Does Poverty Change Labor Supply? Evidence from Multiple Income Effects and 115,579 Bags*

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Abstract

The income elasticity of labor supply is a central parameter of many economic models. We test how labor supply and effort in northern Ghana respond to exogenous changes in income and wages using a randomized evaluation of a multi-faceted grant program combined with a bag-making operation. We find that recipients of the grant program increase, rather than reduce, their supply of labor. We argue that simple models with either labor or capital market frictions are not sufficient to explain the results, whereas a model that allows for a positive psychological productivity effect from higher income does fit our findings.

Keywords: poverty, labor supply, income elasticity
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1 Introduction

The income elasticity of labor supply is one of the central parameters of economic models. Under the standard assumption that consumption and work are not strong complements, it is easy to derive the prediction that any increase in income will reduce labor supply. This has important implications for the design of social policies, where for example a reduction in labor supply would lower the net income gains.

The basic argument for why we should expect this negative labor supply response is well-known. Making the standard assumptions that the utility from consumption is $u(c)$, the disutility of labor supply is $v(l)$ and the relation between consumption and labor supply is $c = f(l) + t$, where f is income and is some increasing concave function of labor supply and t is a transfer, we immediately get a first order condition

$$u'(f(l) + t)f'(l) = v'(l)$$

from which it follows that any increase in t will reduce the marginal utility of income and therefore labor supply. A number of important assumptions go into this much-used framework that predicts higher income will lower labor supply. First, as pointed out by Benjamin (1992) many years ago, we need that t does not directly raise the marginal product of labor. In other words, we cannot have $f(l, t)$ with $f_{lt}(l, t) > 0$. As Benjamin (1992) also points out, this is typically ruled out by either the assumption of perfect capital markets (in which case t should not enter $f(l, t)$) or by the assumption that household labor and market labor are perfect substitutes at the margin (in which case $f_l(l, t) = w$, where w is the market wage). However neither of these assumptions seem particularly plausible especially in the context of low income families in developing countries (LaFave et al., 2020). Therefore a transfer may actually directly raise the marginal product of labor, thus making this kind of *investment productivity effect* quite relevant.

A second reason why the expected income effect may be absent or even go the other way is that consumption (or income) and labor supply may be complements. In other words it is possible that the disutility of effort takes the form $v(l, c)$ with $v_{lc}(l, c) < 0$, at least for the very poor. The idea that a mechanical nutrition-productivity relationship generates complementarity between consumption and work lies at the heart of the earliest models of a poverty trap (Leibenstein, 1957; Dasgupta and Ray, 1986). In these models, a better-fed worker provides more effort. We call this a *physiological productivity effect*. More recently, psychological models of poverty traps have made a similar argument, arguing that low levels of psychological well-being generate similar theoretical predictions for how income may boost labor supply–what we will call a *psychological income effect*. One reason this may be slightly different from the physiological models is that the effect may go through income or even potential income rather than consumption.[1]

[1]For example, people may be relieved by the fact that they do not need to worry so much

One body of work, summarized in Mullainathan and Shafir (2013), has suggested that people living under any form of scarcity exhibit "tunnel vision," focusing so intently to allocate their scarce resources that they neglect other margins and make sub-optimal decisions as a result. The psychological effects of financial strain may have concrete effects on productivity in the labor market (Kaur et al., 2019; Fink et al., 2018). Another body of work, summarized in Haushofer and Fehr (2014), investigates the effects of poverty on risk-taking and time-discounting. Positive income shocks have been shown to reduce risk aversion (Tanaka et al., 2010), and negative income shocks have been shown to increase present-biased behavior (Haushofer and Fehr, 2019). These effects may operate via economic circumstances (i.e. anticipating future liquidity constraints), but they may also operate through preferences: poverty alleviation has been shown to reduce negative affect and stress (Haushofer and Shapiro, 2016), which have in turn been shown to influence risk-taking and time-discounting (Kandasamy et al., 2014). A final body of work examines the relationship between poverty and aspirations. Several theoretical papers explore how both individuals (Dalton et al., 2016) and economies (Genicot and Ray, 2017) can become trapped when aspirations and outcomes are jointly determined, and there is emerging evidence that outcomes can indeed affect aspirations (Lybbert and Wydick, 2017). Taken together these bodies of evidence support the idea that additional income might have a physical or psychological productivity effect that plays off against the conventional income effect.

Consistent with this set of theories, the evidence from a number of recent field experiments suggests that the income effect on labor supply is often not negative. Using data from a number of cash transfer programs around the world that had a built in randomized controlled trial, Banerjee et al. (2017) shows that cash transfers to low income households have no effect on labor supply, either at the intensive margin or at the extensive margin. Banerjee et al. (2015) and Bandiera et al. (2017) report on evidence from a six-country study and a one-country study, respectively, of the Graduation program, a multi-faceted program built around an asset transfer to very poor households, and both find that the intervention led to higher income and labor supply. The positive impact persisted to the end of reported measurement periods, between three and five years after the initial intervention.

This evidence, while suggestive, has two important potential limitations. First there is concern with the measurement of labor supply. If labor supply is measured with noise, we may not pick up the negative effect. Indeed the measurement error may not be classical and the estimate may be biased. For example, if much of the labor supply response is in the form of reduced (unmeasured) effort, it could be that the person is doing less on the job and eventually will be fired, but we do not observe this long-term outcome.

Second, these experiments do not shed light on the mechanisms involved. This is evident with the Graduation program which was multi-faceted by de-

about meeting basic needs (because they *can* earn more if need be) and therefore be more productive per hour even if they work less hours and therefore actually earn no more.

sign: it involves both the transfer of a productive asset to households who are very plausibly credit constrained (so an increase in t, which may shift the $f(l,t)$ function) and encouragement and hand-holding for the program recipients, intended to shift their $v(.)$ functions. In the case of cash transfers there is also the possibility that the cash is used to fund investment in a productive asset (Gertler et al., 2006), but many of the physical and psychological mechanisms highlighted above might be triggered by the cash transfer as well.

With this context in mind, we make two contributions by building on our study of the Ghana Graduation program, (also called "Graduating the Ultra Poor", and here onward referred to as "GUP"), which was part of the set of studies reported on in Banerjee et al. (2015)). First, we provide better measurement of labor supply and still find a non-negative income effect on labor supply. Second, we provide evidence that what we call the psychological productivity effect is the source of the observed departure from the traditional income effect.

A key to both contributions is a novel measurement exercise involving a bag-making operation. GUP treatment and control villages were randomly chosen to have bag production units. Those who were invited to work in these units were offered piece rate contracts to produce bags, and all inputs were provided. The number of bags they produced as well as their quality was carefully graded and the piece rate depended on quality, so we have a reliable measure of how much effort individuals put into bag-making. Each bag-making unit was also randomly assigned to produce either simple or more complex bags.

For those in the bags production sub-groups, the comparison of GUP and control households tells us that GUP increases participation in bags, bags production, and earnings from bags. These effects are individually statistically significant, and the q values after adjusting for multiple hypothesis testing are 0.10, 0.10 and 0.17. Moreover there is an increase in productivity in bags, which is not statistically significant overall but highly statistically and economically significant for complex bags, with GUP individuals spending a third less time per bag. If we interpret productivity as measuring effort per minute spent on producing bags, it represents an alternative dimension of labor supply. This increase in productivity cannot be attributed to complementary capital investment in bag making because all inputs are provided by the researchers, thus we attribute this effect to a psychological or physiological productivity effect.

The increase in labor supply on bags along both of these dimensions among GUP-bags households relative to control-bags households is not countered by any evident decline in labor or effort supplied to other productive activities. We estimate that GUP-bags households supply only about two percent fewer hours to all forms of productive labor (producing bags, farming, business operations, animal production and home labor) than do control-bags households, and this difference is nowhere near statistically significant at conventional levels. Nor is there evidence of a decline in effort conditional on number of hours.

To get at a measure of effort we start from the fact that there is essentially no wage labor in our context. Individuals either work on their own farms or run their own businesses. In both of these cases the household is the residual claimant and the effective labor supply, including any differences in effort, should be reflected in the income from the activity, which we measure, in addition to the reported labor time on the activity. We do not see any evidence that GUP households are supplying less total effort in either of these occupations. Relative to control bags households, the average GUP-bags households spend 21 minutes fewer per day on farming but produce about 10% more.[2] Moreover we see little evidence that they are making labor-saving investments, which would allow earnings from agriculture to go up even when effort has gone down. Expenditure on herbicides (which is labor-saving) is slightly higher among GUP-bags households, but expenditure on (labor-using) fertilizer is also higher. There is no difference in hired labor between GUP-bags and control-bags households. GUP-bags households, relative to control-bags households, spend 33% more time on their businesses (p=0.06) and appear to earn more than twice as much, though this effect is not statistically significant (p=0.16). We do not have data on whether the business adopted labor saving innovations but given how small the businesses are, the absence of hired labor and the simple technologies (shea butter production, petty trading) this seems unlikely. Finally, GUP households report spending a bit more time on animals after two years, which makes sense given that most of them have additional goats to care for, but animal revenue does not rise significantly. Both are small relative to farming and business time and revenue.[3]

It is striking that GUP-bags households supply more overall effort because these households earn substantially and statistically significantly more than the control bags households across all the sources of earnings and cash transfers during bag-making ($20.9 more per month, more than double the control-bags monthly earnings of $17.9, p<0.01) while spending roughly the same amount of time on productive labor.[4] Based on their higher earnings we would expect them to value leisure relatively more and therefore supply less labor. Taken together, this evidence rejects the idea that the GUP effect on labor supply is negative.

Turning to our second question, the same evidence is very consistent with the existence of what we have called physiological or psychological productivity effects, and not the investment productivity effect. The bag-making operation we created allows us to make this distinction. The investment productivity effect implies that households would increase their investment in capital towards productive activities as a result of the increase in the marginal product of labor. But the bag making operation provided no such opportunity: all capital (cloth

[2] This effect is not statistically significant, but see below for the evidence from one particular sub-treatment–high unconditional cash transfers ("high UCT") for GUP-bags households– where it is much larger and statistically significant

[3] Given that both animal time use and earnings are low relative to other activities, and since we do not have data on animal revenue during the bags program nor any measure of animal costs, we do not focus on livestock activities in the remainder of the paper.

[4] Breaking this down, GUP-bags households earn $7 more monthly than control-bags in self-reported income, $3 more from bag-making, and $11 more in unconditional consumption support. We include administrative data on bags earnings, since most households do not appear to have included their bags earnings in their reports of wage income; removing it makes no difference in the estimate.

materials basically) was provided by us, the researchers, and nothing such as sewing machines were viable in this context. Thus the nutrition or psychology productivity effect is the appropriate framework to consider in this context.

However the one important question that remains is whether the GUP effect is merely an income effect. The issue is, as mentioned already, that the GUP program was multifaceted and had a number of components that went beyond just providing an asset. However the experimental design included two arms that allows us to address this possibility.

The "savings only" arm in the experiment allows us to test whether the GUP effect comes just from the savings intervention. If the households were savings constrained this would have made it more lucrative for them to work harder and earn more. Perhaps this is what is driving the observed effects. In the "SOUP" (Savings Only Ultra-Poor program) treatment households received a weekly visit from a nonprofit organization to collect deposits into a bank account with a partnering financial institution. The bags intervention was then cross-cut with the SOUP treatment allowing us to test whether the observed complementarity between GUP and labor supply also shows up with SOUP. While the SOUP intervention by itself has an effect on household consumption and assets comparable to the GUP effect, and also raises household earnings (this effect is substantially, though not statistically significantly, smaller than the GUP effect), we find no evidence of a positive productivity effect on bag-making coming from SOUP. In fact the point estimates of SOUP on bag productivity are strongly negative (while the GUP effect is positive) and the difference between them is close to being statistically significant (p=0.13).

In other words, the complementarity between GUP and bag productivity is not the result of the savings component of GUP. This also tells us that the effect is unlikely to be driven by the physiological effect of consumption because the SOUP intervention had a similar effect on consumption as the GUP intervention, but not the same effect on bags productivity.[5]

GUP also had a pure encouragement component–for the first 24 months of the program households were visited weekly by NGO staff who encouraged them to believe that they can and should aim higher. Could this encouragement, rather than the extra income, be the source of the productivity effect? To address this question we make use of the fact that the GUP households received weekly unconditional cash support during each lean season. For the bags households, during the bags program the amount of this unconditional support was randomly varied between $1.3 and $3.9 per week. Unlike the basic GUP effect, this is a pure income shock to the household, since all the GUP-bags households received the exact same set of interventions.

The labor supply effects of this rather substantial pure income shock (which amounts to a 34% increase in total income in the lean season)[6] align with our

[5]It does not rule out the possibility that the GUP effect was at least partly the result of anticipated future consumption, since the households may have reason to think that GUP will have a more durable effect on household well-being than SOUP.

[6]During bag-making, GUP households reported $12.7 of monthly income and received $14.7 in bags earnings, on average. Converting weekly transfers to monthly, 11.2/(12.7+14.7+5.6)

previous findings. The high UCT households are, unsurprisingly, richer than the low UCT households, but work roughly the same amount per day. They work slightly less on the farm and slightly more at their business, but neither difference is statistically significant. The value of their harvest is higher while business earnings are similar. The high UCT households use more (labor-using) fertilizer and less (labor-saving) herbicide, and hire less outside labor than do low UCT households. In other words, there is no evidence of the high UCT households working less or putting less effort into non-bag-making activities. The high UCT households do participate more in bags production, produce more bags, earn more from bags and take fewer minutes per bag, though none of these differences is statistically significant. In other words, while there is some evidence of the high UCT households working harder and being more productive on bags, there is no evidence of a negative income effect. This has important implications for interpreting which of the components of the GUP program may be driving the results. Since amongst the GUP households, high UCT recipients worked more than low UCT recipients, we infer that at least some of the psychological productivity effect (rather than an investment effect or a physiological effect) comes from the positive income shock component of the program. The encouragement component may or may not be additive on top of that.

This paper contributes to a large literature on labor markets in developing countries (e.g. Lewis (1954); Rosenzweig (1988); Foster and Rosenzweig (1996); Goldberg (2016); Guiteras and Jack (2018)). It relates to work on the relationship between credit constraints and labor supply (e.g. Kochar (1999); Rose (2001); Jayachandran (2006); Fink et al. (2018)), and most directly builds on work understanding the effects of positive income shocks, through transfers or other mechanisms, on labor supply (e.g. Baird et al. (2018); Kaur et al. (2019)). Finally, it contributes to the large body of work that attempts to unpack the determinants of effort (e.g. Breza et al. (2018); Brune (2016); Brune et al. (2019); Kaur et al. (2015)), including the potential importance of psychological well-being and its link to income (Mani et al., 2013; Shah et al., 2012).

We start by presenting the overall experimental design in Section 2. Section 3 then presents the model that we use to interpret the results. Section 4 describes our data and empirical methods. Section 5 presents the results on the impact of GUP on standard economic outcomes and labor supply outside of bag-making. Section 6 presents the evidence from the bag-making program, first comparing GUP and SOUP, and then high and low unconditional transfers. We then use these results and the theory in Section 3 to try to make the case for a strong complementarity between consumption/income and labor supply/effort. We conclude in Section 7.

= 34%. Again, we include bags earnings since most households did not appear to include bags earnings in reported wage income; if we remove them, the income shock is even larger.

2 Experimental Design

We partnered with Presbyterian Agricultural Services (PAS), a local NGO in northern Ghana with prior experience doing extension work and promotion of savings groups, including a prior randomized controlled trial with Innovations for Poverty Action (Karlan et al., 2017). While it was PAS field agents who engaged in the direct field implementation, Innovations for Poverty Action coordinated the implementation with senior management of PAS. PAS first identified poor communities in poor regions in northern Ghana, and in each identified community, staff members then facilitated a Participatory Wealth Ranking (PWR) in which members of the community worked together to rank households by economic status. Finally, PAS staff members returned for a verification of the households judged to be the poorest.

We begin by describing the randomized design of the Graduation program in Ghana, and then move on to explain the sub-treatments within the bag-making exercise.

2.1 GUP and SOUP Treatment Designs

Table 1 Panel A shows the assignment of households and villages to GUP, SOUP and control, and the cross-cutting bags measurement village assignments. Each village was assigned GUP, SOUP, or control, and then within each treatment village, half of sample households actually received the treatment intervention, and half served as control households within treatment villages. Thus there is a two-level randomization: at the village level to assign the treatment arm, and then at the household level within village to assign treatment or control status to specific households.

In GUP villages, 51% of sample households were assigned to the GUP treatment. The GUP program included six components: (1) the transfer of a productive asset; (2) skills training for the management of the asset, (3) life skills training and mentorship, via weekly household visits over two years, (4) a weekly cash stipend for consumption support, worth between \$6 and \$9 PPP depending on family size, during each lean season, (5) access to a savings account at a local bank and deposit collection, and (6) some basic health services and health education. The first component, the productive asset transfer, was provided at the beginning of the program, and households were permitted to choose a package of productive assets from a set list. Most households chose a package that included four goats.[7] The skills training, in which participants learned how to take care of the asset (e.g., when to vaccinate goats), took place at the start of the program, and then also as part of weekly household visits by the PAS field officer. The household visits also provided the backbone for delivering components three through six. The third component, a "hand-holding" or life-skills component, provided nudges to help the household focus on building productive assets to generate positive change in long-term outcomes, and more generally,

[7]Other assets included hens, pigs, and inputs for the production of shea, maize, and sorghum.

to set aspirations and plans for coping with current problems and improving the future. The consumption support was explicitly intended to help this process in the short-run, by helping to absorb short-run shocks that could lead to households consuming the transferred assets. The sixth component, health, included basic education on health and hygiene as well as enrollment in the national health insurance scheme (about \$2 per month).[8]

In SOUP villages, 59% of sample households were assigned to the SOUP treatment. These households received a visit from the field officer to collect savings, but did not receive any other components of the program.[9] The remaining households in SOUP villages were assigned to the SOUP control group.

2.2 Bag-making

We designed an employment program offering wages for the production of cloth bags, and implemented it such that it cross-cut the three GUP treatment groups (GUP, SOUP, and control). Half of the villages (120) were then randomly selected to receive the Bags Program, as shown in Table 1 Panel A. In GUP and SOUP villages selected to receive the Bags program, all sample households assigned to GUP or SOUP were invited to participate. In control villages selected to receive the employment program, half of sample households were invited to participate. This amounts to 1098 households: 397 control, 313 GUP, and 388 SOUP.

Table 1 Panel B presents the details of two sub-treatments within the bags measurement exercise. First, we varied the complexity of the bag at the village level. Of the 120 villages, 60 were assigned to produce a simple bag, and 60 were assigned to produce a complex bag. The main difference between the complex and simple bag was that while the simple bag has basic "running stitches" on the hem and the strap, the complex bag alternates one "running stitch" with four "chain stitches," a slightly more complex stitch in a pattern that requires counting. Importantly, because of the difficulty of this pattern, it was harder to meet quality standards (discussed below).

Second, we varied the amount of unconditional consumption support, in the form of a cash transfer, received by GUP-bags households. This was varied at the village level, and was either USD 1.31 or USD 3.92. Since GUP-bags households also received earnings from bags, this was designed to be about half as much as what GUP-no-bags households received (between USD 6 and 9

[8]Among households assigned to GUP, there was an additional sub-treatment: for half of the households, the field officer who visited them weekly also collected savings deposits. For these households, the treatment is equivalent to the combination of GUP and SOUP. We find no evidence that adding savings collection to GUP makes a difference in its impact on consumption or income; see Banerjee et al. (2020)

[9]Among households assigned to SOUP, there was an additional sub-treatment: half received savings accounts and deposit collection without a match ("SOUP without match") and half received savings accounts and deposit collection with a 50% match ("SOUP-match"). Specifically, for every GHC 1 deposited, households in this group received a matching contribution of GHC 0.50. At the onset of the program, there was a maximum match of GHC 1.50 GHC per week (for a GHC 3 deposit) but this cap was eventually removed.

depending on household size).[10]

The program began with four days of training for each community, after which the bag production began. During production, GUP, SOUP, and Control Field Agents visited each community on a weekly basis. At each visit, they collected new bags, distributed replacement fabric (according to the number of bags collected), and paid wages for bags submitted two weeks prior. Households could submit a maximum of ten bags per week. In the two weeks between when bags were collected and when wages were paid, quality checks were carried out by program facilitators. There are 18 quality standards for simple bags, and 25 quality standards for complex bags. Bags were assigned one point for meeting the quality standards at the "excellent" level, half a point for "satisfactory," and zero points for "unsatisfactory." At the end of the quality check, the final quality score was calculated and the bag was classified as high, mid, or low quality.

Wages were paid with a two-week lag. Each week, program facilitators informed households of the composition of high, mid, and low quality bags submitted two weeks prior, and distributed payment accordingly. Baseline wages were either USD 0.40 or USD 0.91. Bags judged to be high quality earned the baseline wage plus USD 0.13, bags judged to be mid quality earned the baseline wage, and bags judged to be low quality bags earned the baseline wage minus USD 0.13. The wage was not affected by whether the bag was simple or complex. Every four weeks, bags program facilitators returned to communities to give feedback and remedial training.

3 A model of labor supply

The utility from a certain income c is given by $\lambda u(\frac{c}{\lambda}))$, where λ is a shifter for the utility function. A higher λ is meant to capture the impact of the savings intervention, which makes it possible to spread the extra consumption over a longer future, hence raising the marginal utility of income. The household production function is $f(l,t)$, where the inclusion of t represents the possibility that the transfers raise the marginal product of labor. In other words we assume that $f_l(l,t) > 0$, $f_{ll}(l,t) < 0$, $f_t(l,t) \geq 0$ and $f_{lt}(l,t) \geq 0$. As noted, a necessary condition for this is that there are imperfections in both the capital market and the labor market. The disutility of labor supply l is given by $v(l,T))$, where the inclusion of T is aimed to capture the relation between the various

[10] We also varied the wage at the village level over time. Every four weeks, villages were assigned a different baseline wage: USD 0.40 or USD 0.91. Women were informed of the payment per bag they would be receiving for bags made in a given week at the start of that week. Bags produced in week 1 of a given wage rotation would be collected at the end of week 1 and inspected for quality over the course of weeks 2 and 3. Payment for the bags produced during week 1 would be given to the producer at the end of week 3. For this reason, there is a lag between when the wage rate changes and when individuals start receiving higher wages, and the data show that responsiveness to wage rate changes is lagged by three weeks (see Appendix Table 2 Panel A). Since the pattern and timing of responses to wage changes indicates that there were delays between the announcement of wage changes and full understanding of their effect, we do not focus on these results in the main part of the paper, but show our estimates of wage elasticities in Appendix Table 2 Panel B.

interventions and labor supply. In other words it is possible that $T = t$, but we want to allow for possibility of interventions that shift labor supply without providing an income transfer (such as the encouragment). We assume that $v_l(l, T) > 0$, $v_{ll}(l, T) > 0$, $v_T(l, T) \geq 0$ and $v_{lT}(l, T) \leq 0$. One case where we might expect $v_T(l, T) > 0$ and $v_{lT}(l, T) > 0$, is when $T = t$, income transfers boost consumption and greater consumption raises labor supply. However as already mentioned, there are other possible channels. Finally we assume that $c = f(l, t) + t$.

The first order condition for utility maximization is

$$u'\left(\frac{f(l,t)+t}{\lambda}\right) f_l(l,t) = v_l(l,T).$$

Suppose that $t = t(T)$ with $t'(T) > 0$. It is evident that $\frac{dl}{dT} < 0$ as long as $f_{lt}(l, t) = 0$ and $v_{lT}(l, T) = 0$. However $\frac{dl}{dT}$ can be positive if either $f_{lt}(l, t) > 0$ or $v_{lt}(l, T) < 0$. As before we call these two sources of a non-traditional income effect the investment productivity effect and the psychological/ physiological productivity effect.

Result 1: A necessary condition for the income effect on labor supply not to be negative is that there has to be either the investment productivity effect and the psychological/physiological productivity effect.

For our second result, we permit the household to have access to two production technologies, so that

$$c = f^a(l^a, t) + f^b(l^b, t) + t,$$

where $f^a(.)$ represents the bag making opportunity.

The household now maximizes

$$\lambda u\left(\frac{f^a\left(l^a,t\right)+f^b\left(l^b,t\right)+t}{\lambda}\right) - v(l^a + \gamma l^b, T)$$

by choosing l^a and l^b. γ represents the relative cost of effort in the two tasks. Now suppose $f^a_{l^a t}(l^a, t) = 0$. The first order condition with respect to l^a yields

$$u'\left(\frac{c}{\lambda})\right) f^a_{l^a}(l^a, t) = v_l(l, T)$$

.

We wish to compare $l^a(T)$ with $l^a(T')$ where $t(T) > t(T')$. Now suppose $c(T) \geq c(T')$ and therefore $u'(c(T)) < u'(c(T'))$. Moreover let $l^b(T) \geq l^b(T')$. Then if it also true that $l^a(T) \geq l^a(T')$ then $l(T) \geq l(T')$. Now if $v_{lT}(l, T) = 0$, then $v_l(l(T), T) \geq v_l(l(T'), T')$. In this case the only way to satisfy the first order condition is for $f^a_{l^a t}(l^a, t) > 0$. Conversely, if $f^a_{l^a t}(l^a, t) = 0$ then it must be the case that $v_{lT}(l, T) < 0$. We summarize this as:

Result 2: If there is one activity where there is no investment productivity effect, and the labor supply to that activity is greater despite the fact the household is richer and is working no less, then there must be a psychological/physiological productivity effect on that activity.

The last observation is about λ. If λ goes up, say because of savings collection, the household's marginal utility of income goes up and therefore both its labor supply and its income must both go up.

Result 3: If λ goes up, the household's labor supply and its income must both go up.

4 Data and Empirical Methods

4.1 Data

The final sample was selected from the households identified as the poorest in their poor communities as described in section 2.2. Participants come from three areas of Northern Ghana corresponding to three agricultural "stations" run by PAS: Tamale, Langbensi, and Sandema. We restrict all of our analysis to villages with more than 30 compounds, as for logistical reasons, we assigned all pure control villages with fewer than 30 compounds to no-bags. This leaves 93 bags villages and 72 non-bags villages.

We have three sources of data. First, we have weekly administrative data on labor supply (the number of bags submitted), the quality of each bag, and the resulting earnings. Second, we have time use surveys in which households reported how they spent their time the previous day. We administered these surveys five times monthly during the bags program, to 1051 bags households and 470 no-bags households.[11] Third, we have a series of standard and comprehensive household surveys that were part of the larger program evaluation of the Graduation program (Banerjee et al. 2015). These include a baseline survey, three shorter midline surveys, a two-year follow-up survey and a three-year follow-up survey. These surveys included questions about income, consumption, agricultural outcomes, business outcomes, and welfare. The second midline survey is used heavily, as it took place during the bags program. Midline surveys were conducted with about one third of the full sample, so for this survey, we have data on 1070 households, including 343 bags households and 727 no-bags households.

4.2 Orthogonality

Tables 2 and 3 show baseline survey data across treatment groups. We have baseline imbalance on average age, land area, monthly per capita consumption, monthly household income, and the food security index. We had intended to re-randomize, but due to a coding error, it did not happen. As a result, in every regression, we also control for the five aforementioned variables at baseline.

[11] In our time use survey, rather than asking about time spent on bags directly, we asked only about "wage labor (including bags)" in order to maintain a strong separation between the evaluation team and the team that was implementing the bags program. We thus impute time on bags by taking the answer to a question about time on wage labor, and subtracting average time on wage labor from the control-no-bags, GUP-no-bags, and SOUP-no-bags households for each bags group, respectively. See Appendix Table 1 for details.

4.3 Method of Analysis

We use two main specifications for our three types of data: one for the analysis of individual-level outcomes measured in our two-year survey (Equation 1); and one for the analysis of individual-month level time use outcomes, or individual-week level bag-making outcomes, measured during the bags program (Equation 2). Any deviations from these specifications or additional details will be reported in table notes.

$$Y_i = \alpha + \beta T_i + \gamma Y_i^0 + W_i^{strata} + \theta^{interviewer} + \epsilon_i \tag{1}$$

$$Y_{it} = \alpha + \beta T_i + W_i^{strata} + \rho^{station*t} + \epsilon_{it} \tag{2}$$

$Y_{i(t)}$ is outcome Y for individual i at either month or week t, T_i is a treatment dummy, Y_i^0 is the baseline value of outcome Y for individual i (only used in Equation 1 since we do not have baseline data for time use or bag-making), W_i^{strata} is a vector of baseline controls that consists of the variables we used for re-randomization plus the five variables that were imbalanced at baseline, $\theta^{interviewer}$ are interviewer fixed effects, and $\rho^{station*t}$ are either $station * week$ or $station * month$ fixed effects. We cluster standard errors at the village level, since both GUP/SOUP and bags were assigned at the village level.[12]

We use the Benjamini-Hochberg (Benjamini and Hochberg 1995) and procedures put forward in Anderson 2008 to compute q-values that correct for the multiple hypotheses within each table (and sometimes within panels). We do not extend these corrections beyond the boundary of an individual table (or panel) because the substantive aspects of the hypotheses we test change dramatically across tables. We decided to focus on theoretically related hypotheses, and our tables (panels) are organized exactly on such lines.

5 Impact Results for the Basic Treatments

5.1 Effects of GUP and SOUP

In Table 4 Panel A we report on the basic treatments, GUP and SOUP, including both bags and non-bags households. Columns 1-5 report data collected at two-years; Columns 6 and 7 report time use data collected during the bags program, averaged over the five monthly surveys.[13] GUP and SOUP households spend

[12]For some comparisons, this is conservative, since within GUP-no-bags, GUP-bags, SOUP-no-bags, SOUP-bags, and control-bags villages, each household in the sample was randomly assigned treatment. Comparing, say, GUP-bags to control-no-bags would not require clustering at the village level, because those GUP-bags households could have been individually assigned control-no-bags. But comparing GUP-bags to control-bags requires village-level clustering, because GUP-bags households could not have been individually assigned to control-bags.

[13]We use average time use data here so that we can use the specification from Equation 1, consistent with the rest of the table. In the remainder of the paper, when we report time use data we will not average over surveys, and will use the specification from Equation 2

the same amount time providing productive labor as do control households, and report the same amount of leisure time (each of the estimated treatment effects is smaller than four percent of the control mean, and statistically indistinguishable from zero at any conventional level of significance). The GUP treatment raised the value of livestock owned by the household by more than 30 percent relative to control (itt = \$73, s.e. = 16). SOUP households also acquire more livestock (itt = \$32, s.e. = 16), but the net increase is significantly less than that for the GUP households. On the other hand, as column 2 reports, SOUP has as large an effect on total asset value as GUP (and both are statistically different from control). The pattern for income (in column 3) is similar: both SOUP and GUP have positive point estimates, but the GUP effect is almost twice as large as the SOUP and is the only one that is significant. There are no statistically significant effects on consumption or health (columns 4 and 5).

To finish this section, we describe the results for the GUP-no-bags and SOUP-no-bags interventions, reported in Table 4 Panel B. This is of special interest because GUP-no-bags is the classic GUP intervention. GUP-no-bags households report statistically significantly lower amounts of leisure than control no-bags households, and also that they spend more time on productive labor (although this later effect is not statistically significant at conventional levels). SOUP-no-bags households also report less leisure time and more productive labor supply than control no-bags households, but neither coefficient is statistically significant (nor can either be distinguished from its corresponding GUP effect). The effects of GUP-no-bags and SOUP-no-bags on livestock, total assets and income parallel those of GUP and SOUP overall: GUP-no-bags has a stronger effect on livestock than SOUP-no-bags, they have similar impacts on total assets, and GUP-no-bags has the largest and only statistically significant impact on income. Neither GUP-no-bags nor SOUP-no-bags has a noticeable impact on health, but SOUP-no-bags does increase consumption.

These program impacts indicate, first, that self-reported income was higher among GUP households, both with and without bags, at the end of the two-year program. Second, they show no evidence of a reduction in labor supply.

5.2 Are we missing the effect on effort?

We find no evidence so far that being a beneficiary of GUP, which raised household earnings, reduced household labor supply. However at this point it is useful to address one additional concern. Is it possible that GUP beneficiaries used their extra income to buy more labor for their farming or other businesses and therefore are putting less direct effort into those, which allows them to work harder at the other occupations? As already noted, we do not see evidence of this in our measure of time spent on productive labor, but perhaps it shows up in measures of effort. To get at this we now examine GUP-induced changes in agriculture, which is the dominant household enterprise, and non-farm enterprises in Table 5.

We see that while GUP-bags recipients work somewhat less on their farms compared to control-bags households (column 5), there is no difference in the amount of hired labor they use (column 1). At the same time we see only minimal evidence of labor-saving expenditures, the most important of which would be herbicide. Column 2 shows that there is a statistically significant increase in expenditure on herbicide among GUP-bags household, which is large relative to the control mean, but the absolute magnitude is very small. As a point of comparison, the increase in herbicide equals about two percent of the average use by farmers in this region (calculated from data from the same agroclimatic zone from a representative set of farmers in villages with fewer than 50 compounds (Udry, 2019)). Moreover, there is a more sizable increase in fertilizer expenditure, which is complementary with labor input because of its effects on weed growth and output (and here the increase equals 10 percent of the average use in the region, calculated from same regional data). Agricultural earnings are no lower for GUP-bags households—the point estimate is positive (column 8). Moreover GUP-bags has no impact on residual productivity, which is the residual from regressing harvest value on input expenditure, acreage and labor time, and is an attempt to measure the effort the household is putting into agriculture (column 9). In other words there is no evidence that the GUP-bags households are neglecting their agricultural business.

The same holds for their other businesses—the effect on business revenue (column 10) and earnings (Column 11) is positive, albeit not statistically significant —and the effect on time spent on the business is positive and statistically significant (column 6). We do not have measures of labor substitution for these businesses, but given the (tiny) scale of the businesses, this seems unlikely.

One other activity where there may be a related concern is household work. We do not have any measure of effort for household work but there is no difference in the time spent on household work by GUP-bags, Control-bags and SOUP-bags households. The last possibility, discussed in the introduction, is wage labor. Wage labor is extremely uncommon in our sample. In control-no-bags, average monthly wage labor earnings are USD 1.13, and only 16% of households have positive wage earnings in a month. In terms of time, in control-no-bags, average time spent on wage labor is 6.2 minutes daily, and only 4.8% of households spent any time on wage labor yesterday.[14] Appendix Table 1 shows that during the bags program, GUP-bags households did earn $0.92 less in monthly wage income relative to control-bags. Thus there may be some substitution from wage labor, but this is very small relative to the increases in earnings across the other sources.

5.3 Summary at this point

Taken together these results suggest that GUP increases income (even without the consumption support), while not increasing leisure or reducing labor supply. From Result 1 in our theoretical model, these are consistent with either an investment productivity effect or an psychological/physiological productivity effect from the GUP intervention. The weak impacts on consumption and

[14] Demand for wage labor is also low: in control-no-bags, yearly expenditure on wage labor is USD 4.21 and only 10.4% of households demand any labor from the market in a year.

health shown in Table 4 Panel B suggest that nutritional or other physiological mechanisms cannot explain the observed increases in labor supply, and from now on we will drop reference to the physiological channel. However, at this point we cannot rule out the investment productivity effect or, for example, the possibility that savings collection may be driving these results (as suggested by Result 3). In particular the SOUP outcomes reported above are not clearly enough differentiated from the outcomes of either the control group or GUP, making it difficult to interpret the mechanisms underlying the observed changes from SOUP. To make further progress we turn to the bags intervention.

6 The Evidence from Bags

6.1 Descriptive Statistics on Bags

Of the 1098 clients who were eligible to participate in the employment program, 91.3% chose to make bags at some point over the six months. Over the course of the study, we collected 116,488 bags. On average, the 1098 potential participants produced 4.2 bags per week. Among clients who participated in a given week, the average number of bags submitted was 7. Most people submitted either zero or 10 bags, as demonstrated in Figure 1. Over the course of the study, 35% of bags collected were low quality, 34% were mid quality, and 31% were high quality. Figure 2 shows the distribution of earnings, broken down by complex and simple bags, and holding wage rate constant. Both have a mode at zero (consistent with Figure 1), and the simple bags do show a slight shift towards more earnings (undoubtedly because the task was easier).

6.2 GUP Effects on Bags Production and Comparisons with SOUP

The positive effect of the GUP program on the supply of effort to bags production is shown in Panel A of Table 6. GUP participants are more likely to participate in bag production, produce a larger number of bags and earn more from bags production than control-bags. On the other hand SOUP participants are actually less likely to produce bags, produce less bags and earn less from bags production than control-bags. The difference with control bags is not significant, but SOUP-bags participants under-perform GUP-bags participants on almost every measure (for example, there is a twenty-three percent point gap in bags participation rates)

The differences become more stark when we focus in Panel B of Table 6 on complex bags, which as mentioned, was one of the arms of the bags treatment. GUP households produce more complex bags than control bags households, whereas SOUP households produce many fewer complex bags than control bags and a fortiori than GUP-bags. In fact SOUP spend much more time per dollar earned on complex bags than they do on simple bags, whereas there is no such difference for GUP households. Together, these results indicate that savings collection does not appear to be the reason why GUP-bags participants earn more than control-bags participants and work no less hard. Indeed, improved access to savings is associated with substitution of labor towards household businesses and away from bags, perhaps due to an improved ability to manage risk or timing of working capital needs.

The fact that GUP-bags participants earn more from and work no less hours at non-bags occupations than control-bags households and the fact they produce more bags also sheds light on the possible mechanisms in operation. Specifically, since no investment is needed in bag production, Result 2 tells us that the psychological productivity effect must be in operation.

What remains to be settled however is the source of the psychological productivity effect. This is because an important part of the GUP intervention was encouragement and hand-holding of the beneficiaries and this could have directly shifted the cost of effort. To rule out this possibility we turn to the experimental variation in the unconditional cash transfer.

6.3 High UCT versus Low UCT effects on Bags Production and What They Tell Us

Table 7 compares the outcomes of GUP participants receiving a high level of unconditional cash transfers with those getting less. Column 1 shows that the bags production index is higher for GUP households receiving high UCT than for low UCT, but the difference between the two is not statistically different from zero at conventional levels of significance.[15] However harvest value and residual productivity are statistically significantly higher for the high UCT households than the low UCT households, suggesting that if there is any crowd out of farming effort due to the GUP intervention, it is happening only for the low UCT households. The high UCT GUP households also spend less on hired labor and herbicide, which is labor-saving, and more on fertilizer (though this last estimate is not statistically significantly different from zero) than low UCT households. While the high UCT households spend less time producing bags, they produce no less (in fact, they produce more) than low UCT households.

This is striking evidence of the psychological productivity effect. The high UCT households are more productive at farming, and no less productive in business. They earn more overall and produce more bags in less time. It appears that the fact of receiving the high UCT is encouraging those households to produce more from the same amount of time. We cannot rule out the possibility that the differences between GUP-bags and control-bags are in part driven by an encouragement effect. That said, the fact that a transfer amounting to 34% of total income did not reduce labor supply to any activity, and indeed appears to have increased labor supply to farming, provides strong evidence for the existence of a psychological productivity effect.

[15] In Table 7 we show only the estimate for the bag production index; in Appendix Table 3 we report estimates for each component.

7 Conclusion

The idea that there may be positive rather than negative income effects on labor supply has a long pedigree. This paper provides support for this view based on a sequence of field experiments designed for this purpose.

We find that GUP has a positive effect on income, but does not reduce labor supply, and in fact raises production of bags and especially production of complex bags. This is not driven by the savings component, as SOUP participants produce far fewer bags than GUP, and fewer complex bags than even control. It cannot be exclusively driven by the encouragement component of GUP (a sequence of household visits by the implementing non-profit organization), as GUP households with high unconditional transfers do not reduce their labor supply relative to those with low transfers, and in fact appear to work much harder on their farms.

Taken together, these findings provide strong evidence of a psychological productivity effect, and should strengthen the case for well-designed transfer programs, especially for the very poor.

References

Baird, S., McKenzie, D., and Özler, B. (2018). The effects of cash transfers on adult labor market outcomes. *IZA Journal of Development and Migration*, 8(1):22.

Bandiera, O., Burgess, R., Das, N., Gulesci, S., Rasul, I., and Sulaiman, M. (2017). Labor markets and poverty in village economies. *The Quarterly Journal of Economics*, 132(2):811–870.

Banerjee, A., Duflo, E., Goldberg, N., Karlan, D., Osei, R., Parienté, W., Shapiro, J., Thuysbaert, B., and Udry, C. (2015). A multifaceted program causes lasting progress for the very poor: Evidence from six countries. *Science*, 348(6236):1260799.

Banerjee, A., Karlan, D., Osei, R. D., Trachtman, H., and Udry, C. (2020). Unpacking a multi-faceted program to build sustainable income for the very poor. Working Paper 24271, National Bureau of Economic Research.

Banerjee, A., Rema, H., Gabriel, K., and Benjamin, O. (2017). Debunking the myth of the lazy welfare recipient: Evidence from cash transfer programs worldwide. *World Bank Research Observer*, 32(2):155–184.

Benjamin, D. (1992). Household composition, labor markets, and labor demand: Testing for separation in agricultural household models. *Econometrica*, 60(2):287–322.

Breza, E., Kaur, S., and Shamdasani, Y. (2018). The morale effects of pay inequality. *The Quarterly Journal of Economics*, 133(2):611–663.

Brune, L. (2016). The effect of lottery-incentives on labor supply: Evidence from a firm experiment in malawi. Working paper.

Brune, L., Chyn, E., and Kerwin, J. T. (2019). Pay me later: A simple employerbased saving scheme. Working paper.

Dalton, P. S., Ghosal, S., and Mani, A. (2016). Poverty and aspirations failure. *The Economic Journal*, 126(590):165–188.

Dasgupta, P. and Ray, D. (1986). Inequality as a determinant of malnutrition and unemployment: Theory. *The Economic Journal*, 96(384):1011–1034.

Fink, G., Jack, B. K., and Masiye, F. (2018). Seasonal liquidity, rural labor markets and agricultural production. Working Paper 24564, National Bureau of Economic Research.

Foster, A. D. and Rosenzweig, M. R. (1996). Comparative advantage, information and the allocation of workers to tasks: Evidence from an agricultural labour market. *The Review of Economic Studies*, 63(3):347–374.

Genicot, G. and Ray, D. (2017). Aspirations and inequality. *Econometrica*, 85(2):489–519.

Gertler, P., Martinez, S., and Rubio-Codina, M. (2006). Investing cash transfers to raise long term living standards. Working Paper 3994, The World Bank.

Goldberg, J. (2016). Kwacha gonna do? Experimental evidence about labor supply in rural Malawi. *American Economic Journal: Applied Economics*, 8(1):129–49.

Guiteras, R. P. and Jack, B. K. (2018). Productivity in piece-rate labor markets: Evidence from rural Malawi. *Journal of Development Economics*, 131:42–61.

Haushofer, J. and Fehr, E. (2014). On the psychology of poverty. *Science*, 344(6186):862–867.

Haushofer, J. and Fehr, E. (2019). Negative income shocks increase discount rates. Working paper.

Haushofer, J. and Shapiro, J. (2016). The short-term impact of unconditional cash transfers to the poor: Experimental evidence from Kenya. *The Quarterly Journal of Economics*, 131(4):1973–2042.

Jayachandran, S. (2006). Selling labor low: Wage responses to productivity shocks in developing countries. *Journal of Political Economy*, 114(3):538–575.

Kandasamy, N., Hardy, B., Page, L., Schaffner, M., Graggaber, J., Powlson, A. S., Fletcher, P. C., Gurnell, M., and Coates, J. (2014). Cortisol shifts financial risk preferences. *Proceedings of the National Academy of Sciences*, 111(9):3608–3613.

Karlan, D., Savonitto, B., Thuysbaert, B., and Udry, C. (2017). Impact of savings groups on the lives of the poor. *Proceedings of the National Academy of Sciences*, 114(12):3079–3084.

Kaur, S., Kremer, M., and Mullainathan, S. (2015). Self-control at work. *Journal of Political Economy*, 123(6):1227–1277.

Kaur, S., Mullainathan, S., Schilbach, F., and Oh, S. (2019). Does financial strain lower worker productivity? Working paper.

Kochar, A. (1999). Smoothing consumption by smoothing income: Hours-of-work responses to idiosyncratic agricultural shocks in rural India. *Review of Economics and Statistics*, 81(1):50–61.

LaFave, D. R., Peet, E. D., and Thomas, D. (2020). Farm profits, prices and household behavior. Working Paper 26636.

Leibenstein, H. (1957). *Economic backwardness and economic growth*. Wiley, New York.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *Manchester School*, 22(2):139–191.

Lybbert, T. J. and Wydick, B. (2017). Hope as aspirations, agency, and pathways: Poverty dynamics and microfinance in Oaxaca, Mexico. In *The Economics of Poverty Traps*, NBER Chapters, pages 153–177. National Bureau of Economic Research, Inc.

Mani, A., Mullainathan, S., Shafir, E., and Zhao, J. (2013). Poverty impedes cognitive function. *Science*, 341(6149):976–980.

Mullainathan, S. and Shafir, E. (2013). *Scarcity: Why having too little means so much*. Times Books/Henry Holt and Co.

Rose, E. (2001). Ex ante and ex post labor supply response to risk in a low-income area. *Journal of Development Economics*, 64(2):371–388.

Rosenzweig, M. R. (1988). Labor markets in low-income countries. *Handbook of Development Economics*, 1:713–762.

Shah, A. K., Mullainathan, S., and Shafir, E. (2012). Some consequences of having too little. *Science*, 338(6107):682–685.

Tanaka, T., Camerer, C. F., and Nguyen, Q. (2010). Risk and time preferences: Linking experimental and household survey data from Vietnam. *American Economic Review*, 100(1):557–71.

Udry, C. (2019). Information, market access and risk: Addressing constraints to agricultural transformation in Northern Ghana. *Draft Report*.

Table 1: Experimental Design

Panel A: Intervention and Bags Assignments

Intervention Village Assignment	**Bags Village Assignment**	**# Villages**	**Household Assignment**	**# Households**
control	no bags	34	untreated	526
	bags	42	untreated	376
			treated	397
GUP	no bags	39	untreated	328
			treated	353
	bags	39	untreated	314
			treated	313
SOUP	no bags	38	untreated	238
			treated	345
	bags	39	untreated	272
			treated	388
TOTAL		*231*		*3850*

Panel B: Bags Sub-Treatment Assignment

Intervention Village Assignment - Bags	**Bags Simple/Complex Sub-treatment**	**Bags UCT Sub-treatment**	**# Villages**	**# Households**
control-bags	simple	n/a	21	189
	complex	n/a	21	208
GUP-bags	simple	high UCT	10	69
		low UCT	10	90
	complex	high UCT	9	79
		low UCT	10	75
SOUP-bags	simple	n/a	19	202
	complex	n/a	20	186
TOTAL			*120*	*1098*

Panel A shows intervention treatment assignments (GUP, SOUP, and control) and assignment to the Bags program. Both were assigned at the village level. Within each village assigned to GUP or SOUP, about half of sample households were treated with GUP or SOUP, respectively. All treated households in bags villages received the Bags program. In control villages assigned to bags, about half of sample households were selected to receive the bags program. Panel B shows sub-treatments within the Bags program. All sub-treatments were randomized at the village level such that al individuals who received the Bags program received identical sub-treatment assignments. Control-Bags = intervention control villages assigned to Bags. GUP-bags GUP intervention villages assigned to bags. SOUP-bags = SOUP intervention villages assigned to bags. Simple = assigned to sew the simple bag. Complex = assigned to sew the complex bag. high UCT = GUP intervention households with Bags who received an unconditional cash transfer of USD 3.92 each week. low UCT = GUP intervention households with Bags who received an unconditional cash transfer of USD 1.31 each week. All monetary values are reported in 2014 USD, Purchasing Power Parity (PPP) terms.

Table 2: Household Level Descriptive Statistics for Baseline Indicators, Intervention Treatments

Means and Standard Deviations

	ctrl-no-bags	GUP-no-bags	SOUP-no-bags	ctrl-bags	GUP-bags	SOUP-bags	p-value, F-test joint sig
household size	7.16	7.61	7.28	7.18	7.29	7.48	0.69
	(3.88)	(4.16)	(3.72)	(3.50)	(3.62)	(3.51)	
average age, household	25.57	25.02	25.13	24.77	24.37	23.04	0.00
	(10.90)	(10.55)	(10.69)	(9.68)	(9.11)	(8.10)	
land area (acres)	4.54	4.50	4.84	4.65	5.03	4.82	0.56
	(3.92)	(4.02)	(4.12)	(3.76)	(3.88)	(3.94)	
monthly per cap cons. (USD)	58.96	54.00	62.61	58.58	59.24	58.55	0.15
	(38.68)	(34.49)	(40.88)	(39.14)	(41.87)	(36.97)	
monthly HH income (USD)	42.34	42.60	48.74	41.12	45.07	45.49	0.67
	(56.76)	(58.84)	(56.77)	(53.07)	(50.13)	(56.63)	
savings balances (USD)	2.40	1.63	2.78	1.65	2.46	3.11	0.47
	(11.98)	(8.54)	(13.91)	(9.86)	(11.06)	(13.97)	
food security index	0.00	0.03	0.16	-0.14	0.14	0.19	0.00
	(1.01)	(1.02)	(1.11)	(0.91)	(1.05)	(1.07)	
asset value index	0.03	0.03	0.09	0.03	0.00	0.02	0.95
	(1.07)	(1.01)	(1.12)	(1.02)	(0.73)	(0.77)	
financial inclusion index	0.00	0.00	0.05	-0.08	-0.08	0.19	0.08
	(0.96)	(0.94)	(1.07)	(0.84)	(0.76)	(1.36)	
physical health index	-0.06	0.00	0.00	0.03	0.13	0.00	0.12
	(1.02)	(1.07)	(1.04)	(0.98)	(0.93)	(0.99)	
mental health index	0.00	-0.04	0.14	-0.08	0.03	0.08	0.15
	(1.02)	(0.97)	(1.00)	(1.02)	(1.02)	(1.01)	
political involvement index	0.00	0.09	-0.16	0.06	0.00	0.01	0.06
	(1.00)	(0.99)	(1.01)	(0.99)	(1.00)	(1.00)	
female empowerment index	0.00	0.11	-0.09	0.02	-0.12	0.00	0.11
	(0.99)	(1.03)	(0.99)	(1.01)	(1.02)	(1.00)	

We report means and standard deviations for key indicators at baseline. Indices are centered around mean baseline value. The last column contains the p-value from an F-test of joint significance of all treatments. See Appendix for components of all indices.

Table 3: Household Level Descriptive Statistics for Baseline Indicators, Bags Sub-Treatments
Means and Standard Deviations

	ctrl-bags simple	ctrl-bags complex	GUP-bags simple, low UCT	GUP-bags simple, high UCT	GUP-bags complex, low UCT	GUP-bags complex, high UCT	SOUP-bags simple	SOUP-bags complex	p-value, F-test joint sig
household size	6.96	7.38	6.59	7.71	8.13	7.28	7.58	7.38	0.82
	(3.37)	(3.60)	(3.19)	(4.30)	(4.24)	(2.81)	(3.37)	(3.64)	
average age, household	24.20	25.28	26.87	23.02	24.45	22.74	22.72	23.36	0.34
	(8.50)	(10.61)	(11.36)	(7.37)	(9.12)	(6.72)	(7.43)	(8.73)	
land area (acres)	4.76	4.54	3.45	5.01	6.50	6.17	5.01	4.63	0.03
	(4.21)	(3.30)	(3.09)	(4.11)	(3.83)	(3.82)	(4.03)	(3.82)	
monthly per cap cons. (USD)	51.98	64.57	46.03	51.17	73.18	75.58	63.31	53.64	0.00
	(33.04)	(43.08)	(35.19)	(34.71)	(48.80)	(44.15)	(37.22)	(36.06)	
monthly HH income (USD)	41.37	40.89	25.69	43.46	71.51	56.17	53.74	36.99	0.02
	(58.20)	(47.93)	(30.06)	(43.75)	(77.74)	(48.24)	(66.85)	(42.03)	
savings balances (USD)	1.46	1.82	4.27	1.43	1.76	1.73	2.54	3.70	0.68
	(8.16)	(11.18)	(15.16)	(6.20)	(9.46)	(9.48)	(12.37)	(15.43)	
food security index	-0.28	0.00	-0.13	0.28	0.08	0.36	0.31	0.06	0.00
	(0.79)	(0.99)	(0.86)	(1.15)	(1.02)	(1.10)	(1.05)	(1.07)	
asset value index	-0.10	0.15	-0.12	0.00	0.12	0.10	0.06	0.00	0.59
	(0.87)	(1.13)	(0.66)	(0.71)	(0.96)	(0.67)	(0.78)	(0.75)	
financial inclusion index	0.00	-0.14	0.00	-0.05	-0.21	-0.10	0.08	0.30	0.14
	(0.89)	(0.79)	(0.91)	(0.75)	(0.57)	(0.66)	(1.18)	(1.51)	
physical health index	0.00	0.06	0.12	0.27	-0.09	0.11	0.00	0.03	0.30
	(0.97)	(0.98)	(1.01)	(0.61)	(1.12)	(0.94)	(1.02)	(0.97)	
mental health index	-0.20	0.02	-0.10	0.18	0.00	0.07	0.14	0.01	0.34
	(0.96)	(1.06)	(1.02)	(1.10)	(0.96)	(0.93)	(1.07)	(0.95)	
political involvement index	0.06	0.06	0.03	0.12	-0.14	-0.08	0.06	0.00	0.90
	(0.99)	(0.99)	(1.00)	(0.98)	(1.01)	(1.01)	(0.99)	(1.00)	
female empowerment index	0.05	0.01	0.10	-0.10	-0.39	-0.27	-0.06	0.00	0.49
	(0.98)	(1.04)	(1.07)	(0.95)	(1.07)	(0.96)	(1.02)	(0.97)	

We report means and standard deviations for key indicators at baseline. Indices are centered around mean baseline value. The last column contains the p-value from an F-test of joint significance of all treatments. See Appendix for components of all indices.

Table 4: Intervention Treatment Effects at Two Years

Panel A: Impacts of GUP and SOUP

		livestock value	asset value	monthly household income	monthly cons. per capita	physical health index	time prod. labor	time leisure
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
GUP	itt	72.92	74.85	7.49	1.13	0.04	3.55	-4.55
	se	(17.61)	(38.64)	(2.54)	(1.62)	(0.03)	(10.41)	(6.11)
	pval	0.00	0.05	0.00	0.48	0.24	0.73	0.46
	qval	0.00	0.16	0.03	0.58	0.36	0.80	0.56
SOUP	itt	32.09	83.33	4.00	2.91	-0.01	-9.44	1.97
	se	(14.65)	(39.53)	(2.49)	(1.64)	(0.05)	(11.87)	(7.59)
	pval	0.03	0.04	0.11	0.08	0.85	0.43	0.80
	qval	0.11	0.12	0.25	0.20	0.85	0.54	0.83
Ctrl Mean		240.17	589.48	36.59	44.15	-0.16	597.71	127.42
Ctrl SD		348.59	764.13	43.08	30.15	0.84	128.32	114.42
Obs		2909	2900	2907	2880	2767	1221	1221
GUP - SOUP = 0	pval	0.05	0.86	0.25	0.35	0.36	0.29	0.43

Panel B: Impacts by Bags Treatment

		livestock value	asset value	monthly household income	monthly cons. per capita	physical health index	time prod. labor	time leisure
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
control-bags	itt	-3.16	56.57	2.48	2.98	-0.02	44.44	-27.63
	se	(16.21)	(46.06)	(2.49)	(2.01)	(0.05)	(12.87)	(6.70)
	pval	0.85	0.22	0.32	0.14	0.65	0.00	0.00
	qval	0.85	0.34	0.45	0.29	0.74	0.01	0.00
GUP-no-bags, UCT \$6-\$9	itt	77.20	104.70	9.40	2.73	0.01	23.67	-30.43
	se	(23.75)	(47.92)	(3.33)	(2.07)	(0.04)	(18.43)	(10.39)
	pval	0.00	0.03	0.01	0.19	0.76	0.20	0.00
	qval	0.02	0.11	0.03	0.34	0.81	0.34	0.03
GUP-bags, UCT \$3.9 or \$1.3	itt	64.73	72.67	6.44	0.63	0.05	30.61	-18.22
	se	(21.75)	(54.46)	(3.32)	(1.63)	(0.05)	(11.32)	(7.50)
	pval	0.00	0.18	0.05	0.70	0.35	0.01	0.02
	qval	0.03	0.34	0.16	0.78	0.47	0.04	0.07
SOUP-no-bags	itt	26.77	107.61	4.97	5.09	0.03	28.11	-13.26
	se	(18.55)	(49.79)	(3.14)	(1.99)	(0.05)	(21.88)	(14.60)
	pval	0.15	0.03	0.12	0.01	0.63	0.20	0.37
	qval	0.30	0.11	0.25	0.06	0.73	0.34	0.48
SOUP-bags	itt	34.92	91.45	4.22	1.99	-0.07	14.01	-14.24
	se	(20.01)	(50.65)	(3.36)	(1.61)	(0.08)	(12.68)	(8.47)
	pval	0.08	0.07	0.21	0.22	0.37	0.27	0.09
	qval	0.20	0.20	0.34	0.34	0.48	0.39	0.22
Ctrl Mean		242.93	578.33	35.94	43.64	-0.17	575.48	137.46
Ctrl SD		356.19	760.35	42.14	29.43	0.85	125.66	111.80
Obs		2909	2900	2907	2880	2767	1221	1221

Panel A shows average effects of GUP and SOUP; the omitted group is control households (bags and non-bags) in any village. Panel B shows effects by bags sub-treatment; the omitted group is control non-bags households in any village. The sample is restricted to villages with more than 30 compounds. We include surveyor fixed effects and control for stratification variables, imbalanced variables (average household age, food security index, land area, monthly per capita consumption, and monthly household income), whether or not household was treated with bags (Panel A only), and baseline value of the outcome when possible. Standard errors clustered at village level. We use the Benjamini-Hochberg step-up method to compute q-values, considering all tests in the table. Columns 1-5 are taken from the two-year survey; Columns 6-7 are averages over the five monthly time use surveys administered during the bags program. Livestock value is the total number of livestock owned times the median reported price for each animal. Asset value is the total number of assets (including livestock, household and productive assets, and stocks), valued using asset prices relative to the price of goats from other countries. Monthly household income is monthly self-reported household income, computed as the sum of income from the household's business, farm, wage labor, and (revenue from) animals. Monthly consumption per capita is self-reported monthly consumption per capita, including both food and non-food expenditure. Physical health index includes two variables. The first is the average daily living score, which is the mean of four variables: capacity bathing, capacity lifting, capacity walking, and capacity working (each measured on a scale from 1 being easily done to 4 being unable to do). The second is sick day, which is 1 if the member did not miss a day of work due to illness in the last year, 0 otherwise. Time productive labor is minutes spent yesterday spent on bags or wage labor, agriculture, business, animals, and home labor (time spent on children, cleaning, cooking, collecting firewood, shopping, or fetching water). Time leisure is minutes spent yesterday on religious activities, social activities, ceremonies, traveling, personal care, and resting. All monetary values are reported in 2015 USD, Purchasing Power Parity (PPP) terms.

Table 5: Productive Non-Bags Labor during Bag-Making

		(1) expenditure on labor	(2) expenditure on herbicide	(3) expenditure on fertilizer	(4) time bags	(5) time field	(6) time business	(7) time home labor	(8) harvest value	(9) residual prod.	(10) business revenue	(11) business income
GUP-bags	itt	2.59	3.83	20.06	-2.12	-20.96	9.22	1.18	59.31	-4.52	14.97	8.76
	se	(3.54)	(2.11)	(13.35)	(11.64)	(9.80)	(4.80)	(11.79)	(55.62)	(64.00)	(11.66)	(6.05)
	pval	0.47	0.08	0.14	0.86	0.04	0.06	0.92	0.30	0.94	0.21	0.16
	qval	0.69	0.30	0.39	0.94	0.27	0.30	0.94	0.50	0.94	0.46	0.39
SOUP-bags	itt	-0.59	1.27	17.49	-21.85	-24.02	10.06	4.41	-22.20	-60.59	-9.47	-2.94
	se	(2.18)	(2.32)	(20.01)	(12.37)	(10.86)	(4.74)	(11.42)	(70.42)	(54.77)	(6.16)	(2.56)
	pval	0.79	0.59	0.39	0.08	0.03	0.04	0.70	0.75	0.28	0.13	0.26
	qval	0.92	0.81	0.61	0.30	0.27	0.27	0.91	0.92	0.50	0.39	0.50
Ctrl Mean		4.02	3.83	57.58	112.94	206.61	28.48	299.27	408.47	-13.50	13.94	6.54
Ctrl SD		15.67	10.82	88.11	106.61	185.65	78.23	155.09	461.91	349.39	55.61	24.83
Obs		272	272	272	1978	3442	3442	3442	272	266	287	287

Effects of treatments on productive non-bags labor outcomes for the bags sample, during the bag-making period. The omitted group is control-bags households. The sample is restricted to villages with more than 30 compounds. We include surveyor fixed effects and control for stratification variables, imbalanced variables (average household age, food security index, land area, monthly per capita consumption, and monthly household income), and baseline value of the outcome when possible. Standard errors clustered at the village level. We use the Benjamini-Hochberg step-up method to compute q-values, considering all tests in the table. Expenditure on labor, herbicide, fertilizer are expenditures in the last 12 months, measured in the midline survey during the bag-making period. Time on bags, field, business, and home labor are minutes spent yesterday on bags, agriculture, business, and home labor, respectively, measured in five monthly surveys during bag-making (on average, 78% of the 1098 bags households were found and surveyed each month). We compute time on bags by taking the answer to a question about time on wage labor, and subtracting average time on wage labor from the control-no-bags, GUP-no-bags, and SOUP-no-bags households for each bags group, respectively. See Appendix Table 1 for details. For this outcome we exclude one of the stations, Langbensi, that reported zero time spent on wage labor. Harvest value is the total revenue from harvest, measured in the midline survey six months after the bag-making period. Residual productivity contains the residuals from a regression of harvest value on input expenditure, acreage, and average time on field. Business revenue and income pertains to all non-agricultural businesses and is measured in the midline survey during the bag-making period. All monetary values are reported in 2014 USD, Purchasing Power Parity (PPP) terms.

Figure 1: Bags

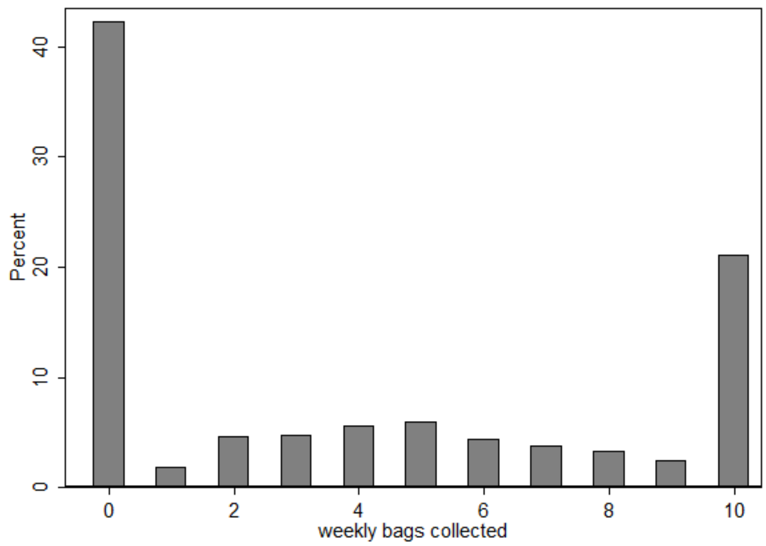


Figure 2: Bags Earnings by Complexity

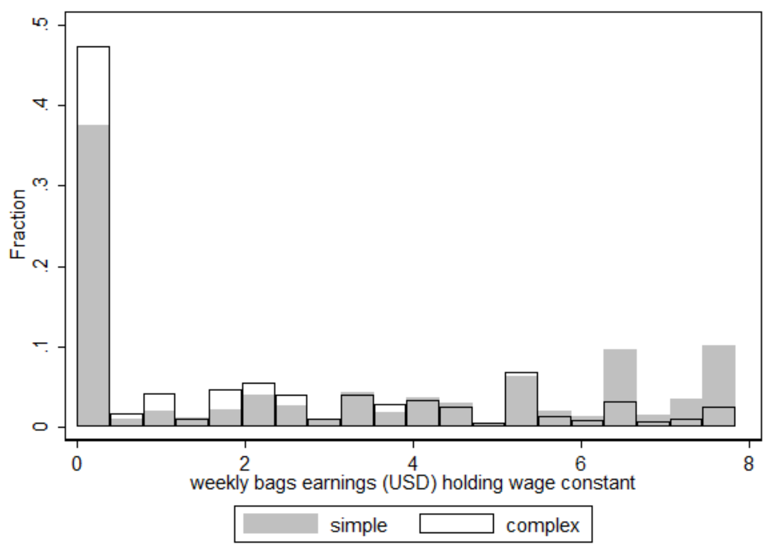


Table 6: Bag Production

Panel A: Effects of GUP, SOUP

		(1) bags production index	(2) number of bags	(3) participates (0/1)	(4) bags earnings	(5) minutes per dollar earned
any GUP	itt	0.28	1.14	0.12	0.66	-117.91
	se	(0.12)	(0.50)	(0.05)	(0.35)	(97.61)
	pval	0.03	0.03	0.02	0.06	0.23
	qval	0.10	0.10	0.10	0.17	0.41
any SOUP	itt	-0.17	-0.65	-0.11	-0.33	227.98
	se	(0.13)	(0.49)	(0.06)	(0.38)	(221.55)
	pval	0.19	0.18	0.06	0.39	0.31
	qval	0.37	0.37	0.17	0.49	0.45
Ctrl Mean		0.00	3.76	0.58	2.45	676.09
Ctrl SD		1.00	3.97	0.49	3.01	1316.80
Obs		18816	18816	18816	18816	1661
any GUP - any SOUP	pval	0.00	0.00	0.00	0.03	0.13

Panel B: Effects of Complex

		(1) bags production index	(2) number of bags	(3) participates (0/1)	(4) bags earnings	(5) minutes per dollar earned
control complex	itt	-0.18	-0.94	-0.06	-0.70	376.85
	se	(0.13)	(0.51)	(0.06)	(0.36)	(116.92)
	pval	0.18	0.07	0.30	0.05	0.00
	qval	0.37	0.19	0.45	0.17	0.02
GUP simple	itt	0.23	0.66	0.10	0.51	148.59
	se	(0.16)	(0.68)	(0.06)	(0.52)	(133.75)
	pval	0.16	0.33	0.12	0.33	0.27
	qval	0.37	0.45	0.31	0.45	0.45
GUP complex	itt	0.11	0.63	0.08	-0.02	90.75
	se	(0.20)	(0.82)	(0.09)	(0.48)	(127.30)
	pval	0.57	0.45	0.38	0.96	0.48
	qval	0.64	0.54	0.49	0.96	0.56
SOUP simple	itt	-0.08	-0.30	-0.09	-0.07	280.71
	se	(0.19)	(0.73)	(0.08)	(0.58)	(216.30)
	pval	0.68	0.68	0.29	0.90	0.20
	qval	0.73	0.73	0.45	0.93	0.37
SOUP complex	itt	-0.46	-2.08	-0.21	-1.39	854.84
	se	(0.12)	(0.44)	(0.07)	(0.31)	(377.08)
	pval	0.00	0.00	0.00	0.00	0.03
	qval	0.00	0.00	0.03	0.00	0.10
Ctrl Mean		0.17	4.59	0.62	3.07	472.56
Ctrl SD		1.07	4.24	0.49	3.30	918.84
Obs		18816	18816	18816	18816	1661
GUP complex - ctrl complex	itt	0.29	1.57	0.14	0.68	-286.09
GUP complex - ctrl complex	pval	0.14	0.05	0.14	0.15	0.03

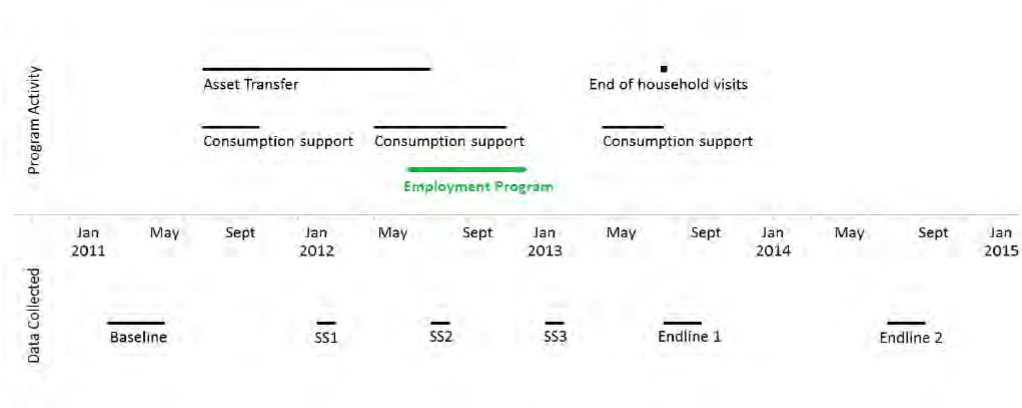
In Panel A, we show effects of GUP and SOUP on bag-making labor supply for bags households. The omitted group is control-bags households (i.e. those who received neither GUP nor SOUP but were assigned to the bags program). In Panel B, we show effects of being assigned the complex bag by treatment on bag-making labor supply for bags households. The omitted group is control-bags households with simple bags. In both panels, the sample is restricted to villages with more than 30 compounds. We control for stratification variables and imbalanced variables (average household age, food security index, land area, monthly per capita consumption, and monthly household income). Columns 1-4 report weekly data with station-week fixed effects (896 people over 21 weeks). The bags production index is a standardized index of the variables in columns 2-5, centered around the control-bags mean. Column 5 reports monthly data with station-month fixed effects, since this measure incorporates time use data (time use data was collected on only a monthly basis; on average, 78% of the 1098 bags households were found and surveyed each month). Standard errors clustered at the village level. We use the Benjamini-Hochberg step-up method to compute q-values, considering all tests in the table. We compute minutes per dollar earned by taking average daily earnings over the course of the month as the denominator, and time on bags (measured once in the month) as the numerator. We compute time on bags by taking the answer to a question about time on wage labor, and subtracting average time on wage labor from the control-no-bags, GUP-no-bags, and SOUP-no-bags households for each bags group, respectively. See Appendix Table 1 for details. All monetary values are reported in 2014 USD, Purchasing Power Parity (PPP) terms.

Table 7: Effects of High vs. Low UCT

		(1) bags prod. index	(2) harvest value	(3) residual prod.	(4) exp. labor	(5) exp. herbicide	(6) exp. fertilizer	(7) time bags	(8) time field	(9) time business	(10) time home labor	(11) business revenue	(12) business income
GUP, UCT $3.9	itt	0.37	138.60	94.92	-2.62	-0.32	26.20	-28.90	-25.13	14.85	11.73	10.58	6.42
	se	(0.17)	(64.83)	(60.56)	(3.48)	(1.72)	(14.72)	(12.55)	(11.82)	(5.95)	(11.38)	(12.44)	(5.36)
	pval	0.03	0.03	0.12	0.45	0.85	0.08	0.02	0.04	0.01	0.31	0.40	0.23
	qval	0.14	0.14	0.29	0.57	0.85	0.21	0.14	0.14	0.14	0.46	0.53	0.39
GUP, UCT $1.3	itt	0.17	-46.51	-136.67	9.45	9.36	11.91	18.19	-16.15	2.75	-10.95	21.01	12.00
	se	(0.15)	(79.86)	(70.00)	(5.09)	(3.20)	(19.20)	(13.66)	(12.74)	(6.07)	(17.66)	(21.26)	(9.31)
	pval	0.25	0.56	0.05	0.06	0.00	0.54	0.19	0.21	0.65	0.54	0.32	0.20
	qval	0.39	0.61	0.18	0.19	0.10	0.61	0.38	0.38	0.68	0.61	0.46	0.38
Ctrl Mean		0.00	408.47	-13.50	4.02	3.83	57.58	112.94	206.61	28.48	299.27	13.94	6.54
Ctrl SD		1.00	461.91	349.39	15.67	10.82	88.11	106.61	185.65	78.23	155.09	55.61	24.83
Obs		18816	272	266	272	272	272	1978	3442	3442	3442	287	287
high UCT - low UCT	pval	0.35	0.04	0.01	0.07	0.01	0.49	0.01	0.55	0.11	0.22	0.69	0.63

Differences in labor supply between GUP high UCT and GUP low UCT for bags households, during the bag-making period. The omitted group is control-bags households. The sample is restricted to villages with more than 30 compounds. We include surveyor fixed effects and control for stratification variables, imbalanced variables (average household age, food security index, land area, monthly per capita consumption, and monthly household income), and baseline value of the outcome when possible. Standard errors clustered at the village level. We use the Benjamini-Hochberg step-up method to compute q-values, considering all tests in the table. Bag Production Index is a standardized index of weekly bags submitted, weekly participation (0/1), bags earnings, and minutes per dollar earned, centered around the control-bags mean. Harvest value is the total revenue from harvest, measured in the midline survey six months after the bag-making period. Residual productivity contains the residuals from a regression of harvest value on input expenditure, acreage, and average time on field. Expenditure on labor, herbicide, fertilizer are expenditures in the last 12 months, measured in the midline survey during the bag-making period. Time on bags, field, business, and home labor are minutes spent yesterday on bags, agriculture, business, and home labor, respectively, measured in five monthly surveys during bag-making (on average, 78% of the 1098 bags households were found and surveyed each month). We compute time on bags by taking the answer to a question about time on wage labor, and subtracting average time on wage labor from the control-no-bags, GUP-no-bags, and SOUP-no-bags households for each bags group, respectively. See Appendix Table 1 for details. For this outcome we exclude one of the stations, Langbensi, that reported zero time spent on wage labor. Business revenue and income pertains to all non-agricultural businesses and is measured in the midline survey during the bag-making period. All monetary values are reported in 2014 USD, Purchasing Power Parity (PPP) terms.

Appendix Figure 1: Timeline



In the top part of the timeline we show program activities, and in the bottom part we show data collection. During the employment program we conducted additional time use surveys each month, over five months.

Appendix Figure 2: Simple Bag (left) and Complex Bag (right)

The simple bag has "running" stitches on the hem and strap. The complex bag has a more complicated pattern on the hem and strap: a sequence of four "chain" stitches alternating with one "running" stitch.

Appendix Table 1: Justifying Imputation of Time Spent on Bags

VARIABLES	(1) Monthly Wage Income (USD)	(2) Time Bags and/or Wage Labor
GUP-no-bags	-0.78**	-5.55
	(0.31)	(4.96)
SOUP-no-bags	-0.36	-2.54
	(0.65)	(3.65)
control-bags	0.21	77.98***
	(0.39)	(5.69)
any GUP-bags	-0.92***	74.96***
	(0.27)	(6.85)
SOUP-bags	-0.25	56.97***
	(0.58)	(6.57)
Observations	864	789
Ctrl Mean	1.130	6.220
any-GUP-bags = GUP-no-bags	0.590	0
SOUP-bags = SOUP-no-bags	0.890	0

This table shows levels of monthly wage income and time spent on bags and/or wage labor across treatment groups. In Column 1, we can see that within each treatment group—control, GUP, and SOUP—there is very little difference in wage income between bags and no-bags, despite large differences in time spent on bags and/or wage labor, as shown in Column 2. Therefore, we assume that any differences in time spent on "time bags and/or wage labor" within each treatment group, between bags and no-bags, can be attributed to time spent on bags. We thus impute time spent on bags by taking the time spent on "time bags and/or wage labor" for each bags participant, and subtracting the mean time spent on "time bags and/or wage labor" from the corresponding no-bags treatment group. For example, for a GUP-bags participant, we subtract the mean time spent on "time bags and/or wage labor" in GUP-no-bags to impute time spent on bags.

Appendix Table 2: Wage Elasticity Results

Panel A: Evidence of Responsiveness to Wages Received for Previously Submitted Bags

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	IHS(bags)	IHS(bags)	IHS(bags)	IHS(bags)	IHS(bags)	IHS(bags)	IHS(bags)
log(wage)	0.02	-0.00	0.10	-0.02	0.15**	-0.11***	0.19***
	(0.04)	(0.05)	(0.07)	(0.04)	(0.07)	(0.04)	(0.07)
Observations	23,058	14,822	8,236	16,470	6,588	13,146	9,912
consecutive		no	yes				
experience						no	yes
fourth week				no	yes		

Panel B: Elasticity Estimates with respect to the 3-Week Lagged Wage

	(1)
VARIABLES	IHS(bags)
log(wage(t-3))	0.16***
	(0.05)
Observations	19,764
experience	no

Panel A provides evidence that participants were responsive to wages they were receiving for bags submitted previously, as opposed to the correct relevant wage for the bags they were making. We examine elasticities by three sub-groups. First, we look at participants who were randomly assigned two consecutive high wage months and two consecutive low wage months (39/120 villages, and 363/1098 participants). Second, we look at participant-weeks that were the fourth week in the wage month. Participants were paid wages with a two-week lag. If participants only fully internalized the wage change upon receiving new wages, then they should take the new wage into account only for bags produced in the fourth week of the month. (The new wage is active in the first week of production; wages for these bags are paid in the third week, and thus only bags collected in the fourth week are produced with experience of new wage.) Finally, we define "experience" to mean either the fourth week of the month, or for "consecutive" participants, any week in the second consecutive month with the same wage. Given this evidence, Panel B shows elasticity estimates with respect to the 3-week lagged wage.

Appendix Table 3: Effects of High vs. Low UCT - Components of Bags Production Index

		(1) number of bags	(2) participates (0/1)	(3) bags earnings	(4) minutes per dollar earned
GUP, UCT $3.9	itt	1.46	0.16	0.86	-164.21
	se	(0.67)	(0.07)	(0.49)	(113.28)
	pval	0.03	0.03	0.09	0.15
	qval	0.13	0.13	0.23	0.31
GUP, UCT $1.3	itt	0.77	0.08	0.44	-82.20
	se	(0.66)	(0.07)	(0.41)	(130.70)
	pval	0.24	0.22	0.28	0.53
	qval	0.32	0.32	0.32	0.53
Ctrl Mean		3.76	0.58	2.45	676.09
Ctrl SD		3.97	0.49	3.01	1316.80
Obs		18816	18816	18816	1661
high UCT - low UCT	pval	0.44	0.41	0.49	0.59

Differences in labor supply between GUP high UCT and GUP low UCT for bags households. The sample is restricted to villages with more than 30 compounds. We control for stratification variables, imbalanced variables (average household age, food security index, land area, monthly per capita consumption, and monthly household income), and baseline value of the outcome when possible. Columns 1-4 report weekly data with station-week fixed effects (896 people over 21 weeks). Column 5 reports monthly data with station-month fixed effects. (Time use data was collected on only a monthly basis for roughly 60% of households over 5 months, and only about 60% of households were found each month.) Standard errors clustered at the village level. We use the Benjamini-Hochberg step-up method to compute q-values, considering all tests in the table. Standard errors clustered at the village level. We compute minutes per dollar earned by taking average daily earnings over the course of the month as the denominator, and time on bags (measured once in the month) as the numerator. We compute time on bags by taking the answer to a question about time on wage labor, and subtracting average time on wage labor from the control-no-bags, GUP-no-bags, and SOUP-no-bags households for each bags group, respectively. All monetary values are reported in 2014 USD, Purchasing Power Parity (PPP) terms.

Appendix: Variable Definitions and Construction

Variable	Definition
animal revenue, (monthly, USD)	Revenue from animal sales, births, slaughters, and animal product sales in the last 6 months. Each revenue stream is computed by multiplying the reported number of animals or products sold/born/slaughtered for revenue and multiplying it by the reported sale price (if available) or the median sale price. We sum over all four animal revenue streams and then divide by six.
asset value (USD)	We ask about all of the assets owned by the household. We calculate the price in goats for each asset by using price data from other countries, as in Banerjee et al. (2015). We then sum the total asset value in goats, and multiply by the price of goats (average of median buy price and sell price across villages).
asset value index	We ask about all of the assets owned by the household. We calculate the price in goats for each asset by using price data from other countries, as in Banerjee et al. (2015). We then sum the total asset value in goats, and standardize it into an index around the baseline mean.
bags earnings	Weekly earnings from bags submitted (not including any unconditional consumption support), paid with a two-week lag. Earnings depend on number of bags submitted, the relevant wage (which varied each month), and the quality of each bag. If the wage was GHC 0.70, mid-quality bags earned GHC 0.70, high-quality bags earned GHC 0.80, and low-quality bags earned GHC 0.60. If the wage was GHC 0.30, mid-quality bags earned GHC 0.30, low-quality bags earned GHC 0.20, and high-quality bags earned GHC 0.40. For the measure used in Figure 2, we hold the wage constant; we assume that all mid-quality bags earned GHC 0.50, low-quality bags earned GHC 0.40, and high-quality bags earned GHC 0.60.
bags production index	Standardized index of four variables, centered around control-bags mean. The variables are: number of bags, participates (0/1), bags earnings, and minutes per dollar earned.
business income (monthly, USD)	Monthly business revenues minus expenses. For each business within the household, we ask about how many months in the last year the business was operating, how many months were "normal" (neither higher nor lower than last month), how many months were "high profit," and how many months were "low profit." We ask about sales and profits in the last month, as well as profits in normal, high, and low months. We use the ratio of last month's profits to high and low profits to impute sales in high and low profit months, compute total sales in the last year by summing over sales in normal, high, and low months, and divide by the number of months the business was operating to get monthly revenue. We do the same exercise for expenses.
business revenue (monthly, USD)	For each business within the household, we ask about how many months in the last year the business was operating, how many months were "normal" (neither higher nor lower than last month), how many months were "high profit," and how many months were "low profit." We ask about sales and profits in the last month, as well as profits in normal, high, and low months. We use the ratio of last month's profits to high and low profits to impute sales in high and low profit months, compute total sales in the last year by summing over sales in normal, high, and low months, and divide by the number of months the business was operating to get monthly revenue.
crop income (monthly, USD)	Harvest sale value minus expenditure on inputs (annual), divided by twelve. To get harvest sale value, we ask about the quantity of each crop sold in the last year. If the units of harvested crops are the same as the units of sold crops and we have the sale price, then we use this price to compute the sale value of each crop, and then sum over crops. Otherwise, we use the median price for that crop. To get expenditure on inputs, we ask about expenditures on manure, fertilizer, labor, herbicide, insecticide, and other inputs in the last year, and then sum over all categories.

expenditure on fertilizer (USD)	Expenditure on fertilizer in the last year.
expenditure on herbicide (USD)	Expenditure on herbicide in the last year.
expenditure on labor (USD)	Expenditure on farm labor in the last year.
female empowerment index	Standardized index of five variables, centered around baseline means. Each variable is the answer to the question ""To what extent do you believe yourself able to make your own decisions concerning X?" The categories X are food, school expenses, health expenses, visiting friends, and purchases. They are measured on a scale from 1 to 3.
financial inclusion index	Standardized index of two variables, centered around the baseline mean. The first variable is the total amount received in loans by the household in the last year. The second variable is the total savings balances at the time of the survey.
food security index	Standardized index of three variables, centered around baseline means. The first two variables equal 0 if the household answered "all year" or "during the lean season only" to the following questions, about adults and kids, respectively: "Did adults/kids ever reduce number of meals per day or reduce portions over the past year?" The third variable equals 0 if the household answered "all year" or "during the lean season only" to the question "Did adults ever skip entire days without eating?"
harvest value (USD)	We ask about the quantity of each crop sold in the last year. If the units of harvested crops are the same as the units of sold crops and we have the sale price, then we use this price to compute the sale value of each crop, and then sum over crops. Otherwise, we use the median price for that crop.
livestock value (USD)	Sum of values of goats, fowl, pigs, sheep, and cows. To get the value of each animal, we first take the average of the median buy price and the median sell price across villages. We then multiple this price by the number of animals owned in the household.
mental health index	Standardized index of three variables, centered around baseline means. The first is economic satisfaction, measured on a scale from 1 to 5. The second is a standardized index of five measures: feeling sad, crying, not eating, not working, and feeling restless, measured on a scale from not at all, hardly ever, some of the time, or most of the time. The third is whether the individual was not worried in the last year (0 if the member experienced a period of worry in the last year, 1 otherwise).
minutes per dollar earned	We first compute the minutes spent on bags yesterday (see below). Since time use surveys were conducted once per month, we have one measure of this for each month. We then divide this by the average daily earnings for the month. (This variable is thus measured with error, as some households spent no time yesterday but had high average monthly earnings, while others spent lots of time yesterday but had very low average monthly earnings.)
monthly per capita consumption (USD)	For food consumption, we ask about household consumption of a variety of food products in the last month, and multiply the amounts by median prices to get expenditure. For non-food consumption, we ask about monthly and yearly expenses on a wide variety of goods and services that are typically consumed on a monthly (yearly) basis. Total monthly consumption per capita is the sum of monthly household food and non-food consumption, divided by the household size.
monthly household income (USD)	total of monthly business income, crop income, wage income, and animal revenue (we do not have animal income because we were unable to collect data on costs associated with animals).
number of bags	Weekly bags collected.
participates (0/1)	1 if the household submitted at least 1 bag that week, 0 otherwise.

physical health index	Standardized index of two variables, centered around baseline means. The first is the average daily living score, which is the mean of four variables: capacity bathing, capacity lifting, capacity walking, and capacity working (each measured on a scale from 1 being easily done to 4 being unable to do). The second is whether or not they did not take a sick day (1 if the member did not miss a day of work due to illness in the last year, 0 otherwise).
political involvement index	z-score of attendance at village meetings in the last year (1 if the person attended a village meeting in the last 12 months, 0 otherwise), centered around baseline mean.
residual productivity	The residuals from a regression of harvest value on input expenditure, acreage, and time field.
savings balances (USD)	We ask about the total amount saved in various locations (a private bank, at home, with a friend, etc.) and sum them all together.
time bags	We take the answer to a question about minutes spent on wage labor yesterday, and subtract average minutes spent yesterday on wage labor from the control-no-bags, GUP-no-bags, and SOUP-no-bags households for each bags group, respectively. In the appendix we confirm that there is no evidence that the bags treatment had an effect on wage income, so we assume it also did not affect time spent on wage labor. (We did not ask directly about time on bags because we were worried that it would compromise the separation between the evaluation and implementation teams.) We exclude one of the stations, Langbensi, that reported zero time spent on wage labor.
time business	Minutes spent on household business yesterday.
time home labor	Minutes spent on home labor yesterday. Home labor includes cleaning, cooking, collecting firewood, shopping, and fetching water.
time field	Minutes spent on the farm yesterday.
time productive labor	Minutes spent on wage labor (including bags), business, home labor, and field, yesterday.
time leisure	Minutes spent on leisure activities yesterday (resting, socializing, etc.)
wage income (monthly, USD)	We ask about each instance of paid labor in the last nine months within the household, the quantity of time worked, and the total earnings from that activity. We sum the total earnings and divide by nine to get monthly household wage income.