# Long-run Effects of Catastrophic Drought Insurance

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# Motivation

- Uninsured catastrophic aggregate shocks have negative long-run impacts on well-being (e.g., education, health, assets). (Maccini and Yang, 2009; Dinkelman, 2017; Shah and Steinberg, 2017; Carrillo, 2020).
  - When shocks occur, people may draw down productive assets and reduce human capital investment – with detrimental effects when it happens early in life (Jensen, 2000; Alderman et al., 2006).
  - Exposure to disaster risk may induce risk averting behaviors, including precautionary savings in kind, with child labor implications (Shah and Steinberg 2017)
  - In the presence of multiple equilibrium poverty traps, there might not be recovery (Lybbert et al., 2004; Kraay and McKenzie, 2014; Banerjee et al., 2019; Barrett et al. 2019; Balboni et al., 2022).
- Insurance market failures are an important reason why catastrophic risk has adverse impacts (Lybbert et al., 2004; Karlan et al., 2014; Barrett et al., 2019).
- ...but evidence on the long-run impacts of insurance is lacking.

**Does insurance against catastrophic covariate shocks impact long-run household well-being outcomes?**

# What we do in this paper

- We investigate the long-run impacts of catastrophic drought insurance – index-based livestock insurance (IBLI) – **10 years after its initial introduction.**
  - 82% of the original panel households were re-interviewed.
  - Primary outcomes of interest include income, assets, productive strategies, and human capital accumulation. (Pre-analysis plan: AEARCTR-0011184)
- We use **randomized premium discounts** during initial years to identify the LATE of insurance coverage on pre-specified outcomes 10 years after initial IBLI exposure.
- We investigate robustness to potential spillovers, the dynamics of effects over time, and whether effects are generated by *ex ante* coverage or *ex post* payouts.

# What we find

## Long-run impacts of IBLI

- Herd composition changes: a 48% reduction in smaller animals (goats to large stock)
  - Heterogeneity: households with small baseline herds reduced smaller livestock ($\sim$26 goats).
- Substantial increase (40%-55% over control group) in the maximum, total, and average education of household members who were school-aged during the experiment.

## Mechanisms

- **No effect on recent IBLI uptake** of initial adoption ... supply-side problems.
- Impacts from ***ex ante* behavioral effects**, not to *ex post* indemnity payments.
- Herd size effects materialized promptly. Educational effects observed only at endline.
- Reduced risk exposure induced less precautionary savings in kind (as goats), reducing marginal productivity of child labor, leading to greater schooling.

# Contribution to the literature

Literature on long-run impacts of covariate weather shocks

- Uninsured exposure to covariate shocks has long-run impacts on height, education, health, and labor market outcome. (e.g., Maccini and Yang, 2009; Shah and Steinberg, 2017; Carrillo, 2020)
- Shocks may change the marginal productivity of labour of children (e.g., Shah and Steinberg, 2017; Bau et al., 2024)
- **Contribution:** Insurance against catastrophic weather shocks affects similar long-run outcomes.
  - Changes in productive strategies change marginal productivity of child labor

Literature on long-run impacts of development interventions

- Human capital interventions appear effective at boosting long-run economic outcomes (e.g., Hoddinott et al., 2008; Baird et al., 2016; Bettinger et al., 2018; Gray Lobe et al. 2023).
- Cash transfers and grant assistance find short-run effects, particularly on asset accumulation, that fade out in the long-run (Araujo et al., 2017; Baird et al., 2016b; Blattman et al., 2020, 2022)
- **Contribution:** We demonstrate the long-run importance of risk mitigation for human capital formation, which is generated through behavioural change, and not lump-sum transfers.

# In the long-run, with IBLI...

From herding goats ...

... to school!

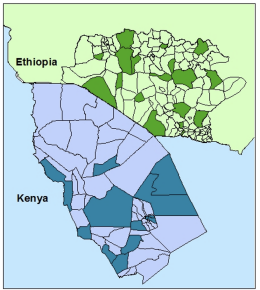
# Setting: Northern Kenya (Marsabit) and Southern Ethiopia (Borena)

**Livestock grazing and drought**

- Pastoralists rely on extensive livestock grazing.
- Drought-related causes account for 47% of total livestock losses.

**Risk management and self-insurance**

- Seasonal migration
- Inter-household gifts/loans insufficient for aggregate shocks; all are similarly affected.
- Aggregate shocks causes livestock prices to fall, so markets don't buffer against supply shocks.
- Prior to IBLI, formal finance was largely unavailable.



# Baseline characteristics of pastoral households

| | Mean | [SD] |
|---|---|---|
| Age of the household head | 48.81 | [18.35] |
| Male headed household (=1) | 0.68 | [0.47] |
| Household head's years of education | 0.87 | [2.72] |
| Adult equivalent | 4.77 | [1.97] |
| Dependency ratio | 0.51 | [0.20] |
| Herd size (CMVE) | 22.62 | [32.64] |
| Annual income per AE (USD) | 115.15 | [185.95] |
| Own or farm agricultural land | 0.34 | [0.47] |
| Fully settled (=1) | 0.41 | [0.49] |
| Observations | 1179 | |

▸ By country ▸ Baseline pre-specified outcomes

# Intervention: Index-Based Livestock Insurance (IBLI)

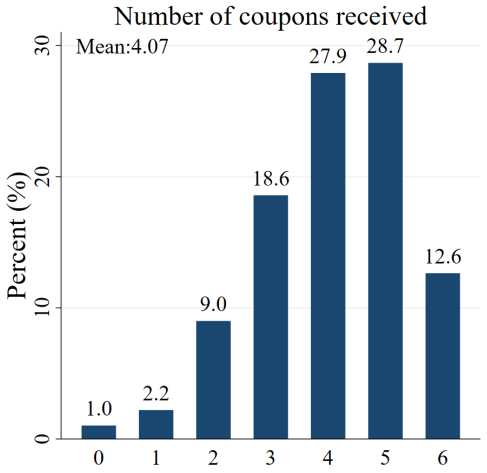
## Product

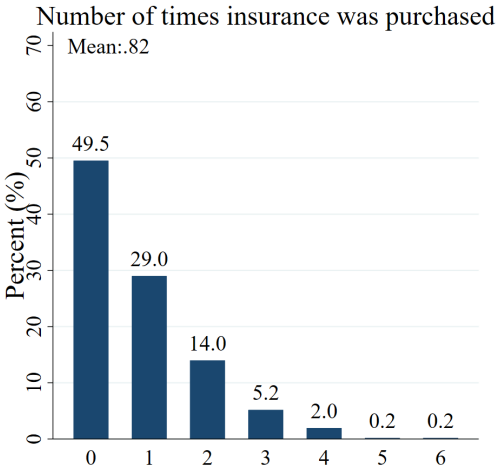
- Unlike most agricultural index insurance, IBLI insures against the loss of durable **assets**: livestock, the main non-human asset and source of livelihood for pastoralists.
- Index uses satellite-based Normalized Difference Vegetation Index (NDVI) indicator of forage scarcity, specifically designed to minimize basis risk (Chantarat et al. 2013).
- 1st piloted in 2010 in northern Kenya. Expanded into southern Ethiopia in 2012. Foundation of Kenya Livestock Insurance Program (began 2015). Now used in Ethiopia, Kenya, Mauritania, Zambia (>560K insured)
- Recent (DRIVE) initiative by WB and gov'ts of Kenya, Ethiopia, Djibouti and Somalia aims to scale IBLI to reach 1.6 million pastoralists by 2025
- From 2009-2015, low NDVI triggered drought index 4 times in Kenya, 1 time in Ethiopia.

# Research design

- Original study sample: 1,439 pastoralists from 33 locations.
  - Random samples from the population in each location, stratified by herd size.
  - Baseline survey conducted before IBLI was announced (Kenya 2009; Ethiopia 2012); panel surveys of the same households conducted annually up to 2015.
- Randomized discount coupons
  - Randomly selected households were given coupons with varying premium discount rates (10-80%) on purchase of coverage up to 15 TLU.
  - Non-transferable, expired at the end of semi-annual sales seasons.
  - Re-randomized in each of six sales seasons between 2010 and 2015.
- Follow-up surveys of original panel households in Kenya (2020) & Ethiopia (2022).
  - No surveys nor experiments conducted between 2015 and the long-term follow-up survey.
  - Insurers didn't sell in these villages post-2015.

# Discount coupons and insurance uptake




Correlation

# Estimation strategy: First stage

We instrument IBLI uptake, $I_{ij}$, by the following first stage equation:

$$I_{ij} = \alpha_0 + \alpha_1 D_{ij} + \alpha_2 y_{ij0} + \alpha_3 X_{ij0} + \rho_j + \mu_{ij} \quad (1)$$

where $I_{ij}$ is insurance uptake for household $i$, who lives in location $j$

$X_{ij0}$ is a vector of baseline household characteristics

where insurance uptake ($I_{ij}$) and discount coupons received ($D_{ij}$) are defined as below:

$$I_{ij} = \begin{cases} 1 \text{ if there exists } t \in \{1,2,3\} \text{ such that } I_{ijt} > 0 \\ 0 \text{ otherwise} \end{cases} \qquad D_{ij} = \sum_{t=1}^{t=3} Z_{ijt}^{D} \text{ where } Z_{ijt}^{D} = 1 \text{ if } R_{ijt} > 0$$

where $Z_{ijt}^{D}$ is an indicator for whether the respondent received a discount coupon in season $t$, and $R_{ijt}$ is the discount rate.

# Estimation strategy: Second stage

We estimate:

$$y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \epsilon_{ijT} \quad (2)$$

where $y_{ijT}$ is the outcome y for household $i$, who lives in location $j$, in sales season $t$,

$\widehat{I}_{ij}$ is the predicted insurance uptake from the first stage,

$D_{ij4}^{t=6}$ is the number of seasons a household received a coupon in seasons 4 to 6,

$t = 0$ refers to the pre-IBLI baseline; $t = T$ refers to the 10 year follow-up survey.

# IV assumptions are satisfied

- **Exogeneity:** Randomization of discount coupons was successful. ▸ Balance
  - No significant differences or significant F-statistics.
  - Normalized differences are below the threshold of 0.25 in 46 out of 48 tests.

- **Monotonicity:** the likelihood of any IBLI take-up in the first three seasons monotonically increases with the number of coupons received in the first three seasons. ▸ Monotonicity

- **Exclusion restriction:** Since the instrument consisted of randomized discount coupons not transferable and only for the immediate season, violation is unlikely.
  - We check for violation of SUTVA/exclusion restriction under potential inter HH spillovers.

# No differential attrition by our instrument

- 82% of the households interviewed during the baseline (N=1,439) were re-interviewed at our 10-year follow-up (N=1,179).
- **Attrition is not differential** by our instrument, i.e., the number of times that they were randomized to receive discount coupons during the first three seasons. ▸ Differential attrition
- Overall, households that have fewer adults, or (weakly) female-headed or do not own agricultural land, were more likely to attrit from the sample. ▸ Selective attrition

# First stage regression results

| | Any insurance purchased – first three seasons | Respondent purchased ANY IBLI in each season | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| No. of coupons received – first three seasons | 0.124*** | | | | | | |
| | (0.016) | | | | | | |
| | [0.014] | | | | | | |
| | {0.000} | | | | | | |
| Coupon Receipt – first season | | 0.236*** | | | | | |
| | | (0.023) | | | | | |
| | | [0.032] | | | | | |
| | | {0.000} | | | | | |
| Coupon Receipt – second season | | | 0.078*** | | | | |
| | | | (0.022) | | | | |
| | | | [0.027] | | | | |
| | | | {0.000} | | | | |
| Coupon Receipt – third season | | | | 0.127*** | | | |
| | | | | (0.017) | | | |
| | | | | [0.031] | | | |
| | | | | {0.000} | | | |
| Coupon Receipt – fouth season | | | | | 0.066*** | | |
| | | | | | (0.017) | | |
| | | | | | [0.019] | | |
| | | | | | {0.001} | | |
| Coupon Receipt – fifth season | | | | | | 0.070*** | |
| | | | | | | (0.016) | |
| | | | | | | [0.033] | |
| | | | | | | {0.002} | |
| Coupon Receipt – sixth season | | | | | | | 0.058*** |
| | | | | | | | (0.013) |
| | | | | | | | [0.020] |
| | | | | | | | {0.000} |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Effective F-statistics | 57.374 | 106.329 | 12.878 | 55.462 | 15.587 | 19.502 | 19.669 |
| 10% Critical Value | 23.109 | 16.380 | 16.380 | 16.380 | 16.380 | 16.380 | 16.380 |
| Control mean | 0.237 | 0.117 | 0.113 | 0.041 | 0.057 | 0.047 | 0.023 |
| N | 1179 | 1168 | 1168 | 1176 | 1175 | 1173 | 1171 |

Note: (robust SE), [cluster SE at community], and {p-values for RI}

# Long-run effects of catastrophic drought insurance on herd composition

| | Share of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased | 0.209* | -0.209* | 6.316 | -0.865 | -2.007 | -2.591* | 13.827* | 1.666 |
| | (0.112) | (0.112) | (4.447) | (1.094) | (5.069) | (1.541) | (7.819) | (1.583) |
| | [0.145] | [0.145] | [3.142] | [0.779] | [4.629] | [1.401] | [7.825] | [1.507] |
| | {0.057} | {0.041} | {0.106} | {0.393} | {0.671} | {0.061} | {0.054} | {0.293} |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sample (Baseline TLUs) | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Control mean | 0.566 | 0.434 | 9.185 | 3.617 | 9.968 | 3.915 | 6.986 | 2.779 |
| Complier mean | 0.618 | 0.382 | 9.385 | 2.618 | 6.497 | 2.213 | 15.046 | 3.412 |
| Observations | 987 | 987 | 1179 | 1179 | 790 | 790 | 389 | 389 |

Note: (robust SE), [cluster SE at community], and {p-values for RI}

▸ Herd distributions per location ▸ Histogram of herd distribution
▸ Income ▸ Income - total livestock and crop
▸ Without control vars. ▸ All seasons IV ▸ season 1 ▸ seasons 1-2 ▸ seasons 1-4 ▸ seasons 1-5 ▸ N. IBLI as endogenous vars. ▸ MHT
▸ Prespecified primary I ▸ Prespecified primary II ▸ Prespecified secondary I ▸ Prespecified secondary II

# Long-run effects of catastrophic drought insurance on education

| | Of household members who were school-aged at any point during initial three periods of experiments | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Any insurance purchased | 2.906* | 7.314** | 2.520** |
| | (1.544) | (3.704) | (1.276) |
| | [1.336] | [2.523] | [1.286] |
| | {0.052} | {0.030} | {0.040} |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 742 | 742 | 742 |

Note: (robust SE), [cluster SE at community], and {p-values for RI}

▸ Child time use ▸ Education - by TLU

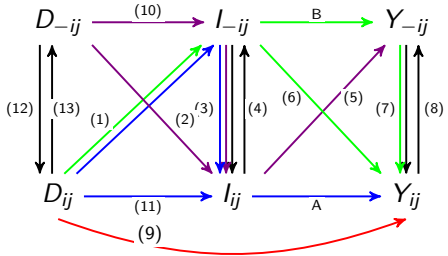
▸ Without control vars. ▸ All seasons IV ▸ season 1 ▸ seasons 1-2 ▸ seasons 1-4 ▸ seasons 1-5 ▸ N. IBLI as endogenous var. ▸ MHT

▸ Younger cohorts

▸ Prespecified primary I ▸ Prespecified primary II ▸ Prespecified secondary I ▸ Prespecified secondary II

# Robustness to Interpersonal Spillovers

- Individual-level randomization: SUTVA violation?
  - Random variation in intensity of encouragement received by a respondent's peers. ▸ summary statistics
  - Community fixed effects cannot be included (Fruehwirth, Iyer, and Zhang, 2019; Rahman, 2023).
  - Can't distinguish mechanical correlation from spillovers (Guryan, Kroft, and Notowidigdo, 2009; Caeyers and Fafchamps, 2020).




- Potential spillover pathways in the **first- and second-stage** are presented in the DAG.
- We leverage exogenous variation in $D_{ij}$ and $D_{-ij}$ to identify first-stage spillovers.
  - First-stage and second-stage estimates are robust to controlling for discount coupons and insurance purchase by peers ▸ first stage ◂ herd composition ◂ education ◂ child time use

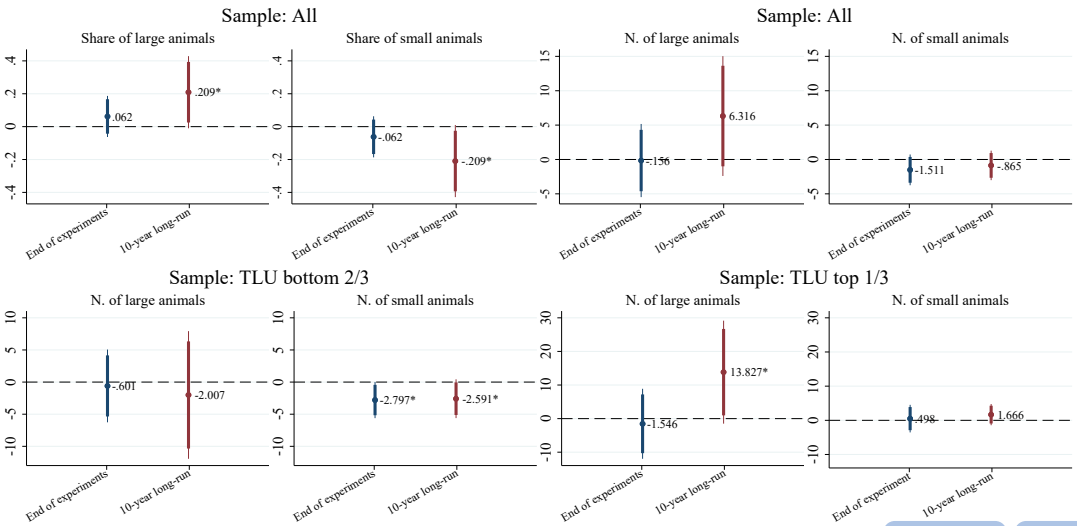
# Mechanisms

- We investigate dynamics of the effects by re-estimating the same estimating equation on the outcomes observed at the end of experiments.
  - Effects on herd composition appear immediately, significant at the end of experiments.
  - Effects on educational attainment are only observed at the 10-year follow-up

- Results are driven by *ex ante* coverage and induced behavioural change, not *ex post* indemnity payments Payout effects - herd composition Payout effects - education

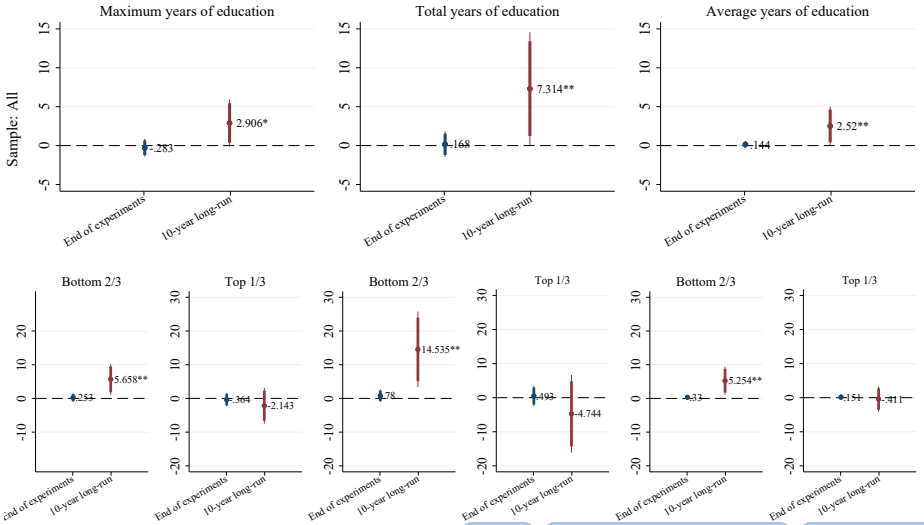
- Migration and sedentarization do not explain the results migration

# Dynamics: Herd composition over time




◂ Table: share ◂ Table: N

# Dynamics: Educational attainment over time




◂ Table ▸ Figure: Dynamics - child time ▸ Table: Dynamics - child time

# Suggested interpretation

Catastrophic drought insurance reduced *ex ante* risk exposure and thereby...

1. ...reduced the need for **precautionary savings on the hoof** to cover drought-related expenditures.
   - Reduced the incentive to hold small animals for liquidity purposes
2. ...induced hhds to **re-balance livestock portfolio** towards higher-value, lumpier large animals.
   - Yielded higher income through increased productivity of larger animals.

▸ Short-run livestock investment

Children routinely manage smaller animals, while large animals are managed by adult men.

▸ child time use and goats ▸ change in education and shoats

- Changes in production strategies **decreases the marginal productivity of child labor**, which, together with suggestive income effects, boosts investments in education

# Conclusions

- 10 years after its inception, IBLI had a significant effect on pastoralists'
  - Production strategies: reduction in the share and number of small livestock herded, particularly for those poorer in the baseline
  - Human capital accumulation: education outcomes grew sharply
- Had no effect on herd size, w/ large, imprecisely estimated impact on total income
- Effects are mainly attributable to *ex ante* behavioral responses.
- Insurance can mitigate long-run effects of catastrophic droughts on human capital accumulation.
- needs complementary intervention(s) to help boost incomes/wealth of persistently poor pastoralist populations.

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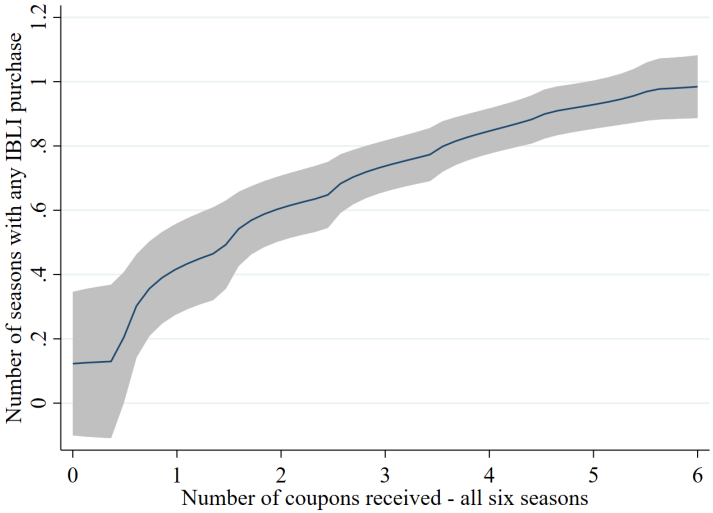
# Correlations between discount coupons and insurance uptake

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# Summary statistics Ethiopia and Kenya

## Baseline controls

| | Kenya | | Ethiopia | |
|---|---|---|---|---|
| | Mean | [SD] | Mean | [SD] |
| Age of the household head | 48.08 | [18.35] | 50.23 | [18.30] |
| Male headed household (=1) | 0.63 | [0.48] | 0.79 | [0.41] |
| Household head's years of education | 1.05 | [3.07] | 0.54 | [1.84] |
| Adult equivalent | 4.68 | [1.95] | 4.94 | [2.01] |
| Dependency ratio | 0.50 | [0.21] | 0.54 | [0.19] |
| Herd size (CMVE) | 25.48 | [35.98] | 17.01 | [23.90] |
| Annual income per AE (USD) | 121.45 | [198.01] | 102.79 | [159.19] |
| Own or farm agricultural land | 0.18 | [0.38] | 0.65 | [0.48] |
| Fully settled (=1) | 0.23 | [0.42] | 0.76 | [0.43] |
| Observations | 781 | | 398 | |

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# Summary statistics Ethiopia and Kenya

## Baseline outcomes

### Primary outcomes

| | Kenya | | Ethiopia | |
|---|---|---|---|---|
| | Mean/SD | Obs | Mean/SD | Obs |
| ***Baseline prespecified primary outcomes*** | | | | |
| Share of camels in herd (CMVE) | 0.30 | [0.31] | 0.12 | [0.21] |
| Share of cattle in herd (CMVE) | 0.30 | [0.36] | 0.67 | [0.25] |
| Share of goats in herd (CMVE) | 0.25 | [0.26] | 0.17 | [0.18] |
| Share of sheep in herd (CMVE) | 0.14 | [0.17] | 0.05 | [0.08] |
| Annual total household cash earning (USD) | 516.55 | [828.25] | 462.92 | [594.14] |
| Maximum years of education | 3.54 | [3.30] | 2.92 | [2.55] |
| Observations | 781 | | 398 | |

### Secondary outcomes

| | Kenya | | Ethiopia | |
|---|---|---|---|---|
| | Mean/SD | Obs | Mean/SD | Obs |
| ***Baseline prespecified secondary outcomes*** | | | | |
| Herd management expenditure (USD) | 48.79 | [153.93] | 41.00 | [129.63] |
| Annual milk income (USD) | 886.04 | [1668.25] | 161.81 | [265.31] |
| Livestock lost in the past 12 months (CMVE) | 11.05 | [15.22] | 9.20 | [16.96] |
| N of lost camel | 1.15 | [3.56] | 0.28 | [0.81] |
| N of lost cattle | 5.13 | [11.40] | 7.58 | [16.04] |
| N of lost goats/sheep | 32.52 | [55.13] | 5.69 | [8.67] |
| Distress sale in the past 12 months (CMVE) | 0.77 | [2.03] | 7.72 | [19.66] |
| Share of children working full-time | 0.36 | [0.38] | 0.47 | [0.34] |
| Share of children working part-time | 0.29 | [0.39] | 0.26 | [0.32] |
| Share of children studying full-time | 0.22 | [0.36] | 0.12 | [0.23] |
| Observations | 781 | | 398 | |

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# Balance of coupon distribution

| | Received coupon vs. No coupon | | | | | | |
|---|---|---|---|---|---|---|---|
| Sales Season Kenya: | 2010 JF | 2011 JF | 2011 AS | 2012 AS | 2013 JF | 2013 AS | |
| Sales Season Ethiopia: | 2012 AS | 2013 JF | 2013 AS | 2014 JF | 2014 AS | 2015 JF | F-test |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Age of the household head | 0.493 | 1.37 | -0.243 | 0.0224 | 1.28 | 0.0177 | 3.94 |
| | (1.05) | (1.04) | (1.01) | (0.959) | (0.944) | (1.09) | {0.685} |
| | [0.0515] | [0.0862] | [0.0173] | [0.0309] | [0.101] | [0.00159] | |
| Male headed household (=1) | -0.0206 | -0.0265 | -0.0340 | -0.0373 | 0.00494 | -0.0253 | 7.14 |
| | (0.0248) | (0.0244) | (0.0243) | (0.0245) | (0.0251) | (0.0284) | {0.308} |
| | [0.0345] | [0.0235] | [0.00977] | [-0.00182] | [0.0790] | [-0.0608] | |
| Education of household head | -0.238 | -0.0563 | -0.0407 | 0.0914 | -0.224 | 0.183 | 5.99 |
| | (0.171) | (0.170) | (0.163) | (0.155) | (0.158) | (0.157) | {0.424} |
| | [-0.121] | [-0.0606] | [-0.0805] | [-0.0370] | [-0.153] | [0.0777] | |
| Adult equivalent | -0.00907 | 0.0569 | -0.108 | -0.0176 | -0.137 | -0.142 | 3.43 |
| | (0.120) | (0.118) | (0.119) | (0.116) | (0.119) | (0.147) | {0.753} |
| | [0.0308] | [0.0414] | [-0.00252] | [0.0267] | [-0.0253] | [-0.0707] | |
| Dependency ratio | -0.00238 | -0.00368 | 0.00527 | 0.0125 | 0.0148 | -0.0123 | 4.59 |
| | (0.0118) | (0.0114) | (0.0113) | (0.0110) | (0.0109) | (0.0123) | {0.597} |
| | [0.0446] | [0.0462] | [0.0940] | [0.129] | [0.138] | [-0.0634] | |
| Herd size (CMVE) | 1.14 | -0.917 | -0.252 | -1.36 | 0.453 | -2.06 | 3.17 |
| | (1.63) | (1.61) | (1.69) | (1.44) | (1.15) | (1.87) | {0.787} |
| | [-0.0200] | [-0.0637] | [-0.0410] | [-0.0261] | [0.0794] | [-0.0876] | |
| Annual income per AE (USD) | -4.77 | -15.8 | -3.28 | 11.1 | -2.64 | -20.0 | 4.03 |
| | (10.2) | (15.5) | (13.7) | (10.6) | (12.8) | (16.4) | {0.673} |
| | [-0.0438] | [-0.113] | [-0.0875] | [0.0173] | [-0.0829] | [-0.0816] | |
| Own or farm agricultural land | -0.0293* | -0.00378 | 0.0151 | 0.0221 | -0.0169 | -0.00445 | 6.95 |
| | (0.0174) | (0.0170) | (0.0157) | (0.0166) | (0.0159) | (0.0190) | {0.326} |
| | [0.152] | [0.204] | [0.290] | [0.259] | [0.180] | [-0.00469] | |
| F statistics of Joint F-test: | 5.988 | 4.702 | 4.279 | 8.845 | 8.241 | 8.770 | |
| P-value of Joint F-test: | 0.649 | 0.789 | 0.831 | 0.356 | 0.410 | 0.362 | |

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# Differential attrition across cumulative coupon receipt status

| | Outcome: Interviewed at baseline but not in latest round (=1) | |
|---|---|---|
| | (1) | (2) |
| N of coupons received – the initial three seasons | -.00764 | |
| | (.00998) | |
| N of coupons received – all six seasons | | -.00285 |
| | | (.00734) |
| N | 1439 | 1439 |

Back

# Selective attrition across baseline characteristics

| | Outcome: Interviewed at baseline but not in latest round (=1) |
|---|---|
| | (1) |
| Age of the household head | -2.04 |
| | (1.33) |
| Male headed household (=1) | -.0555* |
| | (.0335) |
| Education of household head | .355 |
| | (.229) |
| Adult equivalent | -.383*** |
| | (.143) |
| Dependency ratio | -.00781 |
| | (.0151) |
| Herd size (CMVE) | 1.3 |
| | (1.95) |
| Annual income per AE (USD) | 20.8 |
| | (15.9) |
| Own or farm agricultural land | -.0478* |
| | (.0254) |
| P-value of joint F-test | 0.016 |
| N | 1439 |

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# Checking monotonicity assumption

| | Number of seasons purchase IBLI | | | |
|---|---|---|---|---|
| Number of coupons recipient's received | 0 | 1 | 2 | 3 |
| 0 | 76.250 | 20.000 | 3.750 | 0.000 |
| 1 | 65.819 | 29.096 | 4.802 | 0.282 |
| 2 | 50.953 | 39.515 | 9.185 | 0.347 |
| 3 | 43.452 | 37.500 | 19.048 | 0.000 |

| | Whether or not to purchase IBLI (%) | |
|---|---|---|
| Panel B. Number of coupons recipient's received | 0 | 1 |
| 0 | 76.250 | 23.750 |
| 1 | 65.819 | 34.181 |
| 2 | 50.953 | 49.047 |
| 3 | 43.452 | 56.548 |

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# Checking monotonicity assumption

| | Number of seasons purchase IBLI | | | |
|---|---|---|---|---|
| Number of coupons recipient's received | 0 | 1 | 2 | 3 |
| 0 | 76.250 | 20.000 | 3.750 | 0.000 |
| 1 | 65.819 | 29.096 | 4.802 | 0.282 |
| 2 | 50.953 | 39.515 | 9.185 | 0.347 |
| 3 | 43.452 | 37.500 | 19.048 | 0.000 |

| | Whether or not to purchase IBLI (%) | |
|---|---|---|
| Panel B. Number of coupons recipient's received | 0 | 1 |
| 0 | 76.250 | 23.750 |
| 1 | 65.819 | 34.181 |
| 2 | 50.953 | 49.047 |
| 3 | 43.452 | 56.548 |

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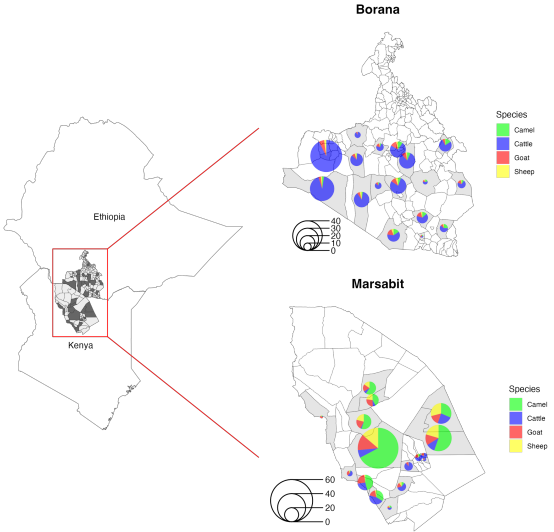
# Map of study locations and herd (size) distributions per location

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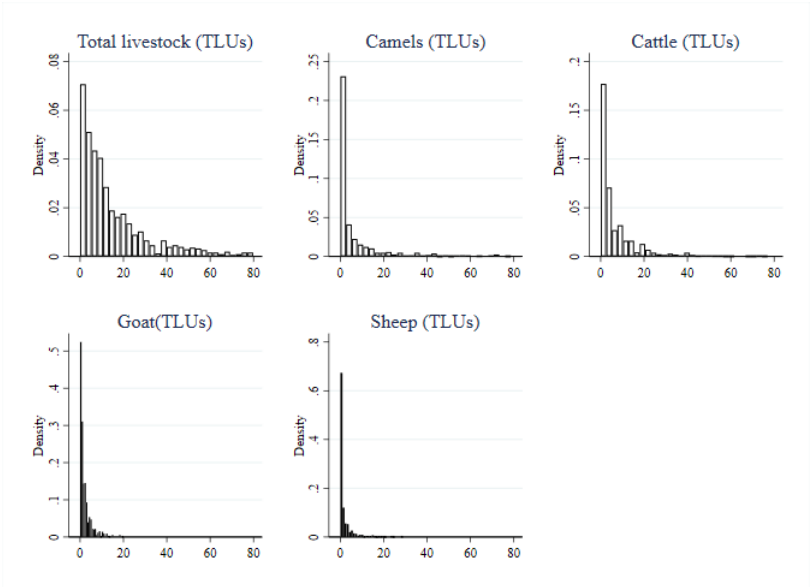
# Right-skewed baseline herd distribution (TLU)

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# Effects on income

| | Aggregate | Mutually exclusive categories (USD) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Annual total household income (USD) | Annual in-kind milk income (USD) | Annual earnings from milk (USD) | Annual in-kind slaughter income (USD) | Annual earnings from slaughter (USD) | Annual animal birth income (USD) | Annual in-kind crop income (USD) | Annual earnings income from crop (USD) | Annual employment (food for work) income (USD) | Annual earnings from the rest (USD) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Panel A: All samples | | | | | | | | | | |
| Any insurance purchased | 322.285 | 273.583 | 37.506 | -20.925 | 47.719 | -42.832 | 48.226*** | 5.381 | -10.384 | -38.772 |
| | (510.801) | (306.754) | (154.578) | (36.817) | (35.202) | (98.798) | (16.955) | (29.255) | (8.667) | (204.527) |
| | [1.000] | [1.000] | [1.000] | [1.000] | [1.000] | [1.000] | [0.077] | [1.000] | [1.000] | [1.000] |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 1290.881 | 110.007 | 343.598 | 63.310 | 20.065 | 173.375 | 3.733 | 8.350 | 5.781 | 562.661 |
| Complier mean | 1176.312 | 161.955 | 267.489 | 43.557 | 19.585 | 141.213 | 18.207 | 16.859 | 2.405 | 505.042 |
| Observations | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 |
| Panel B: Low or middle baseline TLU class | | | | | | | | | | |
| Any insurance purchased | -166.983 | 25.377 | -18.375 | -71.851 | 59.395 | -202.937 | 45.608** | -19.214 | -0.230 | 15.128 |
| | (518.707) | (192.869) | (186.125) | (47.708) | (47.420) | (131.627) | (22.083) | (45.381) | (5.135) | (246.699) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 1228.531 | 96.149 | 312.709 | 76.307 | 23.370 | 204.732 | 5.061 | 11.322 | 0.000 | 498.882 |
| Complier mean | 1052.144 | 145.618 | 230.785 | 39.559 | 15.220 | 96.588 | 15.765 | 17.189 | 2.903 | 488.516 |
| Observations | 790 | 790 | 790 | 790 | 790 | 790 | 790 | 790 | 790 | 790 |
| Panel C: High baseline TLU class | | | | | | | | | | |
| Any insurance purchased | 1016.430 | 659.178 | 22.290 | 27.808 | 38.321 | 208.073 | 30.707 | 25.862 | -26.825 | -6.666 |
| | (973.659) | (718.089) | (258.321) | (53.146) | (56.615) | (177.085) | (21.646) | (16.311) | (19.642) | (296.087) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 1466.054 | 148.944 | 430.383 | 26.796 | 10.781 | 85.277 | 0.000 | 0.000 | 22.025 | 741.848 |
| Complier mean | 1419.681 | 193.974 | 339.427 | 51.392 | 28.141 | 228.678 | 22.994 | 16.212 | 1.430 | 537.433 |
| Observations | 389 | 389 | 389 | 389 | 389 | 389 | 389 | 389 | 389 | 389 |

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# Effects on aggregated income – total livestock and crop

| | Annual income (USD) | | Extensive margin: $= 1$ if the outcome $> 0$ | |
|---|---|---|---|---|
| | Total livestock income | Total crop income | Total livestock income | Total crop income |
| | (1) | (2) | (3) | (4) |
| Panel A: All samples | | | | |
| Any insurance purchased | 310.307 | 54.427 | 0.039 | 0.086 |
| | (440.532) | (34.409) | (0.108) | (0.086) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 710.356 | 12.083 | 0.787 | 0.138 |
| Complier mean | 633.799 | 35.066 | 0.801 | 0.160 |
| Observations | 1179 | 1179 | 1179 | 1179 |
| Panel B: Low or middle baseline TLU class | | | | |
| Any insurance purchased | -207.262 | 28.724 | 0.048 | -0.015 |
| | (416.869) | (48.662) | (0.151) | (0.121) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 713.266 | 16.383 | 0.780 | 0.186 |
| Complier mean | 527.771 | 32.954 | 0.784 | 0.169 |
| Observations | 790 | 790 | 790 | 790 |
| Panel C: High baseline TLU class | | | | |
| Any insurance purchased | 995.289 | 50.120 | 0.031 | 0.218** |
| | (911.323) | (32.421) | (0.145) | (0.096) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 702.181 | 0.000 | 0.810 | 0.000 |
| Complier mean | 841.613 | 39.206 | 0.834 | 0.143 |
| Observations | 389 | 389 | 389 | 389 |

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# Robustness: Without control variables

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased | 0.230** | -0.230** | 6.067 | -1.028 | -1.734 | -2.793* | 14.173* | 1.949 |
| | (0.114) | (0.114) | (4.410) | (1.097) | (5.130) | (1.532) | (7.814) | (1.642) |
| Controls | | | | | | | | |
| Sample | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Control mean | 0.566 | 0.434 | 9.185 | 3.617 | 9.968 | 3.915 | 6.986 | 2.779 |
| Complier mean | 0.618 | 0.382 | 9.385 | 2.618 | 6.497 | 2.213 | 15.046 | 3.412 |
| Observations | 987 | 987 | 1179 | 1179 | 790 | 790 | 389 | 389 |

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# Robustness: Using IBLI uptake and coupon receipts from all six sales seasons

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased (in six sales seasons) | 0.242* | -0.242* | 6.486 | -1.318 | -0.873 | -2.508 | 15.192 | 1.394 |
| | (0.129) | (0.129) | (5.099) | (1.288) | (5.115) | (1.592) | (11.105) | (2.253) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sample | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Control mean | 0.214 | 0.786 | 0.333 | 4.127 | 9.968 | 3.915 | 6.986 | 2.779 |
| Complier mean | 0.642 | 0.358 | 9.548 | 2.580 | 6.880 | 2.233 | 14.739 | 3.255 |
| Observations | 987 | 987 | 1179 | 1179 | 790 | 790 | 389 | 389 |

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# Robustness: Effects of IBLI uptake in season 1

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased – season 1 | 0.197** | -0.197** | 4.683 | -1.475 | 1.667 | -2.042** | 6.692 | -0.362 |
| | (0.089) | (0.089) | (3.542) | (0.905) | (3.159) | (0.972) | (8.346) | (1.849) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sample (Baseline TLUs) | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Control mean | 0.542 | 0.458 | 8.249 | 3.013 | 6.611 | 2.865 | 11.576 | 3.313 |
| Complier mean | 0.642 | 0.358 | 9.548 | 2.580 | 6.880 | 2.233 | 14.739 | 3.255 |
| Observations | 976 | 976 | 1168 | 1168 | 783 | 783 | 385 | 385 |

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# Robustness: Effects of IBLI uptake in seasons 1-2

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased – from season 1 to 2 | 0.290** | -0.290** | 9.752* | -0.588 | -0.688 | -2.395 | 21.102** | 2.760 |
| | (0.136) | (0.136) | (5.381) | (1.312) | (5.774) | (1.697) | (10.740) | (2.148) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sample (Baseline TLUs) | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Control mean | 0.542 | 0.458 | 8.249 | 3.013 | 6.611 | 2.865 | 11.576 | 3.313 |
| Complier mean | 0.642 | 0.358 | 9.548 | 2.580 | 6.880 | 2.233 | 14.739 | 3.255 |
| Observations | 976 | 976 | 1168 | 1168 | 783 | 783 | 385 | 385 |

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# Robustness: Effects of IBLI uptake in seasons 1-4

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased – from season 1 to 4 | 0.275** | -0.275** | 5.438 | -1.424 | 1.495 | -2.147 | 6.124 | 0.117 |
| | (0.134) | (0.134) | (5.013) | (1.257) | (4.780) | (1.482) | (9.934) | (2.131) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sample (Baseline TLUs) | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Control mean | 0.542 | 0.458 | 8.249 | 3.013 | 6.611 | 2.865 | 11.576 | 3.313 |
| Complier mean | 0.642 | 0.358 | 9.548 | 2.580 | 6.880 | 2.233 | 14.739 | 3.255 |
| Observations | 976 | 976 | 1168 | 1168 | 783 | 783 | 385 | 385 |

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# Robustness: Effects of IBLI uptake in seasons 1-5

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased – from season 1 to 5 | 0.283** | -0.283** | 6.110 | -1.788 | 0.554 | -3.018* | 8.467 | -0.047 |
| | (0.135) | (0.135) | (5.072) | (1.256) | (5.507) | (1.745) | (8.318) | (1.732) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sample (Baseline TLUs) | All | All | All | All | Botom 2/3 | Botom 2/3 | Bottom 2/3 | Bottom 2/3 |
| Control mean | 0.166 | 0.834 | 1.900 | 4.044 | 2.338 | 4.900 | 0.000 | 0.333 |
| Complier mean | 0.642 | 0.358 | 9.548 | 2.580 | 6.880 | 2.233 | 14.739 | 3.255 |
| Observations | 976 | 976 | 1168 | 1168 | 783 | 783 | 385 | 385 |

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# Robustness: Number of IBLI as the endogenous variable

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| N. of IBLI purchased | 0.147* | -0.147* | 4.435 | -0.607 | -1.403 | -1.812* | 10.328* | 1.241 |
| | (0.078) | (0.078) | (3.113) | (0.765) | (3.538) | (1.051) | (5.988) | (1.188) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sample | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Control mean | 0.214 | 0.786 | 0.333 | 4.127 | 9.968 | 3.915 | 6.986 | 2.779 |
| Complier mean | 0.618 | 0.382 | 9.385 | 2.618 | 6.497 | 2.213 | 15.046 | 3.412 |
| Observations | 987 | 987 | 1179 | 1179 | 790 | 790 | 389 | 389 |

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# Long-run effects of catastrophic drought insurance on herd composition

## Westfall-Young stepdown adjusted p-values, controlling for the FWER

| | Share of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased | 0.209* | -0.209* | 6.316 | -0.865 | -2.007 | -2.591* | 13.827* | 1.666 |
| | «0.190» | «0.190» | «0.304» | «0.542» | «0.190» | «0.190» | «0.190» | «0.190» |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sample (Baseline TLUs) | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Control mean | 0.566 | 0.434 | 9.185 | 3.617 | 9.968 | 3.915 | 6.986 | 2.779 |
| Complier mean | 0.618 | 0.382 | 9.385 | 2.618 | 6.497 | 2.213 | 15.046 | 3.412 |
| Observations | 987 | 987 | 1179 | 1179 | 790 | 790 | 389 | 389 |

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# Long-run effects of catastrophic drought insurance on child time use

| | Share of children in the household | |
|---|---|---|
| | Working | Studying full-time |
| | (1) | (2) |
| Any insurance purchased | -0.550 | 0.423* |
| | (0.338) | (0.251) |
| Controls | ✓ | ✓ |
| Control mean | 0.553 | 0.159 |
| Complier mean | 0.464 | 0.221 |
| Observations | 376 | 376 |

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# Effects on education by baseline TLU class

| | Of household members who were school-aged at any point during initial three periods of experiments | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: Low or middle baseline TLU class | | | |
| Any insurance purchased | 5.658** | 14.535** | 5.254** |
| | (2.337) | (5.723) | (2.124) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 6.917 | 11.528 | 5.051 |
| Complier mean | 7.147 | 13.562 | 5.552 |
| Observations | 484 | 484 | 484 |
| Panel B: High baseline TLU class | | | |
| Any insurance purchased | -2.143 | -4.744 | -0.411 |
| | (2.708) | (5.804) | (1.898) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 8.067 | 17.467 | 5.884 |
| Complier mean | 7.077 | 11.231 | 5.666 |
| Observations | 258 | 258 | 258 |

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# Robustness: Without control variables

| | Of household members who were school-aged at any point during initial three periods of experiments | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: All samples | | | |
| Any insurance purchased | 2.944* | 7.068* | 2.354* |
| | (1.536) | (3.707) | (1.293) |
| Controls | | | |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 742 | 742 | 742 |
| Panel B: Low or middle baseline TLU class | | | |
| Any insurance purchased | 5.793** | 14.360** | 4.773** |
| | (2.377) | (5.720) | (2.092) |
| Controls | | | |
| Control mean | 6.917 | 11.528 | 5.051 |
| Complier mean | 7.147 | 13.562 | 5.552 |
| Observations | 484 | 484 | 484 |
| Panel C: High baseline TLU class | | | |
| Any insurance purchased | -1.673 | -3.517 | -0.452 |
| | (2.518) | (5.930) | (1.877) |
| Controls | | | |
| Control mean | 8.067 | 17.467 | 5.884 |
| Complier mean | 7.077 | 11.231 | 5.666 |
| Observations | 258 | 258 | 258 |

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# Robustness: Using IBLI uptake and coupon receipts from all six sales seasons

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: All samples | | | |
| Any insurance purchased (in six sales seasons) | 3.018 | 8.209* | 2.541 |
| | (1.864) | (4.420) | (1.558) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 5.889 | 8.333 | 4.833 |
| Complier mean | 6.992 | 12.540 | 5.499 |
| Observations | 742 | 742 | 742 |
| Panel B: Low or middle baseline TLU class | | | |
| Any insurance purchased (in six sales seasons) | 5.406** | 14.287** | 4.895** |
| | (2.329) | (5.742) | (2.094) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 6.625 | 9.375 | 5.438 |
| Complier mean | 7.083 | 13.215 | 5.494 |
| Observations | 484 | 484 | 484 |
| Panel C: High baseline TLU class | | | |
| Any insurance purchased (in six sales seasons) | -3.948 | -8.384 | -0.867 |
| | (4.637) | (9.446) | (3.155) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 0.000 | 0.000 | 0.000 |
| Complier mean | 6.828 | 11.321 | 5.508 |
| Observations | 258 | 258 | 258 |

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# Robustness: Effects of IBLI uptake in season 1

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: All samples | | | |
| Any insurance purchased – season 1 | 0.494 | 2.257 | 1.352 |
| | (1.406) | (3.332) | (1.145) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.316 | 12.977 | 5.431 |
| Complier mean | 7.306 | 12.936 | 5.618 |
| Observations | 738 | 738 | 738 |
| Panel B: Low or middle baseline TLU class | | | |
| Any insurance purchased – season 1 | 1.398 | 5.779 | 1.692 |
| | (1.510) | (3.700) | (1.272) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.018 | 11.898 | 5.235 |
| Complier mean | 7.459 | 14.432 | 5.735 |
| Observations | 482 | 482 | 482 |
| Panel C: High baseline TLU class | | | |
| Any insurance purchased – season 1 | -2.750 | -8.942 | 1.279 |
| | (3.817) | (8.272) | (2.941) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.825 | 14.825 | 5.766 |
| Complier mean | 6.986 | 9.817 | 5.374 |
| Observations | 256 | 256 | 256 |

Back

# Robustness: Effects of IBLI uptake in seasons 1-2

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: All samples | | | |
| Any insurance purchased – from season 1 to 2 | 2.484 | 5.968 | 2.797* |
| | (1.829) | (4.312) | (1.520) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.323 | 13.208 | 5.378 |
| Complier mean | 7.215 | 12.755 | 5.592 |
| Observations | 738 | 738 | 738 |
| Panel B: Low or middle baseline TLU class | | | |
| Any insurance purchased – from season 1 to 2 | 4.435* | 13.760** | 4.918** |
| | (2.440) | (6.110) | (2.177) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.154 | 11.600 | 5.167 |
| Complier mean | 7.362 | 14.062 | 5.714 |
| Observations | 482 | 482 | 482 |
| Panel C: High baseline TLU class | | | |
| Any insurance purchased – from season 1 to 2 | -1.164 | -8.967 | 0.557 |
| | (3.640) | (8.549) | (2.658) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.677 | 16.581 | 5.822 |
| Complier mean | 6.909 | 10.039 | 5.341 |
| Observations | 256 | 256 | 256 |

Back

# Robustness: Effects of IBLI uptake in seasons 1-4

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: All samples | | | |
| Any insurance purchased – from season 1 to 4 | 3.143* | 8.848** | 2.296* |
| | (1.675) | (4.196) | (1.387) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 8.250 | 15.542 | 6.424 |
| Complier mean | 6.989 | 12.285 | 5.453 |
| Observations | 738 | 738 | 738 |
| Panel B: Low or middle baseline TLU class | | | |
| Any insurance purchased – from season 1 to 4 | 4.725** | 13.729*** | 3.921** |
| | (1.980) | (5.118) | (1.736) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.722 | 13.500 | 5.918 |
| Complier mean | 7.044 | 13.148 | 5.452 |
| Observations | 482 | 482 | 482 |
| Panel C: High baseline TLU class | | | |
| Any insurance purchased – from season 1 to 4 | -2.979 | -8.437 | -1.064 |
| | (4.281) | (8.926) | (2.968) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 9.833 | 21.667 | 7.944 |
| Complier mean | 6.888 | 10.704 | 5.455 |
| Observations | 256 | 256 | 256 |

Back

# Robustness: Effects of IBLI uptake in seasons 1-5

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: All samples | | | |
| Any insurance purchased – from season 1 to 5 | 3.157* | 8.513** | 2.481* |
| | (1.640) | (3.957) | (1.354) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.667 | 12.417 | 6.583 |
| Complier mean | 6.892 | 12.011 | 5.376 |
| Observations | 738 | 738 | 738 |
| Panel B: Low or middle baseline TLU class | | | |
| Any insurance purchased – from season 1 to 5 | 6.082*** | 17.290*** | 5.089** |
| | (2.308) | (5.758) | (1.990) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.222 | 9.667 | 6.000 |
| Complier mean | 6.905 | 12.723 | 5.337 |
| Observations | 482 | 482 | 482 |
| Panel C: High baseline TLU class | | | |
| Any insurance purchased – from season 1 to 5 | -3.353 | -9.306 | -1.071 |
| | (3.019) | (6.597) | (2.195) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 9.000 | 20.667 | 8.333 |
| Complier mean | 6.868 | 10.674 | 5.448 |
| Observations | 256 | 256 | 256 |

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# Robustness: Number of IBLI as the endogenous variable

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: All samples | | | |
| N. of IBLI purchased | 2.000* | 5.074** | 1.742** |
| | (1.049) | (2.544) | (0.871) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 5.889 | 8.333 | 4.833 |
| Complier mean | 6.992 | 12.540 | 5.499 |
| Observations | 742 | 742 | 742 |
| Panel B: Low or middle baseline TLU class | | | |
| N. of IBLI purchased | 3.981** | 10.292*** | 3.694** |
| | (1.591) | (3.971) | (1.440) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 6.625 | 9.375 | 5.438 |
| Complier mean | 7.083 | 13.215 | 5.494 |
| Observations | 484 | 484 | 484 |
| Panel C: High baseline TLU class | | | |
| N. of IBLI purchased | -1.712 | -3.829 | -0.330 |
| | (2.227) | (4.807) | (1.533) |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 0.000 | 0.000 | 0.000 |
| Complier mean | 6.828 | 11.321 | 5.508 |
| Observations | 258 | 258 | 258 |

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# Long-run effects of catastrophic drought insurance on education

## Westfall-Young stepdown adjusted p-values, controlling for the FWER

| | Of household members who were school-aged at any point during initial three periods of experiments | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Any insurance purchased | 2.906* | 7.314** | 2.520** |
| | «0.097» | «0.097» | «0.097» |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 742 | 742 | 742 |

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# Robustness: Effects on education for younger cohorts

| | Maximum years of education | Total years of education | Average years of education |
|---|---|---|---|
| | (1) | (2) | (3) |
| Panel A: All samples | | | |
| Any insurance purchased | 1.079 | 0.275 | 0.604 |
| | (0.743) | (1.240) | (0.503) |
| Baseline outcome | | | |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 3.203 | 4.514 | 2.041 |
| Complier mean | 3.619 | 5.155 | 2.406 |
| Observations | 1015 | 1015 | 1015 |
| Panel B: Low or middle baseline TLU class | | | |
| Any insurance purchased | 1.515 | 0.144 | 0.779 |
| | (1.020) | (1.675) | (0.692) |
| Baseline outcome | | | |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 3.145 | 4.673 | 2.030 |
| Complier mean | 3.621 | 5.232 | 2.459 |
| Observations | 679 | 679 | 679 |
| Panel C: High baseline TLU class | | | |
| Any insurance purchased | 0.673 | 2.064 | 0.505 |
| | (1.054) | (1.741) | (0.701) |
| Baseline outcome | | | |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 3.368 | 4.053 | 2.070 |
| Complier mean | 3.614 | 5.007 | 2.304 |
| Observations | 336 | 336 | 336 |

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# Prespecified primary outcomes I

| | Herd size (CMVE) | | Annual household cash earnings (USD) | | Maximum years of education | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Any insurance purchased | 2.061 | 3.276 | -6.587 | 17.411 | 2.944* | 2.906* |
| | (8.662) | (8.839) | (207.341) | (208.250) | (1.536) | (1.544) |
| Controls | | ✓ | | ✓ | | ✓ |
| Control mean | 14.979 | 14.979 | 591.076 | 591.076 | 7.255 | 7.255 |
| Complier mean | 13.889 | 13.889 | 541.487 | 541.487 | 7.123 | 7.123 |
| Observations | 1179 | 1179 | 1179 | 1179 | 742 | 742 |

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# Prespecified primary outcomes II

| | Outcome: N of animal type in CMVE / Total N of animals in CMVE | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Camel | | Cattle | | Goats | | Sheep | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased | 0.120 | 0.104 | 0.106 | 0.106 | -0.220** | -0.211** | -0.007 | 0.005 |
| | (0.089) | (0.088) | (0.082) | (0.081) | (0.095) | (0.094) | (0.051) | (0.050) |
| Controls | | ✓ | | ✓ | | ✓ | | ✓ |
| Control mean | 0.255 | 0.255 | 0.311 | 0.311 | 0.293 | 0.293 | 0.141 | 0.141 |
| Complier mean | 0.191 | 0.191 | 0.427 | 0.427 | 0.281 | 0.281 | 0.101 | 0.101 |
| Observations | 987 | 987 | 987 | 987 | 987 | 987 | 987 | 987 |

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# Prespecified secondary outcomes I

| | Herd management expenditure (USD) | | Milk Income (USD) | | Livestock loss (CMVE) | | Distress sales (CMVE) | | Livestock Sale (CMVE) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Any insurance purchased | 2.590 | -6.107 | 372.295 | 401.211 | 1.797 | 1.044 | -0.328 | -0.415 | -1.135 | -1.109 |
| | (88.734) | (91.418) | (397.133) | (404.225) | (2.867) | (2.683) | (0.523) | (0.510) | (1.446) | (1.448) |
| Controls | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ |
| Control mean | 207.775 | 207.775 | 455.696 | 455.696 | 5.503 | 5.503 | 0.381 | 0.381 | 2.595 | 2.595 |
| Complier mean | 166.827 | 166.827 | 431.342 | 431.342 | 5.142 | 5.142 | 0.765 | 0.765 | 2.078 | 2.078 |
| Observations | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 | 781 | 781 | 1179 | 1179 |

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# Prespecified secondary outcomes II

| | IBLI uptake in the past 12 months (=1 if purchased) | | IBLI uptake in the past 12 months (CMVE) | | Working | | Studying full-time | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Any insurance purchased | 0.033 | 0.036 | -0.966 | -0.936 | -0.520 | -0.566 | 0.436* | 0.423* |
| | (0.043) | (0.044) | (0.889) | (0.907) | (0.342) | (0.347) | (0.264) | (0.251) |
| Controls | | ✓ | | ✓ | | ✓ | | ✓ |
| Control mean | 0.037 | 0.037 | 0.308 | 0.308 | 0.553 | 0.553 | 0.159 | 0.159 |
| Complier mean | 0.064 | 0.064 | 0.700 | 0.700 | 0.464 | 0.464 | 0.221 | 0.221 |
| Observations | 1179 | 1179 | 1179 | 1179 | 376 | 376 | 376 | 376 |

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# Payout effect: Herd composition

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | |
|---|---|---|---|---|
| | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) |
| Predicted insurance purchase ($\gamma_1$) | 0.126 | -0.126 | 4.617 | -0.837 |
| | (0.125) | (0.125) | (4.968) | (1.313) |
| Predicted insurance purchase × Number of shocks ($\gamma_2$) | 0.135 | -0.135 | 7.098 | 1.234 |
| | (0.288) | (0.288) | (7.178) | (1.251) |
| Number of shocks ($\gamma_3$) | -0.0978 | 0.0978 | -4.432 | -1.209** |
| | (0.141) | (0.141) | (3.223) | (0.589) |
| Coef: $\gamma_1 + \gamma_2$ | 0.261 | -0.261 | 11.716 | 0.397 |
| p-val.: $\gamma_1 + \gamma_2$ | 0.361 | 0.361 | 0.115 | 0.734 |
| Coef: $\gamma_2 + \gamma_3$ | 0.037 | -0.037 | 2.666 | 0.026 |
| p-val.: $\gamma_2 + \gamma_3$ | 0.805 | 0.805 | 0.515 | 0.970 |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 0.566 | 0.434 | 9.185 | 3.617 |
| Complier mean | 0.618 | 0.382 | 9.385 | 2.618 |
| Observations | 987 | 987 | 1179 | 1179 |

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# Payout effect: Herd composition – by baseline TLU

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | |
|---|---|---|---|---|
| | Large | Small | Large | Small |
| Low or middle baseline TLU class | | | | |
| Predicted insurance purchase ($\gamma_1$) | 0.132 | -0.132 | -4.835 | -2.954* |
| | (0.154) | (0.154) | (5.293) | (1.601) |
| Predicted insurance purchase × Number of shocks ($\gamma_2$) | 0.0681 | -0.0681 | 5.414 | 2.295* |
| | (0.327) | (0.327) | (6.173) | (1.339) |
| Number of shocks ($\gamma_3$) | -0.0866 | 0.0866 | -3.424 | -1.593** |
| | (0.163) | (0.163) | (2.854) | (0.629) |
| Coef: $\gamma_1 + \gamma_2$ | 0.200 | -0.200 | 0.578 | -0.659 |
| p-val.: $\gamma_1 + \gamma_2$ | 0.536 | 0.536 | 0.923 | 0.609 |
| Coef: $\gamma_2 + \gamma_3$ | -0.018 | 0.018 | 1.990 | 0.702 |
| p-val.: $\gamma_2 + \gamma_3$ | 0.913 | 0.913 | 0.562 | 0.344 |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 0.553 | 0.447 | 9.968 | 3.915 |
| Complier mean | 0.585 | 0.415 | 6.497 | 2.213 |
| Observations | 650 | 650 | 790 | 790 |
| High baseline TLU class | | | | |
| Predicted insurance purchase ($\gamma_1$) | 0.0872 | -0.0872 | 21.21** | 3.786 |
| | (0.228) | (0.228) | (10.52) | (2.366) |
| Predicted insurance purchase × Number of shocks ($\gamma_2$) | 0.469 | -0.469 | 29.30 | -0.373 |
| | (0.669) | (0.669) | (29.93) | (3.528) |
| Number of shocks ($\gamma_3$) | -0.189 | 0.189 | -14.42 | -0.685 |
| | (0.321) | (0.321) | (13.37) | (1.672) |
| Coef: $\gamma_1 + \gamma_2$ | 0.556 | -0.556 | 50.510 | 3.413 |
| p-val.: $\gamma_1 + \gamma_2$ | 0.402 | 0.402 | 0.089 | 0.284 |
| Coef: $\gamma_2 + \gamma_3$ | 0.279 | -0.279 | 14.882 | -1.058 |
| p-val.: $\gamma_2 + \gamma_3$ | 0.429 | 0.429 | 0.379 | 0.581 |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 0.608 | 0.392 | 6.986 | 2.779 |
| Complier mean | 0.679 | 0.321 | 15.046 | 3.412 |
| Observations | 337 | 337 | 389 | 389 |

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# Payout effect: Education

| | Of household members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Predicted insurance purchase ($\gamma_1$) | 4.086** | 9.942** | 3.776*** |
| | (1.661) | (4.186) | (1.327) |
| Predicted insurance purchase × Number of shocks ($\gamma_2$) | -0.176 | 2.636 | -4.786 |
| | (3.539) | (6.066) | (3.254) |
| Number of shocks ($\gamma_3$) | -0.270 | -1.670 | 2.131 |
| | (1.752) | (2.914) | (1.624) |
| Coef: $\gamma_1 + \gamma_2$ | 3.910 | 12.578 | -1.010 |
| p-val.: $\gamma_1 + \gamma_2$ | 0.263 | 0.031 | 0.753 |
| Coef: $\gamma_2 + \gamma_3$ | -0.447 | 0.966 | -2.655 |
| p-val.: $\gamma_2 + \gamma_3$ | 0.808 | 0.772 | 0.113 |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 742 | 742 | 742 |

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# Payout effect: Education – by baseline TLU

| | Of household members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| Low or middle baseline TLU class | | | |
| Predicted insurance purchase ($\gamma_1$) | 7.180*** | 18.50*** | 6.610*** |
| | (1.961) | (5.293) | (1.586) |
| Predicted insurance purchase × Number of shocks ($\gamma_2$) | -2.548 | -5.768 | -5.976 |
| | (3.916) | (6.646) | (3.646) |
| Number of shocks ($\gamma_3$) | 0.415 | 1.891 | 2.294 |
| | (1.950) | (3.182) | (1.838) |
| Coef: $\gamma_1 + \gamma_2$ | 4.632 | 12.728 | 0.634 |
| p-val.: $\gamma_1 + \gamma_2$ | 0.235 | 0.046 | 0.862 |
| Coef: $\gamma_2 + \gamma_3$ | -2.133 | -3.877 | -3.682 |
| p-val.: $\gamma_2 + \gamma_3$ | 0.294 | 0.300 | 0.049 |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 484 | 484 | 484 |
| Panel B: High baseline TLU class | | | |
| Predicted insurance purchase ($\gamma_1$) | -2.794 | -7.961 | -1.293 |
| | (3.155) | (6.820) | (2.429) |
| Predicted insurance purchase × Number of shocks ($\gamma_2$) | 5.807 | 22.51 | -3.206 |
| | (6.946) | (14.01) | (6.194) |
| Number of shocks ($\gamma_3$) | -2.284 | -10.57 | 2.194 |
| | (3.301) | (6.402) | (2.974) |
| Coef: $\gamma_1 + \gamma_2$ | 3.014 | 14.549 | -4.500 |
| p-val.: $\gamma_1 + \gamma_2$ | 0.657 | 0.290 | 0.451 |
| Coef: $\gamma_2 + \gamma_3$ | 3.523 | 11.942 | -1.012 |
| p-val.: $\gamma_2 + \gamma_3$ | 0.349 | 0.125 | 0.760 |
| Controls | ✓ | ✓ | ✓ |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 258 | 258 | 258 |

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# Effects on migration

| | Fully settled | Any satellite camp to feed livestock currently | Plant any crops during gana | Plant any crops during hagaiya |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Any insurance purchased | -0.014 | -0.251 | 0.026 | -0.362 |
| | (0.106) | (0.265) | (0.277) | (0.280) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 0.550 | 0.217 | 0.217 | 0.174 |
| Complier mean | 0.589 | 0.123 | 0.196 | 0.089 |
| Observations | 1179 | 398 | 398 | 398 |

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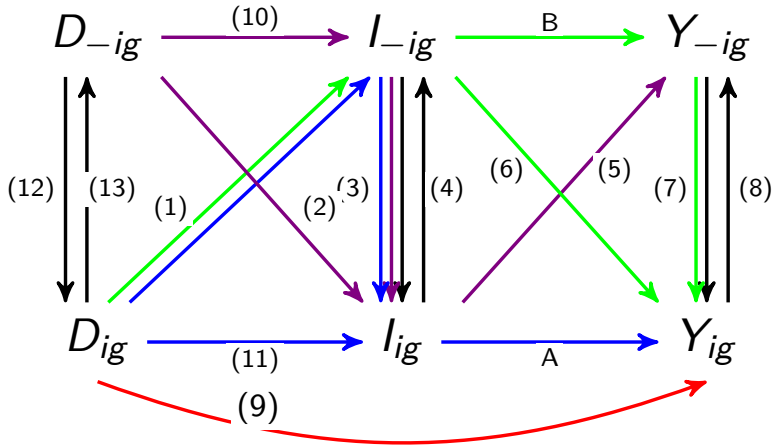
# Potential spillover interactions

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# Summary statistics of the spillover variables

| | Kenya | | | Ethiopia | | | Pooled | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean/SD | Min | Max | Mean/SD | Min | Max | Mean/SD | Min | Max |
| $D_{ij}$: No. of coupons received | 1.78 | 0.00 | 3.00 | 1.57 | 0.00 | 2.00 | 1.71 | 0.00 | 3.00 |
| | [0.87] | | | [0.60] | | | [0.79] | | |
| $I_{ij}$: Any insurance purchase | 0.43 | 0.00 | 1.00 | 0.45 | 0.00 | 1.00 | 0.44 | 0.00 | 1.00 |
| | [0.50] | | | [0.50] | | | [0.50] | | |
| $\overline{D}_{-ij}$: No. of coupons received | 100.88 | 44.00 | 160.00 | 40.22 | 3.00 | 68.00 | 80.41 | 3.00 | 160.00 |
| | [41.15] | | | [12.85] | | | [44.73] | | |
| $\overline{I}_{-ij}$: No. of peers who purchased any insurance | 22.83 | 8.00 | 50.00 | 11.38 | 0.00 | 19.00 | 18.96 | 0.00 | 50.00 |
| | [10.32] | | | [4.94] | | | [10.40] | | |
| Share of populaiton that was treated in the community | 0.04 | 0.01 | 0.20 | 0.13 | 0.00 | 0.35 | 0.07 | 0.00 | 0.35 |
| | [0.03] | | | [0.08] | | | [0.07] | | |

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# Social spillovers and mechanical correlations

| | Outcome: Any insurance purchase - first three seasons | | | | | |
|---|---|---|---|---|---|---|
| | $I_{ij}$: Recipient's | | | $\overline{I}_{-ij}$: Peers' | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $D_{ij}$: Recipient's number of coupons received | 0.119*** | | 0.119*** | -0.064 | | -0.107 |
| | (0.017) | | (0.017) | (0.283) | | (0.180) |
| $\overline{D}_{-ij}$ : Number of peers receiving coupons | | -0.002*** | -0.002*** | | 0.160*** | 0.160*** |
| | | (0.000) | (0.000) | | (0.005) | (0.005) |
| Pathway (DAG) | (11) | (2) | (2);(11) | (1) | (10) | (1);(10) |
| Recipient controls (i) | | | | | | |
| Peers' controls (-i) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Community FE | | | | | | |
| (Control) mean outcomes | 0.237 | . | 0.237 | 20.288 | . | . |
| Observations | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 |

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# Spillover effects on herd composition

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $I\_ij$: Any insurance purchase | 0.231* | -0.231* | 6.274 | -1.234 | -2.123 | -3.269* | 16.872** | 2.256 |
| | (0.122) | (0.122) | (4.817) | (1.193) | (5.697) | (1.704) | (8.189) | (1.685) |
| $\bar{I}\_{-ij}$: No. of peers who purchased any insurance | -0.001 | 0.001 | -0.061 | -0.026 | -0.110 | -0.028 | 0.237 | 0.036 |
| | (0.003) | (0.003) | (0.087) | (0.025) | (0.079) | (0.027) | (0.289) | (0.068) |
| Recipient controls (i) | | | | | | | | |
| Peers' controls (-i) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Community FE | | | | | | | | |
| Control mean | 0.566 | 0.434 | 9.185 | 3.617 | 9.968 | 3.915 | 6.986 | 2.779 |
| Complier mean | 0.618 | 0.382 | 9.385 | 2.618 | 6.497 | 2.213 | 15.046 | 3.412 |
| Sample (Baseline TLUs) | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Observations | 987 | 987 | 1179 | 1179 | 790 | 790 | 389 | 389 |

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# Spillover effects on education outcomes

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| $\widehat{I}_{ij}$: Any insurance purchase | 3.266** | 8.110** | 2.604* |
| | (1.648) | (3.938) | (1.387) |
| $\bar{I}_{-ij}$: No. of peers who purchased any insurance | 0.117*** | 0.318*** | 0.090*** |
| | (0.037) | (0.088) | (0.031) |
| Recipient controls (i) | | | |
| Peer's controls (-i) | ✓ | ✓ | ✓ |
| Community FE | | | |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 742 | 742 | 742 |

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# Spillover effects on education outcomes – by baseline TLU

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| Low or middle baseline TLU class | | | |
| $I_{ij}$: Any insurance purchase | 6.779** | 16.700*** | 5.433** |
| | (2.771) | (6.465) | (2.391) |
| $\bar{I}_{-ij}$: No. of peers who purchased any insurance | 0.166*** | 0.411*** | 0.123*** |
| | (0.054) | (0.125) | (0.044) |
| Recipient controls (i) | | | |
| Peer's controls (-i) | ✓ | ✓ | ✓ |
| Community FE | | | |
| Control mean | 6.917 | 11.528 | 5.051 |
| Complier mean | 7.147 | 13.562 | 5.552 |
| Observations | 484 | 484 | 484 |
| High baseline TLU class | | | |
| $I_{ij}$: Any insurance purchase | -1.553 | -3.390 | -0.686 |
| | (2.447) | (5.697) | (1.827) |
| $\bar{I}_{-ij}$: No. of peers who purchased any insurance | -0.023 | 0.046 | 0.004 |
| | (0.076) | (0.174) | (0.061) |
| Recipient controls (i) | | | |
| Peer's controls (-i) | ✓ | ✓ | ✓ |
| Community FE | | | |
| Control mean | 8.067 | 17.467 | 5.884 |
| Complier mean | 7.077 | 11.231 | 5.666 |
| Observations | 258 | 258 | 258 |

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# Spillover effects on child time use

| | Share of children in the household | |
|---|---|---|
| | Working | Studying full-time |
| | (1) | (2) |
| $\widehat{I}_{ij}$: Any insurance purchase | -0.595 | 0.569 |
| | (0.494) | (0.524) |
| $\bar{I}_{-ij}$: No. of peers who purchased any insurance | -0.131 | 0.180 |
| | (0.118) | (0.128) |
| Recipient controls (i) | | |
| Peer's controls (-i) | ✓ | ✓ |
| Community FE | | |
| Control mean | 0.553 | 0.159 |
| Complier mean | 0.464 | 0.221 |
| Observations | 376 | 376 |

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# Dynamics: Herd share over time

| | N of animals (CMVE) / Total herd size (CMVE) | | | |
|---|---|---|---|---|
| | Large | | Small | |
| | End of experiment | 10-year long-run | End of experiment | 10-year long-run |
| | (1) | (2) | (3) | (4) |
| Any insurance purchased | 0.062 | 0.209* | -0.062 | -0.209* |
| | (0.064) | (0.112) | (0.064) | (0.112) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 0.616 | 0.566 | 0.384 | 0.434 |
| Observations | 1069 | 987 | 1069 | 987 |

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# Dynamics: Herd composition over time

| | Number of animals (CMVE) | | | |
|---|---|---|---|---|
| | Large | | Small | |
| | End of experiment | 10-year long-run | End of experiment | 10-year long-run |
| | (1) | (2) | (3) | (4) |
| Panel A: All samples | | | | |
| Any insurance purchased | -0.156 | 6.316 | -1.511 | -0.865 |
| | (2.716) | (4.447) | (1.141) | (1.094) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 10.888 | 9.185 | 4.611 | 3.617 |
| Complier mean | 12.634 | 9.385 | 4.222 | 2.618 |
| Observations | 1151 | 1179 | 1151 | 1179 |
| Panel B: Low or middle baseline TLU class | | | | |
| Any insurance purchased | -0.601 | -2.007 | -2.797* | -2.591* |
| | (2.890) | (5.069) | (1.438) | (1.541) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 9.440 | 9.968 | 4.288 | 3.915 |
| Complier mean | 9.305 | 6.497 | 3.830 | 2.213 |
| Observations | 767 | 790 | 767 | 790 |
| Panel C: High baseline TLU class | | | | |
| Any insurance purchased | -1.546 | 13.827* | 0.498 | 1.666 |
| | (5.315) | (7.819) | (2.057) | (1.583) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 14.471 | 6.986 | 5.410 | 2.779 |
| Complier mean | 19.006 | 15.046 | 4.972 | 3.412 |
| Observations | 384 | 389 | 384 | 389 |

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# Dynamics: Educational attainment over time

| | Maximum years of education | | Total years of education | | Average years of education | |
|---|---|---|---|---|---|---|
| | End of experiment | 10-year long-run | End of experiment | 10-year long-run | End of experiment | 10-year long-run |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel A: All samples | | | | | | |
| Any insurance purchased | -0.283 | 2.906* | 0.168 | 7.314** | 0.144 | 2.520** |
| | (0.575) | (1.544) | (0.831) | (3.704) | (0.213) | (1.276) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 2.119 | 7.255 | 2.814 | 13.275 | 0.639 | 5.296 |
| Complier mean | 1.613 | 7.123 | 2.655 | 12.746 | 0.769 | 5.592 |
| Observations | 1048 | 742 | 1048 | 742 | 1048 | 742 |
| Panel B: Low or middle baseline TLU class | | | | | | |
| Any insurance purchased | 0.253 | 5.658** | 0.780 | 14.535** | 0.330 | 5.254** |
| | (0.633) | (2.337) | (0.946) | (5.723) | (0.273) | (2.124) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 1.262 | 6.917 | 1.857 | 11.528 | 0.483 | 5.051 |
| Complier mean | 1.395 | 7.147 | 2.194 | 13.562 | 0.688 | 5.552 |
| Observations | 690 | 484 | 690 | 484 | 690 | 484 |
| Panel C: High baseline TLU class | | | | | | |
| Any insurance purchased | -0.364 | -2.143 | 0.493 | -4.744 | 0.151 | -0.411 |
| | (1.028) | (2.708) | (1.507) | (5.804) | (0.361) | (1.898) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 4.235 | 8.067 | 5.176 | 17.467 | 1.023 | 5.884 |
| Complier mean | 2.018 | 7.077 | 3.512 | 11.231 | 0.919 | 5.666 |
| Observations | 358 | 258 | 358 | 258 | 358 | 258 |

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# Short-run impact on secondary livestock related outcomes

| | Herd management expenditure (USD) | Milk Income (USD) | Livestock loss (CMVE) | Distress sales (CMVE) | Livestock Sale (CMVE) |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Panel A: All samples | | | | | |
| Any insurance purchased | 6.582 | 2.518 | -0.020 | 0.085 | -1.208 |
| | (35.388) | (3.938) | (2.762) | (1.587) | (2.335) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 57.355 | 9.306 | 7.325 | 2.457 | 6.240 |
| Complier mean | 45.165 | 10.368 | 6.401 | 3.198 | 6.465 |
| Sample | All | All | All | All | All |
| Observations | 1156 | 1165 | 1085 | 1096 | 1096 |
| Panel B: Low or middle baseline TLU class | | | | | |
| Any insurance purchased | 82.112* | -2.624 | -0.961 | -0.552 | -0.949 |
| | (47.831) | (3.719) | (3.078) | (1.825) | (2.473) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 41.385 | 8.841 | 5.617 | 2.824 | 5.829 |
| Complier mean | 43.052 | 6.490 | 5.336 | 2.336 | 4.899 |
| Observations | 771 | 776 | 715 | 721 | 721 |
| Panel C: High baseline TLU class | | | | | |
| Any insurance purchased | -105.817* | 10.973 | 1.721 | 1.300 | -0.024 |
| | (56.263) | (8.076) | (5.163) | (3.259) | (4.712) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ |
| Control mean | 95.380 | 10.434 | 11.281 | 1.595 | 7.205 |
| Complier mean | 49.231 | 17.791 | 8.414 | 4.819 | 9.411 |
| Observations | 385 | 389 | 370 | 375 | 375 |

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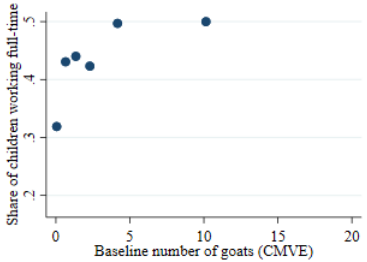
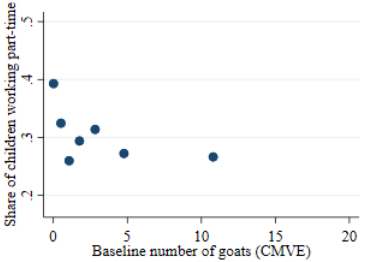
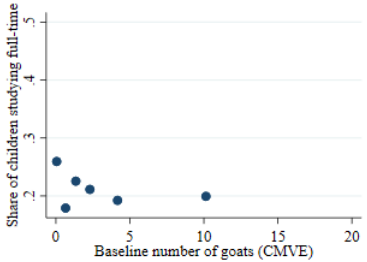
# Child time use and number of goats at baseline survey

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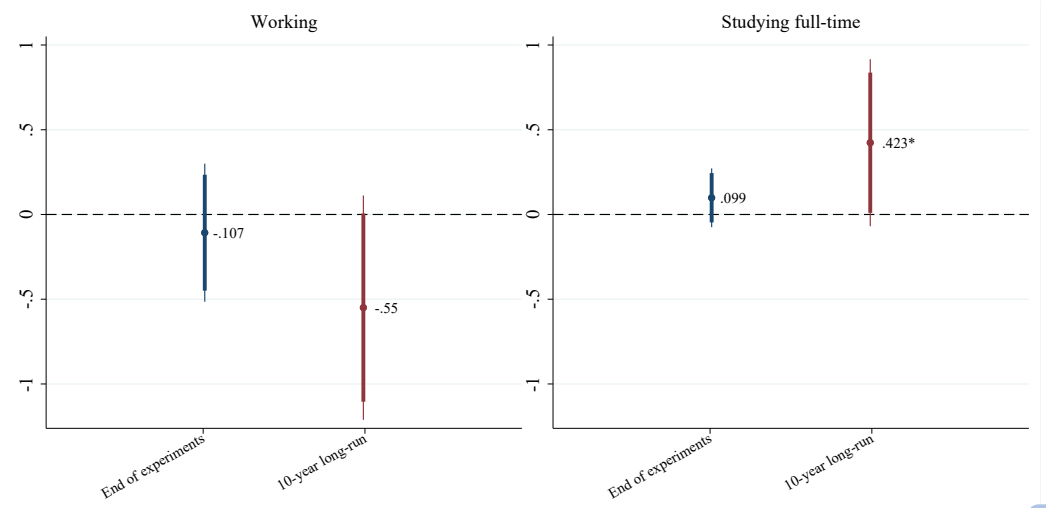
# Dynamics: Child time use over time

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# Dynamics: Child time use over time

| | Working | | Studying full-time | |
|---|---|---|---|---|
| | End of experiments | 10-year long-run | End of experiments | 10-year long-run |
| | (1) | (2) | (3) | (4) |
| Any insurance purchased | -0.107 | -0.550 | 0.099 | 0.423* |
| | (0.208) | (0.338) | (0.088) | (0.251) |
| Controls | ✓ | ✓ | ✓ | ✓ |
| Control mean | 0.795 | 0.553 | 0.131 | 0.159 |
| Complier mean | 0.799 | 0.464 | 0.143 | 0.221 |
| Observations | 375 | 376 | 375 | 376 |

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# Changes in education and shoats over time

| | | Subsample by reduction in small ruminants | | | Pairwise t-test | | |
|---|---|---|---|---|---|---|---|
| | Full sample | Sharp reduction (>.75) | Moderate reduction (<=.75) | No reduction | (2)-(3) | (3)-(4) | (2)-(4) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Change in maximum years of education | 3.66 | 4.13 | 3.76 | 2.80 | 0.37 | 0.96* | 1.33*** |
| | [4.46] | [4.27] | [4.69] | [4.43] | | | |
| Change in total years of education | 6.46 | 8.12 | 5.72 | 4.44 | 2.40** | 1.27 | 3.68*** |
| | [9.90] | [10.62] | [9.45] | [8.60] | | | |
| Change in average years of education | 3.54 | 4.04 | 3.42 | 2.83 | 0.62 | 0.59 | 1.21*** |
| | [3.54] | [3.59] | [3.49] | [3.39] | | | |
| Observations | 742 | 339 | 197 | 206 | 536 | 403 | 545 |

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# Social spillovers and mechanical correlations with control variables

| | Outcome: Any insurance purchase - first three seasons | | | | | |
|---|---|---|---|---|---|---|
| | $I_{ij}$: Recipient's | | | $\overline{I}_{-ij}$: Peers' | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel A: With both own and peers' control variables | | | | | | |
| $D_{ij}$: Recipient's number of coupons received | 0.117*** | | 0.118*** | -0.093 | | -0.134 |
| | (0.017) | | (0.017) | (0.285) | | (0.182) |
| $\overline{D}_{-ij}$ : Number of peers receiving coupons | | -0.002*** | -0.002*** | | 0.159*** | 0.159*** |
| | | (0.000) | (0.000) | | (0.005) | (0.005) |
| Pathway (DAG) | (11) | (2) | (2);(11) | (1) | (10) | (1);(10) |
| Recipient controls (i) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Peers' controls (-i) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Community FE | | | | | | |
| (Control) mean outcomes | 0.237 | . | 0.237 | 20.288 | . | . |
| Observations | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 |

| | $I_{ij}$: Recipient's | | | $\overline{I}_{-ij}$: Peers' | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel B: With own control variables | | | | | | |
| $D_{ij}$: Recipient's number of coupons received | 0.120*** | | 0.122*** | 0.481 | | 0.114 |
| | (0.017) | | (0.017) | (0.400) | | (0.296) |
| $\overline{D}_{-ij}$ : Number of peers receiving coupons | | -0.001*** | -0.001*** | | 0.167*** | 0.167*** |
| | | (0.000) | (0.000) | | (0.007) | (0.007) |
| Pathway (DAG) | (11) | (2) | (2);(11) | (1) | (10) | (1);(10) |
| Recipient controls (i) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Peers' controls (-i) | | | | | | |
| Community FE | | | | | | |
| (Control) mean outcomes | 0.237 | . | 0.237 | 20.288 | . | . |
| Observations | 1179 | 1179 | 1179 | 1179 | 1179 | 1179 |

# Spillover effects on herd composition with control variables

| | Number of animal type / Total number of animals (CMVE) | | Number of animals (CMVE) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Panel A: With both own and peers' control variables | | | | | | | | |
| $T_{ij}$: Any insurance purchase | 0.128 | -0.128 | 5.152 | -1.068 | -4.677 | -3.385* | 17.506** | 2.341 |
| | (0.110) | (0.110) | (4.632) | (1.163) | (5.563) | (1.754) | (7.523) | (1.503) |
| $\bar{T}_{-ij}$: No. of peers who purchased any insurance | -0.002 | 0.002 | -0.118* | -0.009 | -0.145** | -0.005 | 0.057 | 0.024 |
| | (0.002) | (0.002) | (0.069) | (0.017) | (0.059) | (0.019) | (0.225) | (0.050) |
| Recipient controls (i) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Peers' controls (-i) | | | | | | | | |
| Community FE | | | | | | | | |
| Control mean | 0.566 | 0.434 | 9.185 | 3.617 | 9.968 | 3.915 | 6.986 | 2.779 |
| Complier mean | 0.618 | 0.382 | 9.385 | 2.618 | 6.497 | 2.213 | 15.046 | 3.412 |
| Sample | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Observations | 987 | 987 | 1179 | 1179 | 790 | 790 | 389 | 389 |
| | Large | Small | Large | Small | Large | Small | Large | Small |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Panel B: With own control variables | | | | | | | | |
| $T_{ij}$: Any insurance purchase | 0.128 | -0.128 | 5.152 | -1.068 | -4.677 | -3.385* | 17.506** | 2.341 |
| | (0.110) | (0.110) | (4.632) | (1.163) | (5.563) | (1.754) | (7.523) | (1.503) |
| $\bar{T}_{-ij}$: No. of peers who purchased any insurance | -0.002 | 0.002 | -0.118* | -0.009 | -0.145** | -0.005 | 0.057 | 0.024 |
| | (0.002) | (0.002) | (0.069) | (0.017) | (0.059) | (0.019) | (0.225) | (0.050) |
| Recipient controls (i) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Peers' controls (-i) | | | | | | | | |
| Community FE | | | | | | | | |
| Control mean | 0.566 | 0.434 | 9.185 | 3.617 | 9.968 | 3.915 | 6.986 | 2.779 |
| Complier mean | 0.618 | 0.382 | 9.385 | 2.618 | 6.497 | 2.213 | 15.046 | 3.412 |
| Sample | All | All | All | All | Bottom 2/3 | Bottom 2/3 | Top 1/3 | Top 1/3 |
| Observations | 987 | 987 | 1179 | 1179 | 790 | 790 | 389 | 389 |

# Spillover effects on education outcomes with control variables

| | Of households members who were school-aged during the experiment | | |
|---|---|---|---|
| | Maximum years of education | Total years of education | Average years of education |
| | (1) | (2) | (3) |
| Panel A: With both own and peers' control variables | | | |
| $I_{ij}$: Any insurance purchase | 3.316* | 8.602** | 2.855** |
| | (1.692) | (4.017) | (1.397) |
| $\bar{I}_{-ij}$: No. of peers who purchased any insurance | 0.124*** | 0.341*** | 0.099*** |
| | (0.036) | (0.086) | (0.030) |
| Recipient controls (i) | ✓ | ✓ | ✓ |
| Peer's controls (-i) | ✓ | ✓ | ✓ |
| Community FE | | | |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 742 | 742 | 742 |

| | Maximum years of education | Total years of education | Average years of education |
|---|---|---|---|
| | (1) | (2) | (3) |
| Panel B: With own control variables | | | |
| $I_{ij}$: Any insurance purchase | 3.440** | 8.883** | 2.821** |
| | (1.622) | (3.966) | (1.336) |
| $\bar{I}_{-ij}$: No. of peers who purchased any insurance | 0.125*** | 0.342*** | 0.091*** |
| | (0.026) | (0.062) | (0.021) |
| Recipient controls (i) | ✓ | ✓ | ✓ |
| Peer's controls (-i) | | | |
| Community FE | | | |
| Control mean | 7.255 | 13.275 | 5.296 |
| Complier mean | 7.123 | 12.746 | 5.592 |
| Observations | 742 | 742 | 742 |

# Spillover effects on child time use with control variables

| | Share of children in the household | |
|---|---|---|
| | Working | Studying full-time |
| | (1) | (2) |
| Panel A: With both own and peers' control variables | | |
| $\widehat{I}_{ij}$: Any insurance purchase | -0.841 | 0.695 |
| | (0.687) | (0.581) |
| $\bar{I}_{-ij}$: No. of peers who purchased any insurance | -0.174 | 0.182 |
| | (0.155) | (0.144) |
| Recipient controls (i) | ✓ | ✓ |
| Peer's controls (-i) | ✓ | ✓ |
| Community FE | | |
| Control mean | 0.553 | 0.159 |
| Complier mean | 0.464 | 0.221 |
| Observations | 376 | 376 |
| | | |
| Panel B: With own control variables | | |
| $\widehat{I}_{ij}$: Any insurance purchase | -0.841 | 0.695 |
| | (0.687) | (0.581) |
| $\bar{I}_{-ij}$: No. of peers who purchased any insurance | -0.174 | 0.182 |
| | (0.155) | (0.144) |
| Recipient controls (i) | ✓ | ✓ |
| Peer's controls (-i) | ✓ | ✓ |
| Community FE | | |
| Control mean | 0.553 | 0.159 |
| Complier mean | 0.464 | 0.221 |
| Observations | 376 | 376 |