Long-run Effects of Catastrophic Drought Insurance

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Motivation

- Households in low-income countries quite vulnerable to covariate natural disaster shocks
  - e.g., droughts, floods, cyclones, earthquakes
  - Households' ability to informally insure each other is limited as they are similarly affected.
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  - Particularly on indicators of human capital accumulation
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To what extent does insurance against catastrophic covariate shocks impact long-run household well-being outcomes?

The potential of insurance against catastrophic covariate shocks

- Designing drought insurance for low-income settings is challenging
  - Indemnity insurance faces moral hazard, adverse selection and high transaction costs.
  - Index insurance – insuring an index, not individual losses – is often of low quality and faces implementation challenges (Binswanger-Mkhize, 2012; Mobarak and Rosenzweig, 2013; Carter et al., 2017; Hill et al., 2019).

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- A notable exception: Index-Based Livestock Insurance (IBLI) in Kenya and Ethiopia
  - Commercial product insuring against livestock loss based on an index.
  - The index is calibrated to remote-sensing NDVI data on rangeland vegetation conditions.
  - Gradually expanded since piloting in 2010 in northern Kenya.
  - By 2022, it had covered over 500,000 households.
  - Introduced through an experiment with a panel survey.

What we do in this paper

- We investigate the long-run impacts of catastrophic drought insurance, **10 years after its initial introduction and despite only-temporary use**
  - 82% of the original panel households were re-interviewed.
  - Primary outcomes of interests include income, assets, productive strategies, and human capital accumulation. (Pre-analysis plan: AEARCTR-0011184)

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  - ..on our pre-specified outcomes ten years after initial IBLI exposure.
- We investigate:
  - Robustness to potential spillovers.
  - **Mechanisms**: dynamics of effects; *ex ante* coverage or *ex post* payouts

What we find

Long-run impacts of IBLI

- Herd composition changes: a 83% reduction in smaller animals (e.g., goats) towards larger animals (especially camels).
- A substantial increase in educational attainment, from $\sim$ 12% to $\sim$ 28%.
- A tripling of the share of current children studying full time, from 23% to about 70%.
- The former two are robust to controlling for potential social spillovers.

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Mechanisms

- There appears **not** to be an effect of initial adoption on recent adoption. Seems a supply-side problem.
- *Ex post* indemnity payments do not affect outcomes. Instead, effects arise through changes in *ex ante* risk exposure and induced behavior change.
- The effect on herd composition appears to have materialized promptly, followed by the effect on educational attainment, and both continued after experiment ends.

Contribution to the literature - I

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)
- **Contribution:**
  - Insurance against catastrophic weather shocks affects similar long-run outcomes.
  - *Suggestive:* Changes in productive strategies change marginal productivity of child labor

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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 does not work through lump-sum transfers.

Contribution to the literature - II

Literature on the impacts of index insurance

- Short-run *ex ante* behavioral changes
  - Producers are risk averse and reluctant to invest in risky production without insurance (Boucher et al. 2008; Emerick et al., 2016)
  - Despite product quality and/or implementation constraints of many insurance products, many find increases in productive investments (Karlan et al., 2014; Jensen et al 2017; Cole et al., 2017; Matsuda et al., 2019; Hill et al. 2019; Belissa et al. 2020; Mishra et al 2021; Stoeffler et al., 2022; Son, 2023)
- Short-run *ex post* shock response
  - Increase in income and consumption smoothing (Matsuda et al., 2019; Janzen et al., 2019; Jensen et al., 2017, Noritomo et al., 2020)
- **Contribution:**
  - Persistence of changes in production strategies and resulting long-run increases in education.

Road Map

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

Livestock grazing and drought

- Residents in ASALs depend on extensive livestock grazing.
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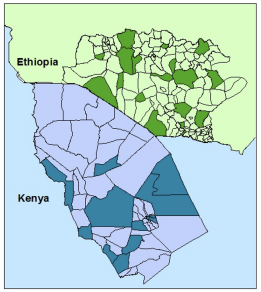
Risk management and self-insurance

- Short-term migration
- Inter-household gifts and loans are insufficient because all are similarly affected.
- Covariate shocks prevent livestock prices from responding orthogonally to animal productivity.
- 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	

▸ Outcome variables

Intervention: Index-Based Livestock Insurance (IBLI)

Product

- Unlike most agricultural index insurance, IBLI insures against the loss of durable assets.
- IBLI relies on a satellite-based Normalized Difference Vegetation Index (NDVI) of relative forage scarcity, specifically designed to minimize basis risk.
- Now used in Ethiopia, Kenya, Mauritania, Zambia
- Recent (DRIVE) initiative by WB and gov'ts of Kenya, Ethiopia, Djibouti and Somalia aim to scale IBLI to reach 1.6 million pastoralists by 2025

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Implementation

- Introduced with random distribution of premium discount coupons (individual-level).
- Baseline survey conducted before IBLI announced (Kenya 2009; Ethiopia 2012), and panel surveys of the same households were conducted annually up to 2015.
- During the period 2009-2015, low NDVI readings triggered the drought index four times in Kenya and one time in Ethiopia.

Research design

- Original study sample: 1,439 pastoralists from 17 locations in Borena Zone (Ethiopia) and 16 locations in Marsabit District (Kenya).
  - Random samples from the population in each location, stratified by herd size.

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- 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 and expired at the end of semi-annual sales seasons.
  - Re-randomized in each of six sales seasons between 2010 and 2015.

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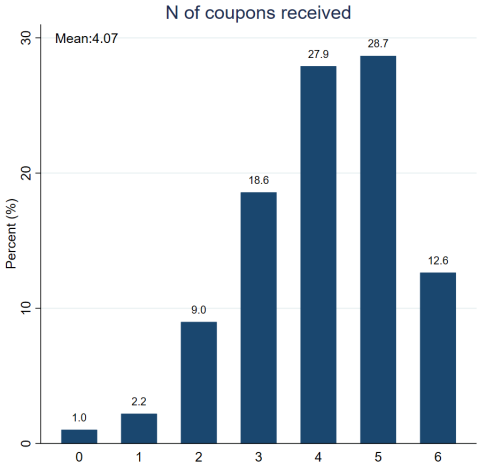
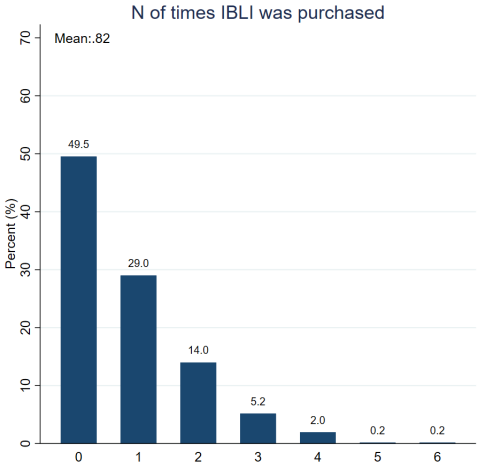
  - Non-transferable and expired at the end of semi-annual sales seasons.
  - Re-randomized in each of six sales seasons between 2010 and 2015.
- Follow-up surveys of original panel households in Kenya (2020) & Ethiopia (2022).
  - No surveys nor experiments conducted between 2015 and the long-term follow-up survey.

▸ IBLI purchase over time

Discount coupons and insurance uptake





▸ Correlation

Estimation strategy: First stage

We instrument 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.

▸ Monotonicity

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.

Road Map

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.

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- **Exclusion restriction:** Since the instrument consisted of randomized discount coupons not transferable and only for the immediate season, violation is unlikely...
  - ...if SUTVA is not violated.
  - We check for violation of SUTVA/exclusion restriction under potential 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 are female-headed, that have fewer adults, and that do not own agricultural land were more likely to attrit from the sample. ▸ Selective attrition

Road Map

First stage regression results

	Any insurance purchased – first three seasons						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
No. of coupons received – first three seasons	0.123***						
	(0.016)						
Received coupon – first season		0.167***					
		(0.029)					
Received coupon – second season			0.069**				
			(0.030)				
Received coupon – third season				0.064**			
				(0.030)			
Received coupon – fourth season					0.004		
					(0.030)		
Received coupon – fifth season						-0.014	
						(0.031)	
Received coupon – sixth season							-0.049
							(0.035)
Controls	✓	✓	✓	✓	✓	✓	✓
Effective F-stat	56.522	32.837	5.294	4.639	0.020	0.213	1.937
10% Critical Value	23.109	23.109	23.109	23.109	23.109	23.109	23.109
N	1179	1166	1154	1165	1154	1151	1151

Primary outcomes: Herd size, cash earnings, education

	Herd size (CMVE)	Total household cash earning (USD)	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)
Any insurance purchased	3.308	5.497	0.168**
	(8.856)	(209.810)	(0.084)
Controls	✓	✓	✓
Control mean	14.265	529.673	0.115
Observations	1179	1179	762

▸ Education - other ▸ Education - gender
▸ All seasons IV ▸ Education sample
▸ Income ▸ Income - extensive margin
▸ Heterogeneity - country ▸ Heterogeneity - herd size ▸ Heterogeneity - gender household head

Primary outcomes: Herd composition

	Outcome: N of animal type in CMVE / Total N of animals in CMVE			
	Camel	Cattle	Goats	Sheep
	(1)	(2)	(3)	(4)
Any insurance purchased	0.120	0.107	-0.235**	0.009
	(0.092)	(0.083)	(0.097)	(0.052)
Controls	✓	✓	✓	✓
Control mean	0.263	0.332	0.284	0.121
Observations	987	987	987	987

▸ Large vs. small ruminants ▸ N of animals - by each species ▸ N of animals - Large vs. small ruminants
▸ All seasons IV ▸ Education sample

Secondary outcomes:

	Herd management expenditure (USD)	Milk Income	Livestock loss (CMVE)	Distress sales (CMVE)	Livestock Sale (CMVE)
	(1)	(2)	(3)	(4)	(5)
Any insurance purchased	2.634	377.169	1.840	-0.389	-1.078
	(89.841)	(401.425)	(2.802)	(0.532)	(1.449)
Controls	✓	✓	✓	✓	✓
Control mean	167.891	359.879	5.448	0.292	1.872
Observations	1179	1179	1179	781	1179

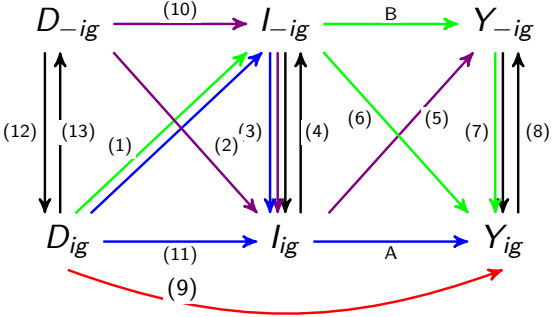
Secondary outcomes:

	IBLI uptake in the past 12 months (=1 if purchased)	IBLI uptake in the past 12 months (CMVE)	Working full-time	Working part-time	Studying full-time
	(1)	(2)	(3)	(4)	(5)
Any insurance purchased	0.036	-0.949	-0.322	-0.261	0.467*
	(0.044)	(0.940)	(0.280)	(0.254)	(0.278)
Controls	✓	✓	✓	✓	✓
Control mean	0.042	0.539	0.271	0.201	0.232
Observations	1179	1179	376	376	376

Road Map

Robustness – Social spillovers

- Individual-level randomization: potential violation of SUTVA.
- Multiple potential spillover pathways exist.
  - Existence of **first-stage spillovers** could lead to violation of *exclusion restriction* and *exogeneity*.
  - **Second-stage spillovers** would not violate IV assumptions, only lead to an underestimate.
- Mechanical correlation and spillovers cannot be separately identified.
- We only have exogenous variation in D_{ig} and D_{-ig} to identify first-stage spillovers.



Robustness Check: Social spillovers and mechanical correlations

- First-stage results are robust to peers' exposure to instrument.

	Outcome: Number of coupons received - first three seasons		Outcome: Any insurance purchase - first three seasons					
	D_{ig}: Recipient's	$\overline{D}_{-ig}$: Peers'	I_{ig}: Recipient's			$\overline{I}_{-ig}$: Peers'		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_{ig}: Recipient's		-0.025***	0.122***		0.132***	-0.003***		-0.001
		(0.001)	(0.016)		(0.034)	(0.001)		(0.001)
$\overline{D}_{-ig}$: Peers'	-31.252***			-3.721***	0.393		0.112***	0.069
	(0.737)			(0.590)	(1.247)		(0.026)	(0.064)
Pathway (DAG)	(12)	(13)	(11)	(2)	(2);(11)	(1)	(10)	(1);(10)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	1.707	1.707	0.200	.	0.200	0.426	.	0.426
Observations	1179	1179	1179	1179	1179	1179	1179	1179

Spillover effects on herd size, earnings, education

	Herd size (CMVE)		Total household cash earning (USD)		Share of members who completed age-appropriate years of education	
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	5.993	3.165	7.840	22.238	0.147	0.144*
	(10.628)	(9.010)	(224.607)	(215.365)	(0.090)	(0.085)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	111.870***	10.719	-569.251	787.677	-0.376	-0.056
	(41.550)	(15.373)	(1217.766)	(487.051)	(0.873)	(0.305)
Recipient controls (i)	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓
Control mean	14.265	14.265	529.673	529.673	0.115	0.115
Village FE						
Observations	1179	1179	1179	1179	762	762

Spillover effects on herd composition

	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)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.090	0.127	0.186	0.124	-0.261	-0.254**	-0.008	0.004
	(0.099)	(0.097)	(0.487)	(0.089)	(0.200)	(0.108)	(0.091)	(0.053)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	-0.637	-0.007	8.798	0.467	-2.636***	-0.350	-1.430	-0.226
	(0.536)	(0.246)	(6.668)	(0.308)	(0.925)	(0.293)	(0.908)	(0.158)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓
Control mean	0.263	0.263	0.332	0.332	0.284	0.284	0.121	0.121
Village FE								
Observations	987	987	987	987	987	987	987	987

◂ secondary - I ◂ secondary -II ◂ with community f.e.'s ◂ community clustering s.e.'s

Road Map

Payout effect: Herd size, earnings, education

	Herd size (CMVE)	Total household cash earning (USD)	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)
Any insurance purchased (γ_1)	3.468	9.794	0.180**
	(9.169)	(215.3)	(0.0870)
Any insurance purchased × Indemnity rate (γ_2)	-0.00110	-0.0293	-0.0000852
	(0.00259)	(0.156)	(0.0000665)
Coef: $\gamma_1 + \gamma_2$	3.467	9.764	0.180
p-val.: $\gamma_1 + \gamma_2$	0.705	0.964	0.039
Controls	✓	✓	✓
Control mean	14.265	529.673	0.115
Observations	1179	1179	762

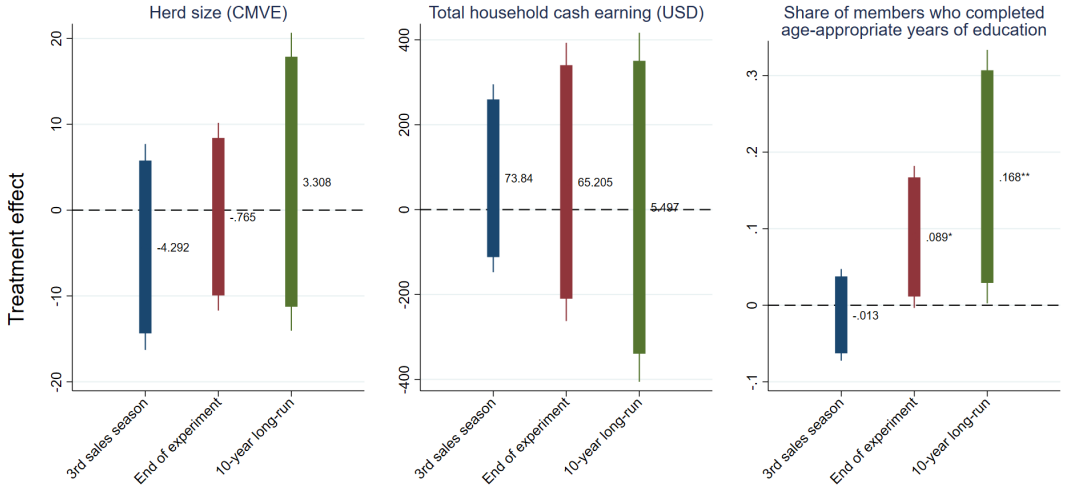
$$y_{ijT} = \gamma_0 + \gamma_1 \widehat{I_{ij}} + \gamma_2 \widehat{I_{ij}} \times R_{jt} + \gamma_3 y_{ij0} + \gamma_4 X_{ij0} + \gamma_5 D_{ij4}^T + \rho_j + \varepsilon_{ijT} \quad (3)$$

Payout effect: Herd composition

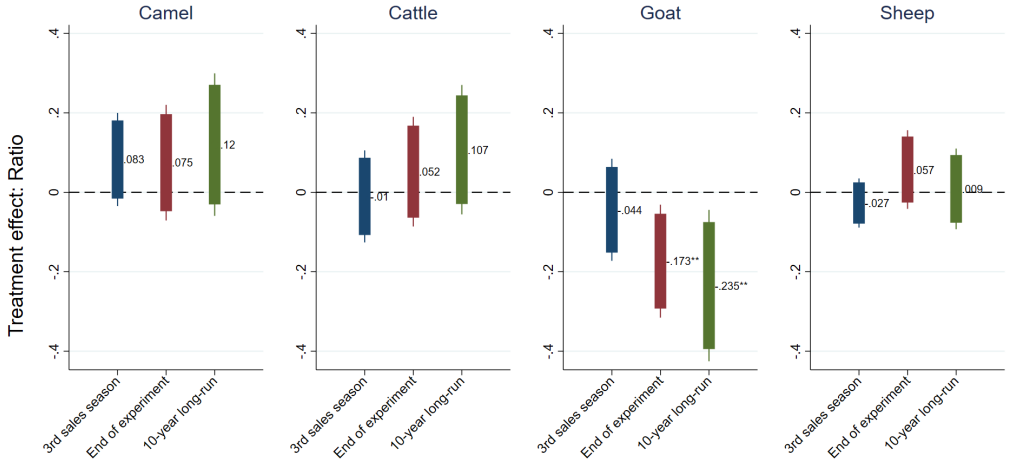
	Outcome: N of animal type in CMVE / Total N of animals in CMVE			
	Camel	Cattle	Goats	Sheep
	(1)	(2)	(3)	(4)
Any insurance purchased (γ_1)	0.118	0.115	-0.242**	0.00841
	(0.0935)	(0.0832)	(0.0989)	(0.0531)
Any insurance purchased $\times$ Indemnity rate (γ_2)	0.0000120	-0.0000523	0.0000520	0.00000124
	(0.0000527)	(0.000103)	(0.0000819)	(0.0000149)
Coef: $\gamma_1 + \gamma_2$	0.118	0.114	-0.242	0.008
p-val.: $\gamma_1 + \gamma_2$	0.205	0.169	0.014	0.874
Controls	✓	✓	✓	✓
Control mean	0.263	0.332	0.284	0.121
Observations	987	987	987	987

▸ Secondary outcomes 1 ▸ Secondary outcomes 2

Dynamics: Primary outcomes over time



Dynamics: The share of individual animal types over time



Suggestive interpretation

- Insurance reduced the need for precautionary saving to cover drought-related expenditures:
- Must liquidate modest asset to pay IBLI premium ("sell a goat to insure a cow"):
  - Goats are “cash with four legs”, a highly liquid, non-lumpy asset.
- By reducing risk of loss of higher-value, lumpier large stock, IBLI induced households to re-balance their livestock portfolio:
  - Households invest less in small ruminants
- Children routinely manage goats, while camels are managed by adult men:
  - Changes in production strategies decreases the marginal productivity of child labor, boosting investments in education

▸ Education effect - gender child

Road Map

Conclusions

- We study the long-run effects of insurance against catastrophic drought shocks.
  - one of the few actively working, scaled examples of index insurance of assets against covariate weather shocks,
  - previously shown to have positive short-term effects on many outcomes.
- 10 years after its inception, IBLI had a significant effect on pastoralists'
  - Production strategies: Livestock composition shifted from goats to large ruminants
  - Human capital accumulation: Share household members w/ age-appropriate education grew
- Had no effect on herd size, incomes

Conclusions (cont.)

- Insurance has potential to 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.

Thank you for your interest, time, and comments!

Comments or edits welcome at cbb2@cornell.edu

Long-run Effects of Catastrophic Drought Insurance

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Summary statistics of the outcomes at baseline

Primary outcomes

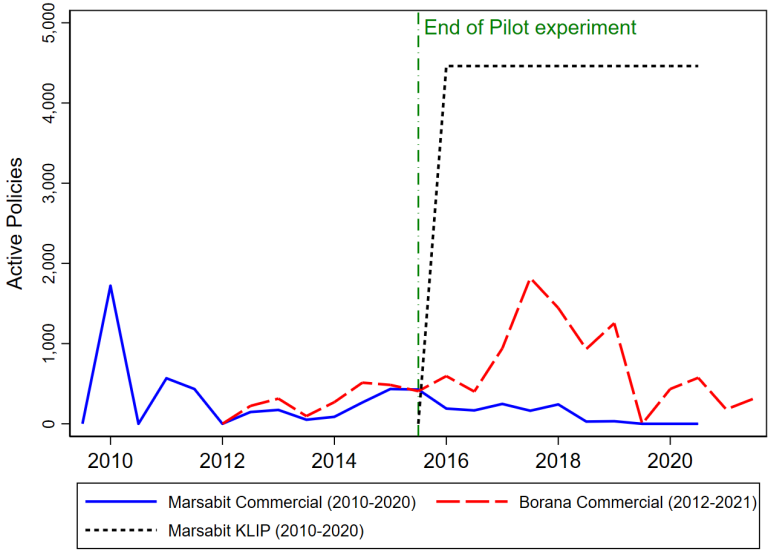
	Mean	[SD]
Baseline prespecified primary outcomes		
Share of camels in herd (CMVE)	0.23	[0.29]
Share of cattle in herd (CMVE)	0.43	[0.37]
Share of goats in herd (CMVE)	0.22	[0.24]
Share of sheep in herd (CMVE)	0.11	[0.15]
Annual total household cash earning (USD)	498.44	[757.52]
Share of members who completed age-appropriate years of education	0.11	[0.24]
Observations	1179	

Secondary outcomes

	Mean	[SD]
Baseline prespecified secondary outcomes		
Herd management expenditure (USD)	46.16	[146.17]
Annual milk income (USD)	641.56	[1408.50]
Livestock lost in the past 12 months (CMVE)	10.49	[15.79]
N of lost camel	0.87	[3.00]
N of lost cattle	5.92	[13.11]
N of lost goats/sheep	23.93	[47.39]
Distress sale in the past 12 months (CMVE)	3.12	[11.99]
Share of children working full-time	0.40	[0.37]
Share of children working part-time	0.28	[0.37]
Share of children studying full-time	0.18	[0.32]
Observations	1179	

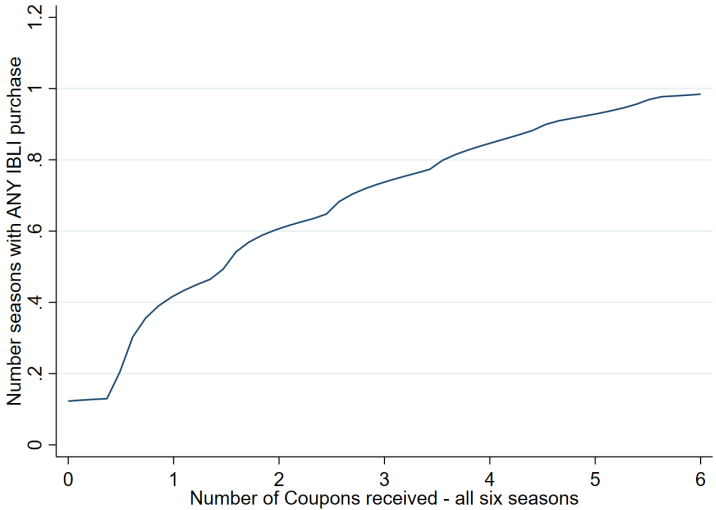
◂ Back

IBLI sales over time



Back

Correlations between discount coupons and insurance uptake



Back

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	

Back

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]
Share of members who completed age-appropriate years of education	0.12	[0.24]	0.11	[0.22]
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]
Milk income	202.86	[717.04]	6.96	[29.65]
Livestock loss (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 sales (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	

◂ Back

Balance of coupon distribution

	Received coupon vs. No coupon						
Sales Season Kenya: Sales Season Ethiopia:	2010 JF 2012 AS	2011 JF 2013 JF	2011 AS 2013 AS	2012 AS 2014 JF	2013 JF 2014 AS	2013 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	

Back

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

Back

Checking monotonicity assumption

	Number of seasons purchase IBLI (%)			
Number of coupons recipient's received	0	1	2	3
0	80.00	16.25	3.75	0
1	67.8	27.12	4.80	0.28
2	51.65	38.82	9.19	0.35
3	48.21	34.52	17.26	0

	Any insurance purchase – first three seasons (%)	
Number of coupons recipient's received	0	1
0	80	20
1	67.8	32.2
2	51.65	48.35
3	48.21	51.79

Back

Checking monotonicity assumption

	Number of seasons purchase IBLI (%)			
Number of coupons recipient's received	0	1	2	3
0	80.00	16.25	3.75	0
1	67.8	27.12	4.80	0.28
2	51.65	38.82	9.19	0.35
3	48.21	34.52	17.26	0

	Any insurance purchase – first three seasons (%)	
Number of coupons recipient's received	0	1
0	80	20
1	67.8	32.2
2	51.65	48.35
3	48.21	51.79

Back

First stage using all six sales seasons

	Any insurance purchased – first three seasons						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
No. of coupons received – all six seasons	0.060***						
	(0.010)						
Received coupon – first season		0.136***					
		(0.030)					
Received coupon – second season			0.096***				
			(0.030)				
Received coupon – third season				0.040			
				(0.029)			
Received coupon – fourth season					0.005		
					(0.030)		
Received coupon – fifth season						0.012	
						(0.030)	
Received coupon – sixth season							-0.007
							(0.035)
Controls	✓	✓	✓	✓	✓	✓	✓
Effective F-stat	33.028	21.165	10.085	1.821	0.026	0.148	0.039
10% Critical Value	23.109	23.109	23.109	23.109	23.109	23.109	23.109
N	1179	1166	1154	1165	1154	1151	1151

◂ Back

Education - School-aged during experiment

				Share of household members				
	Maximum years of education	Total years of education	Average years of education	who completed age-appropriate years of education	who completed any schooling	who completed 4 years of primary education	who completed primary education	who completed secondary education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any insurance purchased	1.964	4.842	2.303**	0.168**	0.208*	0.162	0.142	0.002
	(1.348)	(3.025)	(1.112)	(0.084)	(0.122)	(0.126)	(0.111)	(0.049)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	6.715	8.488	4.860	0.115	0.646	0.549	0.204	0.033
Observations	770	1179	770	762	770	770	770	770

Back

Education - Male child vs. Female child

	Male				Female			
	Maximum years of education	Total years of education	Average years of education	Share of members who completed age-appropriate years of education	Maximum years of education	Total years of education	Average years of education	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any insurance purchased	0.137	3.901**	6.314**	3.115**	0.141	0.624	0.279	0.952
	(0.095)	(1.647)	(3.171)	(1.389)	(0.129)	(1.333)	(2.660)	(1.291)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	0.108	6.289	8.668	4.900	0.144	6.186	8.135	5.557
Observations	530	533	533	533	435	427	427	427

Back

Education - Male child vs. Female child

	Male				Female			
	Maximum years of education	Total years of education	Average years of education	Share of members who completed age-appropriate years of education	Maximum years of education	Total years of education	Average years of education	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any insurance purchased	0.137	3.901**	6.314**	3.115**	0.141	0.624	0.279	0.952
	(0.095)	(1.647)	(3.171)	(1.389)	(0.129)	(1.333)	(2.660)	(1.291)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	0.108	6.289	8.668	4.900	0.144	6.186	8.135	5.557
Observations	530	533	533	533	435	427	427	427

Back

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

	Herd size (CMVE)	Total household cash earning (USD)	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)
Any insurance purchased (in six sales seasons)	2.580	23.284	0.217*
	(9.441)	(244.235)	(0.114)
Controls	✓	✓	✓
Control mean	14.007	512.759	0.112
Observations	1179	1179	762

Back

Robustness: Education sample only - herd size, cash earnings, education

	Herd size (CMVE)	Total household cash earning (USD)	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)
Any insurance purchased	-10.341	47.319	0.168**
	(10.386)	(261.958)	(0.084)
Controls	✓	✓	✓
Control mean	15.442	541.409	0.121
Observations	762	762	762

Back

Effects on income

	Aggregate	Mutually exclusive categories (USD)								
	Total income	In-kind milk income	Milk earnings	In-kind slaughter income	Slaughter earnings	Animal birth income	In-kind crop income	Crop earnings	Employment income	Other earnings
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any insurance purchased	352.660	313.145	67.790	-20.556	51.142	-39.456	48.641***	4.041	-11.043	-46.675
	(519.093)	(310.904)	(158.605)	(37.165)	(35.010)	(97.891)	(17.186)	(29.899)	(8.964)	(204.839)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	1082.818	84.062	275.816	45.156	28.629	134.929	10.346	15.679	2.835	485.365
Observations	1179	1179	1179	1179	1179	1179	1179	1179	1179	1179

◂ Back

Effects on income – extensive margin

	= 1 if the outcome > 0									
	Total income	In-kind milk income	Milk earnings	In-kind slaughter income	Slaughter earnings	Animal birth income	In-kind crop income	Crop earnings	Employment income	Other earnings
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any insurance purchased	0.083	0.054	0.082	-0.078	-0.065	0.107	0.069	0.018	0.033	0.056
	(0.054)	(0.115)	(0.114)	(0.122)	(0.089)	(0.120)	(0.079)	(0.067)	(0.058)	(0.098)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	0.956	0.224	0.517	0.384	0.151	0.723	0.075	0.063	0.034	0.881
Observations	1179	1179	1179	1179	1179	1179	1179	1179	1179	1179

Back

Heterogeneous effects by country: Herd size, cash earnings, education

	Herd size (CMVE)	Total household cash earning (USD)	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)
Any insurance purchase (β_{LATE})	5.260	-94.968	0.120
	(9.014)	(235.571)	(0.088)
Any insurance purchase × Ethiopia (β_{Hetero})	-12.382	627.643	0.330
	(29.476)	(550.229)	(0.349)
Coef: $\beta_{LATE} + \beta_{Hetero}$ (Ethiopia)	-7.122	532.675	0.450
p-val: $\beta_{LATE} + \beta_{Hetero}$ (Ethiopia)	0.802	0.276	0.174
Controls	✓	✓	✓
Control mean	14.265	529.673	0.115
Observations	1179	1179	762

◂ Back

Heterogeneous effects by initial herd tercile: Herd size, cash earnings, education

	Herd size (CMVE)	Total household cash earning (USD)	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)
Any insurance purchase (β_{LATE})	8.728	-42.958	0.248
	(8.244)	(468.805)	(0.183)
Any insurance purchase × 2nd tercile (β^{2nd}_{Hetero})	5.894	197.452	-0.167
	(19.336)	(541.134)	(0.216)
Any insurance purchase × 3rd tercile (β^{3rd}_{Hetero})	-21.174	-58.977	-0.032
	(22.888)	(623.532)	(0.251)
Coef: $\beta_{LATE} + \beta^{2nd}_{Hetero}$ (2nd tercile)	14.622	154.495	0.082
p-val: $\beta_{LATE} + \beta^{2nd}_{Hetero}$ (2nd tercile)	0.399	0.554	0.507
Coef: $\beta_{LATE} + \beta^{3rd}_{Hetero}$ (3rd tercile)	-12.447	-101.935	0.216
p-val: $\beta_{LATE} + \beta^{3rd}_{Hetero}$ (3rd tercile)	0.503	0.793	0.183
Controls	✓	✓	✓
Control mean	14.265	529.673	0.115
Observations	1179	1179	762

Back

Heterogeneous effects by gender of the household head: Herd size, cash earnings, education

	Herd size (CMVE)	Total household cash earning (USD)	Share of members who completed age-appropriate years of education
	(1)	(2)	(3)
Any insurance purchase (β_{LATE})	0.222	3.210	0.095
	(11.026)	(244.001)	(0.086)
Any insurance purchase × Female head (β_{Hetero})	15.849	11.829	0.596
	(19.811)	(569.391)	(0.510)
Coef: $\beta_{LATE} + \beta_{Hetero}$ (Female head)	16.072	15.039	0.691
p-val: $\beta_{LATE} + \beta_{Hetero}$ (Female head)	0.282	0.976	0.171
Controls	✓	✓	✓
Control mean	14.265	529.673	0.115
Observations	1179	1179	762

Back

Herd composition – Large vs. Small ruminants

	N of animals (CMVE) / Total herd size (CMVE)	
	Camels and cattle	Goats and sheep
	(1)	(2)
Any insurance purchased	0.230**	-0.230**
	(0.115)	(0.115)
Controls	✓	✓
Control mean	0.596	0.404
Observations	987	987

Back

Number of animals by species

	Number of animals			
	Camel	Cattle	Goats	Sheep
	(1)	(2)	(3)	(4)
Any insurance purchased	0.953	-1.117	-6.401	-3.332
	(2.746)	(4.879)	(7.910)	(5.221)
Controls	✓	✓	✓	✓
Control mean	6.471	7.455	23.266	22.666
Observations	1179	1179	1179	1179

Back

Number of animals: Large vs. Small ruminants

	N of animals (CMVE)		Raw N of animals	
	Camels and Cattle	Goats and Sheep	Camels and Cattle	Goats and Sheep
	(1)	(2)	(3)	(4)
Any insurance purchased	0.364	-0.746	-0.311	-6.707
	(7.932)	(1.402)	(6.482)	(8.319)
Controls	✓	✓	✓	✓
Control mean	18.134	6.942	13.927	26.684
Observations	1179	1179	1179	1179

Back

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

	Outcome: N of animal type in CMVE / Total N of animals in CMVE			
	Camel	Cattle	Goats	Sheep
	(1)	(2)	(3)	(4)
Any insurance purchased (in six sales seasons)	0.149	0.101	-0.271**	0.020
	(0.106)	(0.097)	(0.111)	(0.058)
Controls	✓	✓	✓	✓
Control mean	0.281	0.292	0.299	0.128
Observations	987	987	987	987

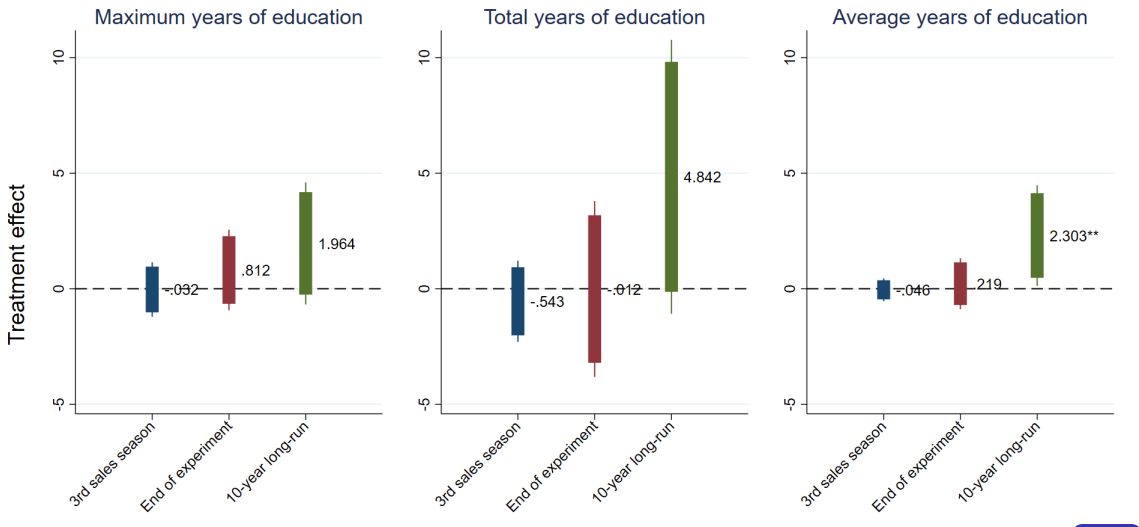
Back

Robustness: Education sample only - Herd composition

	Outcome: N of animal type in CMVE / Total N of animals in CMVE			
	Camel	Cattle	Goats	Sheep
	(1)	(2)	(3)	(4)
Any insurance purchased	0.105	0.087	-0.236**	0.050
	(0.101)	(0.092)	(0.115)	(0.057)
Controls	✓	✓	✓	✓
Control mean	0.290	0.277	0.304	0.129
Observations	629	629	629	629

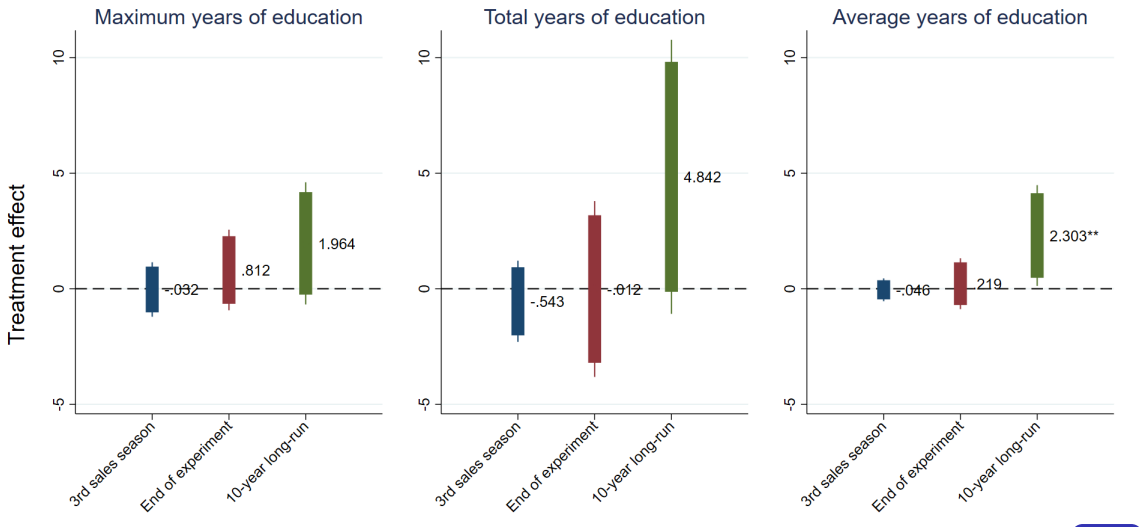
Back

Effects on other measure of educational attainments



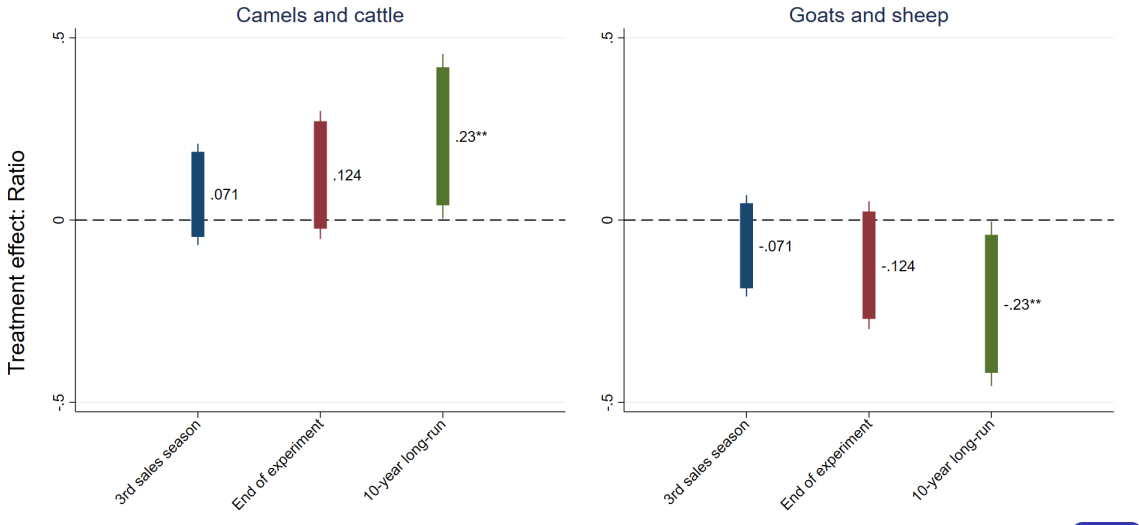
Back

Effects on other measure of educational attainments



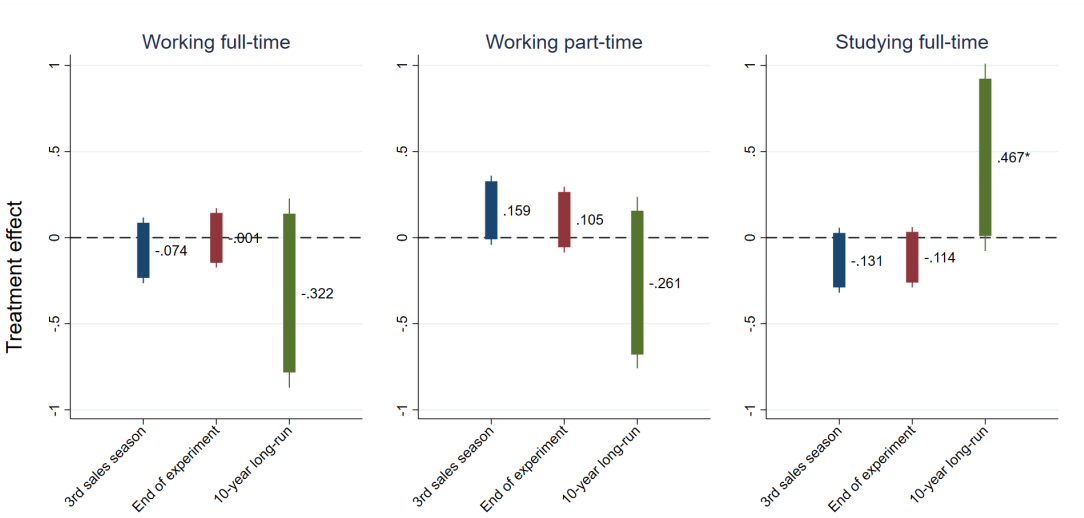
Back

Effects on the share of large vs small animal types over time



Back

Effects on children's work and schooling over time



Payout effect: Herd management expenditure and milk income

	Herd management expenditure (USD)	Milk Income	Livestock loss (CMVE)	Distress sales (CMVE)	Livestock Sale (CMVE)
	(1)	(2)	(3)	(4)	(5)
Any insurance purchased (γ_1)	3.744	418.0	1.669	-0.404	-1.210
	(94.93)	(416.0)	(2.873)	(0.557)	(1.492)
Any insurance purchased $\times$ Indemnity rate (γ_2)	-0.00757	-0.278**	0.00117	0.0000861	0.000902
	(0.0888)	(0.129)	(0.00142)	(0.000158)	(0.000803)
Coef: $\gamma_1 + \gamma_2$	3.737	417.713	1.670	-0.404	-1.209
p-val.: $\gamma_1 + \gamma_2$	0.969	0.315	0.561	0.468	0.418
Controls	✓	✓	✓	✓	✓
Control mean	167.891	359.879	5.448	0.292	1.872
Observations	1179	1179	1179	781	1179

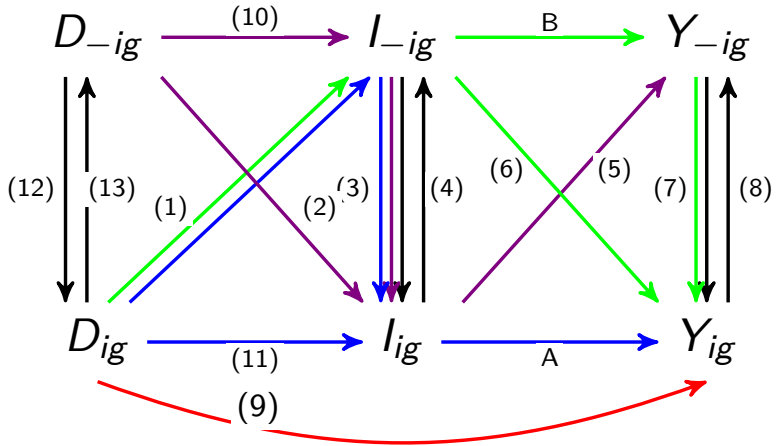
Back

Payout effect: IBLI purchase

	IBLI uptake in the past 12 months (=1 if purchased)	IBLI uptake in the past 12 months (CMVE)
	(1)	(2)
Any insurance purchased (γ_1)	0.0375	-0.993
	(0.0450)	(0.982)
Any insurance purchased $\times$ Indemnity rate (γ_2)	-0.0000108	0.000297
	(0.0000114)	(0.000309)
Coef: $\gamma_1 + \gamma_2$	0.037	-0.992
p-val.: $\gamma_1 + \gamma_2$	0.405	0.312
Controls	✓	✓
Control mean	0.042	0.539
Observations	1179	1179

Back

Potential spillover interactions



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Spillover effects: First stage and mechanical correlation

	Outcome: Number of coupons received - first three seasons		Outcome: Any insurance purchase - first three seasons					
	D_{ig}: Recipient's	$\overline{D}_{-ig}$: Peers'	I_{ig}: Recipient's			$\overline{I}_{-ig}$: Peers'		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_{ig}: Recipient's		-0.025***	0.122***		0.132***	-0.003***		-0.001
		(0.001)	(0.016)		(0.034)	(0.001)		(0.001)
$\overline{D}_{-ig}$: Peers'	-31.252***			-3.721***	0.393		0.112***	0.069
	(0.737)			(0.590)	(1.247)		(0.026)	(0.064)
Pathway (DAG)	(12)	(13)	(11)	(2)	(2);(11)	(1)	(10)	(1);(10)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	1.707	1.707	0.200	.	0.200	0.426	.	0.426
Observations	1179	1179	1179	1179	1179	1179	1179	1179

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Spillover effects on herd size, earnings, education

	Herd size (CMVE)		Total household cash earning (USD)		Share of members who completed age-appropriate years of education	
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	3.842	1.385	-58.264	90.851	0.655	-0.004
	(11.385)	(20.523)	(242.576)	(593.405)	(0.612)	(0.250)
$\hat{\hat{I}}_{-ig}$: Peers' any insurance purchase – first three season	22.499	-74.563	-2669.384	2968.337	19.381	-6.724
	(167.831)	(855.009)	(4492.280)	(20878.732)	(24.435)	(9.597)
Recipient controls (i)	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓
Control mean	14.265	14.265	529.673	529.673	0.115	0.115
Observations	1179	1179	1179	1179	762	762

Back

Spillover effects on herd composition

	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)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.215*	-0.612	0.008	0.480	-0.244**	-0.123	0.016	0.275
	(0.123)	(0.557)	(0.139)	(0.308)	(0.105)	(0.337)	(0.051)	(0.241)
$\hat{\hat{I}}_{-ig}$: Peers' any insurance purchase – first three season	3.854	-26.969	-3.999	13.694	-0.366	4.090	0.304	9.877
	(3.425)	(21.025)	(3.915)	(11.235)	(1.237)	(12.059)	(0.666)	(8.544)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓
Control mean	0.263	0.263	0.332	0.332	0.284	0.284	0.121	0.121
Observations	987	987	987	987	987	987	987	987

Back

Spillover effects on prespecified secondary outcomes

	Herd management expenditure (USD)		Milk Income		Livestock loss (CMVE)		Distress sales (CMVE)		Livestock Sale (CMVE)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	-53.497	430.819	503.728	-419.281	5.010	-1.876	-0.547	-0.489	-0.704	-6.473
	(132.739)	(378.649)	(474.293)	(756.493)	(6.518)	(10.156)	(0.702)	(0.705)	(1.913)	(4.139)
$\hat{I}_{-ig}$: Peers' any insurance purchase – first three season	-2348.016	16642.890	5317.075	-30971.069	132.229	-133.233	-6.924	-5.275	15.597	-208.848
	(3375.063)	(14771.434)	(7064.740)	(29616.079)	(194.592)	(423.671)	(42.544)	(42.782)	(40.584)	(156.800)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓		✓
Control mean	167.891	167.891	359.879	359.879	5.448	5.448	0.292	0.292	1.872	1.872
Observations	1179	1179	1179	1179	1179	1179	781	781	1179	1179

Back

Spillover effects on IBLI purchase and children's activities

	IBLI uptake in the past 12 months (=1 if purchased)		IBLI uptake in the past 12 months (CMVE)		Working full-time		Working part-time		Studying full-time	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.038	-0.102	-2.047	7.502	0.260	-0.031	-0.005	0.252	-0.583	-0.305
	(0.071)	(0.194)	(2.052)	(6.764)	(1.005)	(0.962)	(0.774)	(1.006)	(1.591)	(1.382)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	0.086	-5.334	-45.933	328.898	16.261	7.158	7.198	13.459	-29.402	-20.298
	(1.284)	(8.659)	(58.709)	(296.039)	(32.876)	(29.453)	(24.515)	(30.616)	(50.693)	(41.435)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓		✓
Control mean	0.042	0.042	0.539	0.539	0.271	0.271	0.201	0.201	0.232	0.232
Observations	1179	1179	1179	1179	376	376	376	376	376	376

Back

Spillover effects on herd size, earnings, education

Standard errors clustered at the location level

	Herd size (CMVE)		Total household cash earning (USD)		Share of members who completed age-appropriate years of education	
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	5.993	3.165	7.840	22.238	0.147	0.144
	(7.309)	(5.940)	(287.668)	(275.089)	(0.092)	(0.089)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	111.870	10.719	-569.251	787.677	-0.376	-0.056
	(142.342)	(25.558)	(2363.955)	(781.079)	(1.483)	(0.412)
Recipient controls (i)	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓
Control mean	14.265	14.265	529.673	529.673	0.115	0.115
Clustered standard errors	village	village	village	village	village	village
Observations	1179	1179	1179	1179	762	762

Back

Spillover effects on herd composition

Standard errors clustered at the location level

	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)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.090	0.127	0.186	0.124	-0.261	-0.254**	-0.008	0.004
	(0.107)	(0.095)	(0.238)	(0.112)	(0.170)	(0.122)	(0.072)	(0.047)
$\hat{\hat{I}}_{-ig}$: Peers' any insurance purchase – first three season	-0.637	-0.007	8.798	0.467	-2.636	-0.350	-1.430	-0.226
	(0.981)	(0.457)	(30.662)	(0.550)	(4.035)	(0.605)	(3.502)	(0.241)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓
Control mean	0.263	0.263	0.332	0.332	0.284	0.284	0.121	0.121
Clustered standard errors	village	village	village	village	village	village	village	village
Observations	987	987	987	987	987	987	987	987

Back

Spillover effects on prespecified secondary outcomes

Standard errors clustered at the location level

	Herd management expenditure (USD)		Milk Income		Livestock loss (CMVE)		Distress sales (CMVE)		Livestock Sale (CMVE)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	29.961	3.402	284.159	378.493	5.307	1.807	0.047	-0.204	-0.716	-0.967
	(105.699)	(91.154)	(314.270)	(310.056)	(5.649)	(2.540)	(0.979)	(0.456)	(1.776)	(1.637)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	861.249	120.678	-3554.462	-300.849	130.911	4.721	21.145	7.290	18.314	7.114
	(1241.513)	(321.032)	(4498.627)	(883.089)	(169.883)	(26.676)	(36.332)	(5.183)	(18.907)	(5.828)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓		✓
Control mean	167.891	167.891	359.879	359.879	5.448	5.448	0.292	0.292	1.872	1.872
Clustered standard errors	village	village	village	village	village	village	village	village	village	village
Observations	1179	1179	1179	1179	1179	1179	781	781	1179	1179

Back

Spillover effects on IBLI purchase and children

Standard errors clustered at the location level

	IBLI uptake in the past 12 months (=1 if purchased)		IBLI uptake in the past 12 months (CMVE)		Working full-time		Working part-time		Studying full-time	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.098	0.050	-0.172	-0.718	-0.157	-0.540	-0.978	0.042	0.905	0.376
	(0.096)	(0.040)	(1.419)	(1.069)	(1.245)	(0.572)	(3.602)	(0.628)	(5.775)	(0.284)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	2.685	0.641	35.566	11.383	2.923	-4.012	-8.557	5.403	7.843	-2.139
	(3.588)	(0.581)	(47.276)	(11.190)	(18.285)	(10.289)	(40.728)	(10.880)	(105.137)	(3.415)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓		✓
Control mean	0.042	0.042	0.539	0.539	0.271	0.271	0.201	0.201	0.232	0.232
Clustered standard errors	village	village	village	village	village	village	village	village	village	village
Observations	1179	1179	1179	1179	376	376	376	376	376	376

Back

Spillover effects on herd size, earnings, education

without community fixed effects

	Herd size (CMVE)		Total household cash earning (USD)		Share of members who completed age-appropriate years of education	
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	5.993	3.165	7.840	22.238	0.147	0.144*
	(10.628)	(9.010)	(224.607)	(215.365)	(0.090)	(0.085)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	111.870***	10.719	-569.251	787.677	-0.376	-0.056
	(41.550)	(15.373)	(1217.766)	(487.051)	(0.873)	(0.305)
Recipient controls (i)	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓
Control mean	14.265	14.265	529.673	529.673	0.115	0.115
Village FE						
Observations	1179	1179	1179	1179	762	762

Back

Spillover effects on herd composition

without community fixed effects

	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)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.090	0.127	0.186	0.124	-0.261	-0.254**	-0.008	0.004
	(0.099)	(0.097)	(0.487)	(0.089)	(0.200)	(0.108)	(0.091)	(0.053)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	-0.637	-0.007	8.798	0.467	-2.636***	-0.350	-1.430	-0.226
	(0.536)	(0.246)	(6.668)	(0.308)	(0.925)	(0.293)	(0.908)	(0.158)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓
Control mean	0.263	0.263	0.332	0.332	0.284	0.284	0.121	0.121
Village FE								
Observations	987	987	987	987	987	987	987	987

Back

Spillover effects on prespecified secondary outcomes

without community fixed effects

	Herd management expenditure (USD)		Milk Income		Livestock loss (CMVE)		Distress sales (CMVE)		Livestock Sale (CMVE)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I_{ig}: Any insurance purchase - first three seasons	29.961	3.402	284.159	378.493	5.307	1.807	0.047	-0.204	-0.716	-0.967
	(98.475)	(91.040)	(454.177)	(412.453)	(7.371)	(2.545)	(1.129)	(0.574)	(1.690)	(1.457)
$\hat{I}_{-ig}$: Peers' any insurance purchase – first three season	861.249	120.678	-3554.462***	-300.849	130.911***	4.721	21.145***	7.290***	18.314***	7.114*
	(624.342)	(292.683)	(1246.619)	(513.536)	(37.465)	(24.851)	(7.733)	(2.286)	(6.340)	(4.127)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓		✓
Control mean	167.891	167.891	359.879	359.879	5.448	5.448	0.292	0.292	1.872	1.872
Village FE										
Observations	1179	1179	1179	1179	1179	1179	781	781	1179	1179

Back

Spillover effects on IBLI purchase and children

without community fixed effects

	IBLI uptake in the past 12 months (=1 if purchased)		IBLI uptake in the past 12 months (CMVE)		Working full-time		Working part-time		Studying full-time	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.098	0.050	-0.172	-0.718	-0.157	-0.540	-0.978	0.042	0.905	0.376
	(0.147)	(0.058)	(1.956)	(1.013)	(0.686)	(0.525)	(1.812)	(0.560)	(2.251)	(0.301)
$\hat{I}_{-ig}$: Peers' any insurance purchase – first three season	2.685***	0.641***	35.566***	11.383*	2.923	-4.012	-8.557	5.403	7.843	-2.139
	(0.783)	(0.233)	(13.378)	(6.151)	(6.812)	(6.267)	(11.523)	(6.350)	(29.073)	(3.164)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)		✓		✓		✓		✓		✓
Control mean	0.042	0.042	0.539	0.539	0.271	0.271	0.201	0.201	0.232	0.232
village FE										
Observations	1179	1179	1179	1179	376	376	376	376	376	376

Back