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Can a Light-Touch Graduation Model Enhance Livelihood Outcomes? Evidence from Ethiopia

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Notices

ABSTRACT

In recent years, a growing literature has examined the potential of multifaceted, intensive "graduation model" interventions that simultaneously address multiple barriers constraining households' exit from poverty. In this paper, we present new evidence from a randomized trial of a lighter-touch graduation model implemented in rural Ethiopia. The primary experimental arms are a bundled intervention including a productive transfer valued at $374 (randomly assigned to be cash or an equivalent value in poultry), training, and savings groups; a simpler intervention including training and savings groups only; and a control arm. We find that three years post-baseline, the intervention inclusive of the transfer leads to some increases in assets, savings, and cash income from livestock, though there is no shift in consumption or household food security; these effects are consistent regardless of the modality of the transfer (cash versus poultry). The effects of training and savings groups alone are minimal.

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A. Introduction

In recent years, a growing literature in development economics has examined the multifaceted constraints faced by households in extreme poverty. Given the salience of these constraints, layered "graduation model" interventions that simultaneously address several barriers to exit from poverty are broadly viewed as promising. However, the effectiveness of these interventions at a larger scale has not been widely explored to date, and given that they generally center around the provision of a large asset transfer (valued between $500 and $1000) in conjunction with intensive household-level support, there may be important trade-offs between intensity and feasible scale.

In this paper, we present new evidence from a randomized trial of a light-touch graduation model implemented at scale in rural Ethiopia. Strengthen PSNP4 Institutions and Resilience (SPIR) targeted households who were beneficiaries of the government of Ethiopia's Productive Safety Net Program (PSNP), a safety net that provides lean season food and cash transfers to roughly the poorest 20% of rural Ethiopian households. Building on the base PSNP support, SPIR delivered a multifaceted graduation model encompassing both livelihoods and nutrition interventions and centering around the formation of village-level savings groups. While lighter touch than other models, SPIR was also delivered at relatively large scale, serving more than 150,000 households; this is larger than other graduation and asset transfer projects analyzed in the literature to date, with the exception only of BRAC's Targeting the Ultrapoor program in Bangladesh, serving nearly 400,000 households.[1]

Our trial seeks to further unpack this multifaceted model, analyzing four experimental arms. The first two arms included the full set of livelihoods interventions: a one-time livelihoods transfer provided only to the poorest 60% of households within each experimental cluster, training on livestock production and marketing, and the formation of village-level savings groups (village economic and social associations or VESAs).[2] The transfer was valued at $374 in 2017 purchasing power parity dollars,[3] and a further randomization at the cluster level assigned the transfer modality to be either cash, or a poultry package (16 chickens and complementary inputs) of comparable value. This generates two experimental arms designated as cash and poultry, respectively. The third experimental arm included savings groups and training only; and the fourth arm serves as the control arm. In addition to the livelihoods interventions, all

[1] This estimate draws from the Bandiera et al. paper and refers to the scale of implementation at the time of the trial. A trial conducted in Niger was implemented in the context of a national cash transfer program that reached 22,000 households in the most recent phase of programming (100,000 households overall). Table A1 summarizes the characteristics and scale of graduation programs evaluated in recent randomized controlled trials.

[2] More specifically, transfers were designed to target 10 out of 18 households in each cluster randomly assigned to a transfer, or 56%, and the achieved targeting was 58% of households in those clusters.

[3] All outcomes of interest will be valued using PPP-adjusted dollars with 2017 as the base year, as discussed in more detail in Section B5. 2017 is the most recent year for which a purchasing power parity conversion is available, and it is proximate to the timing of our baseline (conducted in early 2018).

treatment arms except the control received nutrition behavioral change counseling (BCC).[4] The sample included 3,314 households in 192 clusters (subdistricts) in two regions, Amhara and Oromia.

Given that the full set of livelihoods interventions inclusive of the transfer was delivered only to extremely poor households (the poorest 60%), our primary findings focus on this subsample, identified at baseline in all four treatment arms using a within-subdistrict ranking of sample households by wealth. The effect estimates of interest compare extremely poor households who received lump-sum cash transfers in conjunction with savings groups, training, and nutrition BCC; extremely poor households who received poultry transfers as part of the same set of interventions; extremely poor households who had access to VESAs and training only (along with nutrition BCC); and extremely poor households in the control arm. We also report additional results for the less poor sample (the upper 40%); the less poor sample received the same uniform set of livelihoods interventions (savings groups and training) in conjunction with nutrition interventions in all three treatment arms, and thus we estimate a single pooled treatment effect.

The key outcomes of interest were measured in three large-scale surveys at baseline (2018), and one and three years following program initiation (2019 and 2021).[5] The primary outcomes of interest, pre-specified in a registered analysis plan, include assets, financial inclusion, agricultural income, non-agricultural income, and consumption and food security, and we report average standard treatment effects to facilitate interpretation of effects within each outcome family.

Our primary findings suggest that the full set of livelihoods interventions (inclusive of asset transfers) rolled out to extremely poor households generated some modest asset accumulation, increased financial inclusion, and increased cash income from livestock, and these effects do not vary with respect to the transfer modality of poultry versus cash. The effects on overall asset value (driven by livestock) are modest and not statistically significant, but the effects on financial inclusion are large: the probability of credit access increases by eight to ten percentage points, relative to a mean of 45% in the control arm, while the probability of reporting any savings increases by more than 30 percentage points (relative to a mean of 40%). Both poultry and cash recipients also experience a 25% increase in past-year income from livestock. However, given that this income source constitutes only around 11% of the value of total consumption on average, even a large relative increase here is minor vis-à-vis the value of overall consumption, and thus unsurprisingly, there is no significant effect on household-level consumption or food security. In fact, the coefficients estimated are small in magnitude and often opposite in sign relative to the increase in consumption that was hypothesized ex ante.

[4] There is some variation in the intensiveness of nutrition programming in different arms, and we will subsequently demonstrate that this variation has little impact on the livelihood outcomes of interest.

[5] The endline survey was delayed approximately nine months from its scheduled date in 2020 due to the onset of the COVID-19 pandemic.

For extremely poor households who received the more limited set of interventions (savings' groups and training only), the only significant effect observed is an increase in savings. A similar pattern is observed for the less poor households who accessed savings' groups and training only in all treatment arms. Thus, the treatment effects for both subsamples for this set of interventions are identical – an increase in the probability of reporting any savings of around 30 percentage points.

We conclude that the implementation of a light-touch graduation model at scale generally did not lead to an exit from poverty for the targeted households, a finding that makes several contributions to the broader graduation model literature. First, we analyze a lighter-touch model implemented at larger scale that is arguably more policy-feasible. In Ethiopia, even sustaining the base PSNP at a large scale has proved extremely challenging in recent years, and implementing transfers of up to \$500 or \$1000 – as is seen in some of the most successful graduation model programs – is likely impossible.[6] Second, we provide novel evidence about the effects of varying the modality of the main transfer (cash versus poultry), and our findings suggest that the impact of transfer modality is minimal. Third, we analyze the effects of the graduation model intervention for both an extremely poor and less poor sample.

In the previous literature, there is evidence that more intensive graduation model programs analyzed in a six-country evaluation in Ethiopia, Ghana, Honduras, India, Pakistan, and Peru had large positive effects in a range of domains in both the medium and long-term (Banerjee et al. 2015; Banerjee, Duflo, and Sharma 2021), as well as similar evidence from a large-scale trial of BRAC Targeting the Ultrapoor conducted in Bangladesh (Bandiera et al. 2017; Balboni et al. 2022). There is also evidence of positive shorter- and medium-term effects of a graduation model emphasizing enhanced psychosocial support in Niger (Bossuroy et al. 2022), and positive effects of a base graduation model in Afghanistan (Bedoya et al. 2019). In Ghana, another recent paper shows that a graduation model implemented without a productive transfer did not have positive effects, and an intervention centering only around the formation of savings groups had positive effects that did not persist (Banerjee et al. 2022). In Yemen, a graduation model implemented in a high-conflict setting had positive effects only on savings and assets four years post-transfer (Brune et al. 2022).

Our findings also contribute to a literature examining medium- or long-term effects of one-time transfers that are offered in the absence of any overarching graduation model programming, but normally with much larger transfers. In Kenya, a randomized controlled trial of unconditional cash transfers offered by GiveDirectly (valued at \$700 in nominal terms or \$600 in 2017 PPP) found positive effects

[6] Recent publicly released papers by the World Bank and the UNDP have highlighted that in the fifth phase of the PSNP (the phase following PSNP4, during which SPIR was implemented), significant funding shortfalls have led to meaningful curtailment in multiple program dimensions. Thus far from expanding to encompass a more intensive graduation model intervention with a larger transfer, the PSNP is facing budgetary pressure to offer leaner transfers that have not kept pace with steadily escalating inflation (United Nations Development Program 2023; World Bank 2022).

only on assets three years post-transfer when transfer recipient households are compared to households in other villages in order to abstract from intravillage spillovers (Haushofer and Shapiro 2016; 2018). Blattman et al. (2020) report the long-term effects of cash grants ($400, or $594 in 2017 PPP) for youth in Uganda after nine years, and again find significant effects only on durable assets and skilled work, despite large effects on earnings four years post-transfer (Blattman, Fiala, and Martinez 2014; 2020).

There is also a growing literature on transfers of animal assets that shows somewhat heterogeneous medium-term effects, though many papers here focus primarily on effects on nutrition (including child anthropometry) or food security (Rawlins et al. 2014; Miller et al. 2014; Jodlowski et al. 2016). Phadera et al. (2019) analyze the effects of an extremely large livestock transfer ($1600, or $934 in 2017 PPP) implemented in conjunction with skill trainings and supplementary services in Zambia. They find significant positive effects on consumption and assets as well as enhanced resilience approximately three years post-transfer (Phadera et al. 2019). Another more recent paper analyzes the effects of another substantial in-kind transfer of chickens and associated materials (valued at $500, or $717 in 2017 PPP) in Guatemala and find no significant effects on livelihood-related outcomes, on average, about a year post-transfer (Mullally, Rivas, and McArthur 2021).

B. Context and experimental design

1) Context

This trial was conducted in rural Ethiopia and focuses on a sample of largely subsistence agricultural producer households that are beneficiaries of the Productive Safety Net Program (PSNP). Launched in 2005, the PSNP is one of the largest safety net programs in sub-Saharan Africa, now serving eight million people annually. It provides cash and/or food transfers to rural households in the form of payment for labor on public works or direct transfers for households who do not have an eligible worker (Hoddinott and Mekasha 2020). The program is targeted both geographically (in districts that are often drought affected and chronically food-insecure) and at the household level, employing community-based targeting to select households that meet certain criteria, particularly food insecurity (Berhane et al. 2013).

A large existing literature analyzing the effects of the PSNP itself generally suggests it has some modest effects on enhancing food security and assets, but the effects are not large (Berhane et al. 2014; Gilligan, Hoddinott, and Taffesse 2009). The pattern of effects for child nutritional outcomes (Porter and Goyal 2016; Bahru et al. 2020) and agricultural productivity and yields (Hoddinott et al. 2012; Gazeaud and Stephane 2020) is similarly mixed. A recent paper suggests that during the period of pandemic-related restrictions and associated disruptions in 2020 (the year prior to the endline survey conducted for this trial), PSNP beneficiary households did not experience the deterioration in food security observed for non-beneficiary households, consistent with a protective effect of PSNP participation (Abay et al. 2021).

In general, the PSNP is structured around the provision of six months of payments (in food, cash, or a mix of the two) to rural households as payments for labor or direct transfers during the agricultural off-season (January to June). Across the PSNP, cash accounts for about 75% of this transfer value, though there is considerable variation in the mix of cash and food provided across regions and over time (Hirvonen and Hoddinott 2021). Median annual transfers per household in our sample were valued at around $277 in 2017 PPP terms at baseline, with about 58% of the value of transfers received in cash.

2) Interventions

This randomized trial focuses on interventions conducted as part of the Strengthen PSNP4 Institutions and Resilience (SPIR) Development Food Security Activity (DFSA), a five-year program (2016–2021) funded by USAID's Bureau of Humanitarian Assistance and led by World Vision, in partnership with ORDA Ethiopia and CARE. SPIR targeted nearly 150,000 households in 13 of the most vulnerable *woredas* (districts) in the Amhara and Oromia regions of Ethiopia, supporting PSNP implementation and providing complementary livelihood, nutrition, gender, and climate resilience activities.

Given its multiple objectives, SPIR encompasses a large number of program elements. This paper focuses particularly on the effects of livelihoods-related interventions, though we will also provide a brief overview of the nutrition and health-related programming, and more details are provided in project documents (Alderman et al. 2021). All interventions described here and evaluated as part of this randomized trial were delivered only to PSNP clients.

The primary livelihoods interventions include three components: a one-time productive transfer (valued at $374 PPP)[7] targeted at extremely poor households; livestock production and marketing training; and the formation of village economic and social associations (VESAs). The targeting of each of these interventions is distinct. VESAs were designed to be near-universal for PSNP households,[8] including 25—30 members per association (both men and women), and were used as a platform for facilitated discussions on financial literacy, income generation activities, and nutrition, health and gender-related topics. By contrast, livestock trainings were targeted only to households who demonstrated capacity and interest, and the topics (primarily improved poultry production and short-cycle goat and sheep fattening) reflected households' preference for diversification into productive livestock activities.[9]

Finally, the productive transfer was targeted to the poorest 60% of sampled PSNP beneficiary households.[10] These households (denoted the extremely poor) were identified using an asset index constructed from baseline data; the identification process was implemented in in every sample cluster, independent of treatment status, with extremely poor households then receiving transfers in select clusters based on cluster-level random assignment. The transfer was structured either as a lump-sum cash payment or an in-kind poultry package of comparable value (and the modality determined by further random assignment, as described further below). The cash transfer consisted of 5600 birr provided in cash (not via bank transfer), equivalent to approximately $200 at the prevailing market exchange rate or $374 in 2017 PPP. The poultry start-up package included 16 45-day old improved-breed chickens from EthioChicken (on average, eight male and eight female) and complementary inputs (75 kilograms of feed, chicken coop construction materials, a feeding trough, and $35 to purchase veterinarian services). The EthioChicken breeds were expected to reach a higher market weight (for cockerels) and produce up to four times the number of eggs in comparison to local chicken breeds, and preliminary evidence from other evaluations has suggested that they are in fact meaningfully more productive (IDInsight 2018).

The experimental design also included a number of additional interventions in the nutrition and health sectors. The core nutrition intervention (denoted CN) included health and nutrition BCC messages

[7] The value of the transfer was 5600 birr in 2019; based on a market exchange rate in that period of around 27 birr per dollar, this was slightly over $200. Converted to 2017 dollars in purchasing power terms, the value is estimated to be $374.
[8] Households that were included in the PSNP for permanent direct income support but who did not participate in public works due to the absence of an eligible household laborer (generally, elderly and disabled households) were not invited to join VESAs.
[9] While the training was offered at the household level, households would identify a single individual to participate in the training and then be the primary actor in managing the new productive activity. In general, a majority of participants were female, particularly for training around poultry.
[10] More specifically, 10 out of 18 households received the transfer. If there were fewer than 18 households sampled, the poorest 10 would still receive the transfer.

provided in facilitated discussions at VESAs. In clusters assigned to enhanced nutrition and health programming (denoted EN), these interventions were supplemented by a timed and targeted counseling (TTC) strategy that trained local health workers and volunteers to provide BCC at health posts and in home visits around early childhood and maternal nutrition; households including a child who was underweight (based on weight for age and mid-upper arm circumference) were invited to participate in community-based participatory nutrition promotion that included growth monitoring and nutritious food preparation. Following the first year, the EN interventions also included targeted male engagement discussions designed to shift norms around gendered roles, particularly in terms of engagement in household tasks and child-rearing, and the provision of interpersonal therapy in groups to women (and later men) who were identified as eligible based on the prevalence of depressive symptoms.

3) Study design

The study was a cluster randomized controlled trial designed to unpack the effectiveness of various elements of a multisectoral graduation model. The sample included 192 subdistricts (kebeles) in 13 districts (woredas) in Amhara and Oromia regions.[11] The subdistricts were selected based on programmatic criteria, restricting to those areas in which programming (in particular, the formation of VESAs) had not yet launched at baseline.

In the original study, subdistricts were randomized to four arms as summarized graphically in Figure A1. T1 included both the full (enhanced) set of livelihoods interventions and enhanced nutrition programming; T2 included full livelihoods interventions and core nutrition programming; T3 included core livelihoods interventions and enhanced nutrition programming; and the fourth arm constitutes the control arm of households who receive the PSNP only. An additional cross-randomization then assigned clusters within T1 and T2 to receive either cash or poultry transfers; as noted above, these transfers were rolled out only to the poorest 60% of households in each cluster.[12]

This paper focuses solely on livelihoods outcomes, and accordingly we analyze this design somewhat differently. First, we separate the extremely poor and less poor samples. For the extremely poor sample, we pool all clusters assigned to receive poultry and those assigned to receive cash (in both T1 and T2), to identify two treatment arms of analytical interest: in the first arm (denoted Poultry) a full set of livelihoods interventions was rolled out, including a poultry transfer; in the second arm (denoted Cash), a

[11] SPIR was operational in seven woredas in Amhara (these seven later became nine, due to some administrative divisions implemented within pre-existing woredas) and six woredas in Oromia, for a total of 13 woredas. The average subdistrict population is 903 households at baseline, of which 20% on average (around 180 households) are eligible for the PSNP.

[12] There was another cross-randomization assigning subdistricts in T1 and T2 to receive a targeted video-based intervention designed to enhance aspirations. Separate findings have shown that even at the one-year follow-up, the effects of this intervention were not significantly different from zero (Leight et al. 2021) . Accordingly, we do not analyze this dimension of randomization any further in this paper.

full set of livelihoods interventions was rolled out, including a cash transfer. In the third arm (denoted L), a core set of livelihoods interventions (savings groups and training) was rolled out. Second, less poor households (the other 40% of the sample) were offered only the core set of interventions (savings groups and trainings) in all three arms, and thus a pooled treatment effect across all three arms (L) is estimated for these households. The design of the trial as analyzed is summarized graphically in Figure 1.

As noted above, there is some variation in the random assignment of core or enhanced nutritional programming within the primary experimental arms analyzed here. Within the poultry and cash arms, 50% of subdistricts (those originally assigned to T1) received enhanced nutritional programming, while 50% (those originally assigned to T2) received core nutritional programming. The extremely poor sample in the L arm (drawn from T3) received enhanced nutritional programming. For the less poor households, we are estimating a pooled treatment effect of L, within which two thirds of clusters (those originally assigned to T1 and T3) received enhanced nutrition programming. In our analysis, we will explore in detail heterogeneity with respect to the assignment of subdistricts to varying nutrition interventions.

Randomization was conducted in Stata by the research team using stratification at the district level and a rerandomization procedure designed to achieve balance in kebele-level covariates. More details about randomization can be found in Appendix A.1.

4) Data collection and timeline

The evaluation included three major survey rounds: a baseline survey conducted between January and April 2018; a midline survey conducted following one year of program implementation between July and October 2019; and an endline survey following three years of program implementation conducted between February and March 2021. The primary intervention activities, including the formation of VESAs, commenced immediately in the study subdistricts following the baseline, and implementation continued through summer 2021. The one-time transfers of poultry and cash were delivered in April 2019, approximately four months prior to the one-year follow-up survey. Figure 2 summarizes the overall timeline.

The sampling frame was constituted by PSNP households reporting a child aged 0 to 36 months at baseline, and a simple random sample of households meeting these eligibility criteria was selected.[13] The target sample included 3,494 households, and the realized sample was 3,314 households or roughly 17 households per subdistrict.[14] In the one-year follow-up, 3,220 of the realized sample households were surveyed for an attrition rate of 3%, and in the three-year follow-up, 3,098 of the sample households

[14] The target sample was 18 households per subdistrict in 193 subdistricts; however, one subdistrict was also dropped during the baseline survey due to insecurity.

were surveyed for an attrition rate of 7%. Figure A2 provides a flow chart summarizing the sampling. The rate of attrition is substantially driven by clusters that were entirely lost to follow-up due to conflict-related disruptions, and is balanced across the treatment and control arms.[15]

In each survey round, surveys were conducted with the primary female (defined as the primary caretaker, usually the mother, of the index child aged 0—3 at baseline) and the primary male, if present (defined as her husband or partner). Key outcomes of interest included demographic characteristics, participation in the PSNP and SPIR interventions, savings and assets, agriculture, livestock production, consumption and food security, infant and young child feeding practices, maternal nutrition, and depression and well-being. Appendix Table A2 provides an overview of the survey modules administered to each respondent in each round. Each survey respondent provided informed oral consent; ethical review and approval of the trial was provided by the Institutional Review Boards at IFPRI and at Hawassa University.

5) Outcome variables

The analysis in this paper focuses on five pre-specified families of outcomes: assets, financial inclusion, income from agriculture and livestock, non-agricultural income, and consumption and food security. We will report the average standard treatment effects for these five outcome families as well as the treatment effects for each specific variable. While the majority of outcomes of interest are measured only at the three-year follow-up, a subset of outcomes were also measured in the one-year follow-up survey. For the five average standard treatment effect coefficients, we also report q-values robust to the analysis of multiple hypothesis estimated across the set of ASTEs (Simes 1986).[16]

For assets, we analyze total asset value and the value of productive assets, consumer durables, and livestock assets as measured at the three-year follow-up; at the one-year follow-up, only livestock assets are reported.[17] For financial inclusion, we analyze any access to credit, access to formal credit, and total credit accessed over the past year, as well as a binary variable for any savings and the current savings balance. For income, we analyze income from livestock sales, income from sales of livestock products, crop income, and total livestock and crop income, all reported over the past year; for livestock products and crops, we separately analyze both the value sold for cash and the imputed value of the full amount

[15] At both follow-up surveys, additional samples were also constructed with households including young children (0—24 months) in order to constitute a parallel repeat cross-section sample for analysis of intervention effects for anthropometrics. The supplemental samples were not included in any analysis reported in this paper because in the absence of baseline data, we cannot construct an asset index to identify them as extremely poor or less poor.
[16] We estimate these using the command qqvalue.
[17] Assets are valued at a market price based on price reported in complementary market surveys; for livestock, self-reported estimates of value are also reported by respondent households, and we can demonstrate that the estimated treatment effects are robust to using an alternate valuation strategy.

produced. For non-agricultural income, we analyze binary variables for any income from any non-agricultural business, and any income from either formal and casual wage work (both reported for any household member over the past year). Agricultural income and income from a non-agricultural household business are not reported at the one-year follow-up.

For consumption and food security, we analyze total, food and non-food consumption expenditure (reported per adult equivalent over the past month), and the food insecurity experience scale (FIES) as a continuous measure (also reported over the past month); consumption and food security are not reported at the one-year follow-up. All continuous measures of value and income are converted to 2018 birr using Ethiopian CPI data, given that 2018 is the baseline year of this evaluation, and then to US dollars using a purchasing power-adjusted exchange rate from 2017, the most recent year for which the International Comparison Program has published PPP exchange rates.[18] (More details about the measurement of assets and consumption are provided in Appendix A.2.)

[18] Given that the baseline survey was conducted beginning in January 2018, the use of an exchange rate from 2017 is also logical in terms of timing.

C. Empirical results

1) Characterizing the sample

Table 1 presents summary statistics, including simple demographic statistics as well as the baseline values of outcomes of interest, when available. The average household in the sample includes six members, and 20% of households are headed by a female. The average level of education is extremely low: more than 70% of household heads do not report any formal education, and nearly 70% report that their main activity is crop production. Baseline economic characteristics highlight that the sample is extremely poor in terms of consumption levels and characterized by limited access to financial services or formal employment. Average consumption expenditure per month per adult equivalent is $60. The estimated baseline value of assets owned is $1596, of which only 6% is constituted by non-livestock productive assets, 7% is constituted by durable consumption assets, and 86% is constituted by livestock assets.[19] Only 20% of households report any access to credit over the past year, and only 9% report access to formal credit; only 28% report any savings. Between 5% and 10% of households report any non-agricultural business or any engagement in wage labor over the past year (formal or informal).

To assess balance in baseline characteristics, we estimate balance tests separately for the extremely poor and less poor sample. For the extremely poor sample (Panel A of Table 1), the baseline variables of interest are regressed on binary variables for assignment to the poultry, cash and L arms (conditional on woreda fixed effects), and the joint p-value corresponding to the test $\beta_{poultry} = \beta_{cash} = \beta_L$ is reported in Column (6). For the less poor sample (Panel B of the same table), the same variables of interest are regressed on a single binary variable capturing assignment to a pooled treatment arm (again, less poor households were offered the same interventions in all three treatment arms). There is no evidence of any imbalance across treatment arms, and the joint test of balance yields a p-value of 0.108 for the extremely poor sample and 0.807 for the less-poor sample.

Table A3 reports baseline characteristics comparing across the extremely poor and less poor samples (pooled across treatment arms). As previously noted, the extremely poor households were identified using an asset proxy index at baseline that is presumptively correlated with a range of other socioeconomic characteristics, and the summary statistics here suggests that is indeed the case and that for the majority of indicators, the differences are highly statistically significant. Less poor households are larger in size and are much less likely to be female-headed (10% versus 27%): the household head in a less poor household is four percentage points more likely to report some education. Asset value is more

[19] Note that the estimated value of assets does not include cash savings, nor any imputed value of land or housing; land and housing are not privately owned or freely traded in rural Ethiopia, and thus valuing these assets is extremely challenging. The estimated value of all assets relies on prices reported in market prices; for livestock, self-reported valuations by households were also collected, and suggest a total estimated value that is around 25% lower vis-à-vis the market price valuation.

than double for less poor households vis-à-vis extremely poor households ($2271 versus $1052), and the probability of reporting any savings is about 11 percentage points higher. Baseline consumption is not observed to be significantly different in levels comparing across the two subsamples, though a Kolmogorov-Smirnov test does narrowly reject the hypothesis that the distributions are equal (p=0.094).[20]

2) Intervention exposure

Table A4 reports summary statistics around intervention exposure to assess household engagement in the primary SPIR interventions; we generally draw on data reported at the three-year follow-up survey, though data on receipt of transfers (poultry or cash) is from the one-year follow-up, as this survey was more proximate to the date of the transfer. For extremely poor households as reported in Panel A, membership in VESA groups is uniformly high (80% or higher), though attendance over the past year is slightly lower (between 60% and 70%).[21] Between 30% and 40% of households in the kebeles assigned to any treatment arm report participating in financial education or value chain trainings, and this is relatively balanced across treatment arms with the exception of participation in a value chain training; the latter is notably higher in the poultry arm (42%) compared to the other two treatment arms (28—30%).[22] This pattern may be unsurprising given that presumably there are strong complementarities between the receipt of a poultry package and engagement in training. Participation in value chain training is also notably balanced across men and women.

With respect to transfer receipt as reported in the one-year follow-up survey, 94% of households assigned to the poultry arm report receipt of a poultry package and the average number of poultry reported received conditional on reporting receipt is very close to the target of 16. There are minimal reported spillovers in the control arm, and some reported spillovers (15-18%) in the other treatment arms, with these households reporting receipt of only six chickens; these responses presumably reflect a comprehension error in which households are reporting participation in an earlier SPIR nutrition-oriented activity where pregnant and lactating women where provided a subsidized provision of six improved breed hens. For the cash transfers, only around 63% of households report receipt of cash; there are minimal reported spillovers in the other arms. Administrative records suggest that 100% of targeted households received cash transfers, and so this may be suggestive of a serious recall error.[23]

[20] Figure A3 shows the estimated kernel density of consumption at baseline (truncated at the 99th percentile) and some gap between the distribution for extremely poor and less poor households is observed, albeit noisy.

[21] Again, the reported level of non-participation in VESAs is consistent with the observation that around 15% of households served by SPIR are permanent direct support (PDS) households that receive PSNP benefits without the requirement of providing labor to public works due to the absence of an eligible adult laborer (generally, these households are headed by elderly and/or disabled individuals). PDS households would generally not participate in VESAs.

[22] Participation in financial training was reported only in the one-year follow-up survey due to an error in survey design.

[23] Disbursement of cash was carefully monitored by implementing partners, with each sampled household providing written signature confirmation of the receipt of the transfer and records cross-checked by supervisory staff. Accordingly, though we cannot rule out the hypothesis that some cash was not delivered as planned, we regard it was low probability.

Panel B reports parallel data for less poor households. VESA membership and participation in value chain and financial trainings is broadly similar for these households. No less poor households were eligible for either poultry or cash transfers, and this is broadly what is observed, though again around 20% of households report receipt of six poultry, presumably with reference to the other intervention described previously.

3) Primary results

a) Main specification

Our primary specification uses the randomized design and estimates intent-to-treat effects separately for extremely poor and less poor households. For extremely poor households, we estimate the following specifications both with and without the interactions with enhanced nutrition programming, where k denotes subdistrict or kebele (the level of randomization), and w denotes woreda.

$$Y_{ikwt} = \beta_1 Cash_{kw} + \beta_2 Cash_{kw} \text{ x } EN_{kw} + \beta_3 Poultry_{kw} + \beta_4 Poultry_{kw} \text{ x } EN_{kw} + \beta_5 L_{kw} + Y_{ikw,t-1} + \eta_w + \varepsilon_{ikwt} \quad (1)$$

$$Y_{ikwt} = \beta_1 Cash_{kw} + \beta_2 Poultry_{kw} + \beta_3 L_{kw} + Y_{ikw,t-1} + \eta_w + \varepsilon_{ikwt} \quad (2)$$

We also report tests of equality for coefficients β_1, β_2 and β_3 in the second model. Following recent guidance, we report both the fully interacted ("long") and non-interacted ("short") models to avoid incorrect inference based on the significance and sign of the interaction terms (Muralidharan, Romero, and Wüthrich 2023).

For the less poor households, we estimate the following specifications, again both with and without interactions with enhanced nutrition programming. L_{kw} here captures a pooled treatment effect for any livelihood intervention in the three treatment arms.

$$Y_{ilwt} = \beta_1 L_{kw} + \beta_2 L_{kw} \text{ x } EN_{kw} + Y_{ikw,t-1} + \eta_w + \varepsilon_{ikwt} \quad (3)$$

$$Y_{ilwt} = \beta L_{kw} + Y_{ikw,t-1} + \eta_w + \varepsilon_{ikwt} \quad (4)$$

All specifications include strata (woreda) fixed effects η_w, and standard errors are clustered at the subdistrict level.

For continuous variables (including the value of assets, income, savings, and consumption), we present inverse hyperbolic sine transformations to allow for non-linear effects. We then assess the magnitude by calculating the semi-elasticity to estimate the effect of assignment to this treatment arm in terms of a percentage increase relative to the mean of the outcome in the control arm (Bellemare and Wichman 2020).[24]

b) Primary results

The primary results are summarized in Table 2 and Table 3, for the average standard treatment effects as observed three years post-program for the long (fully interacted) and short model, respectively. Figure 3 then summarizes the findings from the short model in graphical form. The corresponding graphs for the long, fully interacted model are presented in Figure A4 in the Appendix.

For the extremely poor sample, the average standard treatment effects suggest that there are weakly positive effects (around .1 standard deviations) on assets in the poultry and cash arms, statistically significant primarily in the poultry arm. All three treatment arms exhibit a large and precisely estimated increase (around .3 standard deviations) in financial inclusion. Finally, there is an increase in income from agriculture and livestock that is significant in the cash and poultry arms (.2 standard deviations), but generally no significant effects observed on non-agricultural income or consumption. (The only exception is a significant increase in engagement in non-agricultural income in the L arm.) More detailed results reported below will suggest that the divergent patterns for income and consumption reflect the fact that the increase in income from livestock observed for households in the poultry and cash arms is not large enough to manifest as a higher level of consumption. All of the statistically significant treatment effects are robust to correction for multiple hypothesis testing.

The estimated results of the long specification reported in Table 2 further suggest there is very little evidence of any meaningful heterogeneity in impacts on livelihoods outcomes generated by experimentally varying exposure to enhanced nutrition programming: the interaction effects are not only statistically insignificant, but are generally extremely small in magnitude, and thus the estimated coefficients on the treatment arms cash, poultry, and L remain highly consistent comparing across the long and short models. The only exception is that the interaction term between cash and enhanced nutrition is highly significant and negative for assets, a pattern that will be further discussed in Section 3c below.[25]

For the less poor sample, there is generally no evidence of any significant treatment effects other than a positive and significant effect on financial inclusion, again of magnitude around .3 standard deviations. This effect is comparable in magnitude to the effect observed for the extremely poor households. Again,

[24] For any treatment effect estimated using the inverse hyperbolic sine transformation, the elasticity of the outcome of interest with respect to treatment can be calculated using the formula exp (β-var(β))-1. The percentage effect is then calculated relative to the mean of the IHS-transformed variable in the control arm (Bellemare and Wichman 2020).
[25] Again, effects on nutritional outcomes of interest will be reported separately.

there is little evidence of any meaningful heterogeneity with respect to exposure to nutrition programming, and the primary estimated coefficients remain consistent in both the long and short models.

Table 4 through Table 8 then present the disaggregated results, focusing on the short model that does not include the interaction effects with enhanced nutrition programming. Here, the coefficient estimates of interest should be interpreted as the effect of the livelihoods interventions conditional on the distribution of nutrition programming; the full models including interaction effects are presented in Tables A11 through A15, and are discussed in Section 3c.[26] For each set of outcomes, we analyze first the results for the extremely poor sample, followed by the results for the less poor sample. Note that the mean of all continuous outcomes in the control arm is reported in the tables for the untransformed variables (without the inverse hyperbolic sine transformations).

The findings on assets are presented in Table 4, for extremely poor households in Panel A and less poor households in Panel B. There is a large increase in the estimated value of livestock assets at the one-year follow-up (10% in the cash arm, and 31% in the poultry arm), suggesting that even for households that receive cash transfers, livestock is a primary productive activity of interest. (The magnitudes of these coefficients are calculated as follows: we calculate exp (β-var(β))-1, equal to 1.912 for poultry; we then assess the mean relative to the mean of the IHS-transformed variable in the control arm, 6.191, yielding an effect of 31%.) Two years later, however, these effects have considerably attenuated and converged across poultry and cash recipients: there is a 9% increase in livestock value in the poultry arm and a 7% increase in the cash arm, and the difference across the two arms is no longer statistically significant. Consistent with this pattern, the difference in the estimated coefficients on livestock assets at the one- and three-year follow-ups is highly significant in the poultry arm but is not significant for the cash arm, where there is little variation over time. Moreover, the increase in total asset value at the three-year follow-up is not statistically significant in either the cash or poultry arm, despite the significant increase in the value of livestock assets. For households in the L arm (who received no lump-sum transfer), there are no significant effects on assets at one year, and some evidence of a decline in assets at three years.

In the control arm, the mean value of total assets at the three-year follow-up is $1105 for extremely poor households– nearly identical to the mean at baseline -- and this value is again overwhelmingly constituted (88%) by livestock. The treatment effect observed thus implies that the absolute gain in livestock assets is between $100 and $77 in the poultry and cash arms, respectively, and thus around 25% of the original transfer has persisted in livestock value. We can also assess persistence using a different

[26] For extremely poor households, 50% of households in the cash and poultry arm were exposed to enhanced nutrition programming (denoted EN) and 50% were exposed to core nutrition programming (denoted CN); all households in the L arm were exposed to EN. For less poor households, 66% of all households pooling across treatment arms were exposed to enhanced nutrition programming, and 33% were exposed to core nutrition programming.

set of data by analyzing effects on the counts of different livestock types in the short- and long-term follow-ups, as reported in Table A5. In the short-term, we see that poultry recipients report an increase of nine poultry owned relative to the control, and cash recipients report an increase of slightly under one poultry; both report an increase of around .6 sheep or goats, and no increase in oxen or cows. (The magnitude of the increase for poultry recipients is consistent with the recommendation provided during training that recipients sell the cockerels, roughly half of the flock, following a roughly three-month period of fattening, while retaining the hens for eggs.) By the long-term follow-up, poultry recipients now have only two more chickens vis-à-vis control households, while their holdings of other livestock are unchanged; cash recipients have experienced some attenuation in both ownership of chickens and sheep and goats. The most parsimonious interpretation of this pattern is that livestock holdings have dwindled over time due to either mortality or buffer stock sales to fund consumption, and have not been replaced. Columns (4) and (8) in the same table also demonstrate that the treatment effects on estimated value of livestock are robust to valuing livestock at self-reported prices rather than market prices.[27]

Panel B of Table 4 presents parallel results for the less poor households (who, again, did not receive any lump-sum transfer). There is little evidence of any significant effect on assets at either one or three years, though there is an increase in the reported value of consumer durables owned at the three-year follow-up, seemingly counterbalanced by a decline in livestock value.[28]

Moving on to financial inclusion, Table 5 presents the findings from the one-year follow-up survey and Table 6 from the three-year follow-up survey; in both tables, the findings from extremely poor households are presented in Panel A, and from less poor households in Panel B. For extremely poor households, there is no evidence of any meaningful effects on credit access at one year. However, a significant increase in credit access is observed at three years in the poultry and cash arms: this is an increase of seven to nine percentage points in the probability of accessing any credit, relative to a mean of 45%, and an eight percentage point increase in the probability of accessing formal credit, relative to a mean of 13%. The differences across waves in the estimated treatment effects are generally statistically significant for credit for the poultry and cash arms (as reported in Table 6), though more precisely estimated for poultry recipients.

For savings, we find positive effects for extremely poor households that are consistent across all three

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[27] The mean levels of livestock asset value in the same table suggest that respondents themselves estimate a value for their livestock that is about 25% lower than the implied mean in market prices: i.e., the mean estimated value in the control arm in the long-term follow up is $1103 when valued at own-reported prices, versus $1495 when valued at market-reported prices. The treatment effects remain similar in magnitude and precision using own-reported prices, suggesting a larger effect relative to the control mean.

[28] Interestingly, a weakly positive (but insignificant) effect on livestock asset value at the one-year follow-up is subsequently observed to be weakly negative (but insignificant) at three years, and the difference across waves is statistically significant. While weak evidence, this could be suggestive of negative spillover effects on livestock asset holdings of the less poor households driven by growth in livestock for extremely poor households that received transfers.

treatment arms and across both waves. In the one-year follow-up, there is a 30-percentage point increase in the probability of reporting any savings relative to a mean of around 50%, and this pattern is persistent at three years. In continuous terms, the mean level of savings in the control arm in the three-year follow-up survey is about $34, and the (unconditional) treatment effect implies a roughly threefold increase relative to this mean. (Interestingly, the level of savings in the control arm also dramatically declines by roughly half from the one to the three-year follow-up, from $75 to $35, and thus the relative treatment effect commensurately increases over time.) For less poor households, a similar positive effect on savings is observed in both periods that is of parallel magnitude (roughly 30 percentage points) to the effect observed for extremely poor households, but no effect on credit access is observed for the less poor households in either wave.

Findings around income at the three-year follow-up are presented in Table 7. (Supplementary results around income from wage work at one year are presented in Table A6 in the Appendix; income from cropping and livestock was not measured in that survey round.) In Panel A of Table 7, extremely poor households in the poultry and cash arms show evidence of a significant increase in past-year income from sales of livestock and livestock products, but no increase in income from cropping. There is no heterogeneity in the effect comparing across the poultry and cash arms, where the implied semi-elasticity suggests around a 25% increase relative to the control mean. However, the total estimated value of income from livestock, livestock products and crops (Column 7) shows a significant effect only in the poultry arm, a difference attributable primarily to the fact that the increase in the sales of livestock products (eggs) is somewhat larger in this arm. For households in the L arm who did not receive any transfers, there is no significant effect on any form of income, and a similar pattern is observed in Panel B for less poor households.

Importantly, there is no evidence of any experimental effects in either sample or in either survey wave on the (extremely low) levels of participation in non-agricultural activities. Across both rounds, only 3% of households report any non-agricultural business (6% for less poor households), only 3-4% report any engagement in regular wage labor, and around 25% report any engagement in casual wage labor. These low levels of participation remain unchanged.

Finally, Table 8 presents findings around consumption and food security, and there is no evidence of any meaningful experimental effect here; the estimated coefficients are small in magnitude and varying in sign. In fact, there is some evidence of an increase in food insecurity (a higher FIES score) among extremely poor households in the cash arm.

Given recent evidence that treatment effects estimated using the inverse hyperbolic sine may not be robust to alternate rescalings (Chen and Roth 2022), we also use two simpler specifications to assess the robustness of the treatment effects reported for continuous variables: a linear specification, and a linear specification for a binary variable equal to one if the variable of interest is strictly positive (non-zero). (The latter specification is not estimated for the total value of livestock product and crop production or for consumption, given that there are few or no zero values.) The findings around assets (Table A7) suggest that the observed increases in asset values remain positive and significant when using a binary specification, but are not significant in a linear specification. The increases in savings at one and three years (Table A8) and income at three years (Table A9) remain significant in both robustness specifications. The findings around consumption (Table A10) remain null.

To interpret the disparate findings on income vis-à-vis consumption, it is useful to note that an accounting of income sources for the sample households indicates that cash income from livestock constitutes a relatively small share of total income. Total estimated household consumption per year is around $2528 in this sample; given an average household size of 5.5, this corresponds to roughly $1.26 in consumption per person per day. Summing up the enumerated sources of income in-kind and in-cash reported in the household survey (including income from cropping over both seasons, income from sales and livestock products, income from cash and non-agricultural businesses, and income from PSNP transfers) accounts for around 60% of this total. Some possible sources of income --- e.g., remittances or informal transfers --- were not enumerated; in addition, underestimation of income vis-à-vis consumption is a common challenge in rural household surveys (Deaton 2019). Unsurprisingly, the sample households are substantially dependent on crop production, largely for subsistence (accounting for nearly 60% of enumerated income, or around a third of consumption); income from livestock and income from PSNP transfers each account for around 20% of enumerated income, or 11% of estimated consumption. Income from non-agricultural sources is negligible. Thus, even a meaningful (25%) relative increase in cash income from livestock such as that reported above would plausibly fail to be large enough to generate a detectable shift in consumption, and this is exactly the pattern we observe.

4) Heterogeneity with respect to exposure to enhanced nutrition programming

As described in some detail above, the experimental design also entails some variation across arms in exposure to enhanced nutrition programming (denoted EN) vis-à-vis core nutrition programming (denoted CN). Among cash and poultry recipients, 50% of households were in subdistricts randomly assigned to receive EN, and 50% were in kebeles randomly designed to receive CN. All extremely poor households in subdistricts in the L arm are also exposed to EN. Among less poor households, two thirds were exposed to enhanced nutrition, and one third to core nutrition.

Findings around the effects of the nutritional interventions are reported in a separate paper and suggest there is little evidence of a significant effect on the majority of nutritional outcomes of interest, other than some effects on knowledge and dietary diversity for women (Alderman et al. 2023). As previously noted, we report in Table 2 the estimated average standard treatment effects for the primary outcomes using a "long" specification that includes the interaction terms with the nutrition cross-randomization. In general, these interaction terms are not significant. They are also very small in magnitude relative to the main effects: for savings and income, for example, the interaction effects range in size between one tenth and one third the magnitude of the primary effect. Though achieving adequate statistical power to detect statistical significance in an interaction term can be challenging in randomized controlled trials (Muralidharan, Romero, and Wüthrich 2023), there is no evidence in this case that the interactions with nutrition programming are large and noisily estimated; rather, they seem to be consistently small.

The only exception to the above pattern is the coefficient on cash and the interaction between cash and EN in the specification employing assets as the dependent variable. In Column 1 of Table 2, we can observe that the coefficient on the cash binary variable is large (.2 standard deviations) and very precisely estimated for the sample that was not exposed to EN programming, while the interaction effect suggests an effect that is zero or slightly negative for the sample that is exposed to EN. This pattern could suggest that cash recipients also exposed to enhanced nutritional interventions are characterized by a higher level of expenditure on, for example, higher-cost or nutritious foods, and thus a lower level of investment in productive assets. This would be consistent with the evidence of an increase in child anthropometry in the subarm of cash recipients exposed to enhanced nutrition programming (Alderman et al. 2023).[29]

5) Attrition

As noted above, the base level of attrition in the sample is extremely low; only 3% of households attrite from the baseline to the one-year follow-up, and slightly over 5% attrite by the three-year follow-up. The majority of the attrition at three years reflects entire kebeles rendered inaccessible to conflict, rather than household-level attrition. Among the 114 attrited households at one year, the top reasons for attrition included moving outside the survey area (n=44) and refusing consent (n=17). Among the 220 attrited households at three years, the top reason for attrition included unrest in Amhara (n=72) and moving outside the survey area at any point during the evaluation period (n=92).

To assess any bias introduced by loss to follow-up, we regress binary variables for attrition at one and three years on baseline covariates, binary variables for the three primary treatment coefficients of interest, and the interaction between the two; we implement this test for a concise set of demographic

[29] As consumption data was not collected at midline, we are not able to identify if cash recipient households in the EN arms devoted relatively more resources to purchasing higher-value or nutritious foods for some period following the receipt of the cash transfer, at the expense of investing in asset accumulation. Such an increase in consumption would be plausible given the anthropometric effects, but the findings presented in Table 6 in this paper suggest that any such shift in consumption had dissipated by the point of the endline survey.

characteristics and baseline values of outcomes of interest. The results are reported in Table A18 and show that there is relatively little evidence of any selective attrition comparing across the treatment and control arms. Female-headed households are significantly more likely to attrite, as are households in the L arm. The only estimated coefficients on an interaction term between a baseline covariate and a treatment arm that are significant are suggest that households without a formally educated head are somewhat less likely to attrite in the cash arm; and households with a higher level of baseline assets are somewhat less likely to attrite in both the poultry and L arms. All three coefficients are significant at only the ten percent level, and the latter two are also small in magnitude. Overall, we assess that there is little evidence of any meaningful bias introduced by selective attrition.

D. Discussion

The findings here suggest that a lighter-touch graduation model implemented at scale in rural Ethiopia generally did not catalyze a substantial shift out of poverty for the targeted households, a pattern at odds with the findings of a number of other recent trials. A summary of recent relevant trials and the transfer sizes analyzed is provided in Table A1, and it is evident that SPIR did effectively target an extremely poor population; monthly per capita consumption in this sample is around $47 at baseline, comparable to a number of the sites in the original multicountry graduation model trial as well as the sample analyzed in a recent trial in Niger (Bossuroy et al. 2022), and around 40% lower than consumption at baseline as measured in the Bangladeshi sample analyzed in Bandiera et al. (2017).

However, the intervention is lighter touch than other graduation models in a number of respects. First, the value of the lump-sum cash or asset transfer ($375 in purchasing power terms and about eight times monthly per capita consumption) is the second-smallest in this literature in absolute terms; the previous literature generally analyzes transfers that are between eight and 26 times monthly per capita consumption, with the exception only of Bossuroy et al. (2022) in Niger, where this ratio is around four. Second, there is no high-frequency household-level coaching included, in contrast to other models that entail weekly coaching visits over a period of two years. While a majority of the households participated in facilitated discussions around financial literacy, saving and lending, and business planning within VESAs, only a subset of households (about 30—40%, by design) participated in a one-time, intensive training on selected livelihood activities.[30] Third, all households receive consumption support transfers (including households in the control arm), a design feature also observed in Bossuroy et al. but generally not in the other papers in this literature.[31] This further narrows the gap between households in the control and treatment arms.

Importantly, the SPIR intervention did generate extremely large effects on financial inclusion, where there are increases of between .2 and .4 standard deviations, comparable to or slightly larger than the effects observed in Banerjee et al. (2015) and Bandiera et al. (2017). The treatment effects on cash income from livestock (around .2 standard deviations in this paper) also compare favorably to the treatment effect estimates observed in Banerjee et al. (2015) (around .35 standard deviations), notable given that the asset transfers in Banerjee et al. are generally much larger. However, in general cash income from livestock represents a small share of total consumption for households in this sample, who are heavily dependent on subsistence agricultural production as well as the transfers disbursed through the

[30] Nor is any psychosocial support provided by the majority of the sample, though women who were identified as eligible for group therapy based on the prevalence of depressive symptoms were offered therapy.

[31] In the Ethiopian sample analyzed in Banerjee et al. (2015), all households were similarly PSNP beneficiaries and thus receiving regular PSNP transfers, inclusive of households in the control arm. A subset of households in the control arm in the trial sample in Peru also received regular cash transfers.

PSNP itself. Accordingly, even quite substantial effects on livestock income are insufficient to generate any shift in consumption or catalyze a movement out of poverty.

It may be informative to consider a more detailed comparison of the economic context faced by the households reached by SPIR and analyzed in this trial, vis-à-vis the economic context observed for ultra-poor Bangladeshi households, where a graduation model intervention analyzed in Bandiera et al. (2017) catalyzes much larger positive effects on consumption. In addition to being somewhat poorer in terms of monthly consumption compared to those households, this rural Ethiopian sample is notably different in its underlying economic characteristics. Ultra-poor Bangladeshi households are characterized by an almost total absence of assets: only 7% own land, and less than 10% report cow or goats, with an estimated total value of livestock of only around $40. By contrast, landlessness is rare in rural Ethiopia, where land is formally owned by the state with households having use rights that were locally allocated (Kebede 2008); 88% of households in our sample own land in this sense of allocated use rights, and livestock ownership is also relatively common, with 75% of even extremely poor households in our sample reporting ownership of some livestock at baseline. The women in extremely poor Bangladeshi households are predominantly engaged in casual labor in agriculture or domestic work (by contrast to women in richer households in the same villages, who are predominantly engaged in livestock rearing), and 40% of ultrapoor households report the woman as the sole income earner; whereas the households in our sample are predominantly engaged in subsistence agricultural production at baseline, with some additional income support from livestock rearing and the PSNP itself, and only about 20% are female-headed.

This comparison has two implications: first, relative to the ex ante asset endowment, the livestock transfer analyzed in Bandiera et al. (at $500 in PPP terms, or about ten times the ex ante livestock asset stock valued at around $40) is much larger than the transfer analyzed in this paper (around $400 in PPP terms, but less than half of households' ex ante livestock asset stock valued at around $900). Second, given the near absence of any meaningful non-agricultural or wage work in the sample subdistricts, the only feasible shift in household economic opportunities would be a very large substitution from cropping to livestock, or a substantial increase in income from cropping itself, and neither pattern is observed. The transfer rolled out as part of this light-touch model does have an appreciable effect on livestock income (a roughly 25% increase), but it is not large enough to catalyze any dramatic shift in household economic welfare.

Another informative comparison can be made to the sample of ultra-poor households in Niger included in the recent analysis of a graduation model enriched by targeted psychosocial interventions (Bossuroy et al. 2022). Consumption in the Nigerien sample is similar to consumption in our sample at baseline, and the lump-sum transfer implemented as part of the intervention (and provided to households in cash) is in fact slightly lower in magnitude than the transfer provided here. The composition of household revenues is dramatically different in the Nigerien sample, however: even in the control arm, only around a quarter of household revenue is generated by agricultural production (harvest value), while nearly 60% is generated by non-agricultural businesses, with the remainder split between livestock revenue and wage revenue. Thus, while this sample of households is notably poor, it is not accurately described as dependent on subsistence agricultural production at baseline.

The graduation model intervention analyzed by Bossuroy et al., in turn, has particularly large positive effects on non-agricultural business revenue, with some (smaller) positive effects on crop value seemingly driven by more intensive use of cropping inputs, as well as positive effects on livestock revenue. The latter effects are roughly in the same range as, though somewhat larger than, the positive effects on revenue from livestock observed in this paper; the ex ante value of livestock assets (around $700 in the control arm) is also roughly similar to, though slightly lower than, the asset value of livestock observed in this sample, and the magnitude of the increase in livestock asset value observed in the Nigerien sample is similar (somewhat higher). Again, however, the positive effects on livestock assets and revenue observed in the Niger trial are relatively minor relative to the much larger positive effects on non-agricultural businesses and associated revenue reported there, and those effects are completely absent in this sample.

To sum up, the sample that we analyze here seems notable for two key characteristics: even relative to other samples of extremely poor households in other contexts, these rural PSNP beneficiary households are highly dependent on subsistence agricultural production at baseline (with some, but not substantial, income from livestock despite high livestock holdings); and they have almost no involvement in any form of non-agricultural business or wage labor, with these low rates of involvement remaining highly persistent over time. The light-touch graduation model implemented did not succeed in dramatically shifting households' portfolio of income-generating activities as in Bangladesh (where women shifted away from casual labor to livestock production), nor did it have a consistently positive effect across multiple income sectors as in Niger (where households already earning substantial non-agricultural income increased that income, while also increasing income from crops and livestock). Rather, the only channel through which the intervention was seemingly able to increase household resources was through expansion of livestock production and associated income from livestock and livestock products, a source that remains too small to substantially shift the trajectory of overall household income.

Our findings can also be usefully linked to a recent review paper and meta-analysis analyzing the effects of unconditional cash transfers and multifaceted graduation programs on consumption (Loeser and Kondylis 2021). In a pooled sample of studies, the authors find that the effects of transfers on consumption is around $0.35 per unit of transfer for UCTs, or $0.52 per unit of transfer of graduation programs, implying in this case an effect of between $130 and $195; relative to mean consumption in the control arm, this is a relative increase of 5—8%. The estimated increase in consumption corresponding to the 95% upper bound of our estimated treatment effects for poultry and cash recipients in the long-run follow-up are a roughly 2.5% and 1% in household consumption, respectively. Thus we can only narrowly rule out the hypothesis that the effect estimates here are consistent with the existing literature, though the effects on cash recipients seem more clearly to be below the level implied by previous estimates. The meta-analysis also usefully highlights that there is considerable dispersion in the estimated effects of any intervention of interest (particularly for multifaceted graduation models, a point the authors explicitly note), and thus focusing on the largest and most salient effect estimates --- such as those reported in the original Science paper or for BRAC's Targeting the Ultrapoor in Bangladesh --- may not be fully informative.

E. Conclusion

In this paper, we analyze the effects of a lighter-touch graduation model targeted to the poorest households in rural Ethiopia and find that this model did not lead to a significant shift in consumption or an exit from poverty. There is an increase in livestock related income and access to credit that could point to a potential pathway for households to expand livestock production over time. However, households that had access to savings and training only showed no positive effects other than increased savings. Our findings also suggest that there is no difference in the effects of cash versus an alternate transfer modality (in this case, an improved breed poultry production package): both showed parallel effects on livelihood outcomes.[32]

More broadly, other contexts in which graduation models have been implemented successfully are often characterized by economic growth, even among poor rural households. By contrast, the setting of this study is characterized by stagnation or reversals, with consumption stationary among households in the control arm during the trial period (2018—2021); more dramatically, the already meager stocks of savings reported by households in control communities in the one-year follow-up survey were halved by the three-year follow-up, and the estimated value of livestock assets, the main asset owned by sample households, declined by 33%. This may reflect the fact that in the period preceding the endline, households in our sample were buffeted by numerous weather and man-made shocks. In Oromia, 35 percent of households surveyed in the three-year follow-up reported losing crops to desert locusts and almost 60 percent reported losses due to army worm; in both Oromia and Amhara, more than half of respondents reported experiencing a flood event and associated erosion in the previous 15 months. In addition, more than 60 percent reported large increases in agricultural input prices, a shock that may itself reflect COVID-19 restrictions and associated supply chain disruptions. (Following the conclusion of this trial, the expansion of the Tigrayan conflict into northern Amhara generated a new and devastating round of conflict-related shocks affecting much of our Amhara study region.)

Even during periods of overall macroeconomic growth, the rural population in Ethiopia has often been left behind, with the poorest fifth of households experiencing stagnant or negative consumption growth compared to an average six percent annual increase in consumption for urban households between 2011-2016 (World Bank 2019). Paths to a sustainable income stream outside of agriculture also continue to be minimal, as rural non-farm enterprises in Ethiopia are often characterized by low productivity and only sporadic operation (Nagler and Naudé 2017; Rijkers, Söderbom, and Loening 2010). While there may be potential gains to income from domestic migration to urban areas (de Brauw, Mueller, and

[32] Separate findings suggest that differential effects on nutrition at the one-year follow-up, including increased egg consumption for children and their mothers among the poultry recipient households, did not persist (Alderman et al. 2022; 2023).

Woldehanna 2018; Mueller et al. 2018), remittance rates in Ethiopia are notably low (de Brauw, Mueller, and Woldehanna 2013). Given these broader economic trends limiting the ability of poor rural households to meaningfully diversify into any other productive economic activity, a lighter-touch graduation model may simply be insufficient to stimulate any meaningful exit from poverty.

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Figure 1: Experimental design

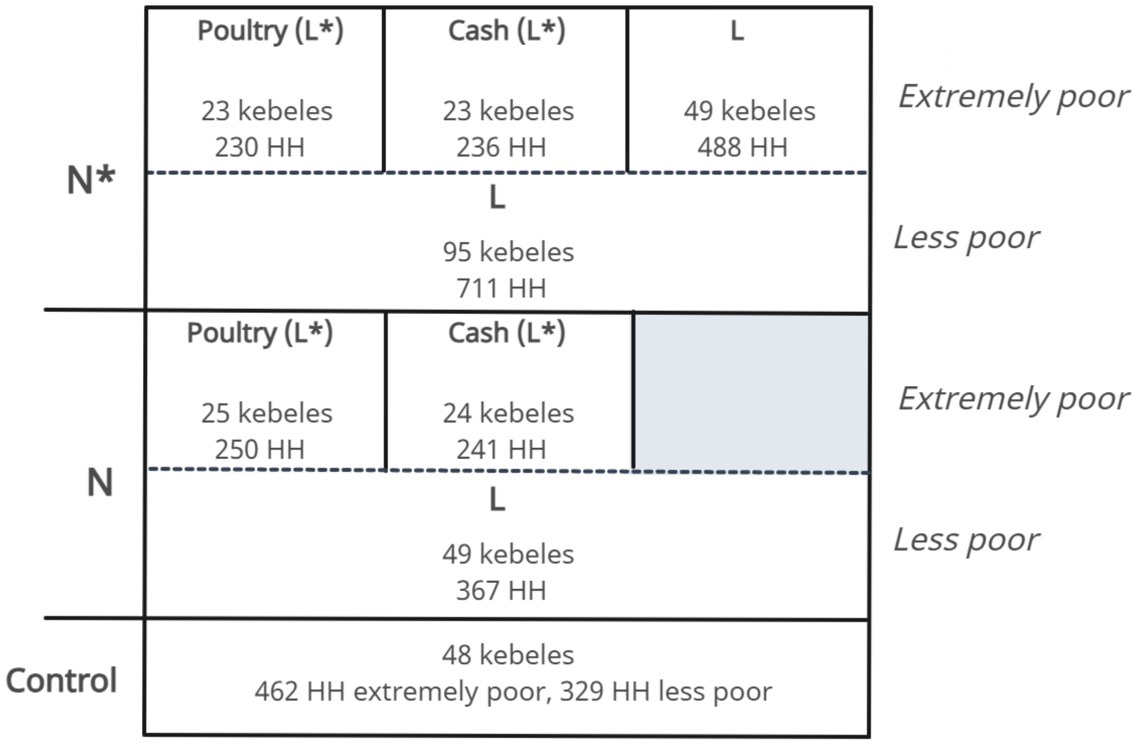


Figure 2: Timeline

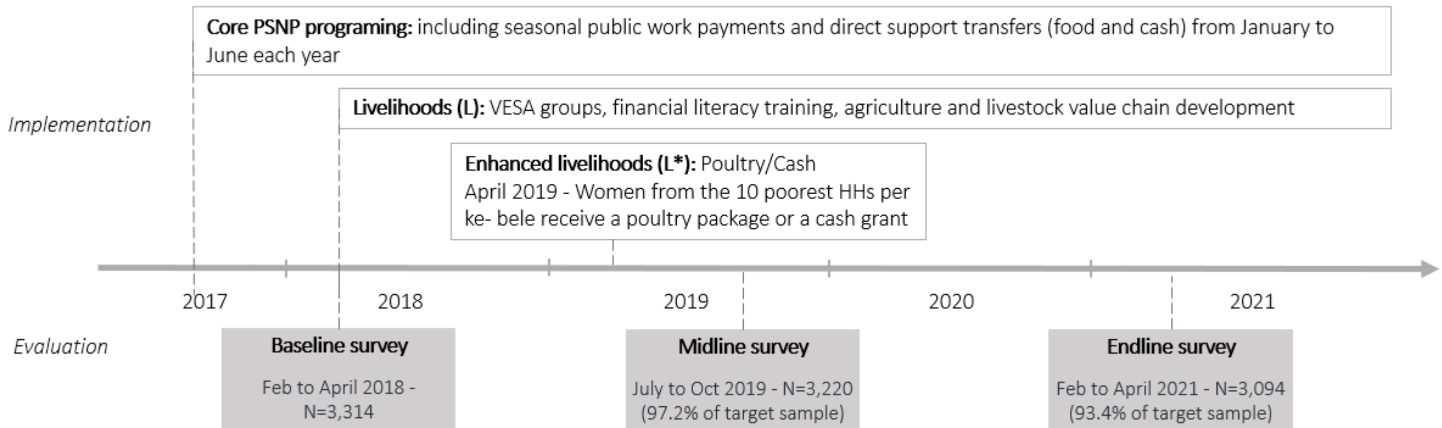


Figure 3: Primary treatment effects at endline

Figure 3a: Extremely poor, short model

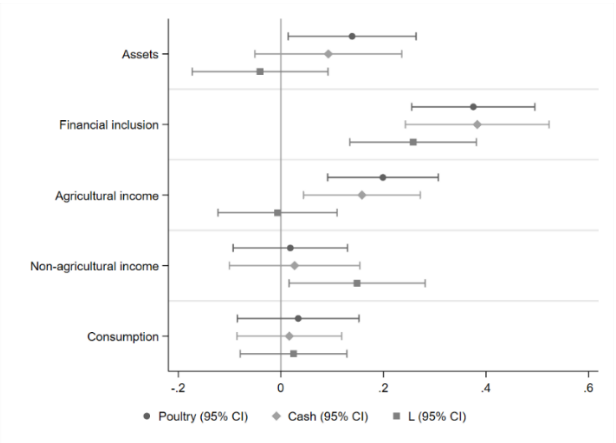
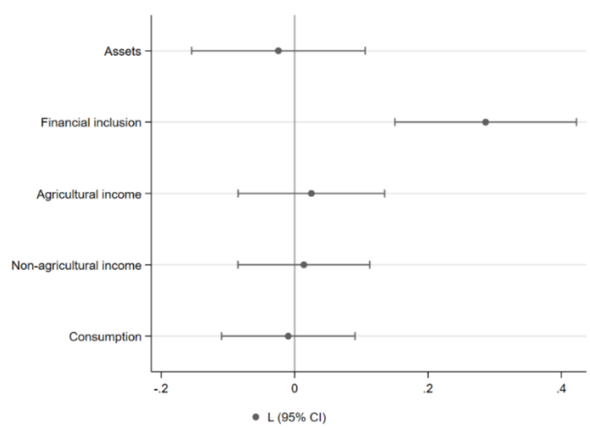


Figure 3b: Less poor, short



Notes: This figure reports the average standard treatment effects for each primary outcome family in conjunction with 95% confidence intervals. Coefficient estimates for the extremely poor are reported in Figure 3a, and for the less poor are reported in Figure 3b.

Table 1: Balance in baseline characteristics

	(1) N	(2) Control mean	(3) Poultry mean	(4) Cash mean	(5) L mean	(6) P-value on joint test
Panel A: Extremely poor households						
Household size	1,907	5.40	5.66	5.47	5.27	0.084*
Female-headed household	1,907	0.29	0.22	0.27	0.31	0.138
Household head: married, monogamous	1,905	0.75	0.79	0.75	0.73	0.305
Household head has no formal education	1,907	0.72	0.72	0.76	0.73	0.203
Value of livestock, productive assets, and consumer durables (market prices)	1,907	1,030.52	1,156.24	1,061.29	962.24	0.188
Total value of all productive assets	1,907	54.65	60.91	59.41	53.02	0.453
Total value of all consumer durable assets	1,907	88.21	94.68	94.67	94.42	0.995
Estimated value of all livestock owned by the household (market prices)	1,907	887.67	995.96	907.22	810.31	0.189
Household took out any type of loan (past year)	1,416	0.22	0.22	0.21	0.18	0.753
Household has any savings	1,465	0.22	0.27	0.26	0.26	0.993
Household reports any non-agricultural business	1,465	0.05	0.03	0.03	0.06	0.262
Household reports any regular wage work (past year)	1,465	0.06	0.03	0.05	0.03	0.508
Consumption expenditure per month per adult equivalent	1,880	59.44	60.63	64.72	62.46	0.894

	(1) N	(2) Control mean	(3) Pooled treatment mean			
Panel B: Less poor households						
Household size	1,407	6.23	6.18			0.808
Female-headed household	1,406	0.06	0.08			0.309
Household head: married, monogamous	1,405	0.95	0.94			0.336
Household head has no formal education	1,407	0.71	0.69			0.817
Value of livestock, productive assets and consumer durables (market prices)	1,407	2,410.23	2,215.95			0.436
Total value of all productive assets	1,407	141.36	145.11			0.683
Total value of all consumer durable assets	1,407	133.49	148.49			0.810
Estimated value of all livestock owned by the household (market prices)	1,407	2,096.09	1,901.01			0.409
Household took out any type of loan (past year)	1,313	0.18	0.21			0.865
Household has any savings	1,342	0.35	0.36			0.807
Household reports any non-agricultural business	1,342	0.05	0.05			0.642
Household reports any regular wage work (past year)	1,342	0.04	0.04			0.848
Consumption expenditure per month per adult equivalent	1,395	61.13	64.11			0.713

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The final column reports a p-value derived from a regression in which the covariate of interest is regressed on the binary variables for treatment assignment, conditional on strata dummies; the p-value corresponds to the joint test of the hypothesis $\beta_1 = \beta_2 = \beta_3 = 0$, in Panel A, or the hypothesis that β=0 in Panel B. All continuous variables are reported in 2017 dollars adjusted for purchasing power parity.

Table 2: Average standard treatment effects, interactions with respect to enhanced nutrition

	(1) Assets	(2) Financial inclusion	(3) Agricultural and livestock income	(4) Non-agricultural income	(5) Consumption and food security
Panel A: Extremely poor households					
Poultry	0.151**	0.321***	0.264***	0.029	0.051
p-value	(0.024)	(0.000)	(0.001)	(0.690)	(0.498)
q-value	[0.075]	[0.000]	[0.005]	[0.877]	[0.877]
Cash	0.217***	0.434***	0.264***	-0.004	0.023
p-value	(0.001)	(0.000)	(0.001)	(0.958)	(0.701)
q-value	[0.005]	[0.000]	[0.005]	[0.958]	[0.877]
Poultry x EN	-0.023	0.108	0.016	-0.022	-0.034
p-value	(0.774)	(0.120)	(0.872)	(0.779)	(0.700)
q-value	[0.886]	[0.300]	[0.909]	[0.886]	[0.877]
Cash x EN	-0.251***	-0.101	-0.044	0.068	-0.014
p-value	(0.007)	(0.323)	(0.611)	(0.494)	(0.822)
q-value	[0.026]	[0.673]	[0.877]	[0.877]	[0.893]
L	-0.039	0.259***	0.064	0.148**	0.025
p-value	(0.569)	(0.000)	(0.292)	(0.029)	(0.640)
q-value	[0.877]	[0.000]	[0.665]	[0.081]	[0.877]
Test: Poultry = L	0.291	0.187	0.995	0.699	0.719
Test: Cash = L	0.000	0.026	0.015	0.063	0.978
Test: Poultry = L	0.004	0.305	0.018	0.133	0.711
N	1,765	1,765	1,765	1,030	1,771
Panel B: Less poor households					
L	-0.025	0.306***	0.063	-0.035	-0.000
p-value	(0.749)	(0.000)	(0.370)	(0.523)	(0.997)
q-value	[0.997]	[0.001]	[0.997]	[0.997]	[0.997]
L x EN	0.001	-0.030	0.005	0.073	-0.014
p-value	(0.991)	(0.576)	(0.930)	(0.101)	(0.786)
q-value	[0.997]	[0.997]	[0.997]	[0.504]	[0.997]
N	1,322	1,322	1,322	951	1,323

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. All average standard treatment effect estimates are calculated following the method of Katz, Kling and Liebman (2007) and present the effect size relative to the standard deviation of the control arm. Both conventional p-values clustered at the subdistrict level and sharpened q-values adjusted for multiple hypothesis testing are reported. Asterisks indicate significance at the 10, 5 and 1 percent level and are calculated with respect to the conventional standard errors and p-values.

Table 3: Average standard treatment effects, no interactions

	(1) Assets	(2) Financial inclusion	(3) Agricultural and livestock income	(4) Non-agricultural income	(5) Consumption and food security
Panel A: Extremely poor households					
Poultry	0.139**	0.375***	0.272***	0.018	0.034
p-value	(0.029)	(0.000)	(0.000)	(0.746)	(0.577)
q-value	[0.062]	[0.000]	[0.000]	[0.751]	[0.751]
Cash	0.093	0.383***	0.242***	0.027	0.016
p-value	(0.205)	(0.000)	(0.000)	(0.680)	(0.751)
q-value	[0.385]	[0.000]	[0.000]	[0.751]	[0.751]
L	-0.041	0.258***	0.063	0.149**	0.025
p-value	(0.549)	(0.000)	(0.295)	(0.028)	(0.641)
q-value	[0.751]	[0.000]	[0.492]	[0.062]	[0.751]
Test: Poultry = Cash	0.481***	0.900***	0.653***	0.892***	0.751***
Test: Cash = L	0.050***	0.046***	0.005***	0.096***	0.856***
Test: Poultry = L	0.003	0.023	0.002	0.047	0.868
N	1,765	1,765	1,765	1,030	1,771
Panel B: Less poor households					
L	-0.024	0.286***	0.066	0.014	-0.009
p-value	(0.714)	(0.000)	(0.285)	(0.783)	(0.853)
q-value	[0.853]	[0.000]	[0.713]	[0.853]	[0.853]
N	1,322	1,322	1,322	951	1,323

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. All average standard treatment effect estimates are calculated following the method of Katz, Kling and Liebman (2007) and present the effect size relative to the standard deviation of the control arm. All treatment effects are estimated conditional on strata fixed effects; both conventional p-values clustered at the subdistrict level and sharpened q-values adjusted for multiple hypothesis testing are reported. Asterisks indicate significance at the 10, 5 and 1 percent level and are calculated with respect to the conventional standard errors and p-values.

Table 4: Assets

	One-year follow-up	*Three-year follow-up*			
	(1) Value of livestock	(2) Value of total assets	(3) Value of productive assets	(4) Value of consumer durables	(5) Value of livestock
		(IHS transformation)			
Panel A: Extremely poor households					
Poultry	1.084***	0.111	0.150	0.038	0.428**
	(0.174)	(0.103)	(0.103)	(0.096)	(0.173)
Cash	0.508**	0.059	0.071	0.008	0.359*
	(0.226)	(0.115)	(0.122)	(0.084)	(0.204)
L	-0.190	-0.244**	0.015	-0.020	-0.314
	(0.206)	(0.110)	(0.101)	(0.090)	(0.198)
Test: Poultry = Cash	0.004***	0.622	0.515	0.756	0.714
Test: Poultry = L	0.000***	0.001***	0.180	0.554	0.000***
Test: Cash = L	0.002***	0.008***	0.630	0.736	0.001***
Test: β_1 1 year = 3 years [poultry]					0.000
Test: β_2 1 year = 3 years [cash]					0.432
Test: β_3 1 year = 3 years [L]					0.519
Mean of control	1,453.86	1,105.66	35.21	96.54	971.87
N	1,847	1,765	1,765	1,765	1,765
Panel B: Less poor households					
L	0.148	-0.074	0.044	0.167**	-0.233
	(0.193)	(0.091)	(0.078)	(0.080)	(0.154)
Test: β 1 year = 3 years					0.018
Mean of control	2,168.13	1,653.85	45.41	100.84	1,495.62
N	1,373	1,322	1,322	1,322	1,322

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The dependent variables are calculated as the value of the specified asset class, valued using locally reported market prices; the means in the control arm are reported in 2017 dollars in purchasing power parity terms. The estimated regressions employ an inverse hyperbolic sine transformation. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table 5: Financial inclusion; one-year follow-up

	(1) Any credit (past year)	(2) Any formal credit (past year)	(3) Total credit (past year, IHS transformation)	(4) Any savings	(5) Total savings (IHS transformation)
Panel A: Extremely poor households					
Poultry	0.024	0.014	0.177	0.318***	1.406***
	(0.043)	(0.036)	(0.261)	(0.041)	(0.186)
Cash	-0.006	0.008	0.011	0.349***	1.362***
	(0.043)	(0.036)	(0.276)	(0.038)	(0.197)
L	0.064	0.046	0.450	0.260***	1.144***
	(0.044)	(0.036)	(0.277)	(0.042)	(0.210)
Test: Poultry = Cash	0.462	0.839	0.500	0.368	0.821
Test: Poultry = L	0.321	0.326	0.257	0.134	0.204
Test: Cash = L	0.088*	0.227	0.087*	0.013**	0.302
Mean of control	0.42	0.17	156.35	0.44	40.98
N	1,291	1,285	1,290	1,289	1,296
Panel B: Less poor households					
L	0.046	0.014	0.211	0.278***	1.018***
	(0.037)	(0.032)	(0.247)	(0.034)	(0.175)
Mean of control	0.436	0.194	184.986	0.504	74.990
N	1,182	1,176	1,182	1,182	1,185

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ an inverse hyperbolic sine transformation. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table 6: Financial inclusion; three-year follow-up

	(1) Any credit (past year)	(2) Any formal credit (past year)	(3) Total credit (past year, IHS transformation)	(4) Any savings	(5) Total savings (IHS transformation)
Panel A: Extremely poor households					
Poultry	0.075**	0.077**	0.516**	0.335***	1.404***
	(0.036)	(0.031)	(0.231)	(0.046)	(0.215)
Cash	0.098**	0.083***	0.620**	0.333***	1.317***
	(0.040)	(0.032)	(0.250)	(0.046)	(0.231)
L	-0.006	0.032	0.016	0.327***	1.275***
	(0.034)	(0.030)	(0.216)	(0.043)	(0.213)
Test: Poultry = Cash	0.576	0.839	0.692	0.955	0.647
Test: Poultry = L	0.019**	0.112	0.027**	0.799	0.450
Test: Cash = L	0.007***	0.083*	0.014**	0.845	0.819
Test: β_1 1 year = 3 years [poultry]	0.297	0.112	0.252	0.718	0.993
Test: β_2 1 year = 3 years [cash]	0.016	0.027	0.019	0.737	0.848
Test: β_3 1 year = 3 years [L]	0.129	0.690	0.118	0.131	0.555
Mean of control	0.45	0.13	147.03	0.40	34.07
N	1,765	1,760	1,765	1,765	1,765
Panel B: Less poor households					
L	0.019	0.036	0.196	0.302***	1.396***
	(0.042)	(0.036)	(0.268)	(0.042)	(0.204)
Test: β 1 year = 3 years	0.567	0.561	0.959	0.602	0.085
Mean of control	0.48	0.19	170.37	0.47	34.73
N	1,322	1,320	1,321	1,322	1,322

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ an inverse hyperbolic sine transformation. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table 7: Income, three-year follow-up

	(1) Income from sales of livestock (past year)	(2) Income from sales of livestock products (past year)	(3) Income from crops (past year)	(4) Total estimated value of livestock products produced (past year)	(5) Total estimated value of crops harvested (past year)	(6) Total income from livestock and crops	(7) Total estimated value of livestock sales and livestock and crop products	(8) Any income from non-agricultural business	(9) Any income from formal wage work (past year)	(10) Any income from casual wage work (past year)
	(IHS transformation)				(IHS transformation)					
Panel A: Extremely poor households										
Poultry	0.787***	0.508***	0.226	0.458**	0.421	0.678***	0.557**	0.014	-0.007	0.025
	(0.243)	(0.141)	(0.198)	(0.188)	(0.267)	(0.256)	(0.218)	(0.017)	(0.018)	(0.047)
Cash	0.791***	0.408***	0.146	0.310*	0.294	0.668**	0.341	0.018	-0.008	0.020
	(0.243)	(0.128)	(0.201)	(0.174)	(0.309)	(0.258)	(0.262)	(0.021)	(0.019)	(0.043)
L	0.075	0.172	-0.289	0.166	-0.226	-0.114	-0.114	0.044**	0.016	0.045
	(0.242)	(0.119)	(0.224)	(0.169)	(0.280)	(0.277)	(0.250)	(0.020)	(0.018)	(0.045)
Test: Poultry = Cash	0.987	0.514	0.665	0.425	0.664	0.967	0.348	0.835	0.962	0.903
Test: Poultry = L	0.006***	0.023**	0.015**	0.108	0.016**	0.004***	0.003***	0.168	0.141	0.670
Test: Cash = L	0.005***	0.078*	0.047**	0.388	0.090*	0.004***	0.076*	0.325	0.172	0.563
Test: β_1 1 year = 3 years [poultry]									0.650	0.358
Test: β_2 1 year = 3 years [cash]									0.505	0.441
Test: β_3 1 year = 3 years [L]									0.623	0.843
Mean of control	266.87	6.48	82.53	27.76	475.02	360.17	773.88	0.03	0.04	0.26
N	1,765	1,761	1,765	1,762	1,765	1,765	1,765	1,030	1,029	1,030
Panel B: Less poor households										
L	0.224	0.147	-0.424*	0.053	0.166	0.032	0.246	-0.019	0.008	0.033
	(0.255)	(0.171)	(0.215)	(0.176)	(0.253)	(0.275)	(0.217)	(0.017)	(0.016)	(0.033)
Test: β 1 year = 3 years									0.914	0.956
Mean of control	373.76	-39.87	126.95	49.41	639.40	465.83	1,067.56	0.06	0.03	0.20
N	1,322	1,319	1,322	1,322	1,322	1,322	1,322	951	951	951

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ an inverse hyperbolic sine transformation. The estimate of total income in Column (6) corresponds to the sum of Columns (1) through (3), and the estimate of total crop and product value in Column (7) corresponds to the sum of Columns (1), (4), and (5). All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table 8: Consumption and food security, three-year follow-up

	(1) Monthly food consumption per adult equivalent (IHS transformation)	(2) Monthly non-food consumption per adult equivalent (IHS transformation)	(3) Monthly consumption per adult equivalent (IHS transformation)	(4) Food Insecurity Experience Scale (0-8)
Panel A: Extremely poor households				
Poultry	0.032	0.020	0.025	0.102
	(0.068)	(0.084)	(0.062)	(0.199)
Cash	-0.085	0.052	-0.059	0.517**
	(0.069)	(0.073)	(0.061)	(0.208)
L	-0.071	0.140*	-0.038	0.226
	(0.067)	(0.077)	(0.060)	(0.175)
Test: Poultry = Cash	0.091*	0.646	0.181	0.057*
Test: Poultry = L	0.120	0.096*	0.309	0.507
Test: Cash = L	0.842	0.140	0.722	0.139
Mean of control	44.87	7.68	52.86	3.36
N	1,706	1,764	1,701	1,748
Panel B: Less poor households				
L	-0.069	0.074	-0.036	0.006
	(0.075)	(0.060)	(0.064)	(0.192)
Mean of control	47.878	7.840	55.872	3.318
N	1,291	1,322	1,290	1,314

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The dependent variables in Columns (1) through (3) are household-level consumption variables; the dependent variable in Column (4) is the continuous FIES score. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ an inverse hyperbolic sine transformation. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

APPENDIX

A.1 Randomization

This description of the randomization process draws substantially on the baseline report. Within the 196 study kebeles that were randomized, 49 were assigned to each of the four treatment arms: T1: L*+EN; T2: L*+N; T3: L+EN; and C: PSNP only. Randomization was stratified at the district (woreda) level to provide balance of treatment assignment geographically, and the first version of the randomization was conducted based on subdistrict (kebele)-level implementation data provided in September 2017. Kebeles in which VESA groups had already formed were removed from the sample, leading to a total of 158 clusters. In November 2017, a second dataset was provided by the implementing partners including an additional woreda in Oromia, Daro Lebu, where implementation would start a few months later, which added 37 additional clusters to the study. In addition, original kebele level data on VESA group formation was incorrect in 4 of the Oromia kebeles. As a result, it was agreed to redo the randomization for Oromia region only, since VESA program formation had already begun in Amhara based on the initial randomization. In the second dataset, VESA programs in Oromia that were marked as "very new" were now kept in the eligible list of kebeles. Thus, the original randomization for the 115 kebeles in Amhara was retained and the new 81 kebeles in Oromia were re-randomized, ending up with a total of 196 clusters.

Using the initial data, 1,000 potential treatment allocations were generated, stratified by woreda. A uniform random number between 0 and 1 was drawn for each of the clusters in each stratum. These were ordered and then allocated 1/4th of the sample to each treatment arm. Since some strata did not consist of clusters that were evenly divisible by four, we randomly allocated the leftover clusters within each stratum to one of the treatment arms ensuring that balance across arms within strata would be preserved (i.e., no treatment arms gets more than one leftover cluster within the strata) and that the allocation would be random. When there was one leftover cluster, a random number between 0 and 1 was drawn, and if it was less than 0.25 it was allocated to treatment group 1, if it was between 0.25 and 0.5 it was allocated to treatment group 2, if between 0.5 and 0.75 it was allocated to treatment group 3, and if between 0.75 and 1 it was allocated to treatment group 4. With two leftover clusters, there were 6 possible allocations across the 4 treatment groups (4 choose 2). Again, we drew a random number between 0 and 1 at the strata level, and if this was less than 0.1667 then the clusters go in treatment groups 1 and 2, if between 0.1667 and 0.3333 then the clusters go in treatment groups 1 and 3, and so on. A second random number is selected and ranked to decide the order of the allocation to each of the treatment arms. The same procedure was followed for strata with 3 leftover clusters.

Using the share of PSNP beneficiaries in each kebele and the distance from the kebele to the district capital to balance the treatment arms, the relative efficiency of each of the 1,000 potential allocations was calculated. For any treatment allocation, the relative efficiency provides a measure of the balance in observable characteristics between potential treatment groups. The maximum t-statistic from the regression of the observed characteristic on the treatment allocations (with strata dummies) is calculated at the sample level. Allocations with the most equal allocations across regions were kept from these 1,000 allocations – that is, allocations with more than 29 kebeles per treatment arm in Amhara were dropped, and allocations with more than 12 kebeles per treatment arm in Oromia were dropped. At the sample level, allocations that resulted in less than 39 clusters in each treatment arm were also dropped. From the remaining allocations, the one with the highest relative efficiency – the minimum maximum t-statistic - was retained (Bruhn and McKenzie 2009). This allocation is used as the final randomization allocation for Amhara.

In the second set of data received on November 1, the procedure was modified to take as given the previous assignment of kebeles to treatment groups in Amhara. For each stratum in Oromia, 1,000 potential treatment allocations were generated using the same procedure that was used in the initial randomization; leftover clusters within each stratum were also managed similarly. For each of the 1,000 potential treatment allocations generated for Oromia in the second set of randomizations, the relative efficiency is calculated using the potential treatment allocation for previously unassigned kebeles in Oromia and the actual treatment assignment for kebeles in Amhara. Allocations with the most equal balance across Oromia were kept – that is allocations that resulted in a treatment group with 19 or fewer clusters were dropped. At the sample level, allocations that resulted in 49 clusters per treatment arm were kept. From the remaining allocations, the one with the highest relative efficiency – the minimum maximum t-statistic - was retained. This allocation is used as the final randomization allocation, maintaining the original Amhara randomization and combining it with the new randomization for Oromia (Table A22).

Following the initial randomization of kebeles across the four treatment arms, two kebeles were dropped because they had no PSNP beneficiaries and one was dropped for security reasons. The randomization across the 193 remaining kebeles is shown in Table A23.

Within the 95 L* kebeles assigned to the treatment arms T1: L* + EN and T2: L*+N, half were randomized, by woreda, to (1) receive aspirations treatment; and (2) not receive aspirations treatment. Again, 1000 potential treatment allocations were calculated, by woreda, of which only allocations with balance between the number of kebeles in the aspirations treatment in L*+EN and L*+N treatment groups, were kept. Of the allocations that remained, a random number between 0 and 1 was assigned to each randomization and the one with the lowest random number assigned was kept as the realized allocation.

The L* kebeles were also randomized into poultry and cash treatment arms. Again, 1000 potential allocations were drawn, stratified by woreda. Only the allocations with balance between the number of poultry treatment kebeles in L*+EN and L*+N treatment groups, as well as balance between the number of poultry treatment kebeles in L*+EN aspirations vs non-aspirations, and L*+N aspirations vs non-aspirations groups were retained. Of the allocations that remained, a random number between 0 and 1 was assigned to each randomization and the one with the lowest random number assigned was retained as the realized allocation.

The resulting final kebele-level randomization is presented in Tables A15 and A16.

A.2 Measuring assets and income

We measure assets and income as follows.

To construct estimates of asset value, we use count values of assets owned provided by households, in conjunction with data on asset prices obtained from local markets. For livestock, the price data was obtained in a market survey administered at the same time as the three-year follow-up survey (in 2021) and is adjusted for inflation to correspond to 2018 prices at baseline. For non-livestock assets, the price data was obtained from the midline survey corresponding to the main IFPRI evaluation of the PSNP (PSNP4 Highland Outcomes Report); this survey was conducted in 2018, and thus no inflation adjustment is required.

To construct income data, we use data that is directly reported by households about their income from sales of livestock products, livestock, and crops in the most recent season; as well as data about their overall output of livestock products and crops. Output and sales of different livestock products are reported for shorter recall periods varying from one week to 3 months, and these reports are imputed to production over the past year assuming consistent production over the year; sales of livestock are directly reported for the past year.

In the two follow-up surveys, output and sales for crops are reported for the mehr season, generally the primary season for production in this region. A secondary growing season, the belg, is characterized by relatively low levels of production; at baseline, belg production constituted less than 10% of total annual production on average, though with considerable variation across woredas. (Woredas in Oromia in which chat production is common are generally characterized by more output in the belg season.) We adjust our total estimates of production upward to encompass the belg season using a woreda-level adjustment factor constructed from baseline data.

Estimates of the total value of livestock products and the total crop value are calculated by valuing each reported crop produced at the local market price. In all cases, we employ price data from the market most proximate to each subdistrict. If a particular market did not report price data for a particular commodity, we replace that missing value with the average price reported in that woreda, or if not reported in that woreda, in that region.

A.3 Comparing consumption and transfers in different graduation models

Table A2 presents data on consumption per capita and transfer size comparing across various graduation model interventions evaluated in the existing literature. This table is constructed as follows. First, data on transfer size and consumption was compiled from the papers published. Importantly, for interventions that include both a lump-sum asset or cash transfer and ongoing cash support in the treatment arm that are not provided to the control arm, we calculate the total sum of both components. (Thus a graduation model that includes a $500 asset transfer and two years of monthly consumption support payments of $25 a month, neither of which are provided to the control arm, would be described as a $1100 transfer here.)

Second, all estimates are then converted to 2017 dollars in purchasing power terms. We do this by identifying the value of the transfer in the original currency in the year recorded, converting this currency value to a 2017 currency value (using exchange rates reported by the World Bank), and then converting to purchasing power parity terms using data from the International Comparison Program.

Figure A1: Study design

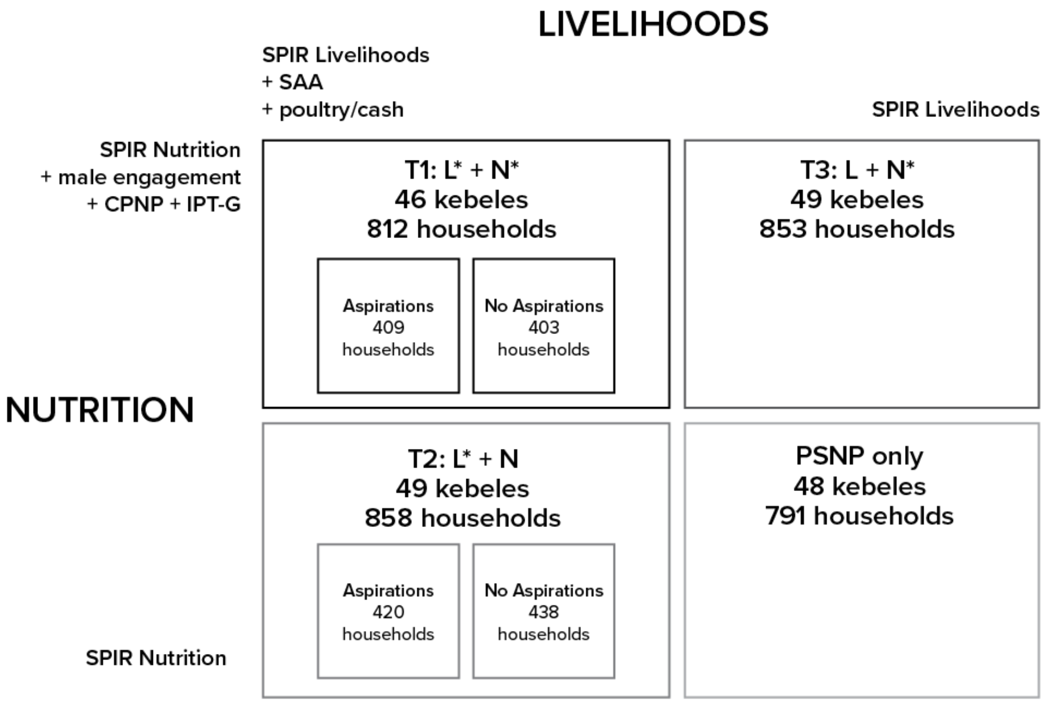


Figure A2: Flow diagram

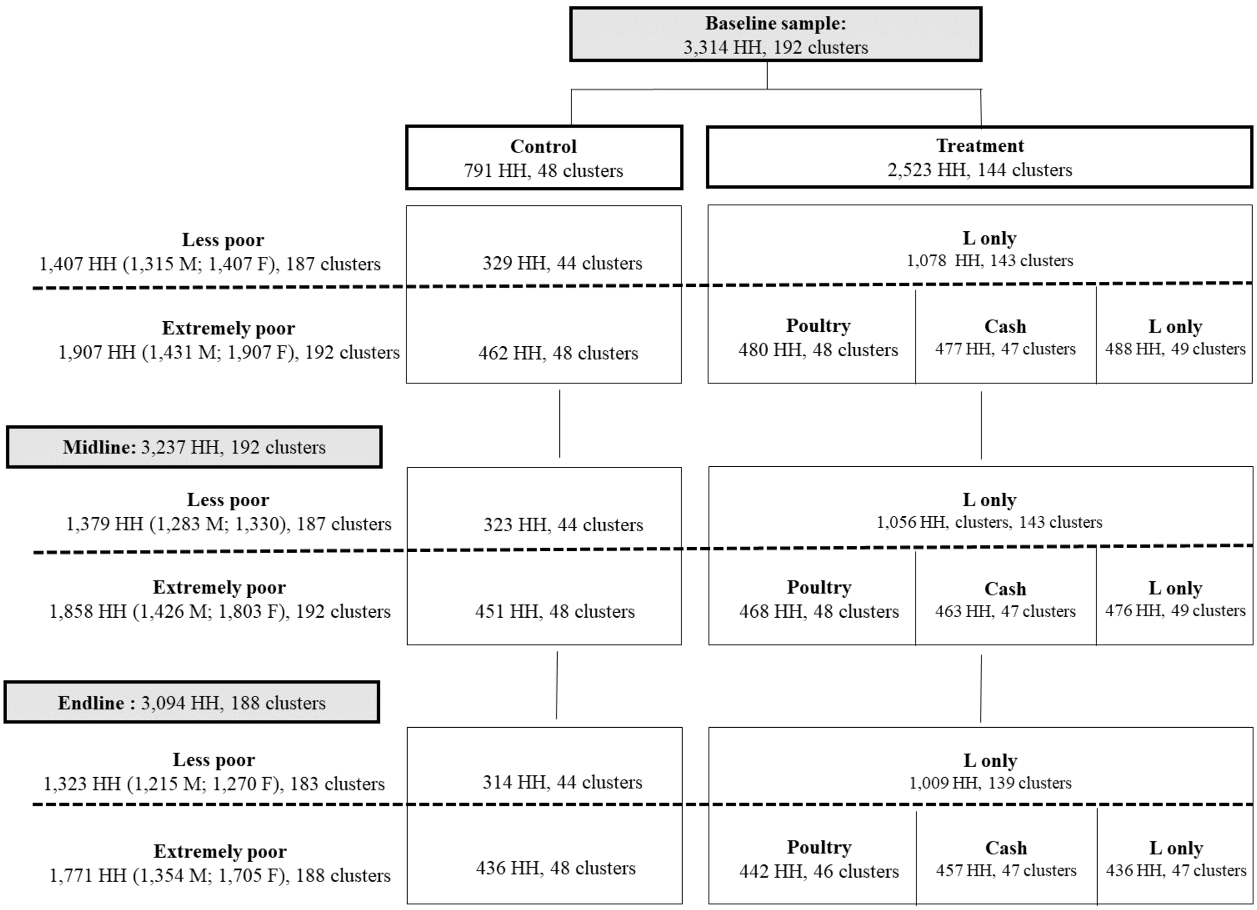
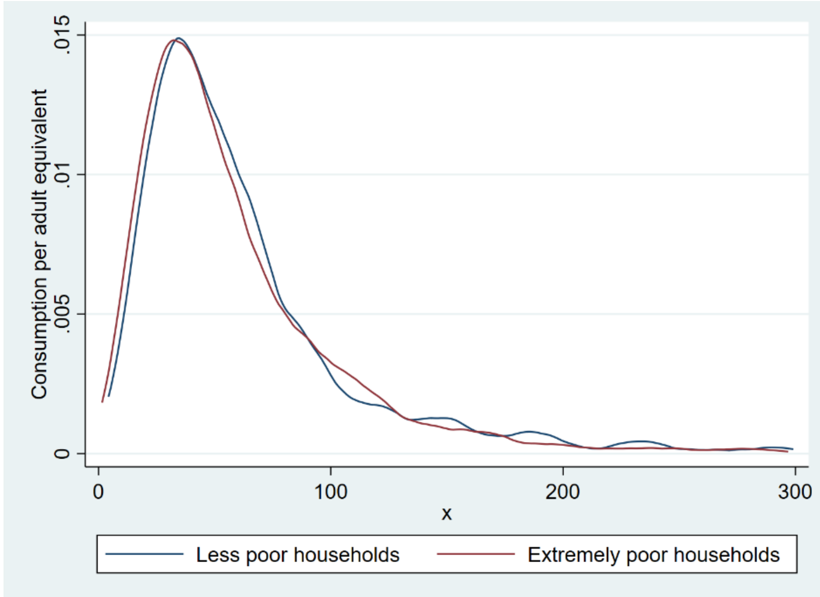


Figure A3: Baseline consumption for extremely poor versus non-poor households



Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The graph truncates consumption per adult equivalent at approximately the 99th percentile observed in the pooled sample.

Figure A4: Primary treatment effects, three-year follow-up

Figure A4a: Extremely poor, long model

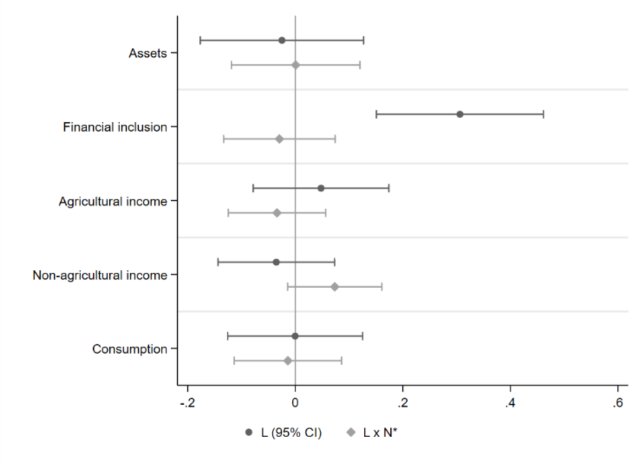
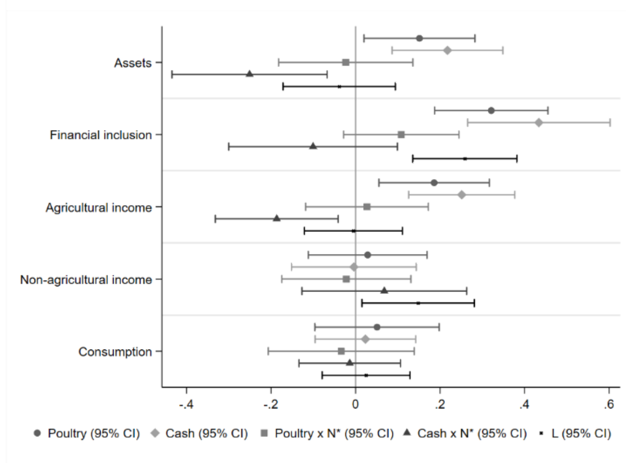


Figure A4b: Less poor, long model



Notes: This figure reports the average standard treatment effects for each primary outcome family in conjunction with 95% confidence intervals. Coefficient estimates for the extremely poor are reported in Figure 3a, and for the less poor are reported in Figure 3b.

Table A1: Transfer size in the graduation model literature

Author	Context	Year project launched	Monthly per capita consumption (PPP $2017)	Monthly household consumption (PPP $2017)	Transfer value (PPP $2017)	Transfer / consumption	Intervention population (number of households)
Bossuroy et al. 2022	Niger	2016	71.30	?	296.85	4.16	22,507
Bandiera et al. 2017	Bangladesh	2007	78.43	?	629.66	8.03	360,000
Alderman et al. 2022	Ethiopia	2019	47.30	272.94	374.20	7.91	150,000
Brune et al. 2022	Yemen	2010	160.83	1254.50	1600.02	9.95	505
Banerjee et al. 2015	Peru	2011	99.51	517.46	1095.57	11.01	785
Banerjee et al. 2015	Ghana	2011	38.18	318.42	481.06	12.60	666
Banerjee et al. 2015	Pakistan	2008	99.53	626.07	1537.88	15.45	660
Banerjee et al. 2015	Honduras	2009	49.94	293.67	781.47	15.65	800
Banerjee et al. 2015	India	2007	40.56	160.63	712.01	17.55	541
Bedoya et al. 2019	Afghanistan	2016	87.70	?	1960.00	22.35	1,219
Banerjee et al. 2015	Ethiopia	2010	50.10	280.07	1295.55	25.86	458

Notes: This table summarizes characteristics of the sample and the transfer included in other recent papers in the graduation model literature. More details about how this information was compiled is provided in the above Appendix Section A.3.

Table A2: Main survey modules administered at each round

FEMALE	Baseline	Midline	Endline
Housing, water & sanitation	X	—	X
Livestock ownership and management	X	X	X
Cost of livestock production	X	X	X
Income from livestock & livestock products	X	X	X
Agricultural extension related to livestock	X	X	—
Own business activities	X	—	—
Wage employment	—	X	X
Credit for productive purposes	X	—	X
Credit for consumption purposes	X	—	—
Access to savings	X	X	X
Household consumables (monthly)	X	—	—
Women's dietary diversity (24-hour recall)	X	X	X
Household food consumption & expenditure	X	—	X
Household food security	X	X	X
Female agency & decision-making	X	X	X
IYCF practices, knowledge & child health history	X	X	X
Childcare activities & exposure to health services	X	X	X
Anthropometry	X	X	X
Participation in VESA groups and SPIR activities	X	X	X
Exposure to SPIR programming	—	X	X
MALE	**Baseline**	**Midline**	**Endline**
Productive assets	X	—	X
Consumer durables	X	—	X
Livestock ownership & management	X	X	X
Income from livestock & livestock products	X	—	X
Cost of livestock production	X	—	X
Agricultural extension related to livestock	X	X	—
Land characteristics and tenure	X	X	X
Crop choice, inputs & production – Belg Season	X	—	—
Crop choice, inputs & production – Mehr Season	X	X	X
Wage employment	X	X	X
Own business activities	X	—	X
Credit for productive purposes	X	X	X
Credit for consumption purposes	X	X	X
Access to savings	X	X	X
Durables and services (annual)	X	X	X
Household consumables (monthly)	X	—	X
Intrahousehold dynamics & gender norms	X	X	X
IYCF knowledge & childcare activities	X	X	X
Exposure to health and nutrition services	X	X	X
Participation in PSNP	X	X	X
Participation in VESA groups and SPIR activities	X	X	X
Experience with shocks	X	X	X

Table A3: Baseline characteristics for extremely poor versus less poor households

	(1) N	(2) Extremely poor mean	(3) Less poor mean	(4) P-value on test of significance
Household size	3,314	5.45	6.18	0.000***
Female-headed household	3,313	0.27	0.10	0.000***
Household head: married, monogamous	3,310	0.75	0.93	0.000***
Household head has no formal education	3,314	0.73	0.69	0.007***
Value of livestock, productive assets and consumer durables (market prices)	3,314	1,052.39	2,271.56	0.000***
Total value of all productive assets	3,314	57.00	143.02	0.000***
Total value of all consumer durable assets	3,314	93.04	144.28	0.000***
Estimated value of all livestock owned by the household (market prices)	3,314	900.02	1,957.90	0.000***
Household took out any type of loan (past year)	2,729	0.21	0.21	0.490
Household has any savings	2,807	0.25	0.36	0.000***
Household reports any non-agricultural business	2,807	0.04	0.04	0.945
Household reports any regular wage work (past year)	2,807	0.04	0.04	0.825
Food consumption expenditure per month per AE	3,275	49.72	51.31	0.399
Non-food consumption expenditure per month per AE	3,275	12.10	13.33	0.021**
Consumption expenditure per month per AE	3,275	61.81	64.63	0.167

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The final column reports a p-value derived from a simple t-test of equality across subsamples.

Table A4: Intervention exposure

	N	Control mean	Poultry mean	Cash mean	L mean
Panel A: Extremely poor households					
At least one household member is a member of a VESA group	1,765	0.14	0.86	0.81	0.79
Member attended >=1 VESA meeting in last 12 months	1,806	0.08	0.72	0.67	0.65
Female participated in value chain trainings	1,720	0.05	0.35	0.20	0.23
Male participated in value chain trainings	1,030	0.06	0.28	0.29	0.24
Household participated in value chain trainings	1,769	0.07	0.42	0.28	0.30
Household participated in financial education trainings	1,825	0.10	0.41	0.37	0.34
Household received a poultry start-up package	1,846	0.05	0.94	0.18	0.15
Number of chickens household received from start-up package	614	8.38	15.77	5.35	6.11
Household received an unconditional cash grant	1,847	0.02	0.12	0.63	0.04
Amount of money household reported receiving	376	221.07	139.48	395.84	178.76

Panel B: Less poor households

	N	Control mean	Pooled treatment mean
At least one household member is a member of a VESA group	1,315	0.13	0.86
Member attended >=1 VESA meeting in last 12 months	1,354	0.09	0.69
Female participated in value chain trainings	1,287	0.05	0.28
Male participated in value chain trainings	950	0.05	0.30
Household participated in value chain trainings	1,366	0.09	0.38
Household participated in financial education trainings	1,322	0.07	0.37
Household received a poultry start-up package	1,372	0.05	0.21
Number of chickens household received from start-up package	206	5.73	6.55
Household received an unconditional cash grant	1,373	0.03	0.03
Amount of money household reported receiving	39	148.39	110.69

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. All variables reported are measured in the three-year follow-up survey, with the exception of variables capturing the cash and poultry transfers and participation in financial education, all reported in the one-year follow-up. (Participation in financial education was not measured in the three-year follow-up due to a survey error.)

Table A5: Livestock ownership: sub-sample of extremely poor households

	One-year follow-up				*Three-year follow-up*			
	(1) Poultry owned	(2) Goats and sheep owned	(3) Cows and oxen owned	(4) Value of livestock (self-reports, IHS transformation)	(5) Poultry owned	(6) Goats and sheep owned	(7) Cows and oxen owned	(8) Value of livestock (self-reports, IHS transformation)
Extremely poor households								
Poultry	9.133***	0.586***	-0.023	1.193***	1.811***	0.460**	0.017	0.634***
	(0.577)	(0.202)	(0.113)	(0.206)	(0.291)	(0.216)	(0.121)	(0.228)
Cash	0.871**	0.513***	-0.008	0.583**	0.552**	0.112	0.020	0.429
	(0.395)	(0.193)	(0.117)	(0.267)	(0.234)	(0.182)	(0.113)	(0.262)
L	0.675*	0.029	-0.220**	-0.176	0.186	-0.069	-0.173	-0.223
	(0.357)	(0.176)	(0.110)	(0.246)	(0.222)	(0.196)	(0.113)	(0.260)
Test: Poultry = Cash	0.000***	0.739	0.886	0.010**	0.000***	0.110	0.975	0.401
Test: Poultry = L	0.000***	0.008***	0.035**	0.000***	0.000***	0.019**	0.093*	0.000***
Test: Cash = L	0.583	0.014**	0.030**	0.004***	0.126	0.356	0.058*	0.015**
Mean of control	1.67	1.50	1.02	1,079.61	1.76	1.49	1.08	705.53
N	1,825	1,825	1,825	1,825	1,765	1,765	1,765	1,765
Less poor households								
L	0.925***	-0.031	-0.169	-0.009	0.569**	0.005	-0.291**	-0.310*
	(0.238)	(0.215)	(0.109)	(0.197)	(0.236)	(0.203)	(0.122)	(0.169)
Mean of control	2.091	2.170	1.562	1,591.816	2.166	2.016	1.777	1,103.525
N	1,364	1,364	1,364	1,364	1,322	1,322	1,322	1,322

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The dependent variables are calculated as the value of the specified asset class, using households' own estimated valuations; the means in the control arm are reported in 2017 dollars in purchasing power parity terms. The estimated regressions employ a linear specification in Columns (1) to (3) and (5) through (7), and an inverse hyperbolic sine specification in Columns (4) and (8). All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A6: Non-agricultural income at one-year follow-up

	(1)	(2)
	Any income from formal wage work (past year)	Any income from casual wage work (past year)
Panel A: Extremely poor households		
Poultry	0.002	-0.019
	(0.016)	(0.047)
Cash	0.007	-0.011
	(0.018)	(0.043)
L	0.007	0.036
	(0.018)	(0.047)
Test: Poultry = L	0.771	0.224
Test: Cash = L	0.984	0.248
Test: Poultry = Cash	0.764	0.842
Mean of control	0.04	0.30
N	1,261	1,260
Panel B: Less poor households		
L	0.006	0.030
	(0.013)	(0.038)
Mean of control	0.03	0.24
N	1,178	1,177

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A7: Assets, without IHS transformation

	One-year follow-up		*Three-year follow-up*							
	Linear outcome	*Binary for positive*	*Linear outcome variable*				*Binary variable for positive value*			
	(1) Value of livestock	(2) Value of livestock	(3) Value of total assets	(4) Value of productive assets	(5) Value of consumer durables	(6) Value of livestock	(7) Value of total assets	(8) Value of productive assets	(9) Value of consumer durables	(10) Value of livestock
Panel A: Extremely poor households										
Poultry	218.189*	0.159***	3.571	2.431	-1.112	4.800	-0.000	0.029	-0.006	0.088***
	(115.320)	(0.021)	(90.286)	(2.044)	(9.032)	(85.321)	(0.001)	(0.024)	(0.015)	(0.023)
Cash	71.876	0.080***	84.526	2.034	9.698	74.549	-0.005*	0.019	0.002	0.059**
	(102.333)	(0.028)	(90.638)	(1.881)	(9.930)	(86.884)	(0.003)	(0.028)	(0.013)	(0.029)
L	-179.966	0.009	-127.681	-0.895	3.489	-125.844	-0.005	0.022	0.003	-0.023
	(109.645)	(0.028)	(87.568)	(1.901)	(10.164)	(83.667)	(0.003)	(0.022)	(0.014)	(0.029)
Test: Poultry = Cash	0.149	0.002***	0.366	0.860	0.218	0.415	0.115	0.685	0.565	0.273
Test: Poultry = L	0.000***	0.000***	0.133	0.147	0.613	0.117	0.104	0.705	0.547	0.000***
Test: Cash = L	0.007***	0.017**	0.015**	0.159	0.522	0.017**	0.997	0.889	0.959	0.006***
Test: β_1 1 year = 3 years [poultry]						0.014				0.001
Test: β_2 1 year = 3 years [cash]						0.974				0.417
Test: β_3 1 year = 3 years [L]						0.509				0.240
Mean of control	1,453.86	0.82	1,105.66	35.21	96.54	971.87	1.00	0.91	0.97	0.83
N	1,847	1,847	1,765	1,765	1,765	1,765	1,765	1,765	1,765	1,765
Panel B: Less poor households										
L	-88.429	0.027	-120.729	0.305	19.670*	-135.548	0.003	0.009	0.001	-0.010
	(130.076)	(0.021)	(98.944)	(2.021)	(10.792)	(94.048)	(0.003)	(0.011)	(0.009)	(0.017)
Test: β 1 year = 3 years						0.569				0.056
Mean of control	2,168.13	0.93	1,653.85	45.41	100.84	1,495.62	1.00	0.97	0.98	0.94
N	1,373	1,373	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The dependent variables are calculated as the value of the specified asset class, valued using locally reported market prices; the means in the control arm are reported in 2017 dollars in purchasing power parity terms. The estimated regressions employ a linear specification or a binary variable for a strictly positive value, as specified. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A8: Financial inclusion, without IHS transformation

	One-year follow-up				*Three-year follow-up*			
	Linear outcome variable		*Binary variable for positive value*		*Linear outcome variable*		*Binary variable for positive value*	
	(1) Total credit (past year)	(2) Total savings	(3) Total credit (past year)	(4) Total savings	(5) Total credit (past year)	(6) Total savings	(7) Total credit (past year)	(8) Total savings
Panel A: Extremely poor households								
Poultry	20.994	25.087**	0.025	0.321***	29.845	20.553***	0.077**	0.340***
	(27.446)	(10.816)	(0.044)	(0.041)	(24.800)	(6.430)	(0.036)	(0.046)
Cash	-18.605	29.336*	-0.002	0.351***	19.535	15.994**	0.098**	0.336***
	(29.573)	(16.136)	(0.044)	(0.039)	(23.365)	(7.019)	(0.040)	(0.046)
L	26.189	38.642	0.059	0.266***	-9.543	19.105**	-0.009	0.328***
	(28.603)	(25.025)	(0.044)	(0.042)	(22.105)	(7.484)	(0.034)	(0.044)
Test: Poultry = Cash	0.129	0.777	0.503	0.380	0.678	0.494	0.597	0.901
Test: Poultry = L	0.829	0.575	0.405	0.158	0.092*	0.839	0.012**	0.730
Test: Cash = L	0.100*	0.724	0.128	0.020**	0.183	0.677	0.005***	0.833
Test: β_1 1 year = 3 years [poultry]					0.746	0.677	0.296	0.683
Test: β_2 1 year = 3 years [cash]					0.128	0.359	0.021	0.740
Test: β_3 1 year = 3 years [L]					0.163	0.378	0.136	0.162
Mean of control	156.35	40.98	0.42	0.44	147.03	34.07	0.45	0.40
N	1,290	1,296	1,295	1,296	1,765	1,765	1,765	1,765
Panel B: Less poor households								
L	8.517	-0.374	0.051	0.278***	20.727	30.448***	0.022	0.301***
	(31.591)	(16.057)	(0.037)	(0.034)	(26.092)	(7.433)	(0.042)	(0.042)
Test: β 1 year = 3 years					0.732	0.024	0.542	0.625
Mean of control	184.986	74.990	0.436	0.504	170.37	34.73	0.48	0.47
N	1,182	1,185	1,185	1,184	1,321	1,322	1,321	1,322

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ a linear specification or a binary variable for a strictly positive value, as specified. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A9: Income at three-year follow-up, without IHS transformation

	Linear outcome variable				*Binary variable for positive value*			
	(1) Income from livestock sales	(2) Income from sales of livestock products	(3) Income from crops cultivated in last year	(4) Total agricultural and livestock income	(5) Income from livestock sales	(6) Income from sales of livestock products	(7) Income from crops cultivated in last year	(8) Total agricultural and livestock income
Panel A: Extremely poor households								
Poultry	45.096	30.665***	7.242	135.117**	0.141***	0.113***	0.048	0.133***
	(32.992)	(11.763)	(21.866)	(66.411)	(0.037)	(0.025)	(0.034)	(0.036)
Cash	85.488**	29.538**	49.605	162.786***	0.112***	0.068***	0.027	0.084**
	(35.569)	(12.564)	(34.317)	(58.472)	(0.037)	(0.021)	(0.033)	(0.036)
L	-19.332	19.342	9.872	13.481	0.023	0.031	-0.043	-0.006
	(33.759)	(11.793)	(48.836)	(69.174)	(0.038)	(0.021)	(0.036)	(0.039)
Test: Poultry = Cash	0.285	0.913	0.224	0.708	0.451	0.091*	0.508	0.147
Test: Poultry = L	0.071*	0.282	0.958	0.149	0.003***	0.002***	0.011**	0.000***
Test: Cash = L	0.006***	0.335	0.540	0.075*	0.023**	0.108	0.045**	0.018**
Mean of control	266.87	6.48	83.99	361.63	0.46	0.08	0.28	0.58
N	1,765	1,761	1,765	1,765	1,765	1,740	1,765	1,752
Panel B: Less poor households								
L	19.759	74.762	-1.233	115.542	0.038	0.021	-0.079**	0.011
	(39.094)	(72.152)	(37.034)	(101.721)	(0.038)	(0.028)	(0.036)	(0.037)
Mean of control	373.77	-39.87	126.64	465.52	0.58	0.15	0.36	0.68
N	1,322	1,319	1,322	1,322	1,322	1,294	1,322	1,306

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ a linear specification or a binary variable for a strictly positive value, as specified. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A10: Consumption and food security, without IHS transformation

	Linear outcome variable		
	(1) Monthly food consumption per adult equivalent	(2) Monthly non-food consumption per adult equivalent	(3) Monthly consumption per adult equivalent
Panel A: Extremely poor households			
Poultry	3.879	-0.117	3.705
	(4.598)	(0.694)	(4.866)
Cash	-1.268	-0.058	-1.511
	(4.040)	(0.643)	(4.235)
L	-2.265	0.882	-1.414
	(3.368)	(0.666)	(3.619)
Test: Poultry = Cash	0.289	0.927	0.306
Test: Poultry = L	0.169	0.128	0.280
Test: Cash = L	0.793	0.122	0.981
Mean of control	44.87	7.68	52.86
N	1,706	1,764	1,701
Panel B: Less poor households			
L	-2.321	0.635	-1.629
	(4.466)	(0.561)	(4.601)
Mean of control	47.878	7.840	55.872
N	1,291	1,322	1,290

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ a linear specification. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A11: Heterogeneity with respect to nutrition exposure: assets

	One-year follow-up	*Three-year follow-up*			
	(1)	(2)	(3)	(4)	(5)
	Value of livestock	Value of total assets	Value of productive assets	Value of consumer durables	Value of livestock
			(IHS transformation)		
Panel A: Extremely poor households					
Poultry	0.932***	0.057	0.145	0.167*	0.285
	(0.197)	(0.120)	(0.111)	(0.086)	(0.204)
Cash	0.564**	0.208*	0.165	0.062	0.682***
	(0.251)	(0.108)	(0.110)	(0.106)	(0.183)
Poultry x EN	0.315*	0.112	0.011	-0.257*	0.289
	(0.188)	(0.137)	(0.144)	(0.142)	(0.219)
Cash x EN	-0.109	-0.296*	-0.188	-0.110	-0.643**
	(0.343)	(0.157)	(0.180)	(0.109)	(0.284)
L	-0.189	-0.241**	0.016	-0.019	-0.309
	(0.206)	(0.110)	(0.101)	(0.090)	(0.199)
Mean of control	1,453.86	1,105.66	35.21	96.54	971.87
N	1,847	1,765	1,765	1,765	1,765
Panel B: Less poor households					
L	0.074	-0.032	0.002	0.163	-0.200
	(0.214)	(0.095)	(0.088)	(0.100)	(0.173)
L x EN	0.113	-0.063	0.063	0.005	-0.050
	(0.145)	(0.075)	(0.063)	(0.075)	(0.158)
Mean of control	2,168.13	1,653.85	45.41	100.84	1,495.62
N	1,373	1,322	1,322	1,322	1,322

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The dependent variables are calculated as the value of the specified asset class, valued using locally reported market prices; the means in the control arm are reported in 2017 dollars in purchasing power parity terms. The estimated regressions employ an inverse hyperbolic sine transformation. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A12: Heterogeneity with respect to nutrition exposure: financial inclusion, one-year follow-up

	(1) Any credit (past year)	(2) Any formal credit (past year)	(3) Total credit (past year, IHS transformation)	(4) Any savings	(5) Total savings (IHS transformation)
Panel A: Extremely poor households					
Poultry	-0.041	-0.030	-0.186	0.305***	1.339***
	(0.048)	(0.040)	(0.302)	(0.051)	(0.237)
Cash	-0.013	0.015	-0.058	0.367***	1.549***
	(0.050)	(0.039)	(0.315)	(0.043)	(0.218)
Poultry x EN	0.133**	0.091**	0.746**	0.027	0.140
	(0.053)	(0.042)	(0.308)	(0.051)	(0.253)
Cash x EN	0.017	-0.016	0.164	-0.042	-0.423
	(0.059)	(0.049)	(0.380)	(0.044)	(0.282)
L	0.064	0.046	0.451	0.260***	1.148***
	(0.044)	(0.036)	(0.277)	(0.042)	(0.210)
Mean of control	0.42	0.17	156.35	0.44	40.98
N	1,291	1,285	1,290	1,289	1,296
Panel B: Less poor households					
L	0.072*	0.026	0.362	0.276***	1.072***
	(0.042)	(0.039)	(0.288)	(0.037)	(0.202)
L x EN	-0.039	-0.019	-0.232	0.003	-0.084
	(0.038)	(0.034)	(0.252)	(0.030)	(0.168)
Mean of control	0.44	0.19	184.99	0.50	74.99
N	1,182	1,176	1,182	1,182	1,185

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ an inverse hyperbolic sine transformation. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A13: Heterogeneity with respect to nutrition exposure: financial inclusion, three-year follow-up

	(1) Any credit (past year)	(2) Any formal credit (past year)	(3) Total credit (past year, IHS transformation)	(4) Any savings	(5) Total savings (IHS transformation)
Panel A: Extremely poor households					
Poultry	0.043	0.033	0.282	0.343***	1.398***
	(0.045)	(0.036)	(0.291)	(0.053)	(0.257)
Cash	0.132***	0.089**	0.827***	0.354***	1.388***
	(0.048)	(0.037)	(0.312)	(0.053)	(0.251)
Poultry x EN	0.064	0.088**	0.470	-0.014	0.012
	(0.053)	(0.041)	(0.348)	(0.054)	(0.251)
Cash x EN	-0.069	-0.010	-0.411	-0.042	-0.142
	(0.062)	(0.045)	(0.397)	(0.054)	(0.288)
L	-0.006	0.032	0.018	0.327***	1.276***
	(0.034)	(0.030)	(0.216)	(0.043)	(0.213)
Mean of control	0.45	0.13	147.03	0.40	34.07
N	1,765	1,760	1,765	1,765	1,765
Panel B: Less poor households					
L	0.017	0.035	0.134	0.321***	1.538***
	(0.050)	(0.041)	(0.312)	(0.049)	(0.239)
L x EN	0.003	0.002	0.093	-0.029	-0.213
	(0.037)	(0.028)	(0.230)	(0.034)	(0.178)
Mean of control	0.48	0.19	170.37	0.47	34.73
N	1,322	1,320	1,321	1,322	1,322

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ an inverse hyperbolic sine transformation. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A14: Heterogeneity with respect to nutrition exposure: income, three-year follow-up

	(1) Income from sales of livestock	(2) Income from sales of livestock products	(3) Income from crops cultivated in last year (Mehr and Belg seasons)	(4) Total estimated value of livestock products produced in last 12 months	(5) Total estimated value of crops harvested in last year (Mehr and Belg seasons)	(6) Total income from livestock and crops	(7) Total value of livestock and crops	(8) Household reports any non-agricultural business	(9) Any income from formal wage work in past 12 months	(10) Any income from casual wage work in past 12 months
	IHS transformation									
Panel A: Extremely poor households										
Poultry	0.729**	0.511**	0.161	0.528**	0.287	0.629**	0.476*	0.027	-0.008	-0.001
	(0.317)	(0.202)	(0.251)	(0.259)	(0.339)	(0.310)	(0.244)	(0.023)	(0.022)	(0.058)
Cash	0.785**	0.484***	0.462*	0.522**	0.890***	0.838***	0.724***	0.014	-0.025	0.030
	(0.305)	(0.181)	(0.241)	(0.221)	(0.299)	(0.317)	(0.260)	(0.021)	(0.019)	(0.053)
Poultry x N*	0.116	-0.004	0.132	-0.137	0.272	0.100	0.164	-0.029	0.002	0.055
	(0.359)	(0.237)	(0.261)	(0.281)	(0.365)	(0.361)	(0.258)	(0.027)	(0.021)	(0.066)
Cash x N*	0.013	-0.153	-0.632**	-0.429*	-1.194***	-0.341	-0.767**	0.010	0.038	-0.022
	(0.348)	(0.199)	(0.250)	(0.229)	(0.427)	(0.334)	(0.352)	(0.038)	(0.029)	(0.058)
L	0.075	0.173	-0.284	0.169	-0.217	-0.112	-0.109	0.044**	0.016	0.045
	(0.242)	(0.119)	(0.224)	(0.169)	(0.280)	(0.277)	(0.250)	(0.020)	(0.018)	(0.045)
Mean of control	266.87	6.48	82.53	27.76	475.02	360.17	773.88	0.03	0.04	0.26
N	1,765	1,761	1,765	1,762	1,765	1,765	1,765	1,030	1,029	1,030
Panel B: Less poor households										
L	0.345	0.054	-0.347	0.009	0.293	0.324	0.314	-0.034*	0.002	0.023
	(0.300)	(0.196)	(0.255)	(0.217)	(0.277)	(0.326)	(0.244)	(0.019)	(0.018)	(0.038)
L x N*	-0.181	0.139	-0.116	0.065	-0.190	-0.436*	-0.101	0.022	0.008	0.014
	(0.229)	(0.158)	(0.193)	(0.181)	(0.200)	(0.237)	(0.171)	(0.016)	(0.014)	(0.034)
Mean of control	373.77	-39.87	126.95	49.41	639.40	465.83	1,067.56	0.06	0.03	0.20
N	1,322	1,319	1,322	1,322	1,322	1,322	1,322	951	951	951

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ an inverse hyperbolic sine transformation. The estimate of total income in Column (6) corresponds to the sum of Columns (1) through (3), and the estimate of total crop and product value in Column (7) corresponds to the sum of Column (1), (4), and (5). All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A15: Heterogeneity with respect to nutrition exposure: consumption and food security

	(1) Monthly food consumption per adult equivalent (IHS transformation)	(2) Monthly non-food consumption per adult equivalent (IHS transformation)	(3) Monthly consumption per adult equivalent (IHS transformation)	(4) Food Insecurity Experience Scale (0-8)
Panel A: Extremely poor households				
Poultry	0.030	0.062	0.039	0.108
	(0.078)	(0.104)	(0.071)	(0.242)
Cash	-0.049	0.061	-0.032	0.343
	(0.075)	(0.085)	(0.069)	(0.231)
Poultry x EN	0.003	-0.085	-0.029	-0.014
	(0.098)	(0.111)	(0.091)	(0.296)
Cash x EN	-0.071	-0.021	-0.055	0.347
	(0.096)	(0.079)	(0.086)	(0.319)
L	-0.071	0.140*	-0.038	0.224
	(0.067)	(0.077)	(0.061)	(0.176)
Mean of control	44.87	7.68	52.86	3.36
N	1,706	1,764	1,701	1,748
Panel B: Less poor households				
L	-0.059	0.075	-0.027	0.033
	(0.087)	(0.080)	(0.079)	(0.245)
L x EN	-0.016	-0.002	-0.015	-0.040
	(0.069)	(0.075)	(0.063)	(0.213)
Mean of control	47.88	7.84	55.87	3.32
N	1,291	1,322	1,290	1,314

Notes: The sample of extremely poor households is defined by ranking households within each subdistrict based on an asset index constructed at baseline; the poorest 10 in each sample of 18 are denoted extremely poor, with the remaining households denoted less poor. The dependent variables in Columns (1) through (3) are household-level consumption variables; the dependent variable in Column (4) is the continuous FIES score. The continuous dependent variables are reported in 2017 dollars in purchasing power parity terms, and the estimated regressions employ an inverse hyperbolic sine transformation. All specifications are estimated conditional on strata fixed effects and employing standard errors clustered at the subdistrict level; asterisks indicate significance at the 10, 5 and 1 percent level.

Table A16: Number of kebeles in each treatment arm, by woreda

Region	Woreda	T1: L*+EN	T2: L*+N	T3: L+EN	C: PSNP4	Total
Amhara	Bugna	2	1	1	1	5
	Dahena	3	4	4	4	15
	Gaz Gibla	2	1	2	2	7
	Lasta	3	4	4	4	15
	Meket	10	9	9	10	38
	Sekota	5	5	5	4	19
	Wadla	4	4	4	4	16
Oromia	Chiro	3	3	3	3	12
	Daro Lebu	9	10	9	9	37
	Gemechis	2	3	3	3	11
	Grawa	4	3	3	4	14
	Kurfachelle	0	1	1	0	2
	Siraro	2	1	1	1	5
Total		49	49	49	49	196

Note: After the sampling was completed, two new woredas – Gazo and Tsagabji – were created from the existing woredas. This led to a reshuffling of some kebeles in Meket, Wadla and Lasta. For the purpose of this study, we refer to these kebeles by the woreda to which they belonged at the time of sampling. Kebele treatment assignments and associated implementation remain unchanged despite these administrative changes.

Table A17: Number of kebeles in each treatment arm, by region

	Amhara	Oromia	Total
T1: L*+EN	27	19	46
T2: L*+N	28	21	49
T3: L+EN	29	20	49
C: L+N	29	20	49
Total	113	80	193

Table A18: Attrition

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Binary variable: Attrited at midline					Binary variable: Attrited at endline				
Poultry	-0.001	-0.009	-0.009	0.000	-0.000	0.005	-0.010	0.092	0.009	-0.085
	(0.009)	(0.016)	(0.022)	(0.010)	(0.100)	(0.014)	(0.022)	(0.056)	(0.016)	(0.143)
Cash	0.012	0.013	-0.026	0.009	0.083	-0.006	0.024	-0.022	-0.011	0.049
	(0.017)	(0.017)	(0.018)	(0.016)	(0.075)	(0.020)	(0.023)	(0.034)	(0.019)	(0.110)
L	0.008	-0.003	-0.001	0.008	0.052	0.027	0.019	0.084**	0.018	0.082
	(0.008)	(0.011)	(0.021)	(0.008)	(0.065)	(0.021)	(0.018)	(0.041)	(0.017)	(0.104)
Female-headed household	0.044***					0.031				
	(0.015)					(0.026)				
Head has no formal education		0.001					0.012			
		(0.008)					(0.013)			
Baseline value of prod. assets			-0.003					0.002		
			(0.002)					(0.003)		
Household reports any savings				-0.002					-0.005	
				(0.009)					(0.014)	
Household consumption					0.004					-0.002
					(0.007)					(0.010)
Baseline variable x Poultry	-0.010	0.012	0.001	-0.013	0.000	0.063	0.044	-0.014*	-0.032	0.016
	(0.034)	(0.019)	(0.003)	(0.014)	(0.015)	(0.068)	(0.033)	(0.007)	(0.023)	(0.022)
Baseline variable x Cash	-0.044	-0.010	0.005	0.015	-0.013	-0.044	-0.052*	0.002	0.016	-0.011
	(0.028)	(0.019)	(0.004)	(0.020)	(0.011)	(0.041)	(0.028)	(0.006)	(0.024)	(0.017)
Baseline variable x L	-0.025	0.012	0.001	-0.000	-0.007	0.043	0.026	-0.008*	0.032	-0.007
	(0.022)	(0.014)	(0.003)	(0.017)	(0.009)	(0.046)	(0.030)	(0.004)	(0.028)	(0.015)
Mean of control (T4)	0.030	0.030	0.030	0.030	0.030	0.052	0.052	0.052	0.052	0.052
N	3,313	3,314	3,314	2,807	3,275	3,313	3,314	3,314	2,807	3,275

Notes: Estimates from the DFSA SPIR endline survey sample. Standard errors (in parentheses) are clustered at the kebele level. Models control for woreda level fixed effects. Asterisks indicate significance at the 10, 5 and 1 percent level and are calculated with respect to the standard errors.

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