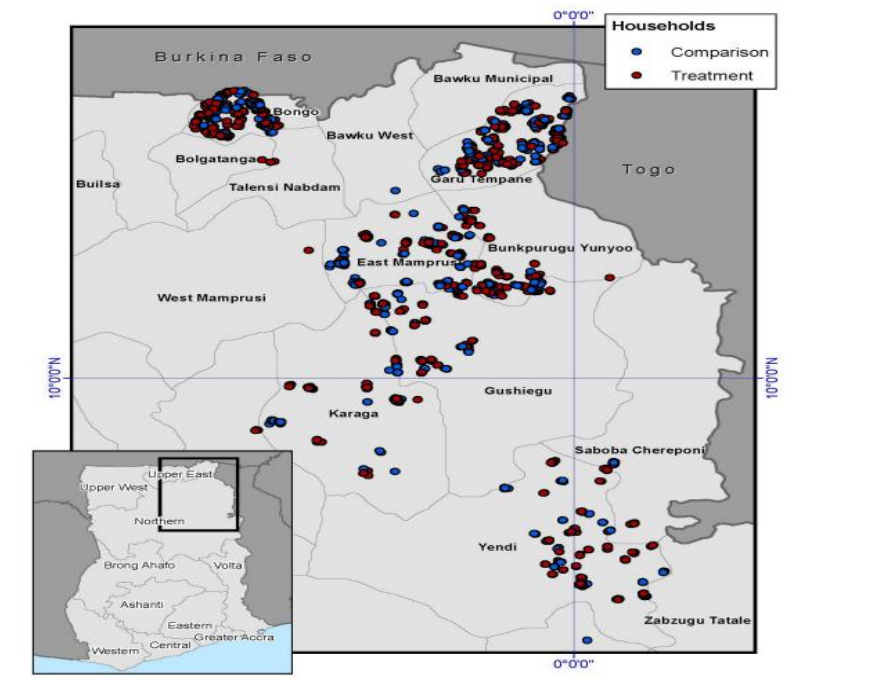
Table 1 Amount of cash transfer per household

Household characteristic	Transfer (GHC)
One eligible member	64
Two eligible members	76
Three eligible members	88
Four eligible members	106

Source: (Transfer Project. 2020)

An interesting characteristic of the LEAP transfer is that it opens access to free health insurance coverage to beneficiaries. This operates through the National Health Insurance Scheme (NHIS) with beneficiaries having access to dental services, maternal health services, as well as free out-patient and in-patient services (Transfer Project. 2020). This is indicative of the complementarities and interdependencies between various social protection instruments.

Figure 1 Map of study area showing LEAP 1000 households.



Source : Transfer Project documents

4. Methodology

4.1. Household survey

This thesis used the quasi-experimental LEAP 1000 impact evaluation data which is a two-wave panel dataset collected in 2015 and 2017 (Transfer Project. 2020). LEAP 1000 as earlier highlighted, is an extension of Ghana's LEAP cash transfer program targeted to pregnant women and women with children who are less than one year old. Data collection was planned for about 2500 households with eligible women. The 2500 households arrived at after power calculations resulted in equal halves of 1250 for households that received the cash payments and households that did not. To cater for missing households and enable quick replacements in some communities, a buffer sample of 125 households was added to both treatment and control groups. In 2015, 2497 households were reached, of which 1262 were households that received cash payments and the rest (1235) received no payments since they were above the cut-off (Table 2). Baseline analysis showed that these households were similar and balanced at baseline with little or no statistically significant difference between the two groups (Transfer Project. 2020). In 2017, the survey successfully reached 2331 households, with an attrition rate of about 6.64 percent. Previous studies that used this data have shown that attrition is not an issue here (Groot et al. 2022; Peterman et al. 2022).

Table 2 Summary of households reached.

	2015	2017
Treatment	1262	1185
Control	1235	1146
Total	2497	2331

Source: (Transfer Project. 2020)

4.2. Measurement of variables

We have three main outcomes: livestock ownership, participation in non-farm livelihood activities and some psychological variables. For livestock, we further have three different measures including livestock ownership as an indicator variable, flock size and the tropical livestock units (TLU). While the indicator variable can be looked upon as an extensive measure of livestock ownership, flock size and tropical livestock units (TLU) are more intensive measures (Tabe-Ojong et al. 2023c). The indicator variable is a binary variable indicating livestock ownership as a dummy (yes or no). Households in the study area in Ghana are keeping both large ruminants (cattle,

donkey), small ruminants (sheep, goats) and different kinds of poultry. Flock size considers the actual number of all these livestock owned. This is arguably a better measurement of ownership than the indicator variable as it captures the number of livestock that households are keeping. However, this measure has some disadvantages as it essentially considers all the different livestock as equal (Tabe-Ojong et al. 2023c). Of course, owning 30 large ruminants such as cattle is better than owning 30 goats or poultry, but this measure does not consider these nuances. To enable comparison between households, we also use the TLU which apportions units to the different livestock considering their live weight. For instance, one cow is equivalent to 0.70 livestock units, sheep and goats are equivalent to 0.10 livestock units and poultry 0.01 livestock units. We also capture livestock commercialization as an indicator variable where we disaggregate them as both households that are buying and selling livestock. We also captured the sales and purchase value of these livestock.

For the second outcome, we consider participation in non-farm livelihood activities as an indicator variable taking the value of one for households that participate in such activities and zero otherwise. Households in the study area are typically rural households and participate in many non-farm livelihood activities such as petty trading, home production activities, handicrafts, community service, shop keeping, small scale manufacturing and participation in various small and medium size enterprises.

For the psychological factors, we consider three outcomes that relate to time preferences and aspects of future making: future orientation, impatience, and the waiting threshold. Future orientation refers to the ability of individuals to evade more certain present gains in favour of better uncertain future gains. This variable ranges from 0-1 and captures some aspects of risk aversion.

To assess time preferences - a measure of potential inclination to present orientation or future orientation, the LEAP survey presented respondents with a series of questions involving a hypothetical situation if they preferred to have a certain amount of money now or at different intervals in future, with an interest. The questions were posed in a manner that estimates consistency in future orientations if a respondent continuously chooses a future option. For instance, where the future option is selected, the next question presents the respondent with an option that penalises the future by reducing the interest rate and hence potential gains. If a

respondent still chooses the future option, they reveal consistent future orientation. The questions are shown in Table 3.

Table 3 Future oriented time preferences

Suppose someone you trust gives you some money. You can choose to receive GH¢ 100 now or an amount at a later date. What would you choose? Select the first option or the second option		
1	GH¢ 100 now or GH¢ 100 in one month	
2	GH¢ 100 now or GH¢ 300 in one month	
3	GH¢ 100 now or GH¢ 75 in one month	
4	GH¢ 100 now or GH¢ 200 in one month	
5	GH¢ 100 now or GH¢ 150 in one month	
6	GH¢ 100 now or GH¢ 250 in one month	

Source: Authors' presentation from LEAP 1000 surveys

Previous studies have established that these hypothetical questions elicit reliable measures of time preferences (Chuang and Schechter 2015; Contreras Suarez and Cameron 2020). Our measure of patience is closely similar to Contreras Suarez and Cameron (2020). Individuals who select the present option are highlighted as the least patient hence most impatient while those who select a future option have higher levels of patience. Our measure of patience therefore ranges from 1-7 with 1 being the least patient (most impatient) and 7 being the most patient (least impatient). This ordinal scale is based on different thresholds and a combination of the responses, but this essentially relates to 7 if someone always chooses the future and 1 if someone always chooses the present.

One key difference with Chuang and Schechter (2015) or Contreras & Cameron (2020) is that our pattern of survey administration is also able to reveal inconsistent preferences in three ways. First, as can be seen from question 3 in Table 3, individuals who have a very high future orientation are still asked whether they still select a future option even when the future is negatively weighted. Second, unlike in other studies the administration of LEAP questions does not follow a linear pattern but more a non-linear pattern and hence able to elicit consistent preferences and not just future discount rates more objectively. Third, because of the non-linear ordering of the questions, we can observe individuals with time-inconsistent time preferences. While time-inconsistent time preferences might emanate from hyperbolic discounting where individuals apply a lower marginal

rate of substitution to future consumption/preferences, inconsistency might also be as a result of psychological phenomena that include over estimations of the future or biased inertia (Caillaud and Jullien 2000). An example of these is when an individual choses option 1 in question 4 but option 2 in question 5.

4.3. Empirical strategy

Given that households with eligible women were not randomly assigned to getting cash payments but rather signed up and were enrolled based on eligible thresholds, employing a quasi-experimental design such as the discontinuity design (RDD) seems most appropriate (Transfer Project. 2020). RDD is a quasi-experimental method that relies on threshold or cutoff values in determining differences between treatment and control households. In our case, the cutoff is based on the PMT score which is exogenously determined. The main identifying assumption of the RDD is because households around the eligibility threshold are “as good as if they were randomly” assigned to the treatment and control groups given that they would potentially be similar.

Despite the suitability of the RDD to estimate the association between LEAP 1000 and productive livelihoods, we rather employ the difference in difference (DiD) approach following extant studies that relied on this same data (Groot et al. 2022; Peterman et al. 2022). The choice of a simple DiD is informed by the fact that households were sampled by the cut-off point of the PMT scores for evaluation purposes. This makes the threshold of the distribution of households in the sample to be small and mostly around the PMT score. Moreover, different tests on the most appropriate functional form showed the DiD to be the best fit for the context and data. For instance, the Akaike information criteria showed the linear functional form to be more appropriate as opposed to other quadratic model forms with different interactions of the cash transfers and the PMT scores. That said, one could think of this as estimating a DiD framework in the spirit of an RDD. We estimate a regression equation of the form:

$$Y_{ijt} = \beta_0 + T_t\beta_1 + CT_{ij}\beta_2 + (CT_{ij} * T_t)\beta_3 + \mathbf{X}_{ijt}\beta_4 + c_j + \epsilon_{ijt} \quad (1)$$

Where Y_{ijt} is the main outcome of interest of woman i living in community j at a point in time t measured as described above. We have several outcomes pertaining to productive livelihoods such as livestock ownership (cows, goats, sheep, poultry), non-farm enterprise (petty trader, crafts, and other local economic activities), and aspects of livestock commercialization. We also have some

psychological factors pertaining to the impatience scale and future orientation. T_t is a dichotomous variable that takes the value of 1 for households in year 2017 and 0 otherwise. CT_{ij} refers to households that are eligible and receive a cash transfer and 0 otherwise. $CT_{ij} * T_t$ is the interaction terms between the cash transfer (LEAP 1000) and time. $\mathbf{X}_{ijt}$ is a vector of control variables used to improve the precision of the model. It refers to other individual and household characteristics as well as the PMT scores of the households. We include controls such as age and educational level, household size, marital status and the PMT scores of the households. c_j refers to time invariant unobserved heterogeneity (it captures individual, household and community level fixed effects) and ϵ_{ijt} is the stochastic error term.

Our variable of interest is the interaction between cash transfer eligibility at a point in time t ($CT_{ij} * T_t$). Our parameter of interest is β_3 which tells of the impact of the combined effect of cash transfers and health insurance on time poverty. Our estimates can be referred to as the intent to treat (ITT) effects since we rely on treatment assignment. We cluster our standard errors at the community level. Although we estimate the impacts of both cash and health insurance since they were joined together, it is important to mention that health insurance compliance was not perfect. At endline, just about 46% of treatment households had signed up for health insurance (Peterman et al. 2022). This makes our estimates likely conservative and should be looked upon as a lower bound of the combined effect of cash transfers and health insurance in Ghana. At this point, it is important to mention that our results would be valid only for households close to the programme eligibility cut-off given we are estimating a DiD in the spirit of an RDD.

The validity of the difference in difference estimator relies on two common assumptions, that is the parallel trend assumption and the anticipation effects assumption. The parallel trend assumption states that treatment and control groups must be similar and have the same trends at baseline. This assumption makes it possible to attribute any change at the endline to the treatment. In other words, any change in the control group after treatment provides a good approximation of an expected change in the treatment group if they did not receive the treatment. We do not have pre-baseline data to test this assumption, but we can rely on mean differences of the outcomes and control variables at baseline to give us an indication of this. At baseline, we observe that the treatment and control groups are sufficiently similar as depicted by the balance tests (Transfer

Project. 2020). The anticipation effect refers to whether the baseline data corresponds to the situation before the program has some effects. As the word goes, individuals may anticipate a program which could drive up the baseline numbers and possibly underestimate the program effects. In the presence of anticipation effects, baseline data would be affected by the program. This may lead to biased program impact which for the most part would be underestimated. We do not think that our analysis suffers from any anticipation effects given the way the program was rolled out.

4.4. Additional Analysis

Although pigs are not considered livestock, we perform some additional analysis where we examine the relationship between LEAP 1000 and pig ownership. Like for the other livestock, we still use the difference in difference framework.

Beyond this, we also perform some further regressions where we look at the relationship between future-orientation and livestock. Here, we undertake both parametric and nonparametric estimations. Parametrically, we estimate panel fixed effect estimations exploring the panel nature of the data. For the non-parametric estimations, we do not impose any prior functional form and graphically observe the estimated relationship between future-orientation and livestock. We examine both the extensive and intensive measures of livestock ownership and extend this further to some heterogeneity analysis where we consider all the various livestock types.

5. Results and discussion

5.1. Characterising the sample

We present the means and the standard deviations for all continuous variables in Table 4. For all the indicator variables, we only present the means given that the standard deviation is gotten directly from the mean and the sample size. Thus, we do not lose any valuable information by excluding it. Commencing with our outcome variable, we show that about 55% of households in the study area own livestock which could either be large ruminants such as cows, donkeys, or small ruminants such as sheep, goats. As highlighted earlier, households are also into poultry keeping. Some households even keep pigs which do not qualify as livestock as they are usually not kept for production or lifestyle but mainly for meat.

In terms of the number of livestock owned, we observe that households own an average of approximately eight livestock. Transforming this using the tropical livestock units, this changes to about 2.4 livestock units per household. As we are also interested in livestock heterogeneity, we also summarise the number of individual livestock owned by households. As shown in Table 4, very few households own large ruminants such as donkeys and cows. Most households own less than 1 cow or donkey and this is even smaller for donkeys. This low ownership of donkeys could be because of the value of these large ruminants which may be costly for most smallholder households. Sheep ownership has an average of less than one, but the average number of goats owned is approximately one. For poultry, we find that many households are into poultry keeping. Households own about 5 poultry birds. For pigs, we also find that few households keep pigs.

Table 4 Descriptive characteristics of the regression variables

Variables	Obs	Mean	Std. Dev.
Livestock ownership (1/0)	4828	0.554	
Flock size (number)	4828	7.58	20.196
Tropical livestock units	2682	2.335	7.209
Donkey	4828	0.088	0.490
Cows	4828	0.567	4.278
Sheep	4828	0.828	3.096
Goat	4828	1.106	3.577
Poultry	4828	4.637	12.574
Pig	4828	0.280	1.758
Non-farm employment (1/0)	4828	0.154	
Purchase livestock (1/0)	4828	0.138	
Sold livestock (1/0)	4828	0.051	
Purchase value (\$)	4828	29	
Sales value (\$)	4828	10.378	99.146
Waiting threshold	4767	241.483	118.087
Future oriented (1/0)	4790	0.396	
Impatience scale (ordinal)	4767	4.478	1.973
Female (1/0)	4828	0.988	
Shocks exposure (1/0)	4828	0.865	
Cooking wood (1/0)	4828	0.883	
Household size (number)	4851	6.574	2.487
Age (years)	4828	19.836	6.155
PMT score	4828	-0.001	1
Married (1/0)	4828	0.971	

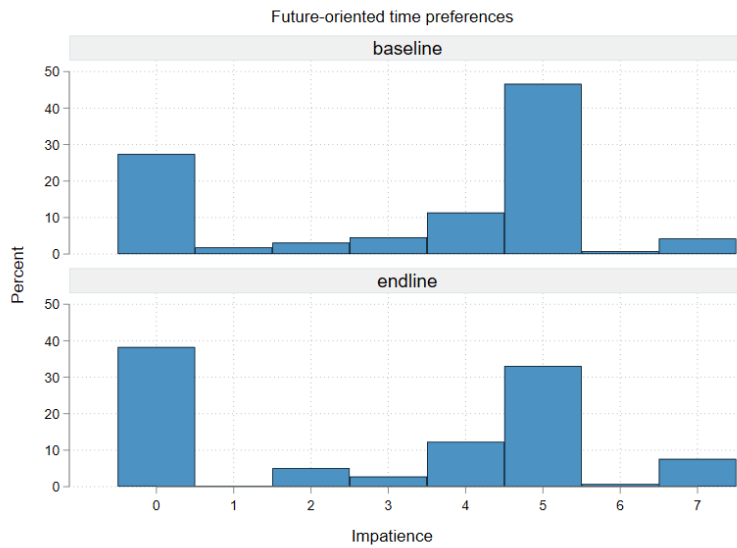
Source: Author's computation from LEAP 1000 data

Table 4 also shows the mean participation level of households into non-farm employment activities such as petty trading and different forms of small and medium enterprises where women earn extra income. About 15% of women are involved in various non-farm employment showing that participation in diversified activities is low amongst households in the study area. In terms of smallholder commercialization where we specifically look at the sales and purchase of livestock, we find that about 14% of households are purchasing various forms of livestock. On the other hand, just about 5% of households are selling livestock. This goes to show that although the market for livestock seems to be active, many households are buying rather than selling livestock. We also value the sales and purchase of livestock, which is in the same direction as the sales and purchase decisions. Given the low value obtained, one could assume that households are mainly buying poultry and, in some cases, small ruminants which are less expensive to buy.

Turning to the behavioral and psychological outcomes, we have three variables: waiting threshold, impatience scale and future orientation. About 40% of households are future-oriented, that is they are more forward looking and value future-oriented investments than present level gratification. Related to this, the impatience scale which ranges from 1-7 in decreasing order of patience shows that households are largely not found at the end of the ordinal scale but are closer to the middle and more towards being impatient. This suggests that households are somewhat impatient although not to a large extent. Figure 3 shows the frequency of patience along the 1-7 scale. We show that majority of the people have lower levels of patience.

As already mentioned, the sample is a female sample as only women were entitled to these cash transfers. About 90 % of households report to have experienced some shocks in the recent past. These shocks range from production to health and economic shocks and include loss of livestock and livelihoods due to weather events, sickness, and accidents. Approximately 90% of women cook using fetched wood. This is not surprising as anecdotal evidence suggests that most women in developing countries are time poor, spending most of their time on different household activities such as fetching water and wood for cooking. This has immense implications on their participation in other livelihood activities, especially those that are paid. In terms of household size, most households are large; every representative household has on average 7 household members. The women are also young with an average age of about 20years. Most of the women in the sample are also married.

Figure 2 Future-oriented time preferences at baseline and end line



Source: Authors visualisation using LEAP 1000 data

We perform some balancing checks although previous analysis using the same data had established considerable balance in both outcomes variables but also covariates (Groot et al. 2022; Peterman et al. 2022). Like them, we find considerable balance for most of the outcome and control variables (Table 5). This is important as it has deep implications on our estimation strategy and the ensuing results and discussion. Obtaining balance in a quasi-experimental setting like this is important for some assumptions of the estimation strategy.

Table 5 Balancing checks showing difference by LEAP 1000

	(1)	(2)	(3)	(4)
Variable	Control	Treatment	Diff (2-1)	Observation
Livestock ownership (1/0)	0.510	0.527	0.017	2,497
	(0.500)	(0.499)	(0.020)	
Herd size (number)	7.879	7.704	-0.175	2,497
	(26.897)	(19.009)	(0.931)	
Tropical livestock units (TLU)	3.021	2.794	-0.227	1,295
	(10.947)	(8.418)	(0.541)	

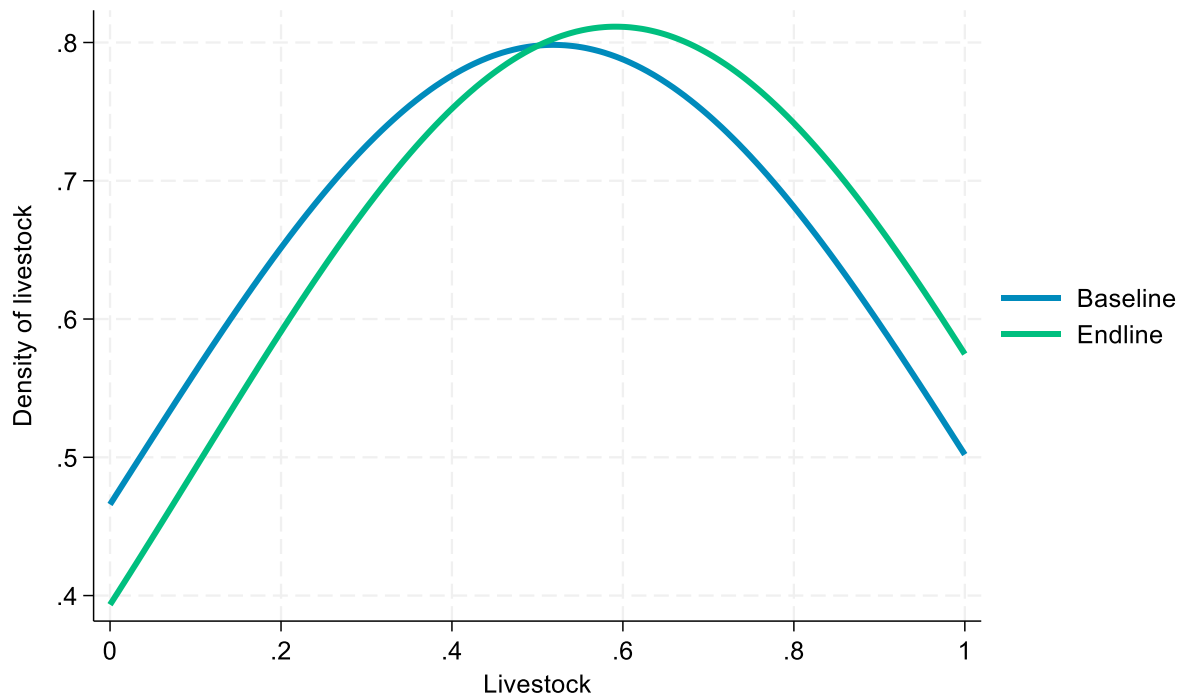
Non-farm employment (1/0)	0.221	0.204	-0.017	2,497
	(0.415)	(0.403)	(0.016)	
Cows (1/0)	0.771	0.741	-0.030	2,497
	(5.631)	(5.633)	(0.225)	
Sheep (1/0)	0.927	0.834	-0.093	2,497
	(4.557)	(2.484)	(0.146)	
Goats (1/0)	1.171	1.059	-0.111	2,497
	(4.662)	(3.592)	(0.166)	
Pigs (1/0)	0.317	0.213	-0.104	2,497
	(2.989)	(1.000)	(0.089)	
Poultry (1/0)	4.446	4.640	0.194	2,497
	(11.925)	(12.945)	(0.498)	
Livestock purchase (1/0)	0.000	0.000	0.000	2,497
	(0.000)	(0.000)	(0.000)	
Livestock sales (1/0)	0.000	0.000	0.000	2,497
	(0.000)	(0.000)	(0.000)	
Livestock purchase (\$)	0.000	0.000	0.000	2,497
	(0.000)	(0.000)	(0.000)	
Livestock sales (\$)	0.000	0.000	0.000	2,497
	(0.000)	(0.000)	(0.000)	
Waiting threshold	223.988	232.330	8.342*	2,497
	(112.066)	(114.080)	(4.527)	
Future orientation (0-1)	0.436	0.417	-0.018	2,497
	(0.299)	(0.303)	(0.012)	
Impatience (ordinal)	4.194	4.338	0.144*	2,497
	(1.883)	(1.894)	(0.076)	

Household head is female (1/0)	0.987	0.988	0.001	2,497
	(0.113)	(0.108)	(0.004)	
Insurance coverage	0.905	0.910	0.004	2,497
	(0.293)	(0.287)	(0.012)	
Fetching cooking wood (1/0)	0.883	0.895	0.012	2,497
	(0.322)	(0.307)	(0.013)	
Household size	6.296	6.907	0.611***	2,497
	(2.488)	(2.678)	(0.104)	
Age (year)	19.653	19.321	-0.332	2,497
	(6.392)	(6.154)	(0.251)	
Married (1/0)	0.977	0.983	0.006	2,497
	(0.151)	(0.131)	(0.006)	
PMT scores	0.869	-0.850	-1.719***	2,497
	(0.488)	(0.533)	(0.020)	
Observations	1,235	1,262	2,497	

Source: Author's computation from LEAP 1000 data. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

We now delve into more details where we look at some of our outcome variables such as livestock ownership and future orientation. Figure 4 shows the kernel density distribution of livestock ownership looking at both the baseline ownership as well as the endline ownership. As can be seen from the figure, both baseline and end line livestock ownership are somewhat following a similar trend although livestock ownership at endline seems to be greater than ownership at baseline. Although descriptive, this is already pointing to the direction that livestock accumulation is increasing over time. Whether this is because of LEAP 1000 is what we are going to show in the empirical results after controlling for different confounding.

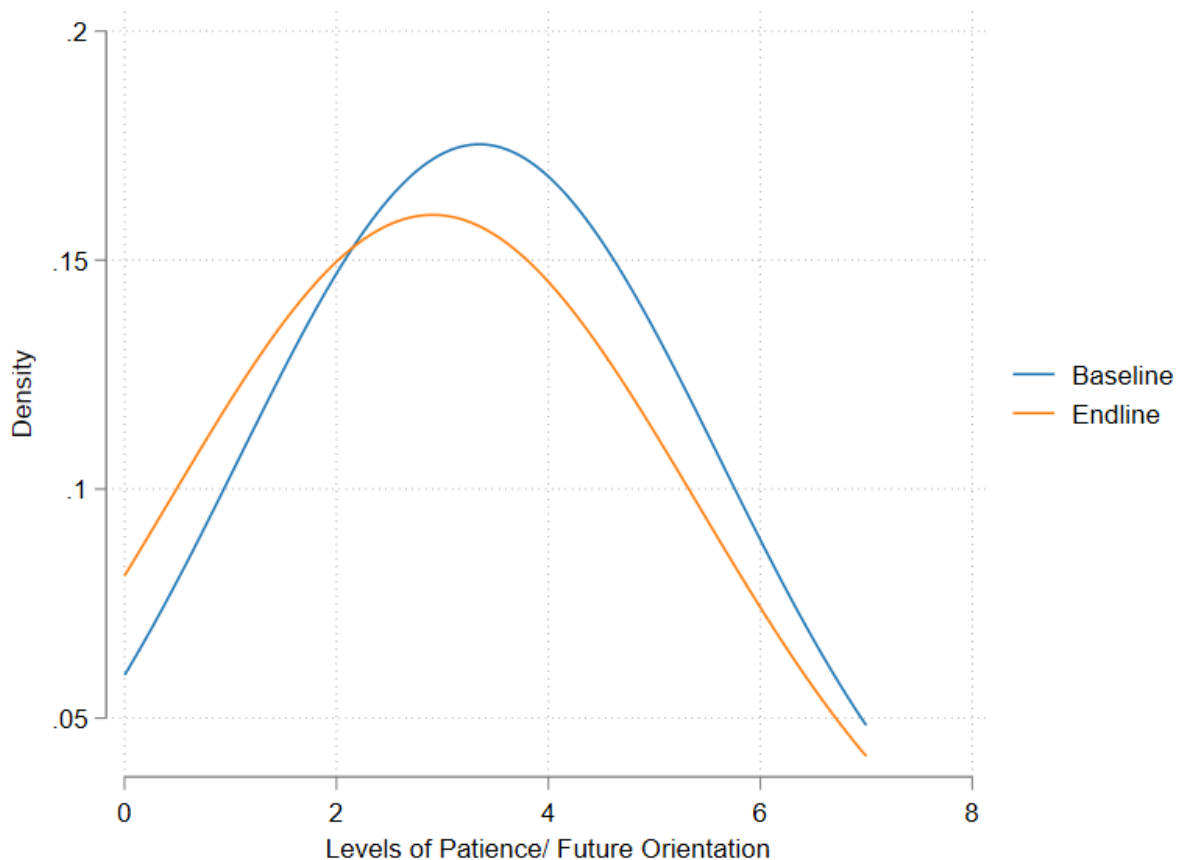
Figure 3 Kernel density distribution of livestock



Source: Authors visualisation using LEAP 1000 data

Figure 5 also shows the kernel density distribution of impatience at both baseline and endline. Again, both baseline and endline impatience levels are somewhat following a similar trend with some reduction in impatience at the endline.

Figure 4 Kernel density distribution of impatience



Source: Author's visualisation using LEAP 1000 data

To obtain some descriptive insights on livestock ownership based on the difference in means of the treatment and control groups and how they evolve over time, we further plot some figures capturing this dynamic relationship. Figures 6 and 7 show the evolution of livestock ownership over time. In figure 6, we observe that both the treatment and control groups are following a particular upward trend, but there's a large difference between the two groups. For future orientation (Figure 7), we obtain a slightly different trend. The future orientation of both the treatment and control groups are reducing, but the reduction is higher for the treatment than for the control group. All these results could already signify and suggest that LEAP 1000 has an important role in increasing livestock ownership and mitigating reactions in future orientation.

Figure 5 Livestock by treatment and control group over time

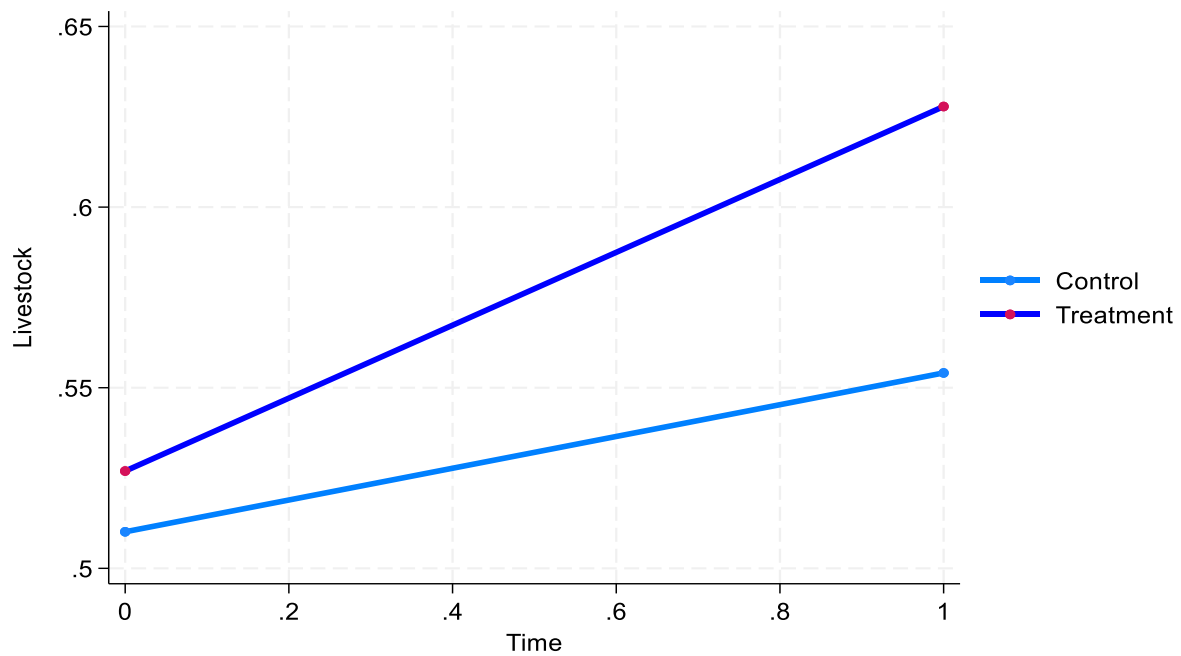
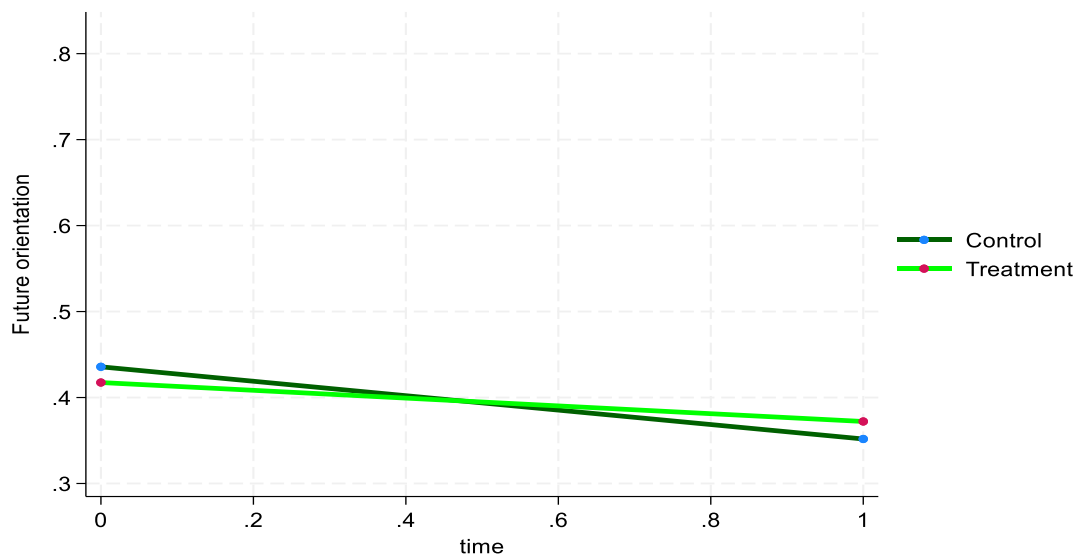


Figure 6 Future orientation by treatment and control group over time



Source: Author's computation from LEAP 1000 data

5.2. Empirical results

After describing the data and some basic descriptive insights from it, we delve into the empirical results which are based on the difference in difference estimator. One of the key assumptions to obtaining unbiased insights from this model is the parallel trends condition; that is the prior to the treatment, the key model outcomes should be following the same trend. In our case, it is hard to observe the parallel trend as we do not have pre-treatment data. We only have one data round before the roll out of LEAP 1000, making it not possible to test this assumption. However, to obtain some insights into this, we perform some balancing checks. The importance of these checks is to establish whether there are any statistical differences in the outcomes, but also the control variables. As shown in Table 6, we do not observe any statistical difference, implying that the balance between treatment and control groups. Given this, we proceed to the results of the difference in difference estimations for all the variables.

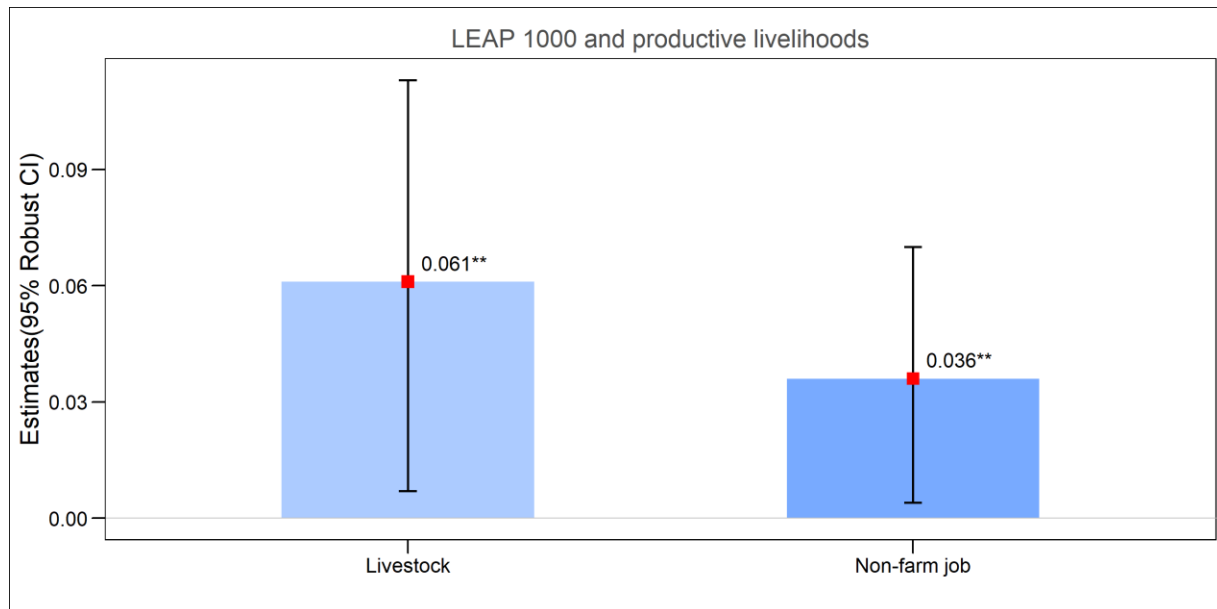
5.3. Cash transfers and livelihoods

We begin by looking at the relationship between LEAP 1000 and livestock production as well as non-farm employment. As shown in Figure 8, we observe a positive association between LEAP 1000 and livestock ownership, that is women in households that receive the cash transfer support are more likely to own livestock. This relationship is statistically significant at the 5 percent level of probability. Figure 8 also shows the relationship between LEAP 1000 and non-farm employment. Here, we observe a positive association between LEAP 1000 and non-farm employment and the relationship is statistically significant at the 5 percent level of probability. This suggests that women who received the cash transfer support are more likely to engage in a non-farm employment such as petty trading and other small and medium size type of enterprises.

The positive association between LEAP 1000 and livestock ownership and non-farm employment is indicative of two important results: (1) cash transfers can stir livestock production and (2) cash transfers can stir productive employment in other livelihood activities. While the first result is more indicative of the agricultural portfolio of cash transfer impacts, the second results tell an interesting story about livelihood diversification. Cash transfer does not only lead to productive employment but is also important in diversifying the livelihood options of smallholder households in rural settings. Given that most households in rural areas are usually engaged in agricultural activities which are increasingly being combined with the production of some livestock

(Habiyaemye et al. 2019), these are important findings as they tell of the ability of cash transfers to diversify rural employment.

Figure 7 Cash transfers and livelihoods



Notes: The figure displays coefficients along with their corresponding 95% confidence intervals as error bars. The coefficients are estimated using the difference in difference estimator with N=4828 observations. The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** p<0.01, ** p<0.05, * p<0.1). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A5. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

Similar insights on the positive association between cash transfers and agricultural production more broadly have been highlighted in the empirical literature (Todd et al. 2010; Covarrubias et al. 2012; Gertler et al. 2012; Boone et al. 2013; Asfaw et al. 2014; Daidone et al. 2019). For instance, cash transfers have been shown to have productive impacts by increasing the ownership of productive assets and the reliance on own production in Malawi (Covarrubias et al. 2012; Boone et al. 2013). With respect to livestock production, the literature here is growing (Todd et al. 2010; Asfaw et al. 2014; Daidone et al. 2019). The most relevant for our analysis are the studies from Asfaw et al. (2014) and Daidone et al. (2019) that cover large scale transfer programs in sub-saharan Africa (Ethiopia, Ghana, Kenya, Lesotho, Malawi, Zambia, and Zimbabwe). Although the

insights from Ghana are based on the LEAP program, it is important to mention that our analysis is about the LEAP 1000 program which is more recent and targeting women. This is made even more explicit by the different results we obtain. While we show a positive association between LEAP 1000 and livestock production, the LEAP program was not able to detect any discernible association. Over all the evaluations done in the seven countries, there is significant heterogeneity in terms of results. Cash transfers are associated with livestock investments in Malawi, Zambia, Lesotho, and Zimbabwe. As earlier mentioned, no effects were found for Ghana but also Kenya and in Ethiopia, households were rather found to exit livestock production (Daidone et al. 2019). In Kenya, Asfaw et al. (2014) show that cash transfers provide more flexibility and labour availability such that women are more likely to create and engage in non-farming enterprises.

Regarding the positive association between LEAP 1000 and non-farm employment, our analysis is well situated and supports some previous work that has been done in this direction (Covarrubias et al. 2012; Boone et al. 2013; Asfaw et al. 2014; Daidone et al. 2019). These studies have shown that cash transfers are associated with labour reductions, especially through inducing the reduction of low skilled labour participation. Low skilled labour participation is common in many rural areas and pays host to many poor people who usually engage in wage labour for survival. If cash transfers can indeed relax the labour availability constraints of households, especially women who are usually engaged in many household' unpaid activities, our insights on non-farm employment participation are therefore in order. This would also apply to livestock production which is an aspect of self-employment. Cash transfer programs have been shown to increase participation in non-farm employment in Zambia and Zimbabwe (Daidone et al. 2019). Similar insights were also earlier reported in Ethiopia and Kenya respectively (Gilligan et al. 2009; Asfaw et al. 2014).

After establishing a positive association between LEAP 1000 and livestock ownership at the extensive margin, we also examine the relationship between LEAP 1000 and intensive livestock production by looking at the number of livestock owned by households as well as the livestock units attributed to these livestock. As shown in Figure 9, we observe a positive association between LEAP 1000 and the number of livestock owned by households. However, these are not significant as the p-values are high. This is also the case for the transformation using the tropical livestock units. LEAP 1000 has a positive and statistically significant association with livestock ownership at an extensive, but not at an intensive margin. This suggests that although LEAP stands the chance

of increasing livestock ownership, it may not do this in an intensive manner. These findings are somewhat intuitive given that the amount of cash given to households can get them invest in livestock but not intensively by making them invest in more livestock since some of the livestock considered are costly and would not match up with respect to the size of the transfer. All in all, cash transfers can get households into productive livestock employment that has the potential to multiple in the long run. But given that we have just one period data after the transfer, we cannot estimate such long-term impacts of cash transfers especially in the case of productive livestock investments. Just observing short term impacts through livestock ownership at an extensive margin is an interesting finding especially given that the cash transfer could have been used for other purposes including stirring livelihood diversification. Previous findings from the *Oportunidades* cash transfer program in Mexico show a positive association on both the probability of owning livestock and the number of livestock owned (Todd et al. 2010). Similar insights on both extensive and intensive measures of livestock production were also obtained in Malawi and Zambia (Daidone et al. 2019)

Figure 8 Cash transfers and Intensive livestock production



Notes: The figure displays coefficients along with their corresponding 95% confidence intervals as error bars. The coefficients are estimated using the difference in difference estimator with N=4828 observations. The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** p<0.01, ** p<0.05, * p<0.1). Statistical tests are two-sided t-tests. Full models are reported in

supplementary table A5. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

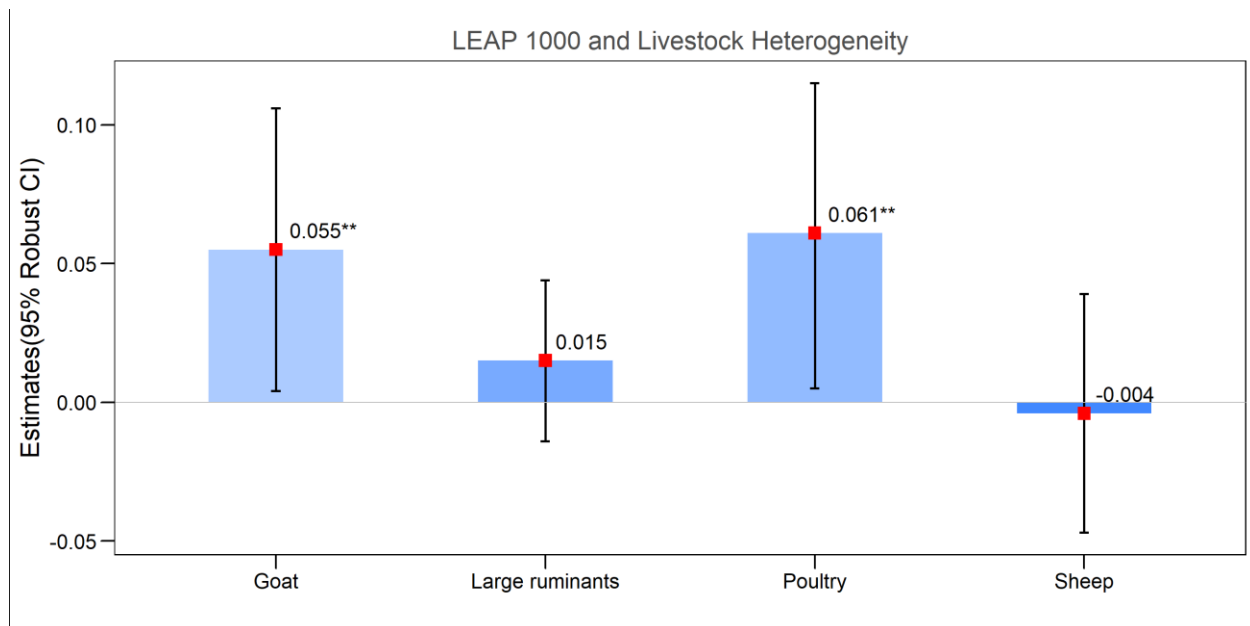
5.4. Heterogeneity analysis

As earlier highlighted, households are into a large portfolio of livestock. They own different livestock such as donkeys, cows, goats, sheep, and poultry. We hypothesize that these different livestock would respond to cash transfers in different ways. For instance, households may prefer to invest in large ruminants such as donkeys and cows which offer a lot of benefits to them including nutritious meat, insurance, traction power and even status (Tabe-Ojong et al. 2023c) but the size of the transfer may limit them from investing in such large ruminants. Given this, they may likely invest in small ruminants such as sheep or goats or better still poultry which are easy to keep and not very costly to purchase. In view of these heterogeneities and with insights from the descriptive statistics, we disaggregate livestock into large ruminants, sheep, goats, and poultry and run separate regressions for each of them. As shown in Figure 10, we observe a positive association between LEAP 1000 and large ruminants, goats, and poultry. However, this relationship is not statistically significant for the case of large ruminants. For both ownership of goats and poultry, we observe statistical significance at the 5 % level of probability, indicating a valid relationship between LEAP 1000 and poultry as well as goat ownership. For the ownership of sheep, we observe a negative association which is also not statistically significant. Given this, we focus and discuss only the relationship between LEAP 1000 and the ownership of goats and poultry.

These insights on the positive relationship between LEAP 1000 and the ownership of goats and poultry are intuitive and expected given the size of the transfers. Beyond this, it could also be the case that goats and poultry are easily marketed, that is they can be bought easily but can also be easily sold to improve the liquidity base of households. Moreover, these categories of livestock, especially poultry, are easy to manage as they require minimum attention and households can be involved in other gainful employment options when investing in these livestock. In some cases, keeping poultry goes in line with agricultural production since most poultry is usually produced in farmyards. For instance in Tanzania, poultry production is well integrated in vegetable production in the form of a feedback loop (Habiyaemye et al. 2019). In these vegetable-cum poultry production systems, poultry rely on and are usually fed with agricultural products from farms and

their litter which comprises excreta and spilled feed is used as a form of organic manure in these vegetable production systems. This sort of a circular production system is less costly but also environmentally friendly since households do not engage in the use of chemical production methods using inorganic fertilisers which may be costly for them. It has even been established that the use of these kinds of organic nature from livestock is associated with food security in rural settings in Cameroon (Tabe-Ojong et al. 2023b).

Figure 9 Cash transfer and livestock heterogeneity



Notes: The figure displays coefficients along with their corresponding 95% confidence intervals as error bars. The coefficients are estimated using the difference in difference estimator with N=4828 observations. The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** p<0.01, ** p<0.05, * p<0.1). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A6. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

Some studies have also established these kinds of livestock heterogeneity where they also show that small ruminants and poultry respond to cash transfers than large ruminants which may be too costly to buy (Asfaw et al. 2014; Daidone et al. 2019). For instance, in Zimbabwe, unconditional transfers programs have been shown to have significant impacts on the ownership of small ruminants and poultry (Daidone et al. 2019). In some countries such as Malawi, there exists substantial heterogeneity in terms of the gender of the household head. For instance, while female

headed households are more likely to invest in chicken, male headed households are more likely to invest in goats. This further disaggregation by gender lines could be indicative of labour constraints but could also signify cultural norms. For instance, since goats are usually tethered on suitable grazing, women may not be able to own goats in some communities where tethering by women is restricted based on cultural norms. Also, the search for suitable grazing land is usually time consuming for women who are usually busy with other household activities. Thus, most women may prefer keeping poultry birds since it is less time consuming and easier to manage.

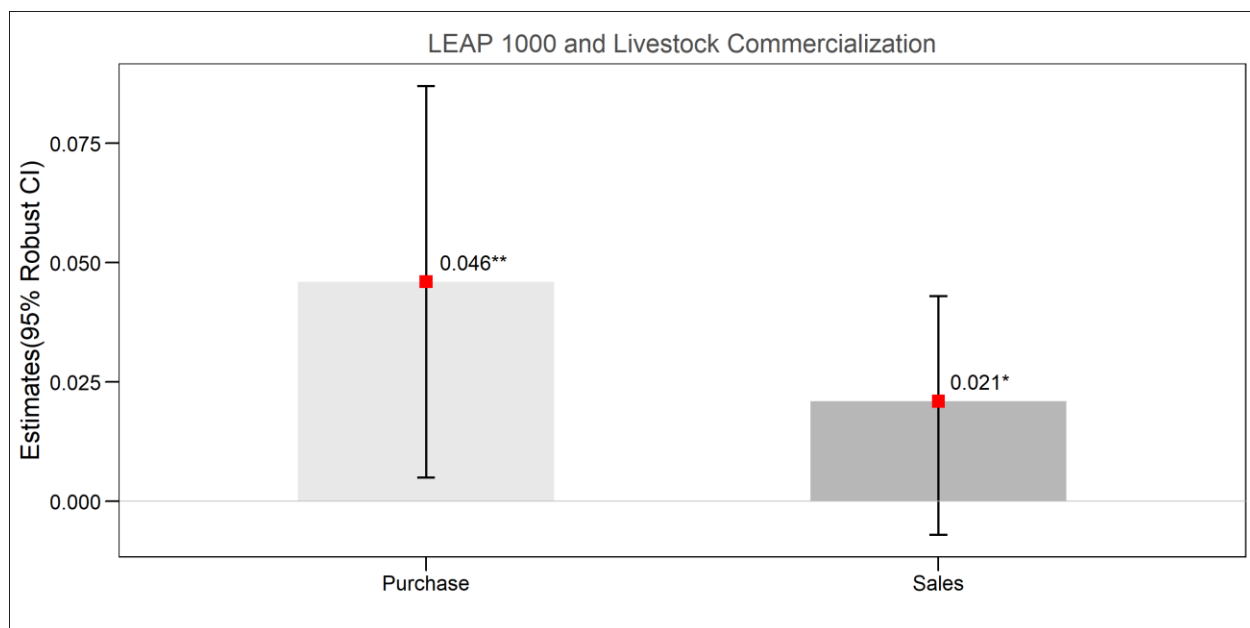
5.6. Cash transfers and livestock commercialization

Given the positive association between LEAP 1000 and livestock production as well as the observed heterogeneities in these results, one could presume that the livestock markets are not completely missing in the study area. Observing a positive association between LEAP 1000 and goat ownership as well as poultry ownership is indicative of some market transactions which may be taking place. We examine this by looking at livestock commercialization, that is whether households are buying or selling livestock. As shown in Figure 11, we observe a positive association between LEAP 1000 and livestock purchase and this relationship is statistically significant at the 5 % level of probability. This finding is supportive of the earlier findings on the relationship between LEAP 1000 and livestock ownership. Households are possibly investing the cash transfers into livestock production, and this is happening through purchasing livestock. Figure 11 also shows the relationship between LEAP 1000 and livestock sales. Here, we still observe a positive association which is significant at the 10 % level of probability. Interestingly, we also observe that the estimated magnitudes of livestock purchase are greater than livestock sales. While we estimate about 4.6 percentage points association with livestock purchase, we only observe 2.1 percentage points association with sales. This clearly indicates that livestock purchase is greater than sales and bodes well with the existing insights. Households are possibly purchasing poultry and goats and obtaining enhanced livelihoods from them. In the same vein, some are also selling as a way of possibly relaxing their financial constraints.

The insights of the positive association between LEAP 1000 and livestock commercialization are informative and tells of both short and long-term implications of cash transfers. While the purchase of livestock could signify the long-term implication, the sales of livestock could signal short term implications in terms of households selling livestock to relax their financial constraints and

possibly diversify their livelihoods to non-farm employment activities. Households could also use this income from livestock sales to cater for household food demands by purchasing food from markets (Hidrobo et al. 2018). The potential impacts of commercialization are immense as agricultural commercialization has been highlighted as having the potential to unlock smallholder poverty and drive households towards economic prosperity (Tabe-Ojong et al. 2022b). Given this, it is interesting to see the commercialization implications of cash transfers especially given that commercialization offers significant welfare benefits for smallholder farmers (Tabe Ojong et al. 2022a).

Figure 10 Cash transfer and commercialization

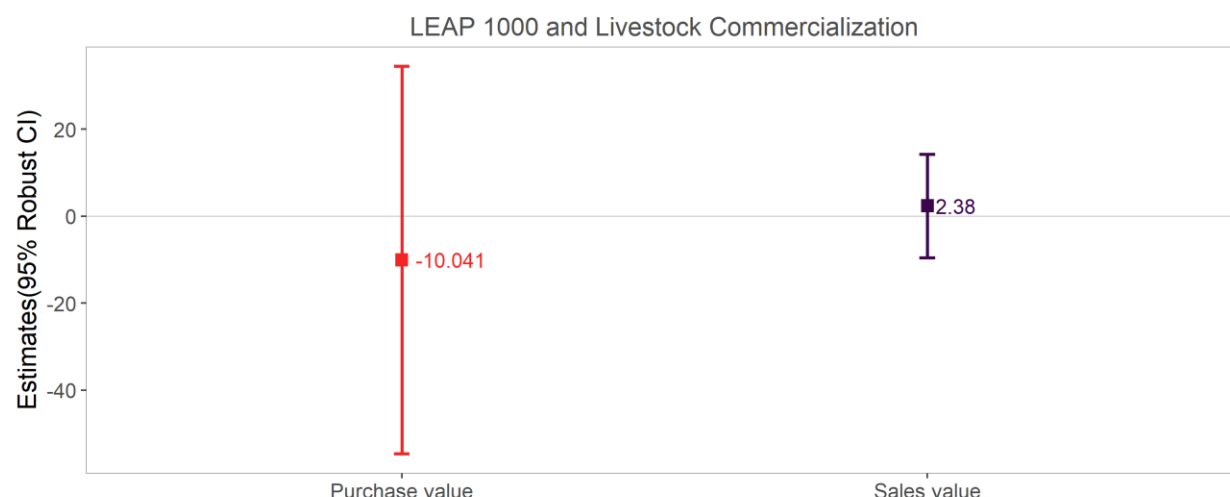


Notes: The figure displays coefficients along with their corresponding 95% confidence intervals as error bars. The coefficients are estimated using the difference in difference estimator with N=4828 observations. The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** p<0.01, ** p<0.05, * p<0.1). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A7. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

Just like with livestock ownership, we also examine commercialization intensity by valuing gains from commercialization. We look at the actual gains observed from both the sales and purchase of livestock. Figure 12 shows the relationship between LEAP 1000 and commercialization gains. We

do not observe any statistical relationship between LEAP 1000 and both livestock purchase values as well as livestock sales value. The p-values are large suggesting no statistical relationship.

Figure 11 Cash transfer and commercialization



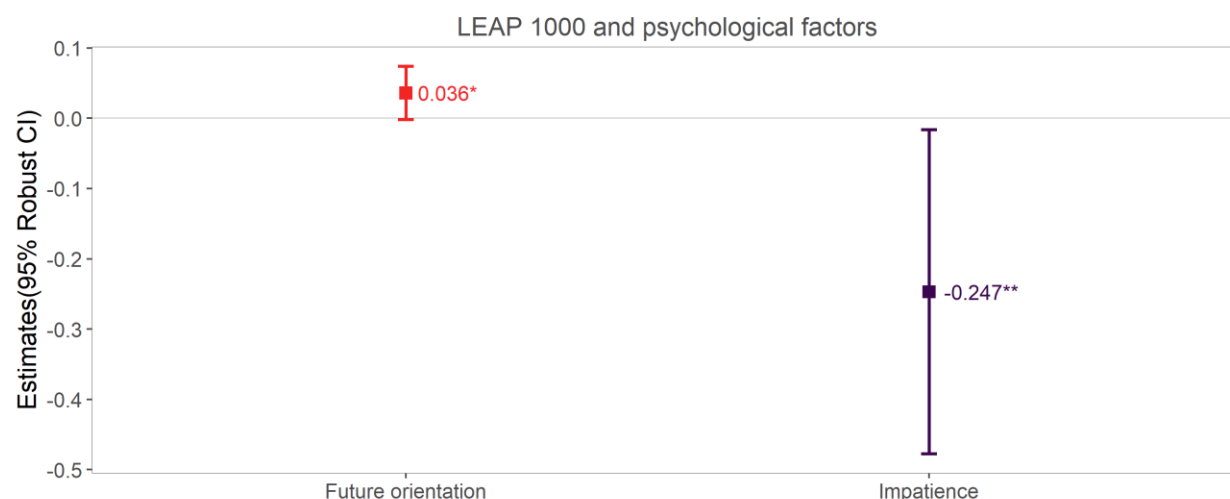
Notes: The figure displays coefficients along with their corresponding 95% confidence intervals as error bars. The coefficients are estimated using the difference in difference estimator with N=4828 observations. The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** p<0.01, ** p<0.05, * p<0.1). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A7. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

5.7. Cash transfers and future orientation

We now present the results of the relationship between LEAP 1000 and some psychological factors. We look at future-orientation, impatience and waiting threshold. Figure 13 shows the relationship between LEAP 1000 and future-orientation as well as impatience. We show a positive association between LEAP 1000 and future-orientation, that is households that receive the cash transfers are more future-oriented. This insight additionally bodes well with the relationship between LEAP 1000 and livestock ownership given that livestock investment is an activity in the present that is indicative of immense future gains. Cash transfers have the potential to not only mitigate external constraints but also internal behavioral constraints such as future orientation. This was the case with the 2012 floods in Pakistan where flood relief support was not able to

attenuate physical losses from the floods but was also instrumental in rebuilding aspirations (Kosec and Mo 2017)

Figure 12 Cash transfer and psychological factors



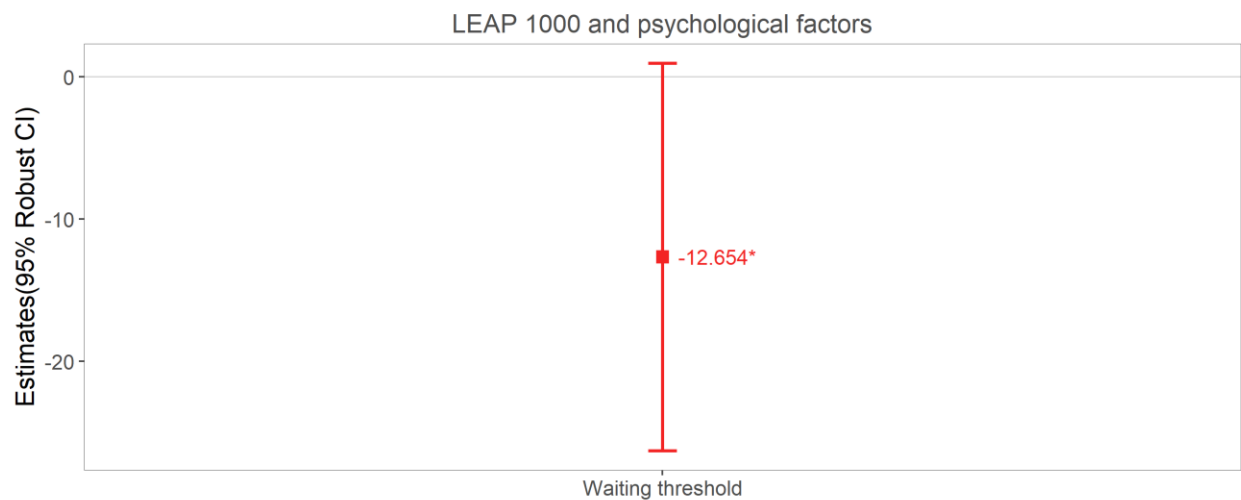
Notes: The figure displays coefficients along with their corresponding 95% confidence intervals as error bars. The coefficients are estimated using the difference in difference estimator with N=4828 observations. The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** p<0.01, ** p<0.05, * p<0.1). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A9. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

Figure 13 also shows the results of the impatience scale which is somewhat related to future orientation but slightly nuanced. It is an ordinal scale that ranges from 1-7 with 1 indicating patience and moves towards impatience. We observe that LEAP 1000 is negatively associated with a 24 percent impatience level. These results are in line with the future-orientation outcome where we observe a positive association. It is plausible that the positive association could be driven by the negative implication on impatience.

Finally, Figure 14 shows the relationship between LEAP 1000 and the waiting threshold which is in principle like the impatience scale. Here, the values also range from being patient to being impatient. The idea here is that some households would prefer, and value, current levels as opposed to future levels. This is the basis of time preferences wherein households' places importance on

either immediate or delayed utility. These households can be described as myopic as they do not value the future since they have high discount rates (Handa et al. 2020). Moving them to preferring future offers over current offers would require significant investments and push. Most of these kinds of individuals can be argued to have a high discount rate in the future. Here, we show a negative relationship between LEAP 1000 and the waiting threshold, that is the provision of cash transfers can push households above their threshold of waiting. This implies that households are more ready to be future-oriented with some push from cash transfers.

Figure 13 Cash transfer and psychological factors



Notes: The figure displays coefficients along with their corresponding 95% confidence intervals as error bars. The coefficients are estimated using the difference in difference estimator with N=4828 observations. The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A9. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

These insights on the positive association between cash transfers and psychological factors have been observed in some developing country settings (Haushofer and Shapiro 2017; Kosec and Mo 2017; Handa et al. 2020; Nnaeme et al. 2020; Molotsky and Handa 2021; Correa et al. 2023). For instance, in Zambia, cash transfers have been shown to affect intertemporal decision making and future-oriented behaviours of households by directly affecting time discounting (Handa et al.

2020). This was also the case in China where a multifaceted poverty reduction program was observed to have immense behavioural consequences by increasing efficiency preferences and reducing selfishness (Li et al. 2023). That said, some null results have been reported in some cases. For instance, Al Izzati et al. (2023) found no statistical significant relationship between unconditional cash transfers and behaviour and preferences in Indonesia.

5.8. Future orientation and livestock investments

After establishing a positive association between LEAP 1000 and livestock investments, we also examine the relationship between future-orientation and livestock. This insight can be seen as a possible explanation/pathway of the association between LEAP 1000 and productive livelihoods. This is inspired by the growing literature on the psychology of poverty (Molotsky and Handa 2021; Correa et al. 2023). The main hypothesis here is that relaxing the liquidity constraints of households may not have the intended effect of making households productive if they do not improve their future-oriented preferences. This is the basis of the literature highlighting that it is hard to escape poverty without some critical behavioural change.

Given this, we perform some simple panel regressions where we show a positive association between future orientation and livestock production both at an extensive and intensive margin. Table 6 presents these results where we highlight a 9.5 percentage point increase in livestock ownership because of future orientation. Future orientation also increases the number of livestock kept by households as well as the livestock unit transformation. These results are in line with some work from Kenya showing a positive association between aspirations and livestock investments (Tabe-Ojong et al. 2023c). The authors also show that locus of control, the belief that individuals control events in their life is also associated with livestock investments. Our findings offer empirical support to this scarce segment of empirical literature.

Table 6 Estimates of future orientation and livestock

	(1) Livestock	(2) Herdsize	(3) TLU
Future orientation (1/0)	0.095*** (0.022)	4.189*** (0.924)	0.791* (0.440)
Constant	0.164*** (0.059)	-4.322* (2.401)	-0.185 (1.398)

Observations	4,767	4,767	2,652
Number of hhid	2,497	2,497	1,827
Additional controls	Yes	Yes	Yes

Notes: The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** p<0.01, ** p<0.05, * p<0.1). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A11. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

Besides looking at livestock ownership at an extensive and intensive margin, we delve into some heterogeneity analysis to understand what livestock type respond more/less to future orientation. We again consider four groups of livestock: cows, sheep, goats, and poultry. As shown in Table 7, we observe a positive association for all livestock types, implying that all livestock types respond to future-oriented behaviour. Looking at the magnitudes, we observe increasing magnitudes from cows, through sheep and goats to poultry. Future orientation is associated with 5.7, 6.1, 7.8 and 11.3 percentage points increase in the ownership of cows, sheep, goats, and poultry. This suggests that small ruminants and poultry respond more to future-orientation than large ruminants such as cows.

Table 7 Estimates of future orientation and livestock heterogeneity

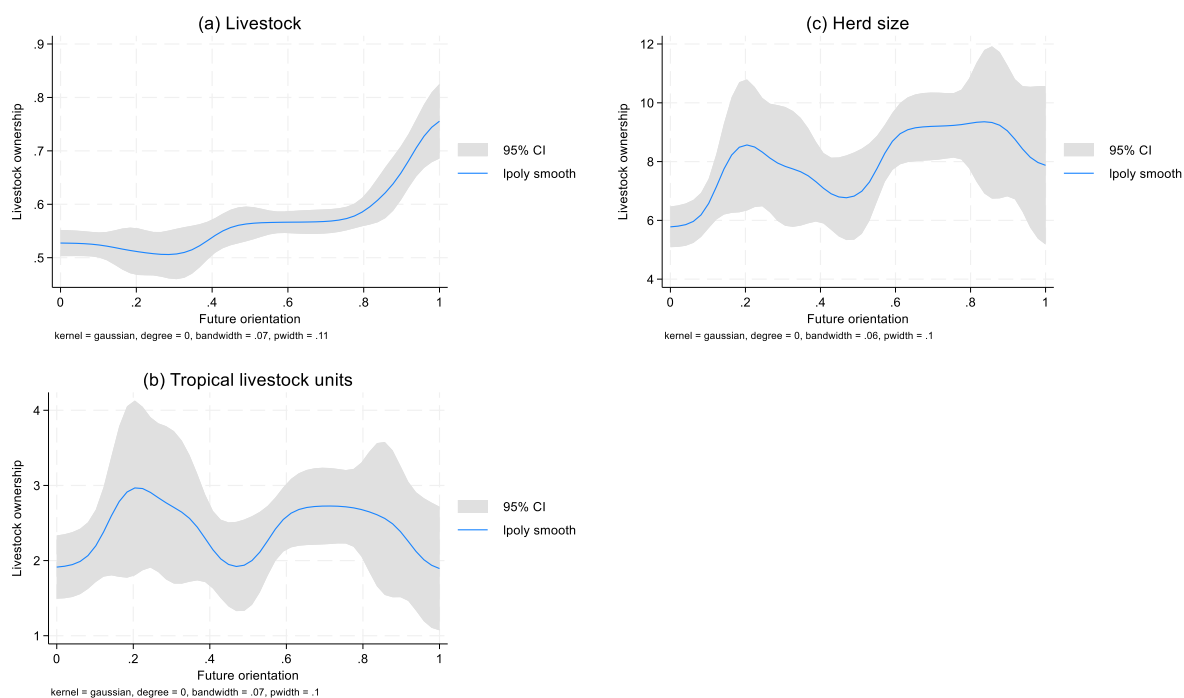
	(1) Cows	(2) Sheep	(3) Goats	(4) Poultry
Future orientation	0.057*** (0.015)	0.061*** (0.019)	0.078*** (0.021)	0.113*** (0.022)
Constant	-0.088** (0.040)	-0.051 (0.049)	0.042 (0.056)	0.152** (0.059)
Observations	4,767	4,767	4,767	4,767
Number of hhid	2,497	2,497	2,497	2,497
Additional controls	Yes	Yes	Yes	Yes

Notes: The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** p<0.01, ** p<0.05, * p<0.1). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A12. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

5.9. Nonparametric estimates of future orientation and livestock

In view of the growing literature of on the non-monotonic (inverse U-shaped) relationship between the aspiration gap and investments, we also estimate this theorized inverse U-shaped relationship given that aspirations reflect future-orientation from a much broader perspective. For instance, aspirations like our measure of future orientation are future oriented and exclude present level gratification. Figure 15 shows the nonparametric relationship between future orientation and livestock production where we consider both extensive and intensive measures of livestock production. We find a linear relationship between future orientation and the extensive measure of livestock production, confirming the previous parametric insight that as future orientation increases, livestock ownership also increases.

Figure 14 Nonparametric estimation of future orientation and livestock production



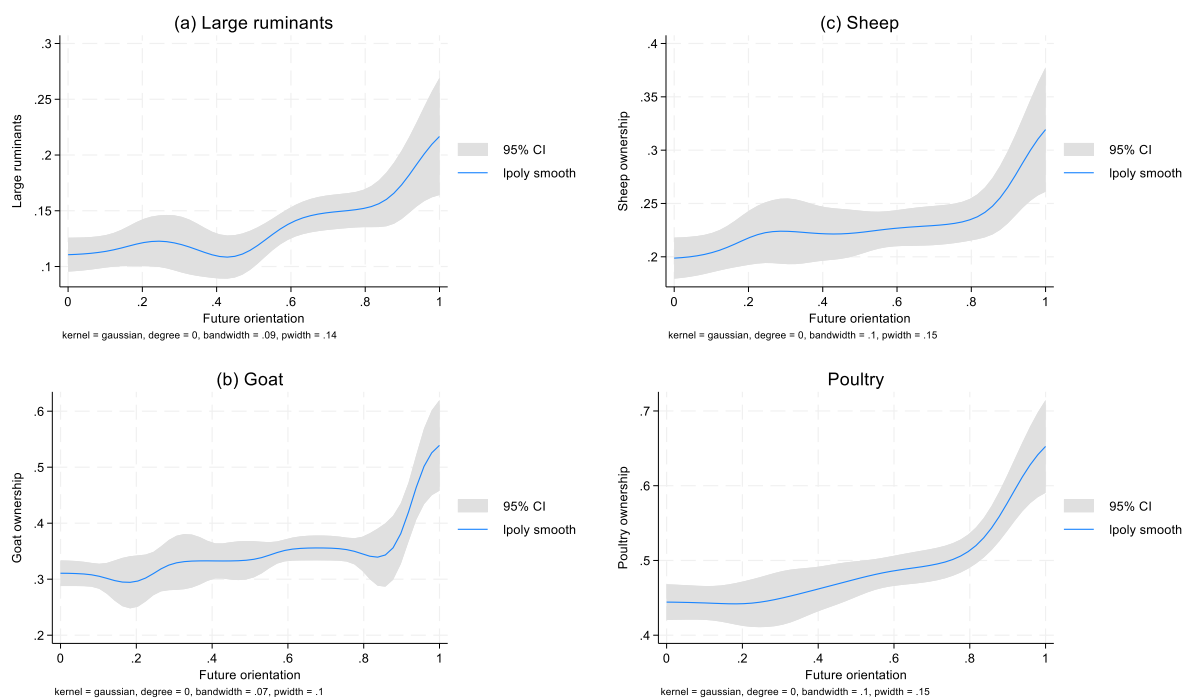
Notes: The figures show the estimated relationship between future orientation and livestock production. The blue line indicates the effect line while the shadow indicates the confidence interval for the estimated relationship.

For the intensive measures of livestock production, that is herd size and tropical livestock units, we find a somewhat non-monotonic relationship which takes the form of an inverse u-shape, although it has some embedded cycles within. This is probably due to the fact that we are just

considering future orientations without basing this on some current status quo such as how the aspiration gap is generated (Tabe-Ojong et al. 2023c). This could possibly explain these nuances, but it is informative that we sort of get this relationship.

We further explore livestock heterogeneity by examining the relationship between future orientation and livestock type. Figure 16 shows these relationships for all the livestock types: large ruminants, goats, sheep, and poultry. We observe a positive linear relationship between future orientation and ownership of large ruminants, goats, sheep, and poultry. This suggests that as future orientation increases, the ownership of the different categories of livestock also increases. This nonparametric relationship supports the parametric estimations that also show a positive linear relationship between future orientation and livestock heterogeneity.

Figure 15 Nonparametric estimation of future orientation and livestock heterogeneity



Notes: The figures show the estimated relationship between future orientation and livestock production. The blue line indicates the effect line while the shadow indicates the confidence interval for the estimated relationship.

5.10 Additional results

We perform some additional regressions to understand the relationship between LEAP and pig production. We differentiate the results because pigs are broadly not considered as livestock since they are mainly produced for meat. Table 8 presents these results where we exclude and include some additional controls. We obtain a positive association which is not statistically significant even at the 10% level of probability. Although previous analysis from Lesotho show a positive and significant relationship with pig production (Daidone et al. 2019), the lack of statistical significance in our case could be a relection of the limited number of households into pig production.

Table 8 Cash transfer and pig production

	(1) Pig	(2) Pig
Cash Transfer and time	0.119 (0.100)	0.126 (0.100)
Cash transfer	-0.104 (0.070)	-0.119* (0.071)
Time variable	-0.027 (0.071)	-0.022 (0.072)
Constant	0.317*** (0.050)	0.055 (0.203)
Observations	4,828	4,828
Number of households	2,497	2,497
Additional controls	No	Yes

Notes: The presence of an asterisk (*) above a coefficient indicates that the coefficient is statistically different from zero at a predetermined level of significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Statistical tests are two-sided t-tests. Full models are reported in supplementary table A8 and A10. The models are estimated with additional controls such as age of the women, marital status, household size, source of cooking wood, shock exposure and the proxy mean test.

6. Conclusion and policy implications

We rely on a two wave panel data set collected in 2015 and 2017 to understand the relationship between a large government based anti-poverty program in Ghana and productive livelihoods. Specifically, we examine the relationship between LEAP 1000 and livestock ownership both at the extensive and intensive margins. We also look at non-farm employment and examine some aspects of livestock heterogeneity. To understand what may be driving the relationship between the LEAP 1000 and productive livelihoods (livestock ownership and non-farm employment), we explore the role of some psychological and behavioral factors such as patience and future-orientation. We rely on the quasi-experimental difference in difference technique in the spirit of a regression discontinuity design to examine the relationship between LEAP 1000 and the various productive livelihood outcomes.

We find a positive association between LEAP 1000 and livestock ownership at the extensive margin. In terms of livestock heterogeneity, we report a positive relationship between LEAP 1000 and the ownership of goats and poultry. Furthermore, we also report a positive relationship between LEAP 1000 and livestock commercialization. We observe a stronger association for livestock purchase than for livestock sales. For the relationship between LEAP 1000 and the psychological factors, we find that in response to households receiving the LEAP 1000, psychological constructs such as impatience reduces. Relatedly, future orientation is also observed to increase. Additionally, we show a linear relationship between future orientation and livestock ownership. Moving to the nonparametric estimations, we observe a somewhat non-monotonic relationship between future-orientation and the number of livestock owned (livestock units). All these findings are suggestive of the fact that psychological factors could explain the relationship between LEAP 1000 and livestock production. Finally, we also show a positive association between LEAP 1000 and non-farm employment. This is also an important finding highlighting that cash transfers have the potential to also lead to livelihood diversification beyond productive implications. That we could obtain an association with non-farm employment which in most cases relates to self-employment suggests that cash transfers have the power to drive individuals towards improved productive livelihoods. We discuss all these interesting findings in the framework of the extant literature on unconditional cash transfers in sub-Saharan Africa that have been rolled out in

the last decade. We compare, contrast, and triangulate these empirical findings showing how they improve learning on cash transfers and social protection more broadly.

Our study has several policy implications and learning on social protection in developing countries. First, our analysis provides empirical support on boosting investments in social protection systems. As implied by our findings, cash transfers offer additional benefits beyond being protective. This finding challenges the notion that cash handouts lead to dependency among individuals in rural settings. We establish significant livestock productive effects but also effects on non-farm employment which are important implications of cash transfers. Thus, supporting poor rural individuals and households has the potential to make them productive with ensuing implications on their welfare and livelihoods.

Second and related to the first, we also support intensive cash transfer support. While it is important to upscale social protection programs, it may be even more important to increase transfer sizes to get larger and more sustained effects. Related to transfer sizes is the aspect of regular transfers so as to not create unintended effects. Besides, the provision of regular transfers may be important in improving the planning portfolio of individuals and households when it comes to productive investments and livelihoods.

Third, just like in any cash transfer program, targeting can be greatly improved to reduce inclusion and exclusion errors. The LEAP 1000 program was targeted to pregnant women and women with young kids, making it gender sensitive but also important for rural development since women are usually time poor and into many non-productive activities that do not earn them income, but they are expected to cater for household food and nutrition security. Given this interesting finding, we provide support to cash transfer programs that target particularly vulnerable groups of society such as women and children. This improved targeting not only has socio-economic and psychological implications but is also an important aspect of inclusivity. Such inclusivity stands the potential of having multiplier effects in communities and bridging various gender gaps in developing countries.

Fourth, our analysis points to the increasing need for effective follow-up of various social protection programs. This relates more to the non-compliance of many individuals with health insurance. Of course, getting assigned impacts is more policy relevant as it shows what will happen

in case of non-compliance, but it is important to also address non-compliance to increase program impacts.

Like every empirical exercise, we have some important caveats under which our study should be understood from. Moreover, we have some limitations that we discuss in this section. In the first place, we refer to our results as estimates that are suggestive of the impact of LEAP 1000 on productive livelihoods. We are careful to not refer to them as entirely causal estimates as we are limited by some of the assumptions of the difference in difference model but more importantly the compliance issues with health insurance coverage. Health insurance was part of LEAP 1000 as a complementary service but individuals had to take it upon themselves to enroll into this, but compliance was not perfect. Given all these, we refer to our estimates as conservative and should be regarded as the lower bound of the true productive effects of both cash transfers and health insurance since compliance to health insurance was not perfect. Given these limitations, it would be important for future efforts to rely on randomised control trials as they offer the benefit of estimating true causal effects. On the grounds of context, future research endeavours may want to further confirm the productive impacts of complementary cash transfer and health insurance programs in different contexts. Complementing various social protection instruments is something that clearly warrants improved attention from empirical research. Programs are sometimes rolled out independently without considering the complementary gains involved therein. This seems to underestimate the power and potential of different social protection programs.

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