Long-run Effects of Catastrophic Drought Insurance*

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Abstract

Aggregate shocks such as droughts, floods, and natural disasters threaten households' long-run human capital accumulation. Formal insurance against aggregate shocks may offer a promising tool to mitigate these negative consequences. We study the long-run impacts of catastrophic drought insurance – first introduced in 2010 – on income, assets, production strategies, and human capital accumulation among pastoralists in Kenya and Ethiopia. We leverage randomized insurance premium discounts to estimate the Local Average Treatment Effect of insurance purchase on outcomes measured in a panel survey with follow-up conducted 10 years later. Insurance changed production strategies, inducing an 83 percent reduction in the share of small animals (vs. large animals) herded. Furthermore, we observe a substantial increase – from ~ 5 percent to ~ 20 percent – in the share of household members who completed age-appropriate education. We demonstrate that these effects arise from insurance coverage, not the receipt of indemnity payments. This suggests that reduced *ex ante* risk exposure and the behavioral change it induces – not the cash transfers resulting from the claim payment – generate the long-run effects we observe.

Keywords: index insurance, 10-year follow-up, production strategies, human capital investment

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1 Introduction

Households in low-income countries remain vulnerable to aggregate shocks such as droughts, floods, and natural disasters. These aggregate shocks complicate households' ability to insure each other informally because they are (almost) all similarly affected at the same time. As a result, these shocks severely threaten households' short-run consumption (Townsend, 1994). Moreover, a growing body of evidence shows that aggregate shocks also have negative long-run effects on various indicators of lifetime well-being (Maccini and Yang, 2009; Dinkelman, 2017; Shah and Steinberg, 2017; Carrillo, 2020). Formal insurance against aggregate shocks could offer a promising tool to mitigate these negative welfare consequences. To date, however, most insurance against covariate shocks introduced in low-income settings has been fraught with moral hazard, adverse selection and high transaction costs, or have remained at pilot scale due to low product quality and implementation challenges (Mobarak and Rosenzweig, 2013; Hill et al., 2019; Binswanger-Mkhize, 2012; Carter et al., 2017). A notable exception is the Index-Based Livestock Insurance (IBLI) program, which insures livestock losses due to droughts. Since piloting in northern Kenya in 2010, IBLI has gradually expanded, and over 500,000 households in three countries have been insured through IBLI as of December 2022 (Jensen et al., 2023). Given that the program has been running for 10 years, and was originally introduced through an experiment with a panel survey, IBLI allows for the first investigation of the long-run impacts of insurance against catastrophic droughts.

We conduct a 10-year follow-up panel survey with 82 percent of the original baseline sample to study the long-run impacts of catastrophic drought insurance on pre-specified indicators of income, assets, production strategies, and human capital accumulation among pastoralists in the arid

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and semi-arid lands (ASAL) of northern Kenya and southern Ethiopia.[1] We leverage randomized insurance premium discounts to estimate the Local Average Treatment Effect (LATE) of insurance purchase on our pre-specified outcomes ten years after initial IBLI exposure. We find no evidence that the insurance had statistically significant impacts on assets or income, but we do find that it changed production strategies by inducing an 83 percent reduction in the share of small animals (mainly goats) herded relative to large animals. We also observe a substantial increase – from $\sim$ 5 percent in the control group to $\sim$ 20 percent for households with insurance – in the share of household members who completed age-appropriate education. The herd composition and education impacts are closely linked, as children are far less likely to herd large animals than small animals. We demonstrate that these effects arise from insurance coverage, not due to receipt of claim payments. This suggests that reduced *ex ante* risk exposure and the behavioral change it induces – not the cash transfers resulting from the claim payments – generate the long-run effects we observe.

Unlike most agricultural index insurance products, which insure against low annual crop yield realizations, IBLI insures against the loss of durable assets, in this case livestock, similar to most commercial insurance products worldwide. IBLI relies on a satellite-based Normalized Difference Vegetation Index (NDVI) of relative forage scarcity – specifically designed to minimize basis risk in this system (Chantarat et al., 2013). Recent initiatives by the governments of Kenya, Ethiopia, Djibouti and Somalia, supported by the World Bank, aim to scale IBLI further to reach 1.6 million pastoralists by 2025 (The World Bank, 2022).[2] Efforts to scale up IBLI result in part from a body of evidence that demonstrates its positive short-run impacts, generated during the initial five years of implementation in 2010-2015, as we review below.

To study the long-run impacts of IBLI, we leverage the individual-level randomized distribution of IBLI premium subsidies to 1,439 pastoralists from 33 locations in southern Ethiopia and northern Kenya during six sales seasons between 2010 and 2015. In each location, a random sample of individuals, stratified by herd size, were randomly assigned to receive the premium subsidies through discount coupons that were distributed just prior to the sales season. These coupons were non-transferable, expired at the end of the sales season, and were re-randomized each season. The coupons provided households with a discount on the insurance premium for a maximum of 15 Tropical Livestock Units.[3] In each location in each round, 60 percent of sample households randomly received a coupon providing a premium discount of 10-60 percent, at 10 percent inter-

[1]See AEARCTR-0011184 in the AEA registry.

[2]Beyond those four countries, IBLI is also employed in Zambia and Mauritania. For more background details on IBLI, see Jensen et al. (2023).

[3]Tropical Livestock Unit (TLU) is an integrated unit for aggregating cattle, camel, sheep, and goats by typical live body weight.1 TLU = 0.7 Camel = 1 Cattle = 10 Sheep/goats

vals. A baseline survey was conducted in Kenya in 2009 and in Ethiopia in 2012, immediately before IBLI became available in each location. Panel surveys of the same households were then conducted annually for three rounds in Ethiopia and four rounds in Kenya, up to 2015. During the period 2009-2015, low NDVI readings triggered the drought index four times in Kenya and one time in Ethiopia, resulting in claim payments to current policyholders. No randomized premium discounts were provided nor any surveys were conducted after 2015, until we conducted the 10-year follow-up survey with original panel households in 2020 in Kenya and in 2022 in Ethiopia.

We causally identify the long-run impacts of any IBLI purchase on our pre-specified outcomes, instrumenting insurance purchase in the first three sales seasons by the number of discount coupons received during that initial exposure period. This provides the strongest instrument while maintaining monotonicity of the instrument and endogenous regressor. Our pre-specified primary outcomes are assets (i.e., herd size), income (i.e., total cash income), production strategies (i.e., herd composition), and human capital accumulation (i.e., education of household members), and were chosen because aggregate shocks have been demonstrated previously to negatively affect these outcomes. Our pre-specified secondary outcomes reflect short-run impacts initially observed in the IBLI pilot period: herd management expenditures, annual milk income (cash income only), livestock loss, distress sale of livestock, share of children working, as well as recent IBLI uptake.

The long-run effects of IBLI are striking. Several key short-run effects observed during the experiment period are not replicated with our pre-specified instrument, and also do not exhibit statistically significant effects after 10 years. Specifically, we find no significant decadal effect of IBLI on total herd size, annual cash earnings, herd management expenditures, livestock loss, distress sales of livestock, nor on IBLI purchases over the last 12 months. We do, however, observe a sharp shift in herd composition – a 83 percent reduction in the share of goats herded and a corresponding increase in larger animals (especially camels), significant at the 95 percent level. We also find a substantial and significant increase in educational attainment, from a 5 percent completion rate of age-appropriate education in the control group to a 20 percent completion rate of age-appropriate education among insured households, significant at the 95 percent level. We also observe a tripling of the share of current children reported studying full time, from about 23 percent to 69 percent, significant at the 90 percent level.

We check the robustness of our results by using a range of specification tests and by considering the potential effect of interpersonal spillovers. This is important because the original pilot experiment randomized households within communities to either receive discount coupons or not. Spillovers in the first- and second-stage of our IV strategy – for example through induced changes in informal risk-sharing arrangements between treated and untreated individuals – may violate the Stable Unit Treatment Value Assumption (SUTVA). To control for potential spillovers, we include peers' insurance uptake, instrumented by peers' discount coupons received, in our main IV estimation. When we do so, only the recipients' discount coupon receipt remains significant and a valid instrument, suggesting that spillovers in the first stage are unlikely. Our second-stage outcomes largely remain robust, except for the positive effect on whether or not children are studying full-time, which disappears and becomes insignificant. In some specifications, the education impact point estimates remain unchanged but become far less precisely estimated, which we attribute to the additional instrument and endogenous regressor.

To investigate the mechanisms that may explain the long-run outcomes, we analyze the dynamics of long-run effects over time. We do so by running the same regressions on outcomes measured immediately after the third sales season - i.e., during the initial experimental period, during which our instrument is strong - as well as at the end of the experiment, after the sixth sales season. The results suggest that the effect on herd composition – to a smaller share of small ruminants and more large ruminants – started to materialize during and at the end of the experiment, while effects on educational attainment are first observable later, namely at the end of the experiment. Effects on herd composition and educational attainment continued afterwards, rather than reverting back to the pre-experiment state.

We also investigate whether our long-run outcomes are driven by the *ex ante* behavioral effects induced by reduced catastrophic risk exposure resulting from purchasing insurance, or from *ex post* impacts of IBLI indemnity payments triggered by low NDVI readings during droughts. We demonstrate that these effects arise entirely from insurance coverage, not the receipt of indemnity payments. This suggests that reduced *ex ante* risk exposure and the behavioral change it induces, not the cash transfers resulting from the claim payment – generate the long-run effects we observe. This is consistent with prior findings of subjective well-being gains from IBLI coverage even in the absence of payouts (Tafere, Barrett, and Lentz, 2019).

This leaves open several potential pathways that may explain our results on production strategies and education outcomes. These are related because children, especially boys, typically herd small ruminants, like goats and sheep, but are far less likely to herd larger animals like cattle, or especially camel, the largest and most ornery livestock species. Insurance may have reduced the need for precautionary savings to cover expenditures on food, fodder, water, and veterinary services in the event of drought. In this context, goats are "cash with four legs," a highly liquid, non-lumpy asset, with an average value of roughly USD 10, commonly sold to cover such expenses (McPeak, Little, and Doss, 2011). IBLI coverage may reduce the incentive to hold goats as precautionary savings in the form of "liquid assets," thereby decreasing the herd share of small ruminants. Another, potentially complementary, explanation is that by reducing risk, IBLI coverage may incentivize households to invest in camels or cattle – a higher risk but higher return strategy as compared to holding goats or sheep[4] – an *ex ante* effect of insurance that is well-documented in the literature (e.g., Cole and Xiong, 2017; Cole, Giné, and Vickery, 2017; Hill et al., 2019; Stoeffler et al., 2022; Boucher et al., 2021). The induced change in herd composition would have changed the marginal productivity of child labor, reducing its demand, and incentivizing investments in education, similar to Shah and Steinberg (2017). We cannot identify which of these mechanisms is at play, merely that the data are consistent with both of them and they are mutually reinforcing.

We build on the literature on the long-run impacts of covariate weather shocks, which finds negative effects on height (Alderman, Hoddinott, and Kinsey, 2006), education completion (Alderman, Hoddinott, and Kinsey, 2006; Maccini and Yang, 2009; Shah and Steinberg, 2017; Carrillo, 2020), health (Maccini and Yang, 2009; Dinkelman, 2017; Carrillo, 2020), assets (Maccini and Yang, 2009), and labor market outcomes (Carrillo, 2020). Maccini and Yang (2009) provide suggestive evidence that these effects arise due to reduced nutrient intake at the time of shocks, while Shah and Steinberg (2017) relate outcomes to changes in the marginal productivity of child labor during shocks. We demonstrate that insurance against catastrophic weather shocks affects similar long-run outcomes, through its *ex ante* effect on behavior. Our results are most consistent with an interpretation akin to Shah and Steinberg (2017), where insurance, by changing production strategies, has an indirect effect on the marginal productivity of child labor, changing incentives for children to remain in school.

We also connect to a nascent literature on the long-run impacts of development interventions (see Bouguen et al. (2019) for a review). Most evidence comes from either studies of human capital interventions or unconditional cash transfers and grant assistance. Human capital interventions[5] appear particularly effective at boosting long-run economic outcomes (Hoddinott et al., 2008; Banerjee, Duflo, and Kremer, 2016; Baird et al., 2016; Bandiera et al., 2017; Charpak et al., 2017; Barham, Macours, and Maluccio, 2017; Bettinger et al., 2018; Blattman, Fiala, and Martinez, 2020; Gray-Lobe, Pathak, and Walters, 2023). This may arise because human capital is a durable asset readily re-allocable across sectors in response to changing economic conditions. Studies of unconditional cash transfers and grant assistance consistently find large short-run effects, particularly on accumulation of assets, that dissipate over time, fading out in the long-run (Araujo, Bosch, and Schady, 2017; Baird, McIntosh, and Özler, 2019; Blattman, Dercon, and Franklin, 2022; Blattman, Fiala, and Martinez, 2020). We bridge these two literature by exploring the long-run impacts of an intervention to insure against catastrophic covariate shocks, demonstrating the long-run importance of risk mitigation for human capital formation.

[4] Camel and cattle are lumpy – at USD 120-250/head average asset value – implying a larger absolute loss in case of catastrophic weather shocks.

[5] Interventions that focus on de-worming, nutritional supplementation or prenatal interventions, sometimes combined with asset transfers, skills training or other economic interventions.

Finally, we build on a literature on the impacts of insurance against aggregate weather shocks, that has so-far focused on short-run impacts. These may occur through their effect on *ex post* responses to shocks, or *ex ante* behavioral changes. The latter is typically explained as arising because producers are risk averse and reluctant to invest in risky production without insurance (Boucher, Carter, and Guirkinger, 2008; Emerick et al., 2016). Many index insurance programs face(d) product quality and implementation constraints. Despite this, many find increases in productive investments (Karlan et al., 2014; Jensen, Barrett, and Mude, 2017; Cole and Xiong, 2017; Matsuda, Takahashi, and Ikegami, 2019; Hill et al., 2019; Belissa, Lensink, and van Asseldonk, 2020; Mishra et al., 2021; Stoeffler et al., 2022; Son, 2023). With respect to *ex post* shock responses, there exists prior evidence of increased income and consumption smoothing from IBLI (Matsuda, Takahashi, and Ikegami, 2019; Janzen and Carter, 2019; Jensen, Barrett, and Mude, 2017; Noritomo and Takahashi, 2020). We contribute to this literature by demonstrating that long-run impacts also exist.

2 Context and Index-Based Livestock Insurance

Residents in the arid and semi-arid lands of northern Kenya and southern Ethiopia, where this study takes place, heavily depend on extensive livestock grazing - pastoralism - as the most productive livelihood strategy on infertile drylands. Low-input pastoralism is vulnerable to catastrophic drought shocks; drought-related starvation and dehydration account for 47 percent of the livestock losses in the region (Jensen, Barrett, and Mude, 2016). Following droughts pastoralists rebuild herds slowly, relying largely on biological reproduction supported by complex systems of inter-household livestock gifts and loans (McPeak and Barrett, 2001; Lybbert et al., 2004; McPeak, Little, and Doss, 2011; Takahashi, Barrett, and Ikegami, 2019). But informal insurance networks have been fraying in the region, in part because of seemingly more frequent and severe droughts that tax all households at the same time (McPeak, Little, and Doss, 2011; Huysentruyt, Barrett, and McPeak, 2009). Furthermore, those who cannot maintain a herd size sufficient to remain migratory fall into poverty traps and commonly get excluded from social insurance mechanisms (Lybbert et al., 2004).

Investing in veterinary services is an effective strategy for reducing livestock mortality and for maintaining herd lactation rates (Admassu et al., 2005; Homewood et al., 2006; Sieff, 1999; Santos and Barrett, 2011). But the supply of veterinary services and treatments is uneven over space and time in the region (McPeak, Little, and Doss, 2011). Livestock markets could theoretically offer a mechanism for mitigating shocks, buying in good seasons and selling in bad ones. Unfortunately, because droughts often take place over large regions, many households suffer the same drought and respond similarly, leading prices to collapse with animal productivity and survival rates, thus markets aggravate rather than mitigate wealth risk in this context (Barrett et al., 2003). Prior to IBLI, financial services, in particular formal credit and insurance, were largely unavailable in these areas. As a result, herd accumulation has long been the key risk management strategy for ensuring that households can rebuild assets after catastrophic shocks, for the simple reason that greater pre-drought herd size is associated with increased post-drought herd size (Barrett and Swallow, 2006; Lybbert et al., 2004; McPeak, 2005; Cissé and Barrett, 2018).

A research team therefore designed an index insurance contract, IBLI, to offer another means to manage catastrophic drought risk. Forage availability offers a key signal of drought in rangelands, so IBLI was designed around near-real-time measures of the Normalized Difference Vegetation Index (NDVI), a reliable signal of forage availability (Meroni et al., 2014; Prince, 1991; Tucker et al., 1985) shown to be correlated with livestock mortality in this region (Chantarat et al., 2013). NDVI is generated and provided freely every ten days by the United States Geological Survey (USGS) from global satellite data. IBLI uses an index that aggregates NDVI data within geographically defined index units in each of two annual seasons that characterize the region's bimodal annual rainfall pattern. Historic NDVI data for each insurance unit were used to develop a statistical distribution of drought outcomes. Insurers and reinsurers used those estimates to negotiate a strike level below which indemnity payments would be made and a corresponding insurance premium rate (Chantarat et al., 2013; Vrieling et al., 2016). While the specifics of the IBLI policy and the index that underpins it have evolved somewhat over time and differ slightly between the Ethiopia and Kenya sites, the core is uniform[6]: IBLI is an NDVI-based catastrophic drought index insurance product sold to individual pastoralists by private insurance companies in the region, that generates an indemnity payment in seasons when the purchaser's index unit exhibits pasture quality below a known, low level - e.g., the 20th percentile.

The first IBLI pilot was launched in Marsabit County, in northern Kenya, in January 2010 as a purely commercial index insurance product sold directly to individual pastoral households, with UAP insurance as local underwriter, SwissRe as re-insurer, and Equity Bank as the insurance agent. This was followed by the introduction of a similar product by Oromia Insurance Company (OIC) in the neighboring Borana region of southern Ethiopia in August 2012, as well as expanded IBLI availability into additional counties in northern Kenya. The randomized experiment on which our work relies ran in Marsabit and Borana. In 2013, Takaful Insurance of Africa (TIA) entered the IBLI market and launched a Sharia-compliant version as a purely commercial enterprise, imple-

[6]See Jensen et al. (2023) for richer details on the background, history and impacts of IBLI, including the evolution of contract design details.

mented in areas outside of the study region. In 2015, after the randomized intervention we use to identify IBLI's effects, the IBLI product was changed to make payments earlier in the seasonal cycle in response to requests by pastoralists who noted that earlier payments could be used to support their animals through the drought, thereby preventing asset loss. This change from post-drought to pre- or mid-drought payouts was made possible by the reasonably predictable rate of forage degradation during the dry seasons after the stochastic accumulation during the rainy season. The insurance companies switched over from the original 'asset replacement' contract to exclusively sell the 'asset protection' contract by the August/September 2015 sales season. Also in 2015, the Government of Kenya added IBLI to its social protection programming by launching the Kenya Livestock Insurance Program (KLIP), which used public resources to purchase individual IBLI policies on behalf of vulnerable pastoralists. By 2017, KLIP annually purchased IBLI on behalf of over 18,000 pastoralists across seven counties. In a similar fashion, several other organizations such as the World Food Program and the International Committee for the Red Cross have used IBLI to support their drought resilience programming elsewhere in Ethiopia and Zambia.

3 Study design

The evolution of IBLI coverage in our study region between 2010 and 2022 is shown in Appendix Figure C1. IBLI coverage increased sharply in Marsabit as KLIP implementation began just as the pilot period ended. Meanwhile, commercial sales in Borana were sustained at the same or higher volumes after the original pilot ended. Thus, study households had the opportunity to continue their IBLI coverage after the randomized encouragement design ceased to provide incentives for uptake. This naturally creates the opportunity both to test whether the short-run impacts of IBLI observed in prior studies persist, and to see whether long-term effects differ from short-term ones. We therefore pre-specified such outcomes as primary outcomes of interest: herd size, household cash income, herd composition, and education in the household. We pre-specified as secondary outcomes of interest other previously-demonstrated short-run impacts of IBLI: herd management expenditure, annual milk income, livestock loss, distress sale of livestock, share of children working, and IBLI uptake in the last 12 months.

To study IBLI's long-run effects, we leverage the original experimental design of seasonally randomized insurance premium subsidy discount coupons to 1,439 pastoralists from 17 locations in Borana Zone in Ethiopia and 16 locations in Marsabit County in Kenya. The 33 study locations were selected strategically to ensure representation across environmental conditions and remoteness. Household selection within those locations was random within baseline herd size strata, which is one of the most important predictors of resilience against shocks. These strata were obtained using household rosters from government administrative offices and – through community engagement – stratifying these households into three categories according to household herd size. The sample size in each site was proportional to its total population, resulting in 924 households sampled in Kenya, and 515 households in Ethiopia, for a total of 1,439 pastoralist households.

Baseline household surveys took place in Kenya in 2009 and in Ethiopia in 2012, before IBLI's launch was announced in either country. The surveys captured a range of household demographic and economic data.[7] IBLI launched with the first follow-up survey round after the baseline in each location. Panel surveys of the same households were then conducted annually for three rounds in Ethiopia and four rounds in Kenya, up to 2015. Individuals in the sample were randomly assigned to receive premium subsidies through discount coupons that were distributed just prior to a sales season. These randomized discount coupons were non-transferable, expired at the end of the sales season, and were re-randomized in each of six sales seasons between 2010 and 2015. The coupons provided households with a discount on the insurance premium for a maximum of 15 TLU. In each location in each round, 60 percent of the sample households randomly received a discount coupon providing a premium discount of 10-60 percent, at 10 percent intervals. During the experiment, low NDVI readings arising from drought triggered the index four times in Kenya and one time in Ethiopia, resulting in indemnity payments. Surveys collected self-reported data on IBLI purchase. We correct for measurement error in those self-reports using the insurers' administrative records.

No surveys nor experiments were conducted in these sites after 2015 until we conducted follow-up surveys in both countries with original panel households in 2020 in Kenya and in 2022 in Ethiopia to investigate IBLI's long-run impacts ten years after the original baseline. Figure 1 shows the timeline of the original pilots, discount coupon treatments, as well as the timing of the latest rounds of survey in each country. Of the original 1,439 baseline pastoralists, we managed to re-survey 82 percent ten years later. We explore attrition patterns below.

3.1 Econometric Strategy

Equation (1) offers a general representation of how we model the long-run impacts of past and current insurance purchases, where y_{ijt} is outcome y for individual i, who lives in location j.[8] $t = 0$

[7] Additional details on the original research design, sample, survey tools and discount coupons can be found at ILRI's data portal: `https://data.ilri.org/portal/dataset/ibli-marsabit-r1` and `https://data.mel.cgiar.org/dataset.xhtml?persistentId=hdl:20.500.11766.1/FK2/S19DC6` for Kenya and `https://data.ilri.org/portal/dataset/ibli-borena-r1` for Ethiopia.

[8] Location refers to 16 sublocations in Kenya and 17 kebeles in Ethiopia. Locations are nested within distinct index units within which NDVI measures generate an index that determines whether an indemnity payment occurs.

Figure 1: Panel Timeline

Year/Season	Kenya Survey	Kenya Policy	Ethiopia Survey	Ethiopia Policy
2009 Oct-Nov	R1			
2010 Jan-Feb		Coupon1		
2010 Oct-Nov	R2			
2011 Jan-Feb		Coupon2		
2011 Aug-Sep		Coupon3		
2011 Oct-Nov	R3	Payout1		
2012 Mar-Apr		Payout2	R1	
2012 Aug-Sep		Coupon4		Coupon1
2012 Oct-Nov	R4			
2013 Jan-Feb		Coupon5		Coupon2
2013 Apr			R2	
2013 Aug-Sep		Coupon6		Coupon3
2013 Oct-Nov	R5			
2014 Jan-Feb				Coupon4
2014 Mar-Apr		Payout4	R3	
2014 Aug-Sep				Coupon5
2014 Oct-Nov		Payout5		
2014 Nov				Payout1
2015 Jan-Feb		Contract Shift		Coupon 6
2015 Mar			R4	
2015 Aug				Contract Shift
2015 Oct-Nov	R6			
2020 Aug-Sep	R7			
2022 Jan-Feb			R5	

Notes: The IBLI contract underwent changes from asset replacement to asset protection in January 2015 for Kenya and in August 2015 for Ethiopia.

refers to the baseline period, before any insurance was sold in location j, $t = 1$ refers to the first period when insurance was sold in location j, and $t = T$ is the final survey period. I_{ij1} refers to insurance purchase by individual i in the first sales period. y_{ij0} represents the household's initial value for outcome y at baseline. X_{ij0} reflects a vector of household characteristics at baseline, and D_{ij} is a vector of the number of sales seasons during which the household received randomized IBLI premium discount coupons.

$$y_{ijT} = f(I_{ij1}, ..., I_{ijT}, y_{ij0}, X_{ij0}, D_{ij}) \tag{1}$$

To causally identify the long-run impacts of insurance, we estimate the LATE of insurance purchase for our pre-specified outcomes, instrumenting for insurance purchase by the number of seasons in which the pastoralist received a discount coupon. As pre-specified, we restrict the analysis to discount coupons and insurance purchases in the first three sales seasons, as this provides a strong instrument (see Section 5). This approach does not, therefore, identify the effect of any changes in behavior during the period with randomized discount coupons in sales seasons 4 to 6, for which we control, nor does it consider any impacts of purchases between 2015 and the final survey round that may have occurred after the randomized encouragement experiment ended. We discuss these dynamics and potential mechanisms driving long-run impacts in Section 6.

Equations (2) to (5) describe the outcome equation and instrumental variable (IV) equations. We use an Analysis of Covariance specification to estimate the LATE of IBLI purchase on long-run outcome y in Equation (2), instrumenting for any insurance purchase using the number of discount coupons received by households in each of the first three sales seasons in Equation (3). Equation (4) generates a binary variable that takes the value one if individual i purchased insurance during any of the first three sales seasons. Equation (5) aggregates the number of discount coupons received (Z) by an individual household i in location j in sales period t over the first three seasons ($t = 1, 2, 3$), yielding our instrument (D_{ij}). For our instrument we use discount coupon distribution during the initial three seasons only. We do, however, control for the number of discount coupons received in sales seasons 4, 5, and 6 ($I_{ij4}^{t=6}$). In our specification we also include location fixed effects to control for time-invariant location-level unobservables. Note that because households rarely migrate on their own but rather travel together with their community members from the same location, location fixed effects effectively control for effects at broader grazing ranges that are episodically used by the households in each community j (McPeak, Little, and Doss, 2011; Huysentruyt, Barrett, and McPeak, 2009). Robust standard errors are used following Abadie et al. (2022) and de Chaisemartin and Ramirez-Cuellar (2022).

$$y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D^{t=6}_{ij4} + \rho_j + \varepsilon_{ijT} \tag{2}$$

$$I_{ij} = \alpha_0 + \alpha_1 D_{ij} + \alpha_2 y_{ij0} + \alpha_3 X_{ij0} + \alpha_4 D^{t=6}_{ij4} + \rho_j + \mu_{ij} \tag{3}$$

$$I_{ij} = \begin{cases} 1 \text{ if there exists } t \in \{1,2,3\} \text{ such that } I_{ijt} > 0 \\ 0 \text{ otherwise} \end{cases} \tag{4}$$

$$D_{ij} = \sum_{t=1}^{t=3} Z^D_{ijt} \text{ where } Z^D_{ijt} = 1 \text{ if } D_{ijt} > 0 \tag{5}$$

4 Descriptive Statistics, Balance, and Attrition

Table 1 presents the mean and standard deviation of pre-specified balance variables, and baseline values of our pre-specified primary and secondary outcomes in each country and pooled, for the non-attrited sample of households (see below for attrition analysis). Appendix Table C1 presents the values of our pre-specified primary and secondary outcomes at endline, ten years after the baseline.

At baseline, in our non-attrited sample, 68 percent of households is male-headed, the average household head is 49 years old, and received less than a year of education. Households consist of 4-5 adults on average[9], with each adult having half a dependent on average. In Kenya, only 18 percent of households own or farm agricultural land, while 65 percent of households in Ethiopia do. Most Ethiopian households (76 percent) are fully settled, while only 23 percent of Kenyan households are. This difference almost surely arises because Borana has a long-established complex of deep wells that offer year-round water access, while our Kenya sites lack similar well systems. Livestock herding is the main source of income. To express herd size, we use the Cattle Market Value Equivalent (CMVE), which aggregates the value of all animals in a herd across species, weighted by average market value of each animal type, expressed in terms of the mean market value of cattle.[10] On average, at baseline, pastoralists herd 25.5 CMVE in Kenya and 17.0 CMVE

[9]The number of adults are measured using adult equivalent scale. An adult equivalent scale is an aggregate measure of total food requirements of a household, which is constructed as a weighted sum of the number of individuals with weights depending on the age of an individual household member.

[10]To construct this measure for each country, we use the average market prices from purchases and sales for each animal type reported by pastoral households in all rounds of our panel data between 2010 and 2022. For Kenya, 1 cattle is equivalent to 0.625 camels, 10 goats or 10 sheep. For Ethiopia, 1 cattle is equivalent to 0.4 camels, 10 goats,

Table 1: Summary statistics of the baseline characteristics

	Kenya				Ethiopia				Pooled			
	Mean/SD	Min	Max	Obs	Mean/SD	Min	Max	Obs	Mean/SD	Min	Max	Obs
Prespecified household characteristics												
Age of the household head	48.08	18.00	98.00	781	50.23	20.00	100.00	398	48.81	18.00	100.00	1179
	[18.35]				[18.30]				[18.35]			
Male headed household (=1)	0.63	0.00	1.00	781	0.79	0.00	1.00	398	0.68	0.00	1.00	1179
	[0.48]				[0.41]				[0.47]			
Household head's years of education	1.05	0.00	16.00	771	0.54	0.00	13.00	397	0.87	0.00	16.00	1168
	[3.07]				[1.84]				[2.72]			
Adult equivalent	4.68	0.70	12.90	781	4.89	1.40	14.40	398	4.75	0.70	14.40	1179
	[1.95]				[2.00]				[1.97]			
Dependency ratio	0.50	0.00	1.00	781	0.54	0.00	1.00	398	0.51	0.00	1.00	1179
	[0.21]				[0.19]				[0.20]			
Herd size (CMVE)	25.48	0.00	416.95	781	17.01	0.00	277.38	398	22.62	0.00	416.95	1179
	[35.98]				[23.90]				[32.64]			
Annual income per AE (USD)	121.45	0.00	1617.14	781	102.79	0.00	1639.55	398	115.15	0.00	1639.55	1179
	[198.01]				[159.19]				[185.95]			
Own or farm agricultural land	0.18	0.00	1.00	781	0.65	0.00	1.00	398	0.34	0.00	1.00	1179
	[0.38]				[0.48]				[0.47]			
Fully settled (=1)	0.23	0.00	1.00	781	0.76	0.00	1.00	398	0.41	0.00	1.00	1179
	[0.42]				[0.43]				[0.49]			
Baseline prespecified primary outcomes												
Share of camels in herd (CMVE)	0.30	0.00	1.00	730	0.12	0.00	0.98	395	0.23	0.00	1.00	1125
	[0.31]				[0.21]				[0.29]			
Share of cattle in herd (CMVE)	0.30	0.00	1.00	730	0.67	0.00	1.00	395	0.43	0.00	1.00	1125
	[0.36]				[0.25]				[0.37]			
Share of goats in herd (CMVE)	0.25	0.00	1.00	730	0.17	0.00	1.00	395	0.22	0.00	1.00	1125
	[0.26]				[0.18]				[0.24]			
Share of sheep in herd (CMVE)	0.14	0.00	1.00	730	0.05	0.00	1.00	395	0.11	0.00	1.00	1125
	[0.17]				[0.08]				[0.15]			
Annual total household cash earning (USD)	563.19	0.00	5659.99	781	475.61	0.00	4098.87	398	533.63	0.00	5659.99	1179
	[983.85]				[646.07]				[885.05]			
Share of members who completed age-appropriate years of education	0.06	0.00	1.00	641	0.09	0.00	1.00	357	0.07	0.00	1.00	998
	[0.18]				[0.19]				[0.19]			
Baseline prespecified secondary outcomes												
Herd management expenditure (USD)	48.79	0.00	2395.60	781	41.00	0.00	2146.89	398	46.16	0.00	2395.60	1179
	[153.93]				[129.63]				[146.17]			
Annual milk income (USD)	202.86	0.00	8074.98	781	6.96	0.00	214.69	398	136.73	0.00	8074.98	1179
	[717.04]				[29.65]				[591.03]			
Livestock lost in the past 12 months (CMVE)	11.05	0.00	116.90	781	9.20	0.16	200.60	343	10.49	0.00	200.60	1124
	[15.22]				[16.96]				[15.79]			
N of lost camel	1.15	0.00	61.00	728	0.28	0.00	6.00	343	0.87	0.00	61.00	1071
	[3.56]				[0.81]				[3.00]			
N of lost cattle	5.13	0.00	96.00	728	7.58	0.00	199.00	343	5.92	0.00	199.00	1071
	[11.40]				[16.04]				[13.11]			
N of lost goats/sheep	32.52	0.00	607.00	728	5.69	0.00	66.00	343	23.93	0.00	607.00	1071
	[55.13]				[8.67]				[47.39]			
Distress sale in the past 12 months (CMVE)	0.77	0.00	27.10	781	7.72	0.00	206.75	398	3.12	0.00	206.75	1179
	[2.03]				[19.66]				[11.99]			
Share of children working full-time	0.36	0.00	1.00	644	0.47	0.00	1.00	350	0.40	0.00	1.00	994
	[0.38]				[0.34]				[0.37]			
Share of children working part-time	0.29	0.00	1.00	644	0.26	0.00	1.00	350	0.28	0.00	1.00	994
	[0.39]				[0.32]				[0.37]			
Share of children studying full-time	0.22	0.00	1.00	644	0.12	0.00	1.00	350	0.18	0.00	1.00	994
	[0.36]				[0.23]				[0.32]			
Observations	781				398				1179			

Notes: All columns present mean, standard deviation (in square brackets), and the number of observation for each variable. Age-specific weights for adult equivalent are as follows: A household member between 16 to 65 (AE=1), a child under 5 (0.5 AE), a child between 5 to 15 (AE=0.7), a household member above 65 (AE=0.7). Dependency ratio is calculated by the number of dependents (household members younger than 15 years old and older than 65 years old) divided by the number of household members. Herd size in CMVE is the sum of the animals herded by the household, aggregated using cattle market-value equivalent. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Annual total household cash earning is the sum of income from the following categories: sale of livestock, sale of livestock products, crop cultivation, salaried employment, casual labor, business and petty trading, and other major sources of income excluding gifts and remittances during the recent 4 pastoral seasons. Herd management expenditure includes expenditure on water, fodder, supplementary feeding, and veterinary expenses.

in Ethiopia. The portfolio of animal types in herds is more diversified in Kenya. Ethiopian herds predominantly consist of cattle (67 percent), while camels make up 12 percent and goats 17 percent. In Kenya, 30 percent of herds consists of camels, 30 percent of cattle, and 39 percent of goats and sheep. By our endline, the total average herd size had shrunk by approximately 50 percent, to 13 CMVE in Kenya, while average herd size remained nearly the same in Ethiopia, at 16.5 CMVE. Herd composition in Ethiopia remained largely unchanged at endline, while goats replaced cattle in Kenya.

At baseline, the annual household-level cash income is 563 USD in Kenya, and 476 USD in Ethiopia.[11] This includes income from sales of livestock, livestock products, or crops, wage employment, casual labor, and business and petty trading. We exclude non-cash income or income from autoconsumed products (e.g., milk, meat, blood) because accurate measurement and valuation of those volumes is notoriously difficult in this context.[12] At endline, the annual total cash income is 645 USD in Kenya and 799 USD in Ethiopia.[13] Annual herd management expenditure on fodder, water, and veterinary expenditures is 48.79 USD in Kenya and 41 USD in Ethiopia at baseline. This substantially increased to 139 USD in Kenya and 270 USD in Ethiopia at endline. Annual milk income is 203 USD in Kenya and 7 USD in Ethiopia at baseline. By endline, this more than doubled in Kenya to 563 USD and increased six-fold, to 43.40 USD in Ethiopia.

The pastoralists in our sample have limited human capital. At baseline, only 10-15 percent of household heads ever went to any school; the average years of completed education is approximately one year in Kenya and half a year in Ethiopia. The maximum years of education completed by a household head is less than five in both countries. The percentage of children aged 5-17 enrolled in school was only 51 percent in Kenya and 34 percent in Ethiopia. It is common for children aged 5-17 to engage in herding (34 percent in Kenya and 54 percent in Ethiopia). Our primary outcome for education[14] is the share of household members that have completed the age-

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and 10 sheep. The average market values from our sales and purchases data are presented in Online Appendix Table E1. CMVE accomplishes the same cross-species aggregation purpose as the more familiar Tropical Livestock Unit (TLU) measure, which weights species according to the physical weight of the average adult animal, which proxies for its nutrient intake needs. Because our interest is in total herd size or herd size composition as a productive asset or as a store of wealth, we favor aggregation based on market value rather than biophysical requirements. The two are necessarily very strongly, positively correlated. We check for robustness to using CMVE or TLU in Online Appendix Tables D1 and D2.

[11] All variables expressed in USD are converted by the annual average exchange rate, not adjusting for inflation.

[12] each household uses its own, different vessel to collect liquids and slaughtered animals come in a wide variety of sizes.

[13] Endline/baseline income ratio is 1.14 in Kenya and 1.67 in Ethiopia, while endline/baseline CPI ratio is 2.08 in Kenya and 2.99 in Ethiopia, suggesting the nominal income increase represent a negative change in real income in our sample during this period.

[14] A household member is defined to have completed the age-appropriate years of education by comparing her age, the years of education at endline, and the legal age of education in each country. In Kenya, the legal age to start education is five, six in Ethiopia. Therefore, if a seven-year old completed one year of education then we classify her

appropriate years of education, 6 percent in Kenya, and 9 percent in Ethiopia at baseline. These rates are similar 10 years later, where this is 4 percent in Kenya and 10 percent in Ethiopia. When children aren't studying full-time, a large share of them work, predominantly herding of goats and sheep. At baseline, 36 percent and 47 percent of children work full-time , while 29 percent and 26 percent work part-time in Kenya and Ethiopia, respectively. At endline in Ethiopia, the share of full-time working children reduced by almost 40 percent, while the share of part-time working children remained stable.[15]

In the year before the baseline, pastoralists in Kenya lost 43 percent of their livestock holding due to deaths and raiding, while this was only 17 percent in Ethiopia (secondary outcome: livestock loss). In Kenya, most of these losses (secondary outcomes: numbers of camels,cattle, goats lost) were goats, while in Ethiopia these were cattle and goats. In those same years, pastoralists in Kenya sold 3 percent of their livestock to cope with adverse effects of drought, while this was 45 percent in Ethiopia (secondary outcome: distress sales).

The right panel of Figure 2 shows that, on average, respondents purchased insurance 0.82 times. 50.5 percent of respondents purchased insurance at least once. The left panel of Figure 2 shows the distribution of the number of sales seasons in which pastoralists received discount coupons. On average, they received coupons 4.07 times. However, 52 percent of ever-purchased households purchased in the first sales season, 19 percent in the second sales season, and 11 percent in the third sales season. In total 83 percent of the ever-purchased households took up the insurance within the initial three sales seasons. Therefore, we would be exploiting less variation if we use full six sales seasons instead of the initial three sales seasons where most of the purchase activities were happening. Therefore, we use the information from the three initial sales seasons for IBLI uptake and discount coupon receipts. These are the variations we exploit to identify the causal effects of IBLI on our pre-specified primary and secondary outcomes.[16]

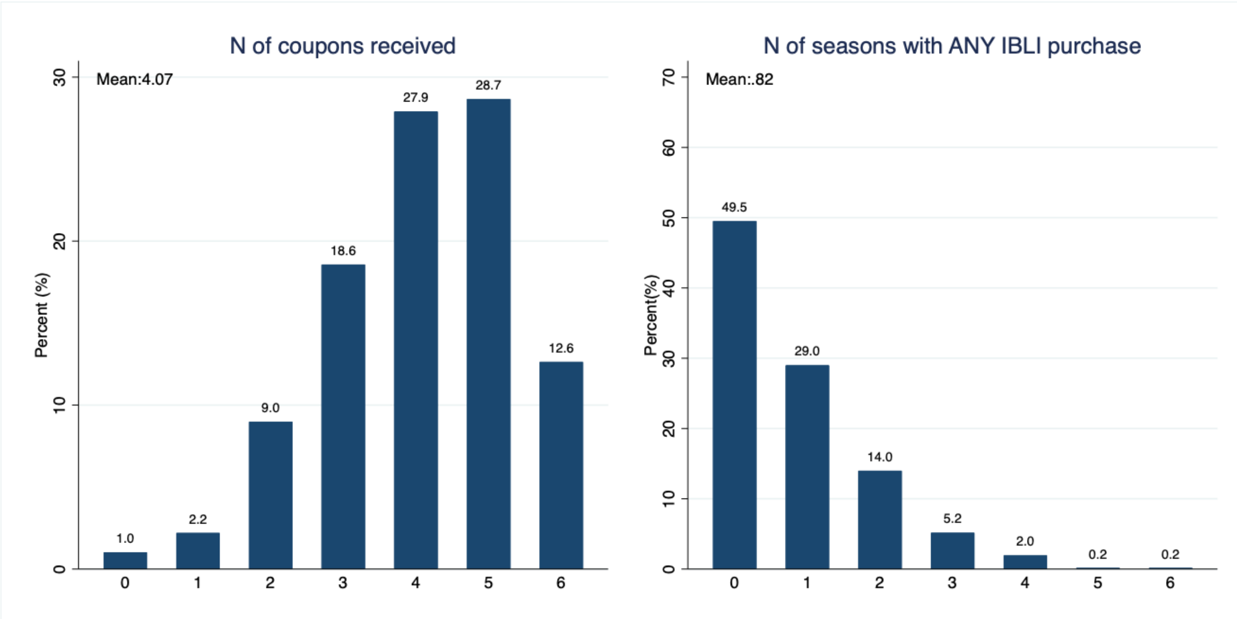
Appendix Table A1 presents balance tests for each of our pre-specified balance variables, by whether or not a household received a discount coupon in each round. Normalized differences are

to have completed the age-appropriate years of education but if she lived in Kenya we would not classify her similarly. We then compute the share of household members who completed age-appropriate years of education. We restrict the household members who were school-aged (five years old or older in Kenya, and six years old or older in Ethiopia) during the pilot period of 2010 to 2015 in Kenya and 2012 to 2015 in Ethiopia. We had pre-specified maximum years of education in the household as our primary outcome, but given that a substantial share of children are still in school, and their final maximum years of education remains unknown, we instead use the share of members that have completed the age-appropriate years of education as primary outcome.

[15]These data were not collected at endline in Kenya.

[16]There are 50 households (4.2 percent of the sample) in our analysis sample who purchased IBLI before they received any discount coupons. Out of the 50 households, 14 purchased without receiving any coupons in all seasons, 23 purchased in the very first sales season without receiving any coupons. The result of our empirical analyses below are robust to the exclusion of these 50 observations.

Figure 2: Number of coupons received and the seasons with ANY IBLI purchase



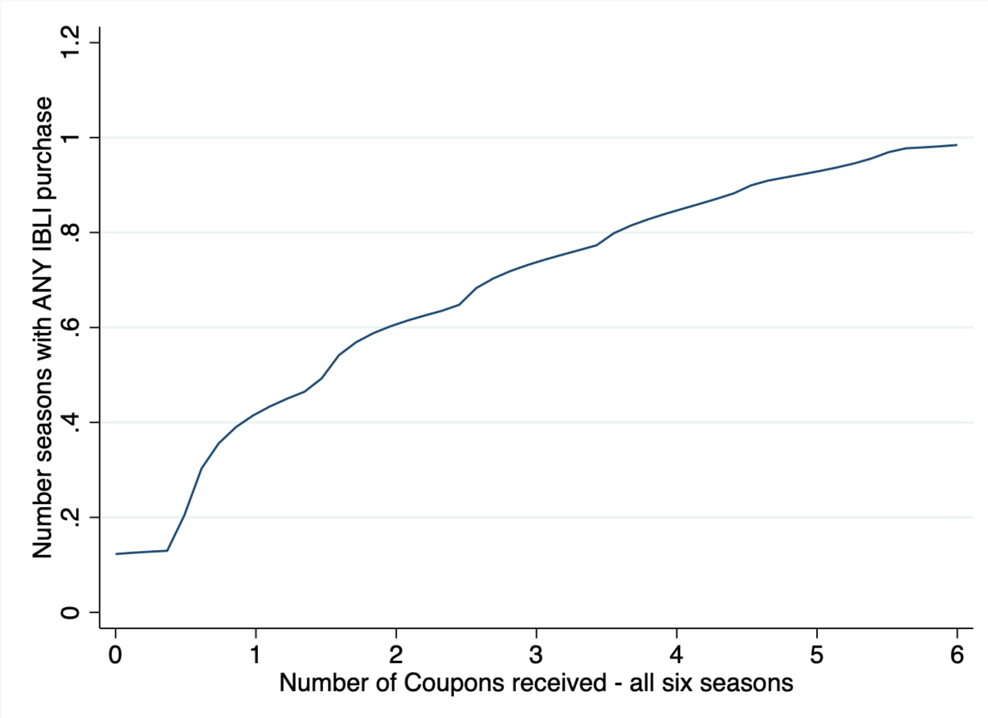
Notes: The left panel x-axis presents the number of coupons that respondents received during the six sales seasons with discount coupons. The y-axis shows the percent of respondents who received 0, 1, 2, 3, 4, 5, or 6 discount coupons during these six sales seasons. The right panel x-axis presents the number of seasons that respondents purchased insurance. The y-axis shows the percent of respondents who purchased insurance 0, 1, 2, 3, 4, 5, or 6 six times during these six sales seasons.

presented in square brackets. We also present the F-statistic for whether or not all variables are jointly significantly different. At the end of each row we present the F-statistic for whether one specific variable across the six rounds of randomization of discount coupons across households jointly generates significant differences. We do not observe any significant differences or significant F-statistics, and normalized differences are below the threshold of 0.25 in 46 out of 48 tests. Therefore we conclude that randomization of discount coupons was successful.

At the 10-year follow-up, we successfully re-interviewed 82 percent of the baseline households (1,179 out of 1,439 – Appendix Table A2). Attrition is not differential by our instrument, the number of coupons received during the initial three seasons, as shown in Appendix Table A4. Overall, households that are not male-headed, that have fewer adults, and that do not own agricultural land were more likely to attrit from the sample (see Appendix Table A3).[17]

[17] We pre-specified two additional attrition tests. First, a joint test of selective attrition, which shows that only the number of adults in the household significantly predicts attrition (Appendix Table A5). Second, a test for differential attrition per survey round, which shows that respondents that received a discount coupon are 5 percentage points less likely to attrit in sales season 3 (Appendix Table A6).

Figure 3: Correlation - IBLI purchase and coupon receipt



Notes: The x-axis present the number of seasons in which the respondent received discount coupons during the first three sales seasons. The y-axis shows the likelihood that a respondent purchased any insurance during these first three seasons.

5 Estimation Results

We first examine the effect of randomized discount coupons on insurance purchase. Figure 3 presents the correlation between the number of times that a pastoral household received coupons during the six experimental rounds and the average number of seasons they purchased insurance. We indeed observe a strong, positive correlation (p-value$<$0.001). Table 2 presents the first stage estimation results of Equation (3). Columns 2-7 present the estimated effect of receiving a discount coupon on insurance purchase in each round. In the first three rounds, coupon receipt significantly predicts insurance purchase, at the 1 percent significance level in the first season, and at the 5 percent level in the second and third season. There is no significant effect of the discount coupon on insurance purchase in any of the latter three seasons. We therefore choose as our instrument the number of coupons that a respondent received during the first three seasons only, and including the latter three rounds only weakens our instrument.

Column 1 of Table 2 presents the results of Equation (3), where we estimate the effect of the number of coupons received in the first three seasons on whether or not a respondent purchased any

Table 2: 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

Notes: All columns present coefficient estimates and robust standard errors (in parentheses). Column (1) shows the result from the following equation: $I_{ij} = \alpha_0 + \alpha_1 D_{ij} + \alpha_3 X_{ij0} + \alpha_4 D_{ij4}^{t=6} + \rho_j + \mu_{ij}$, where $I_{ij} = 1\{\text{there exists } t \in \{1,2,3\} \text{ such that } I_{ijt} > 0\}$. Column (2)-(7) show the results from the following equations: $I_{ij} = \alpha_0 + \alpha_1 D_{ijt} + \alpha_3 X_{ij0} + \rho_j + \mu_{ij}$ for $t = 1,2,3,4,5,6$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. All reported 10 percent critical values are from Olea and Pflueger (2013), which are the cutoffs that we compare effective F-statistics with to determine whether the instrument is weak.

insurance during the first three seasons.[18,19] An increase in one additional coupon received in these first three seasons, significantly increases the likelihood that a respondent purchased insurance by 12.3 percentage points, which is significant at the 1 percent level. The effective F-statistics of Olea and Pflueger (2013) are greater than the critical value at the 10 percent level, providing support for the strength of our instrument.

5.1 Primary outcomes

We report the coefficient estimates for our pre-specified primary outcomes – following Equation (2) – in Tables 3 and 4.[20] We do not observe any significant effect of insurance purchase on either herd size or household cash earnings.

Table 3: Prespecified primary outcomes: 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)
Any insurance purchased	2.078	3.328	-89.409	-98.678	0.142^{**}	0.146^{**}
	(8.731)	(8.792)	(394.301)	(394.083)	(0.061)	(0.061)
Controls		✓		✓		✓
Control mean	14.265	14.265	693.382	693.382	0.048	0.048
Observations	1179	1179	1179	1179	770	770

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table 1 for the definition of outcome variables.

[18] In the pre-analysis plan we pre-specified the endogenous variable as the cumulative insurance purchase {0,1,2,3} in the first three seasons. However, this specification violates the monotonicity assumption that is required for valid instruments, because the number of times insurance is purchased does not increase monotonically with the number of discount coupons received (Appendix Table C2). When instead, we create a binary variable of whether or not the respondent purchased any insurance in the first three seasons, insurance purchase does monotonically increase with the number of discount coupons received, and we therefore use this endogenous variable.

[19] We do not include any analysis using the intensive margin of IBLI uptake – the CMVE of animals insured because the number of coupons received by respondents is not a significant predictor of this intensive margin uptake.

[20] Missing values in control variables are replaced with the mean value of the variable within each country.

Table 4: Prespecified 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)	(5)	(6)	(7)	(8)
Any insurance purchased	0.123	0.120	0.108	0.107	-0.225**	-0.235**	-0.007	0.009
	(0.091)	(0.092)	(0.083)	(0.083)	(0.096)	(0.097)	(0.052)	(0.052)
Controls		✓		✓		✓		✓
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

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Please refer to Table 1 for the definition of outcome variables.

We do observe a strong, positive impact on education – a 14.6 percentage points increase in the likelihood that a household member has completed the age-appropriate years of education, significant at the 5 percent level. The size of the coefficient is triple that of the control group mean of 4.8 percent.[21]

For robustness we also consider other indicators of educational attainment that were not prespecified. Appendix Table C3 presents effects on maximum, total, and average years of education. The effect on maximum years of education is positive but noisy, with a p-value of 0.156. We observe a 5.2 years increase in the total household-level years of education, relative to 8.5 years in the control group, a 60 percent increase, significant at the 10-percent level. In terms of the average years of education, we observe an increase of 2.3 years, from a control mean of 4.9 years, a 46 percent increase, significant at the 5-percent level. Appendix Table C4 reports additional estimations analyzing effects on different education levels the – either at least one year of education, half-way through primary school, completed primary, or completed secondary. The results show that the share of household members that completed at least one year of education increased by 21.9 percentage points, from a control mean of 64.6 percent, significant at the 10-percent level. We also observe an increase of 16.4 percentage points in the share of household members who completed at least 4 years of primary education (p-value 0.201); and a 13.1 percentage points increase in the share of household members who completed primary (p-value 0.246). We do not observe an effect on secondary education.

[21]The sample size for the share of children who completed age-appropriate years of education decreases to 770, because the outcome variable is treated as missing when there were no household members who were of school-going age during the pilot period. The results are qualitatively the same when we impute the average share of age-appropriate household members by each country to missing values of the outcome variables.

We also examine if the increase in educational attainment was driven by male or female household members. If indeed the shift in production strategies drove the education results, we would expect effects to predominantly arise for male and not female household members, given that boys but not girls are commonly involved in herding small ruminants. Appendix Table C5 presents the results for male households members in Panel A and female household members in Panel B. On our pre-specified outcome that is presented in Column (1), we do not observe any differences between outcomes for male and female household members. On maximum, total, and average years of education, however, we do observe large differences in coefficient estimates, where male household members experience significant and substantial increases in education, while female household members do not. [22,23]

In addition to our results on education, we also observe a substantial change in production strategy through a shift in herd composition. Table 4 shows a substantial decrease of 23.5 percentage points in the share of goats herded, significant at the 5 percent level, relative to a control mean share of 28.4, which implies an 83 percent decrease. There are no changes in the share of sheep herded, so by construction we see increases in the share of camels and cattle herded. Point estimates for camel and cattle are positive and marginally insignificant (p-value=0.190 and 0.198, respectively), suggesting a transition to both types of animals, which we might be under-powered to detect. To increase statistical power, we also analyze effects by comparing large ruminants (camel and cattle) to small ruminants (goats and sheep). Column (3) of Appendix Table C8 reports the results for small ruminants – and Column (6) for large ruminants. The sign of the coefficient estimates on the share and the number of animals are similar. The share of larger animals increases by 23 percentage points, significant at the 5 percent level, for respondents who purchased insurance, while the share of smaller animals decreases.

5.2 Secondary outcomes

The results for our pre-specified secondary outcomes are reported in Tables 5 and 6, following Equation (2), with and without controls. We observe no statistically significant effects at the five

[22]Columns (3) and (4) of Appendix Table C6 present estimates with missing values imputed for Ethiopian households. The treatment results in an increase of 7.0 to 8.8 percentage points, significant at the 5 percent level.

[23]To determine whether the educational effect is not influenced by changes in the composition of household members with different educational attainment, Appendix Table C7 presents the effects on fertility and the correlation between higher-educated households at baseline and the share of young adults at the endline. Columns (1) and (2) demonstrate that there is no effect of insurance on fertility decisions. Columns (3) and (4) reveal a positive correlation between higher-educated households at baseline and the share of young adults at the endline. Taken together, these findings suggest that the effect may not be driven by changes in the composition of household members with varying educational backgrounds.

percent level of IBLI purchase on any of our secondary outcomes. The standard errors are large for herd management expenditures, livestock loss, distress sales, whether or not the respondent purchased any insurance in the last 12 months, and the number of CMVE purchased in the last 12 months. The point estimates on annual milk income in the past 12 months are positive and double the mean in the control group, and standard errors suggest that we may be under-powered to detect an effect *p*-value 0.102).

With respect to children's time use we observe a similar pattern of noisy estimates that are potentially under-powered. With respect to full-time work and part-time work, we observe a negative point estimate of -0.327 and -0.263, relative to a control mean of 0.271 and 0.201, respectively (*p*-value 0.251 and 0.304, respectively), suggesting that insurance minimizes the likelihood that children are working either full-time or part-time. Consistent with results on education, we also observe an increase on whether or not children are studying full-time, suggesting an increase of 46 percentage points, double the control mean of 23 percent (*p*-value 0.097).

Table 5: 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)
Any insurance purchased	-6.359	-1.723	582.158	677.707	1.813	1.943	-0.331	-0.342	-1.144	-0.996
	(95.362)	(95.822)	(452.541)	(471.170)	(2.893)	(2.786)	(0.529)	(0.523)	(1.457)	(1.443)
Controls		✓		✓		✓		✓		✓
Control mean	182.827	182.827	339.362	339.362	5.448	5.448	0.292	0.292	1.872	1.872
Observations	1179	1179	1179	1179	1179	1179	781	781	1179	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table 1 for the definition of outcome variables. In Columns 7 and 8, the number of observations for distress sales decreases to 781 since this information was not collected in Ethiopia.

6 Mechanisms

In this section we discuss the potential mechanisms that may explain IBLI's long-term effects. We first analyze the dynamics of long-run effects over time. We then unpack the *ex ante* and *ex post* impacts of IBLI, trying to disentangle the extent to which observed effects result from the mere purchase of insurance - i.e., from the behavioral effects induced by reduced catastrophic risk

Table 6: Prespecified secondary outcomes: 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)
Any insurance purchased	0.033	0.035	-0.974	-0.918	-0.296	-0.327	-0.213	-0.263	0.437*	0.462*
	(0.043)	(0.043)	(0.896)	(0.916)	(0.270)	(0.285)	(0.240)	(0.256)	(0.265)	(0.278)
Controls		✓		✓		✓		✓		✓
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

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table 1 for the definition of outcome variables. Columns 5 to 10 report the estimated coefficients with 376 observations, which is also due to the absence of this information in Kenyan sample at the endline.

exposure for a year - or from receipt of an indemnity payment due to a drought - i.e., the buffering effect of payments to compensate for likely loss.

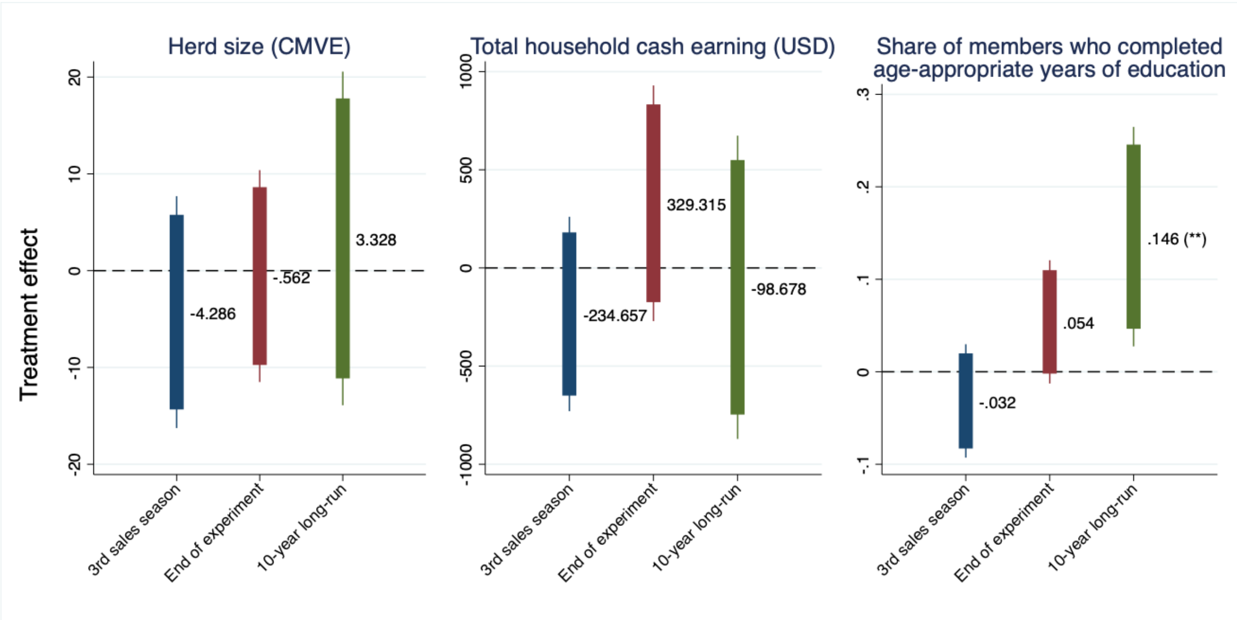
6.1 Dynamics of impacts over time

To investigate the dynamics of effects over time, we estimate Equation (2) on the same outcomes reported in the survey at the end of the third sales season - i.e., during the initial experimental period, during which our instrument is strong - at the end of the experiment after the sixth sales season, and then in the endline. We report these results in Appendix Tables C8-C15. We do not observe any effects at any time period for herd size and household cash income, and standard errors are large (Appendix Table C9).

For education no significant effects emerge by the end of the third season, but we see a positive but noisy point estimate on the educational effect at the end of the sixth season (p-value= 0.124, p-value=0.094 without controls), in the direction of the long-term positive effect we observe (Figure 4). These effects are confirmed in the other measures of educational attainment (Appendix Table C10).

For children's time use we appear underpowered for all estimations run at the 3rd sales season and the end of the experiment. We can, however, not exclude that there are no immediate transitions, for example we observe a negative point estimates for studying full-time of 13.8 per-

Figure 4: Dynamic Effects on income, asset, and human capital



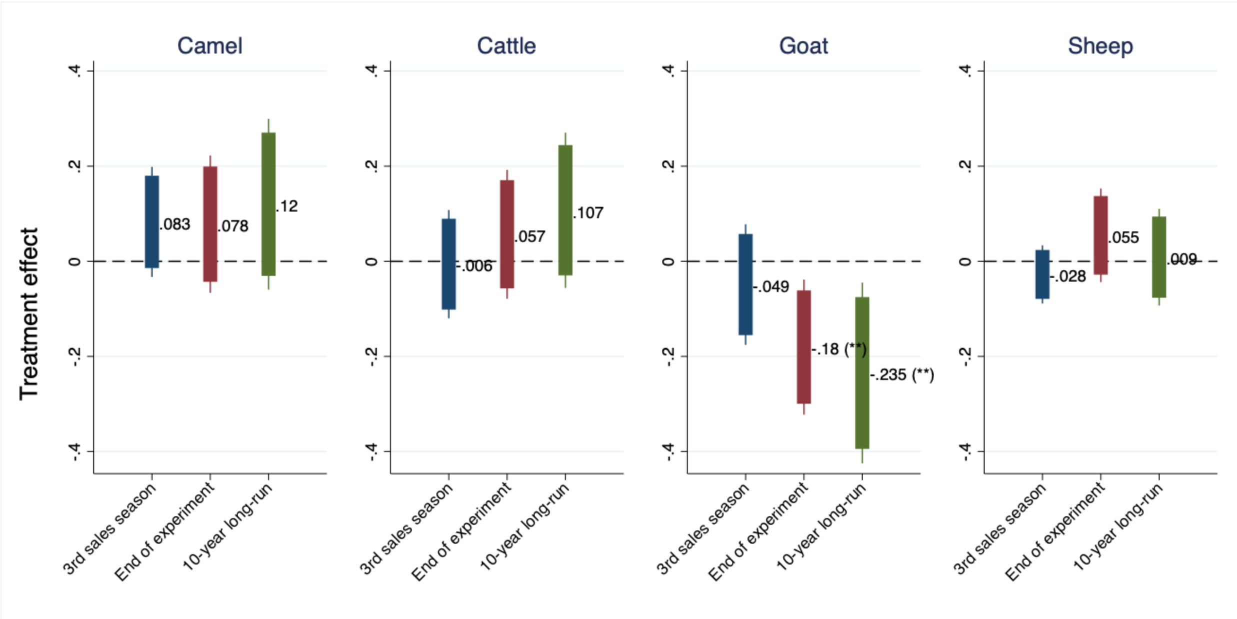
Notes: This figure presents the effects of IBLI uptake in three time periods: i) after the third sales season, after the end of experiment (sixth sales season), and at the 10-year follow up. Box represents the 90 percent confidence interval, and the line represents the 95 percent confidence interval.

centage points (p-value 0.159) after the 3rd sales season, and an 11.3 percentage points reduction (p-value=0.261) at the end of the experiment (Appendix Table C15), while the long-run effect is a substantial and positive increase. For part-time work, the point estimates are positive, with a 15.8 percentage points increase (p-value 0.129) after year three, and a 10.6 percentage points increase (p-value 0.28) after the experiment.

In terms of herd composition (Appendix Table C11), there is a negative and significant 18 percentage points reduction in the share of goats by the end of the experiment, relative to a 23 percent control mean, significant at the 5 percent level. The point estimate after the third sales season is also negative, but noisy. Immediately after the third sales season we observe a marginally insignificant increase in camels by 8.3 percentage points (p-value 0.161), which largely persists from the end of the experiment to the long-run follow-up. For camels there are also positive point estimates from the end of the experiment onward, but these are less precisely estimated. ((Figure 5)

These results suggest that the effect on herd composition – to a smaller share of small ruminants and a larger share of large ruminants – started immediately, after the third sales season and continued, while effects on educational attainment started to materialize around the end of the experiment and then continued. One explanation may be that insurance reduced the need for precautionary sav-

Figure 5: Dynamic Effects on herd composition



Notes: This figure presents the effects of IBLI uptake in three time periods: i) after the third sales season, after the end of experiment (sixth sales season), and at the 10-year follow up. Box represents the 90 percent confidence interval, and the line represents the 95 percent confidence interval.

ings to cover drought-related expenditures on food (to replace lost milk production), fodder, water, and veterinary expenses. In this context, goats are "cash with four legs," a highly liquid, non-lumpy asset (average value roughly USD 10) commonly sold to cover such expenses (McPeak, Little, and Doss, 2011). IBLI indemnity payments provide an alternative to cover such costs. An alternative, complementary explanation is that households invest more in camels (Appendix Table C21), a higher-return, more drought-resistant asset than goats, but at USD 120-250 each, much lumpier investments. By reducing households' need for liquidity during or following a drought, IBLI may have induced households to re-balance their livestock portfolio towards lumpier, more productive but less liquid species. In turn this may have reinforced household investment in children's education, because while children routinely manage goats, camels are large, strong and ornery, managed overwhelmingly by adult men. Results tentatively suggest that the observed changes in herd composition preceded or coincided with changes in education, suggesting that changes in production strategies may have driven changes in the marginal productivity of child labor, thereby boosting investments in education, similar to Shah and Steinberg (2017). Alternatively, perhaps insurance led to changes in educational investments, for example by changing households' future orientation, and that necessitated changes in herd composition. While our evidence is not conclusive, the dynamics of effects over time suggest the latter interpretation is less consistent with the data.

6.2 Indemnity payments as lump sum transfers

Another potential mechanism that may explain our long-run effects could be that the indemnity payment from insurance provided a lump sum cash transfer to households, and helped relieve savings or liquidity constraints. This would parallel prior studies on effects of cash transfer interventions (Angelucci, Attanasio, and Di Maro, 2012; Haushofer and Shapiro, 2016; Blattman et al., 2016; Baird, McIntosh, and Özler, 2019). If households were savings constrained, these indemnity payments could have provided cash to purchase (or refrain from distress selling) lumpy assets such as camels and cattle, explaining changes in herd composition. Alternatively, if households were liquidity constrained and indemnity payments arrived around the same time as education-related expenditures, this could explain the observed changes in educational attainment.

To investigate these potential channels we test to what extent the receipt of indemnity payments, which are conditional on both (instrumented) insurance purchase and a drought subsequently occurring, affect outcomes by estimating the following second-stage equation:

$$y_{ijT} = \gamma_0 + \gamma_1 \widehat{I_{ij}} + \gamma_2 \widehat{I_{ij}} \times R_{jt} + \gamma_3 y_{ij0} + \gamma_4 X_{ij0} + \gamma_5 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT} \tag{6}$$

where R_jt is an exogenous indemnity payment rate specific to the index unit for the three periods of insurance uptake for which we instrument, as determined by the NDVI realization and the pre-specified IBLI contract terms.The receipt of a indemnity payments is the combined effect of being insured and experiencing a weather shock. The latter is exogenous, and absorbed through the location fixed effect, so the coefficient on $\widehat{I_{ij}} \times R_j$ is the direct effect of the indemnity payment on outcomes (γ_2).

Note that during the initial three sales seasons, payouts were only observed once in Kenya, and not in Ethiopia. The coefficient γ_1 captures the effect of insurance uptake on the outcome in the absence of a payout, which we can think of as the "peace-of-mind" (*ex ante*) effect of insurance (Tafere, Barrett, and Lentz, 2019). The combined effects of purchasing insurance and receiving the indemnity payment are captured by $\gamma_1 + \gamma_2$, which is the marginal effect of interest in the event an indemnity payout occurs.

Appendix Tables C16 to C20 show the results of estimating Equation (6) for the primary and secondary outcomes. The marginal effect of receiving insurance and a indemnity payment ($\gamma_1 + \gamma_2$) appears in the first row of the bottom panel of the tables, its p-value in the second row. Appendix Table C16 shows that there are no effects for herd size, and cash earnings. For education, we see that the coefficient on insurance purchase remains strong and positive, irrespective of the indemnity payment. The indemnity payment did not have statistically significant effect on education either. The combined effect of insurance and indemnity payment, however, is positive, a 15.2 percentage points increase, and statistically significant, with a p-value of 0.016. Appendix Table C17 also shows that none of the direct effect of indemnity payments statistically significant. Statistically significant, combined effects of insurance and indemnity payments, therefore are found in education only.

In terms of our pre-specified secondary outcomes, Appendix Tables C19 and Appendix C20 show that there are no significant combined effects of insurance and indemnity payments. Taken together, these results suggest that cash received through indemnity payments had negligible effects on education and herd composition, ruling out savings or liquidity constraints as mechanisms driving our results. This is consistent with broader findings in the literature that cash transfers' short-run effects do not always persist to generate long-term effects (Araujo, Bosch, and Schady, 2017; Baird, McIntosh, and Özler, 2019; Blattman, Dercon, and Franklin, 2022; Blattman, Fiala, and Martinez, 2020). Rather, the long-term effects we observe come from induced behavioral effects that result from reducing pastoralists' *ex ante* exposure to catastrophic risk.

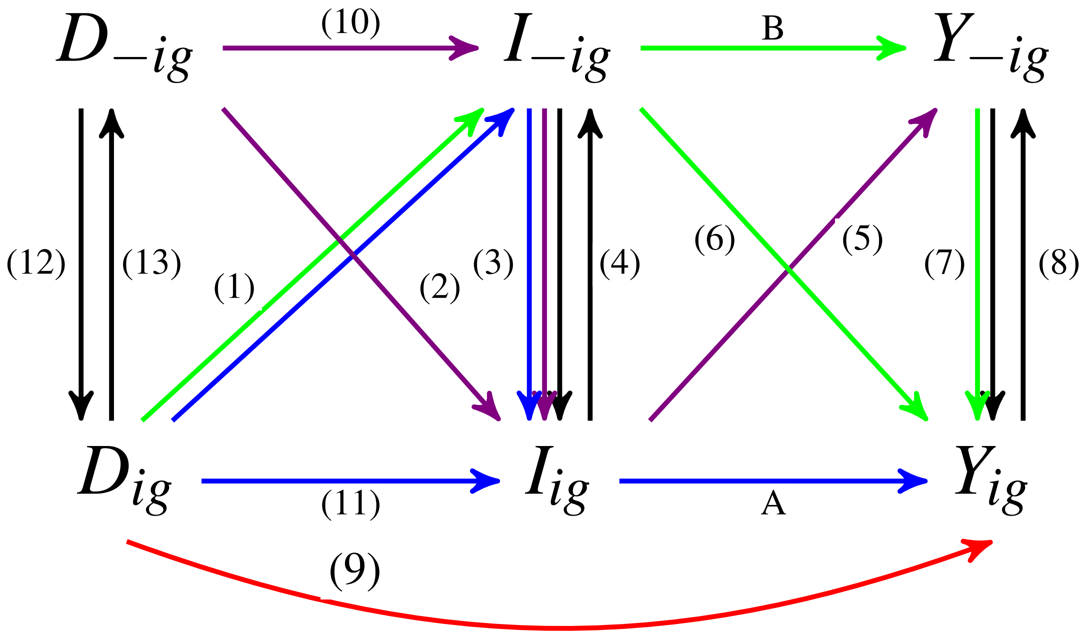
7 Robustness

In this section we consider the potential effect of spillovers on our estimates. This is important because the original pilot experiment randomized households within communities to either receive discount coupons or not. Particularly because individuals in communities are known to informally share risk with each other, the Stable Unit Treatment Value Assumption (SUTVA) may be violated.

To study spillovers, we first identify the potential spillover pathways that may exist in both our first- and second stage. These are graphically represented by Figure 6. Let D_{ig} denote discount coupon receipt by herder i residing in community g, I_{ig} represent insurance purchase, and Y_{ig} denote the long-run outcome of this herder. Note that there exists a group of other herders, $-i$, whom we refer to as "peers," that are also from community g. We define D_{-ig} as the peers' discount coupon receipt, I_{-ig} as the peers' decision of whether or not to buy insurance, and Y_{-ig} as the peers' long-run outcome. We assume that there are no inter-community spillovers.

The blue line A represents the main causal effect we are interested in estimating, namely the effect of i's insurance purchase on $i's$ long-run outcomes. Since insurance purchase is endogenous, we use exogenous variation created by the randomized discount coupons D_{ig} as an instrument (pathway (11)) to estimate the LATE. For a detailed description of all the spillover pathways, including examples, please refer to Appendix B.

Figure 6: DAG: potential spillover interaction



Notes: Pathways are indicated by (1)-(13) and A and B. D_{ig} refers to the discount coupons received by herder i in community g, I_{ig} is their insurance purchase, and Y_{ig} their long-run outcome. Other herders from community g, termed "peers," are denoted as $-i$. We refer to their discount coupons received, insurance purchase, and long-run outcomes as D_{-ig}, I_{-ig}, and Y_{-ig}, respectively. Our main causal effect of interest is A, where we estimate the LATE of I_{ig} on Y_{ig}, instrumenting I_{ig} by D_{ig}. The blue arrows present this main specification. The red pathway presents a direct violation of the exclusion restriction. The green pathways present indirect violations of the exclusion restriction and violations of SUTVA, the purple pathways present violations of SUTVA. The black arrows indicate mechanical negative correlations. See Appendix B for more details.

Given the fact that our research was not designed to measure spillovers, we are limited in our ability to causally identify many of the potential pathways. Furthermore, if we take the measures of D, I and Y for i, these will be mechanically negatively correlated with these measures for $-i$ (see Appendix B for details).

This implies that we can only control for exogenous variation generated by our instruments D_{ig} and D_{-ig}, on both I_{ig} and I_{-ig}, and that any estimated causal effects of D_{ig} on I_{-ig} and D_{-ig} on I_{ig} may consist of both mechanical correlations as well as actual spillovers. In terms of interpretation of our main effect of interest, D_{ig} on I_{ig}, however, this does not matter, as long as the other mechanisms are properly controlled for.

Columns (3)-(8) of Table 7 show the results of the first-stage spillovers. The results are consistent with the existence of the negative mechanical correlations we expect. Columns (3)-(5) show that the coupon receipt of herder i, D_{ig}, and the mean coupon receipt of peers $-i$, henceforth $\overline{D}_{-ig}$, both have a strong and statistically significant effect on the insurance uptake of i, but the effect of the latter is negative. However, when insurance uptake of i is regressed on both D_{ig} and $\overline{D}_{-ig}$ simultaneously, only the former remains significant. Columns (6)-(8) show that similarly, coupon receipt of herder i and the mean coupon receipt of peers $-i$ both have a strong and statistically significant effect on peers' mean insurance uptake, henceforth $\bar{I}_{-ig}$, but the effect of the former is negative. However, when we regress peers' mean uptake on both D_{ig} and $\overline{D}_{-ig}$ simultaneously, neither remains significant. These results suggest that there is no reason to assume that pathways (2), (1), and (10) will bias our LATE estimates.

Table 7: 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'		
No. of coupons received – first three seasons	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_{ig}: Recipient's		-0.025***	0.123***		0.142***	-0.003***		-0.002
		(0.001)	(0.016)		(0.034)	(0.001)		(0.001)
$\overline{D}_{-ig}$: Peers'	-31.145***			-3.672***	0.747		0.111***	0.060
	(0.753)			(0.594)	(1.239)		(0.026)	(0.063)
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

Notes: All columns present coefficient estimates and robust standard errors (in parentheses).

Column (1) and (2) presents the results on outcome D_{ig} and $\overline{D}_{-ig}$, respectively.
Column (1): $D_{ig} = \theta_0 + \theta_1 \overline{D}_{-ig} + \theta_2 X_{ig0} + \theta_3 \overline{X}_{-ig0} + \nu_{1g} + \eta_{1ig}$,
Column (2): $\overline{D}_{-ig} = \theta_4 + \theta_5 D_{ig} + \theta_6 X_{ig0} + \theta_7 \overline{X}_{-ig0} + \nu_{2g} + \eta_{2ig}$,

Column (3) to (5) presents the results on outcome I_{ig}.
Column (3): $I_{ig} = \alpha + \beta_1 D_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,
Column (4): $I_{ig} = \alpha + \beta_2 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,
Column (5): $I_{ig} = \alpha + \beta_1 D_{ig} + \beta_3 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,

Column (6) to (8) presents the results on outcome $\overline{I}_{-ig}$.
Column (6): $\overline{I}_{-ig} = \alpha + \beta_4 D_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,
Column (7): $\overline{I}_{-ig} = \alpha + \beta_5 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,
Column (8): $\overline{I}_{-ig} = \alpha + \beta_4 D_{ig} + \beta_6 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,

* denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons.

As a final step, to confirm the conclusions derived after the analysis of the first stage, we include $\overline{D}_{-ig}$ as additional instrument, and $\bar{I}_{-ig}$ as additional endogenous regressor in our main 2SLS specification. Tables B2 to B5 present the second-stage results of the re-estimation of the main specification (as presented in Appendix Tables 3 to 6) with inclusion of these additional variables. The results are qualitatively similar to the main results, except for the positive effect on whether or not children are studying full-time, which disappears and becomes insignificant. In some specifications we lose statistical power on the education results, which we attribute to the addition of another instrument and endogenous regressor, as coefficient estimates on $\hat{\bar{I}}_{-ig}$ indicate that there is no effect on $i's$ education outcomes.

8 Conclusions

A sizable literature has established that catastrophic covariate shocks can have adverse effects on long-run human capital accumulation. It would seem to follow, therefore, that insurance against such shocks can boost human capital accumulation, but direct evidence on this important question has been lacking to date. We exploit the randomized encouragement design of the original impact evaluation of index-based livestock insurance (IBLI), a catastrophic drought insurance product introduced among pastoralist populations in northern Kenya and southern Ethiopia in 2010-12, and retraced the original survey households ten years later to test that hypothesis. We find that insurance coverage sharply changed household's production strategies and increased children's educational attainment. Insured households decreased the small ruminant - goats and sheep - share of their herd by 83 percent in favor of largestock (mainly camels), while the share of household members who completed age-appropriate education quadruples, to 20 percent. The share of children studying full-time increased sharply in insured households. Importantly, these effects are driven entirely by the insurance coverage itself rather than by receipt of indemnity payments triggered by drought events, suggesting that the reduced *ex ante* risk exposure through insurance coverage and the behavioral changes that induces generate the observed effects, not financial liquidity enhancements through lump-sum cash transfers due to indemnity payments.

Our research illuminates the important role of formal risk mitigation instruments can play for human capital accumulation. Considering recent initiatives to scale the IBLI-based drought insurance program to reach 1.6 million pastoralists across the Horn of Africa, our results seem relevant for gauging the effectiveness of such efforts. The lack of observed long-run effects of IBLI on household asset holdings or cash income, however, suggests the need for complementary interventions to help relieve the continuing, severe poverty that afflicts many pastoralist households, even if IBLI seems to help promote longer-run human capital accumulation, albeit from a very low educational attainment base.

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Appendix

A Balance and Attrition

A.1 Balance

This subsection presents specification in which we test the balance of the randomized coupon offers for each season. We estimate the following equation for our pre-specified set of balance variables that were selected following Jensen, Barrett, and Mude (2017) and Takahashi et al. (2016)[24]:

$$k_{ijt} = \gamma_1 + \gamma_2 \mathrm{D}_{ijt} + \rho_j + \nu_{ijt} \tag{7}$$

where k_{ijt} denotes a characteristic of a household i in location j in sales season t, D_{ijt} is an indicator for whether or not the household i in location j received a discount coupon in sales season t, ρ_j is a location fixed effects, and ν_{ijt} is an error term.

In addition to the coefficient estimates and standard errors, we use the normalized difference as a scale-invariant measure of the size of the difference, which we calculate by:

$$\text{Normalized Difference} = \frac{\bar{X}_{treatment} - \bar{X}_{control}}{\sqrt{(s^2_{treatment} + s^2_{control})/2}} \tag{8}$$

where $\bar{X}$ represents the mean and s the standard deviation of a variable.

As stated in the main body of the text, results reported in Table A1 show that randomization was balanced across observables.

A.2 Attrition

This subsection presents specification in which we test the attrition, and additional analysis of attrition. At baseline, 1439 households participated in our panel survey. Ten years later we were able to track 1179, or 82% of these households (Table A2).

We first verify if we have differential attrition. Because our main instrument uses the number

[24] Variables include: age of the household head, an indicator for male-headed household, years of education of the household head, adult equivalent, dependency ratio, herd size in TLU, annual income per capita in USD, and whether the household owned or farmed on agricultural land in the last 12 months.

of seasons that a household received a coupon during the first three sales seasons, we test the existence of differential attrition by estimating Eq. (9):

$$\text{Attrition}_{ijT} = \delta_0 + \delta_1 \text{D}_{ij} + \gamma_j + \omega_{ij} \tag{9}$$

where $Attrition_{ijT}$ is an indicator of attrition that equals 1 if a household i in location j was interviewed at baseline (2009 in Kenya, 2012 in Ethiopia), but not during the long-run follow-up survey round (2020 in Kenya and 2022 in Ethiopia). D_{ij} is the number of sales seasons out of the initial three where a household received a discount coupon. γ_j represents location fixed effects, and ω_{ij} error term. Column (1) of Table A4 reports the regression results, and we do not find significant differential attrition by our instrument. As pre-specified in our pre-analysis plan we also estimate differential attrition based on cumulative coupons receipt in all six sales seasons, and Column (2) of Table A4 shows our results are similar.

Discount rates may separately affect the probability of a household to attrit differentially, conditional on receiving a discount coupon. Therefore, we estimate the following equation to evaluate attrition by discount coupon receipt and discount rate for each sales season separately:

$$\text{Attrition}_{ijT} = \kappa_0 + \kappa_1 \text{D}_{ijt} + \kappa_2 \text{Discount Rate}_{ijt} + \kappa_3 \text{Absent}_{ijt} + \rho_j + \omega_{ijt} \tag{10}$$

where D_{ijt} is an indicator equal to one if a household i in location j in sales season t received a discount coupon. $\text{Discount Rate}_{ijt}$ is the coupon discount rate in percentages, defined as zero if the household did not receive any coupon. Since some households drop out from the panel survey in a specific round, to return a round later, we include $Absent_{ijt}$, an indicator denoting that the household was absent from the panel survey in specific sales season t. ρ_j represents location fixed effects, and ω_{ijt} is the robust standard error. The estimated results reported in Table A6 show that there is no differential attrition by discount coupon receipt status other than the pooled analysis in sales season 3, where those who received a discount coupon are significantly less likely to attrit than those who did not receive a discount coupon, statistically significant at the 90 percent level. We do not find the discount rates have any effect on attrition.

Finally, we consider selective attrition by our pre-specified observable household characteristics. To do this, we regress each household characteristics on the attrition indicator – i.e., weestimate the following equation:

$$X_{ij0} = \zeta_0 + \zeta_1 Attrition_{ijT} + \rho_j^1 + \sigma_{ijt}^1 \tag{11}$$

where X_{ij0} is the vector of characteristics of household i in community j at baseline. In addition to each coefficients, we also conduct joint significance test to verify if a series of characteristics of attrited group is jointly statistically different from that of the retained group. As reported in the main text, Table A3 shows that households that are female-headed, that have fewer adults, and that do not own agricultural land were more likely to attrit from the sample.

As per the pre-analysis plan, we also test the selective attrition by regressing the attrition indicator on the vector of baseline household characteristics. We estimate the following equation:

$$Attrition_{ijT} = \theta_0 + \theta_1 X_{ij0} + \rho_j^2 + \sigma_{ijt}^2 \tag{12}$$

where all variables are defined the same as Equation 11. Reported results in Table A5 shows that an additional adult household member makes a household significantly less likely to attrit by 1 percentage point, and this estimate is significant at the 10 percent level. None of the other pre-specified observables significantly predict attrition.[25]

[25]In this table, we replace the missing values with a mean of existing observations and include a dummy variable indicating missing in the regression, to utilize information from all households. We use winsorized value for income per adult equivalent, earnings from livestock sale, and livestock expenditure.

Table A1: 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	

Notes: Each cell reports the results from individual regression estimating Equation (7):$y_{ijt} = \alpha + \beta_1 \text{Received Coupon}_{ijt} + \gamma_j + \varepsilon_{ijt}$, where y_{ijt} denotes a characteristic of a household i in area j in sales season t. Columns (1) to (6) report mean differences, robust standard errors (in parentheses), and and normalized difference (in square brackets) between the coupon recipients and non-recipients. All estimations include country and community fixed effects. Column (7) reports joint significance test for each variable across seasons where the first row presents the Chi-statistics and the second row presents the p-value of the test statistic in brackets. Dependency ratio is the ratio of dependents – people younger than 15 or older than 64 – to the working-age population, those ages 15-64.See Table 1 notes for definitions of variables. * denotes significance at 0.10; ** at 0.05; and *** at 0.01.

Table A2: N of households present in each round

	Kenya			Ethiopia		
	Total	Original sample	*Net* replacement	Total	Original sample	*Net* replacement
	(1)	(2)	(3)	(4)	(5)	(6)
R1	924	924	.	515	515	.
R2	924	887	37	506	474	32
R3	924	857	30	514	479	3
R4	924	838	19	513	470	8
R5	923	829	8	438	398	
R6	919	785				
R7	868	781				
Balanced sample		712 (77 %)			387 (75 %)	
Initial & Last		781 (85 %)			398 (77 %)	

Notes: This table shows the number of households interviewed in each round. Column (1) and (4) show the number of households surveyed for each round. Column (2) and (5) are defined on the balanced sample in *and*. Column (3) and (6) show the number of households for the replacement. *Balanced sample* and *Initial* & *Last* show the number of households surveyed in all periods, and $R1$ and $R7$, respectively. Balanced sample gives balanced panel across all the rounds. *Net* replacement at round t is calculated by replacement_t = total_t − original_$t - \sum$_$k = 1^{t-1}$replace_k for $t = 2, \cdots, T-1$ and mechanically empty for $t = 1, T$.

Table A3: 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

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $x_{ijt=0} = \alpha + \beta Attrition_{ijt=T} + \gamma_j + \varepsilon_{ijt}$ where $Attrition_{ijt=T}$ is an indicator variable equals to 1 if an individual household i in community j was interviewed at baseline (2009 in Kenya, 2012 in Ethiopia), but not at the latest round (2020 in Kenya and 2022 in Ethiopia). $X_{ijt=0}$ is the vector of characteristics of household i in community j at baseline. γ_j is the community fixed effects to control for the strata-level commonalities. ε_{ijt} is the robust standard error. See Table 1 notes for definitions of variables. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include country and community fixed effects. P-value of joint F-test reports p-value from the joint significance test for all variables across attrition.

Table A4: 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

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the Equation (9): $\text{Attrition}_{ijt=T} = \alpha + \beta_1 \text{Cumulative N of Coupon Receipt}_{ij} + \beta_2 \text{Cumulative Discount Rates}_{ij} + \gamma_j + \varepsilon_{ij}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include country and community fixed effects.

Table A5: Joint test of selective attrition

	Outcome: Interviewed at baseline but not in latest round (=1)
	(1)
Age of the household head	-.000372
	(.000596)
Male headed household (=1)	-.0357
	(.0255)
Education of household head	.00429
	(.00441)
Adult equivalent	-.0122**
	(.00526)
Dependency ratio	-.0196
	(.0512)
Herd size (CMVE)	.000421
	(.000354)
Annual income per AE (USD)	.0000429
	(.0000718)
Own or farm agricultural land	-.0482
	(.0343)
P-value of joint F-test	0.024
N	1439

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from Equation (11): $Attrition_{ijt=T} = \alpha + \beta X_{ijt=0} + \gamma_j + \varepsilon_{ijt}$ where $Attrition_{ijt=T}$ is an indicator variable equals to 1 if an individual household i in community j was interviewed at baseline (2009 in Kenya, 2012 in Ethiopia), but not at the latest round (2020 in Kenya and 2022 in Ethiopia). $X_{ijt=0}$ is the vector of characteristics of household i in community j at baseline. γ_j is the community fixed effects to control for the strata-level commonalities. ε_{ijt} is the robust standard error. See Table 1 notes for definitions of variables. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include country and community fixed effects. P-value of joint F-test reports joint significance test for all variables (except for fixed effects) across attrition.

Table A6: Differential attrition across coupon receipt status

	(1) Outcome: Interviewed at baseline but not in latest round (=1)
***Sale season 1*: 2010 JF (Kenya), 2012 AS (Ethiopia)**	
Received coupon	.0214
	(.026)
Discount Rate	-.000136
	(.000498)
***Sale season 2*: 2011 JF (Kenya), 2013 JF (Ethiopia)**	
Received coupon	-.0362
	(.0242)
Discount Rate	.000616
	(.000467)
***Sale season 3*: 2011 AS (Kenya), 2013 AS (Ethiopia)**	
Received coupon	-.0525**
	(.0249)
Discount Rate	.000704
	(.000478)
***Sale season 4*: 2012 AS (Kenya), 2014 JF (Ethiopia)**	
Received coupon	.00744
	(.0252)
Discount Rate	-.000327
	(.000474)
***Sale season 5*: 2013 JF (Kenya), 2014 AS (Ethiopia)**	
Received coupon	.00978
	(.0248)
Discount Rate	-.000154
	(.000464)
***Sale season 6*: 2013 AS (Kenya), 2015 JF (Ethiopia)**	
Received coupon	.0394
	(.0265)
Discount Rate	-.000524
	(.000372)
N	1439

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from Equation (12):$\text{Attrition}_{ijt=T} = \alpha + \Sigma_{t=1}^{6}(\beta_1^t \text{Received Coupon}_{ijt} + \beta_2^t \text{Discount Rate}_{ijt} + Absent_{ijt}) + \gamma_j + \varepsilon_{ijt}$, where Received Coupon$_{ijt}$ is an indicator equals to one if a household i in admin unit j in sales season t received a discount coupon, Discount Rate$_{ijt}$ is the discount rate from the coupon in percentage term, defined as zero if the household did not receive any coupon.* denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include country and community fixed effects.

B Spillover

Our estimate of the Local Average Treatment Effect (LATE) is a valid estimator of the causal effect of IBLI if our design satisfies the following assumptions: (i) Stable Unit Treatment Value Assumption (SUTVA); (ii) the exclusion restriction; (iii) monotonicity (iv) exogeneity of the instrument.

To estimate the causal effect of IBLI on long-run outcomes, we use the number of randomized discount coupons received during the first three seasons of IBLI sales as an instrument for whether or not a respondent took up any IBLI during the first three seasons. This is a context where we should anticipate two-sided non-compliance, so we check that we satisfy the monotonicity assumption in Table C2. Our results demonstrate that the likelihood of IBLI take-up in the first three seasons monotonically increases with the number of coupons received during the first three seasons.

If we assume that the receipt of discount coupons and the take-up of insurance do not generate spillovers – and thus SUTVA is not violated – it is unlikely that the exclusion restriction is violated through spillovers. This is because discount coupons were randomly assigned across households in communities. However, if we relax SUTVA, this can lead to spillovers in the second stage, from a herder's insurance purchase decision onto her peers' insurance purchase decision; from a herder's purchase decision onto her peers' outcomes; or from a herder's outcomes onto her peers' outcomes. Furthermore, spillovers may also arise in the first stage, where a herder's receipt of a discount coupon affects her peers' insurance purchase. Because the effect of a herder's discount coupons on their long-run outcomes still runs solely through the herder's insurance purchase, these spillovers would not violate the exclusion restriction. However, the effect of our instrument on insurance purchase now consists of a direct and an indirect effect.

The potential spillovers in the first- and second-stage can be graphically represented by Figure 6. Let D_{ig} denote discount coupon receipt by herder i residing in community g, I_{ig} represent insurance purchase, and Y_{ig} denote the long-run outcome of this herder. Note that there exists a group of other herders, $-i$, whom we refer to as "peers," that are also from community g. We can then define D_{-ig} as the peers' discount coupon receipt, I_{-ig} as the peers' decision of whether or not to buy insurance, and Y_{-ig} as the peers' long-run outcome. We assume that there are no inter-community spillovers.

The blue line (A) represents the main causal effect we are interested in estimating, namely the effect of i's insurance purchase on long-run outcomes. Since insurance purchase is endogenous, we use exogenous variation created by the randomized discount coupons D_{ig} as an instrument (pathway (11)) to estimate the LATE.

Figure 6 summarizes all potential spillovers, of which not all are a concern from the perspective of estimating a valid LATE. For completeness, we start by providing examples of each potential spillover in our context in the list below before we discuss which of those create a concern from the perspective of generating a valid LATE.

- Pathway (1) and (2): The receipt of a discount coupon by a herder affects the likelihood that their peers take-up insurance, and vice versa. In our context, examples of this might be that herder i, upon receiving the discount coupon, also receives *information* about insurance that they communicate to $-i$, which makes $-i$, irrespective of their own coupon receipt, more likely to purchase insurance. Alternatively, receiving a discount coupon by i could lead to *status concerns* that (dis)incentivize $-i$ to purchase insurance, irrespective of their own coupon receipt.

- Pathway (3) and (4): The insurance purchase by a herder has an effect on the likelihood that their peer purchases insurance and vice versa. Examples of this in our context are *social learning*, where $-i$ learns about insurance from i, or *copying*, where $-i$ wants to exhibit the same behaviour as i. Another example is *free-riding*, which refers to the fact that i's insurance purchase decreases the incentive for $-i$ to purchase insurance. This may occur because i and $-i$ informally share risk through transfers, and $-i$ anticipates transfers following claim payments by i, or in case $-i$ views i's insurance purchase as an opportunity to learn about the insurance product.

- Pathway (5) and (6): The insurance purchase by herder i changes the outcomes of a peer (Y_{-ig}) directly, not through the outcomes of i (see pathway (7) and (8) below). An example would be a case where the willingness to share risk through informal transfers by either i or $-i$ is changed as a result of their insurance status. For example, Takahashi, Barrett, and Ikegami (2019) shows that a herder's insurance uptake has no effect on her willingness to transfer to peers, but insurance purchase by peers does increase herder i's willingness to transfer. Alternatively, if formal insurance is available, and i purchases insurance but $-i$ does not, i may become less willing to transfer to $-i$ because $-i$ refrained from protecting themselves by purchasing insurance and instead decided to free-ride on i's insurance purchase (Berg, Blake, and Morsink, 2022).

- Pathway (7) and (8): The outcomes of herder i affect the outcomes of their peers, or vice versa. This is empirically difficult to distinguish from the mechanisms discussed in pathways (5) and (6). Examples would be where claim payments received by i increase i's income, and as a result, i increases transfer to $-i$.

Based on Figure 6 we can categorize threats to a valid LATE as arising from a combination of violations of the exclusion restriction, SUTVA, and violations of SUTVA only.

From the perspective of the *exclusion restriction*, the only pathways of spillovers that are a concern are pathways from D_{ig} to Y_{ig} that do not run through I_{ig}. These are:

- pathway (1) $\rightarrow$ (6)
- pathway (1) $\rightarrow$ B $\rightarrow$ (7)

The following pathways are not a concern from the perspective of the exclusion restriction, because they all run from D_{ig} to I_{ig} to Y_{ig}:

- pathway (1) $\rightarrow$ (3) $\rightarrow$ A;
- pathway (1) $\rightarrow$ (3) $\rightarrow$ (5) $\rightarrow$ (7);
- pathway (11) $\rightarrow$ (4) $\rightarrow$ (6);
- pathway (11) $\rightarrow$ (4) $\rightarrow$ B $\rightarrow$ (7).

Any pathways that run from D_{-ig} to Y_{ig}, either through I_{ig} or I_{-ig} do not pose a violation of the exclusion restriction because they do not affect the causal effect of the instrument D_{ig} on I_{ig}. They do, however, change the overall population of compliers to treatment, and – if spillovers exist in the second stage – would thus affect the estimate of the $\hat{I}_{ig}$ on Y_{ig}. This can happen through:

- (2) $\rightarrow$ A;
- (2) $\rightarrow$ (4) $\rightarrow$ (6);
- (2) $\rightarrow$ (4) $\rightarrow$ B $\rightarrow$ (7);
- (10) $\rightarrow$ (3) $\rightarrow$ A;
- (10) $\rightarrow$ (3) $\rightarrow$ (5) $\rightarrow$ (7);
- (10) $\rightarrow$ (6)
- (10) $\rightarrow$ (B) $\rightarrow$ (7).

As we only have random variation in D_{ig} and D_{-ig}, we can only estimate the causal pathways (1), (2), (10), and (11). Any effects beyond this coming from D_{ig} – such as pathway (1) $\rightarrow$ (3) – cannot be causally interpreted. It is the result of the fact that instrumenting I_{-ig} with D_{ig} is required for a causal interpretation, but the existence of (11) implies that the exclusion restriction would be violated if we do so.

Therefore, we first focus on estimating the direct effects on the first stage only, which would include:

- pathway (1): D_{ig} on I_{-ig}
- pathway (2): D_{-ig} on I_{ig}
- pathway (10): D_{-ig} on I_{-ig}
- pathway (11): D_{ig} on I_{ig}

and the combinations of the two direct effects:

- pathways (1) and (10): D_{ig} & D_{-ig} on $\overline{I}_{-ig}$
- pathways (2) and (11): D_{ig} & D_{-ig} on I_{ig}

B.1 Estimation Strategies

To investigate spillovers empirically, we construct the following variables for $-i$:

- $-i's$ coupon receipt (D_{-ig}): This is constructed by creating a variable for each herder i that is the mean of the number of coupons received in the first three seasons by all other herders ($-i$) in their community g:

  $$\overline{D}_{-ig} := \frac{1}{N_g} \sum_{-i_g=1}^{n_g} [\text{No. of coupons received - first three seasons}]_{-ig}$$

  where [No. of coupons received - first three seasons]$_{-ig}$ is the total number of coupons distributed in the community to all herders except for i in the initial three seasons.

- $-$i's insurance uptake (I_{-ig}): This is constructed by creating a variable for each herder i that is the share of herders $-i$ out of all herders in the community except for i that purchased any insurance during the first three seasons:

$$\bar{I}_{-ig} := \frac{1}{N_g} \sum_{-i_g=1}^{n_g} [\text{Any insurance purchased - first three seasons}]_{-ig}$$

where $[\text{Any insurance purchased - first three seasons}]_{-ig}$ is a binary variable that is one if the households bought insurance at least once in the first three sales seasons.

We also create a vector of control covariates for all herders $-i$ in community g in the same way that we create the above-mentioned variables, which we define as $\overline{X}_{-ig0}$.

Table B1: Summary statistics of the spillover variables

	Kenya				Ethiopia				Pooled			
	Mean/SD	Min	Max	Obs	Mean/SD	Min	Max	Obs	Mean/SD	Min	Max	Obs
D_{ig}: No. of coupons received – first three seasons	1.78	0.00	3.00	781	1.57	0.00	2.00	398	1.71	0.00	3.00	1179
	[0.87]				[0.60]				[0.79]			
I_{ig}: Any insurance purchase - first three seasons	0.41	0.00	1.00	781	0.45	0.00	1.00	398	0.42	0.00	1.00	1179
	[0.49]				[0.50]				[0.49]			
$\overline{D}_{-ig}$: Peers' mean no. of coupons received – first three season	1.78	1.65	1.88	781	1.57	1.35	2.00	398	1.71	1.35	2.00	1179
	[0.04]				[0.09]				[0.12]			
$\overline{I}_{-ig}$: Peers' any insurance purchase – first three seasons	0.41	0.13	0.79	781	0.45	0.00	1.00	398	0.42	0.00	1.00	1179
	[0.16]				[0.17]				[0.17]			
Peers' average: Male headed household (=1)	0.63	0.00	0.88	781	0.79	0.50	1.00	398	0.68	0.00	1.00	1179
	[0.25]				[0.09]				[0.22]			
Peers' average: Age of the household head	48.08	27.19	59.14	781	50.23	37.11	57.03	398	48.81	27.19	59.14	1179
	[6.14]				[4.55]				[5.74]			
Peers' average: Share of male children	0.52	0.38	0.64	781	0.49	0.21	0.65	398	0.51	0.21	0.65	1179
	[0.06]				[0.07]				[0.07]			
Peers' average: Head ever went to school (=1)	0.13	0.00	0.31	781	0.11	0.00	0.30	398	0.13	0.00	0.31	1179
	[0.09]				[0.09]				[0.09]			
Peers' average: Fully settled (=1)	0.23	0.00	0.92	781	0.76	0.00	0.95	398	0.41	0.00	0.95	1179
	[0.23]				[0.13]				[0.32]			
Observations	781				398				1179			

Notes: All columns present mean, standard deviation (in square brackets), and the number of observations for each variable.

We show the summary statistics of these variables in Table B1. By construction – because all herders are included as i in D_{ig} and Y_{ig}, and they are also included as $-i$ in $\overline{D}_{-ig}$ and $\overline{Y}_{-ig}$ – the means of these $-i$ variables across the entire sample are always the same as the mean for the i variables, but the standard deviation is reduced. As a result, if one were to estimate correlations between these two variables, mechanically, we would expect a negative correlation.

Furthermore, the nature of our randomization was such that 33 communities (16 sublocations in Kenya and 17 kebeles in Ethiopia) were selected, and a list of households in the community was used to draw a random sample of households for inclusion in the study. In the second stage, per community, households were randomized to either receive discount coupons or not. In each round, 60% of these sampled households (80% in Ethiopia) were assigned to receive a coupon and 40% (20% in Ethiopia) were assigned not to receive a coupon. It implies that conditional on being selected for the study sample in a location, $-i$'s likelihood of being randomly assigned to receive a coupon is conditional on i's treatment assignment. As a result, treatment assignment of i is mechanically negatively correlated to treatment assignment of $-i$. This is demonstrated in Table 7.

Columns (1) and (2) of Table 7 show that an increase of 1 in the mean number of coupons received during the first three seasons by $-i$ decreases the number of coupons received by i during the first three seasons by -31, relative to a control mean of 1.7 coupons. The inverse relationship demonstrates that one additional coupon received by i reduces the mean number of coupons received by peers by -0.025.

B.2 Results

If we want to understand the causal effect of the instrument D_{ig} on I_{ig}, we need to control for any potential mechanical and/or spillover effects of D_{-ig} on I_{ig}, either direct or indirect, via I_{-ig}. Therefore we estimate three equations for each outcome I_{ig} and $\bar{I}_{-ig}$ as below. First, for herder i's purchase:

$$\text{pathway (11): } I_{ig} = \alpha + \beta_1 D_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig} \tag{13}$$

$$\text{pathway (2): } I_{ig} = \alpha + \beta_2 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig} \tag{14}$$

$$\text{pathway (2); (11): } I_{ig} = \alpha + \beta_1 D_{ig} + \beta_3 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig} \tag{15}$$

where X_{ig0} refers to a vector of recipient's baseline controls and $\overline{X}_{-ig0}$ to a vector of the means of peers' baseline controls. We include D_{ig} and $\overline{D}_{-ig}$, separately and jointly. In equation (13) we can then interpret β_1 as the direct effect of D_{ig} on I_{ig} (pathway (11)), in equation (14) β_2 as the direct effect of $\overline{D}_{-ig}$ on I_{ig} (pathway (2)), and in equation (15) β_3 as capturing the indirect effect of $\overline{D}_{-ig}$ on I_{ig}, that runs through $\bar{I}_{-ig}$.

For the mean purchase of peers, $\bar{I}_{-ig}$,

$$\text{pathway (1): } \bar{I}_{-ig} = \alpha + \beta_4 D_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig} \tag{16}$$

$$\text{pathway (10): } \bar{I}_{-ig} = \alpha + \beta_5 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig} \tag{17}$$

$$\text{pathway (1); (10): } \bar{I}_{-ig} = \alpha + \beta_4 D_{ig} + \beta_6 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig} \tag{18}$$

where we include D_{ig} and $\overline{D}_{-ig}$, separately and jointly. In equation (16) we can then interpret β_4 as the direct effect of D_{ig} on $\bar{I}_{-ig}$ (pathway (1)), in equation (17) β_5 as the direct effect of $\overline{D}_{-ig}$ on $\bar{I}_{-ig}$ (pathway (10)), and in equation (18) β_6 as capturing the indirect effect of D_{ig} on $\bar{I}_{-ig}$, that runs through I_{ig}.

Columns (3)-(8) of Table 7 show the results of the first-stage spillovers. Column (3) repeats the first-stage results presented so far in the paper, which show that an increase of 1 in the number of coupons received by the recipient in the first three seasons increases their likelihood of purchasing any insurance during the first three seasons by 12.3 percentage points. Column (4) shows that an increase of 1 standard deviation in the peers' mean number of coupons received reduces the likelihood of purchase of any insurance in the first three seasons by the recipient by 44.1 percentage points (SD of $\overline{D}_{-ig} = 0.12$; $0.12 * (-3.672) = 44.06$). Column (5) shows that if we use the two variables of coupon receipts – D_{ig}, $\overline{D}_{-ig}$, then the effects from the recipient's coupons is the only effect that is significant.

Columns (6)-(8) present the results for the mean insurance purchase by peers, $\overline{I}_{-ig}$. Column (6) shows that an increase of 1 in the number of coupons received by the recipient decreases the mean likelihood that peers purchase insurance by 0.3 percentage points. Column (7) shows, however, that a 1 standard deviation increase in the peers' mean number of coupons received increases the mean likelihood that peers purchase insurance by 1.3 percentage points (SD of $\overline{D}_{-ig} = 0.12$; $0.12 * 0.111 = 0.0133$). This is consistent with the effect we expect of our exogenous instrument on insurance purchase. When both the coupon receipt of the recipient and mean coupon receipt of peers are included, neither is statistically significant (Column (8)).

In Tables B2-B5, we re-estimate the second-stage estimations presented in Tables 3 to 6, but including $\overline{D}_{-ig}$ as an additional instrument and $\overline{I}_{-ig}$ as an additional endogenous variable. Coefficient estimates are mostly not significant, but the results are qualitatively similar to the main results. Even if they are statistically not significant, the signs and the magnitude of the coefficients are the same, although they lack in statistical significance due to the loss of statistical power by introducing another instruments into estimations where the statistical power was already quite low.

Table B2 reports the effects on primary outcomes – herd size, cash earnings, and education. Similar to Table 3, the effects of recipients' own insurance purchase on herd size and cash earnings are not significant. For education we find that – in the specification without controls – both the recipients' insurance purchase as well as the peers' mean insurance purchase have a positive and significant effect on education. For the effect of the recipients' insurance purchase we observe a 15.7 percentage points increase in the share of members who completed age-appropriate years of education (p-value: 0.580). If we include recepeints' control only, we observe a 12.5 percentage points increase (p-value: 0.516). If we include all controls, we observe a 24.7 percentage points increase with a p-value of 0.349. We do not observe a statistically significant effect of peers' mean insurance purchase in all specifications, although due to potential reverse causality between I_{ig} and

$\bar{I}_{-ig}$ this should not be interpreted as casual effect.

Table B3 reports that the effects on the herd composition, which also shows that results are qualitatively similar to the main results. In the specification without controls, the predicted insurance purchase by the recipient, $\hat{I}_{ig}$, now suggests a 22 percentage points increase, significant at the 10% significance level. Furthermore, in the specification with controls, the predicted insurance purchase increases the share of cattle by 36.0 percentage points, but this effect is also not robust to the exclusion of controls. Columns (7) to (9) show negative effects of the recipients' insurance purchase on the share of goats, albeit it being statistically insignificant in Column (9) (p-value 0.746), and the point estimates varying between 24.0 percentage points without controls to 11.1 percentage points with both recipients' and peers' controls. These results are consistent with Table 4, where a decline of 23.5 percentage points was noted. It's also important to highlight that the coefficient on $\bar{I}_{-ig}$ is negative and not statistically significant.

Table B4 presents the effects on the prespecified secondary outcomes: herd management expenditure (USD), milk income, livestock loss evaluated by CMVE, distress sales (CMVE), and livestock sale. These findings are qualitatively consistent with Tables 5, where no significant effect is observed. The signs and the effects of $\hat{I}_{ig}$ are also similar except when we include peers' control for livestock loss and distress sales. Additionally, we don't observe any significant effects stemming from the peers' mean likelihood of purchasing insurance.

Table B5 presents the effects on other prespecified secondary outcomes, including recent IBLI uptake both at intensive and extensive margins, as well as children's activities. None of the effects of $\hat{I}_{ig}$ are significant, mirroring our findings in Table 6 qualitatively. However, we do not observe the previously noted positive significant effect on studying full time. Although imprecisely estimated, the effect size is notable: an increase of 65 percentage points without controls (p-value 0.191) and 25.3 percentage points with full controls (p-value 0.805). We do not observe any significant effects from peers' mean likelihood of purchasing insurance.

For robustness, we repeat the analyses presented in Table 7 to B5 with cluster standard errors at the village level. The results reported in Table E6 to E10 show that our results using robust standard error is robust to the clustering of the standard errors at the village level.

We also repeat the same analyses without community fixed effects. The results in Table E11 to E15 show that the community fixed effect was decreasing the precision of the estimate. Considering the fact that the our spillover is measured at the community level, so the community fixed effects will take away variations at the community level, which leaves very little variations for peers' insurance uptake or coupon receipts.

Table B2: Spillover effects on prespecified primary outcomes: Herd size, earnings, education with two endogenous variables

	Herd size (CMVE)			Total household cash earning (USD)			Share of members who completed age-appropriate years of education		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	2.485	3.878	0.208	-125.555	-135.190	-430.321	0.105	0.125	0.157
	(11.228)	(11.276)	(20.490)	(430.674)	(429.388)	(1130.550)	(0.190)	(0.193)	(0.168)
$\widehat{\widehat{I}}_{-ig}$: Peers' any insurance purchase – first three season	17.482	23.198	-119.587	-1544.928	-1530.794	-13502.212	-1.438	-0.812	0.435
	(168.443)	(167.174)	(873.663)	(6743.689)	(6755.025)	(40697.165)	(7.249)	(7.303)	(6.388)
Recipient controls (i)		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓
Control mean	14.265	14.265	14.265	693.382	693.382	693.382	0.048	0.048	0.048
Observations	1179	1179	1179	1179	1179	1179	770	770	770

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ig}} + \gamma_1\widehat{\widehat{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$ where we instrument $\widehat{I_{ig}}$ and $\widehat{\widehat{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table B3: Spillover effects on Prespecified primary outcome: Herd composition with two endogenous variables

	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)	(9)	(10)	(11)	(12)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.220*	0.216*	-0.613	0.019	0.008	0.472	-0.240**	-0.244**	-0.111	-0.007	0.016	0.279
	(0.125)	(0.123)	(0.567)	(0.131)	(0.138)	(0.310)	(0.101)	(0.104)	(0.344)	(0.051)	(0.051)	(0.245)
$\widehat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	4.044	3.870	-26.989	-3.674	-4.002	13.384	-0.643	-0.392	4.522	0.009	0.298	10.033
	(3.602)	(3.437)	(21.439)	(3.591)	(3.913)	(11.324)	(1.173)	(1.230)	(12.453)	(0.620)	(0.667)	(8.780)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓
Control mean	0.263	0.263	0.263	0.332	0.332	0.332	0.284	0.284	0.284	0.121	0.121	0.121
Observations	987	987	987	987	987	987	987	987	987	987	987	987

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ig}} + \gamma_1\widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$ where we instrument $\widehat{I_{ig}}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table B4: Spillover effects on prespecified secondary outcomes with two endogenous variables

	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)	(11)	(12)	(13)	(14)	(15)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	-65.605	-62.834	477.054	714.312	844.286	-26.448	5.119	5.156	-2.744	-0.495	-0.565	-0.546	-0.823	-0.581	-5.780
	(148.886)	(148.687)	(424.064)	(516.903)	(549.032)	(788.260)	(6.787)	(6.508)	(10.524)	(0.678)	(0.697)	(0.693)	(1.886)	(1.903)	(3.843)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	-2530.910	-2560.477	18649.720	5660.998	6995.305	-27398.439	140.758	134.314	-169.486	-7.195	-9.772	-10.480	13.647	17.309	-185.911
	(3834.294)	(3805.441)	(16999.063)	(6642.075)	(7649.229)	(31791.967)	(204.793)	(195.178)	(441.015)	(42.322)	(42.312)	(41.652)	(38.681)	(40.774)	(148.740)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓			✓
Control mean	182.827	182.827	182.827	339.362	339.362	339.362	5.448	5.448	5.448	0.292	0.292	0.292	1.872	1.872	1.872
Observations	1179	1179	1179	1179	1179	1179	1179	1179	1179	781	781	781	1179	1179	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ig}} + \gamma_1\widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$ where we instrument $\widehat{I_{ig}}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

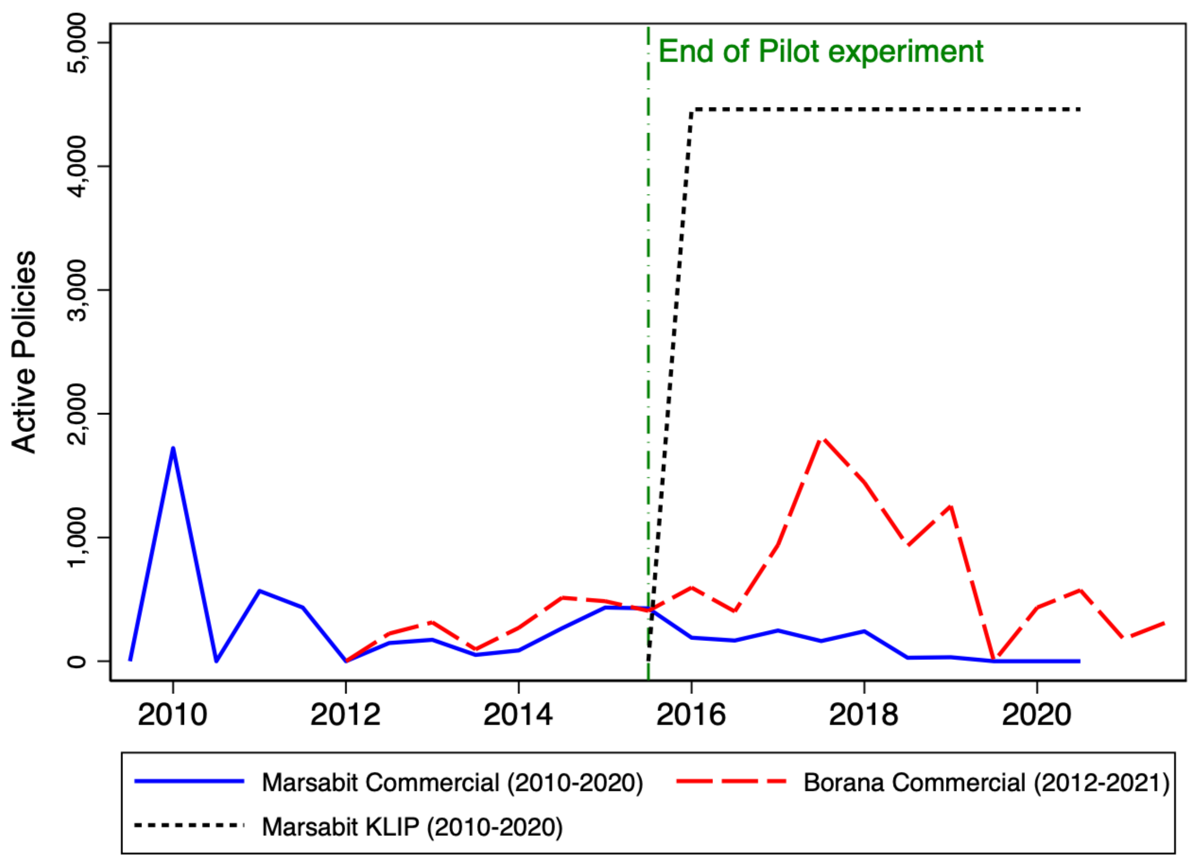
Table B5: Spillover effects on prespecified secondary outcomes: IBLI purchase and children's activities

	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)	(11)	(12)	(13)	(14)	(15)
$\widehat{I}_{ig}$: Any insurance purchase - first three seasons	0.030	0.037	-0.063	-1.985	-1.997	7.742	0.074	0.257	-0.138	-0.145	-0.006	0.257	-0.654	-0.585	-0.353
	(0.070)	(0.070)	(0.180)	(1.902)	(2.015)	(6.663)	(0.797)	(1.008)	(0.942)	(0.620)	(0.778)	(1.029)	(1.684)	(1.588)	(1.427)
$\widehat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	-0.147	0.066	-3.831	-43.215	-45.213	337.409	10.420	16.304	4.912	1.911	7.228	13.639	-30.763	-29.293	-21.110
	(1.285)	(1.268)	(8.122)	(55.114)	(58.114)	(291.627)	(26.915)	(33.017)	(29.167)	(19.695)	(24.651)	(31.329)	(53.801)	(50.585)	(42.576)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓			✓
Control mean	0.042	0.042	0.042	0.539	0.539	0.539	0.271	0.271	0.271	0.201	0.201	0.201	0.232	0.232	0.232
Observations	1179	1179	1179	1179	1179	1179	376	376	376	376	376	376	376	376	376

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ig} + \gamma_1\widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D^{t=6}_{ij4} + \rho_j + \varepsilon_{ijT}$ where we instrument $\widehat{I}_{ig}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

C Tables and Figures Referenced in Text

Figure C1: IBLI Purchase Over time



Notes: This figure shows policies in force since 2010. The solid blue line shows total coverage in the Marsabit IUs, the black dotted line shows the total commercial IBLI sales in the Marsabit IUs including KLIP, and the red dashed line shows the total coverage/commercial sales in Borena.

Table C1: Summary statistics of outcome variables

	Kenya				Ethiopia				Pooled			
	Mean/SD	Min	Max	Obs	Mean/SD	Min	Max	Obs	Mean/SD	Min	Max	Obs
Herd size (CMVE)	12.96	0.00	349.80	781	16.51	0.00	498.78	398	14.16	0.00	498.78	1179
	[24.46]				[38.72]				[30.07]			
Share of camels in herd (CMVE)	0.31	0.00	1.00	619	0.10	0.00	1.00	395	0.23	0.00	1.00	1014
	[0.38]				[0.22]				[0.34]			
Share of cattle in herd (CMVE)	0.21	0.00	1.00	619	0.65	0.00	1.00	395	0.38	0.00	1.00	1014
	[0.35]				[0.23]				[0.38]			
Share of goats in herd (CMVE)	0.34	0.00	1.00	619	0.18	0.00	1.00	395	0.28	0.00	1.00	1014
	[0.35]				[0.17]				[0.30]			
Share of sheep in herd (CMVE)	0.14	0.00	1.00	619	0.06	0.00	0.83	395	0.11	0.00	1.00	1014
	[0.20]				[0.08]				[0.17]			
Annual total household cash earning (USD)	645.09	0.00	7891.03	781	798.94	0.00	10724.90	398	697.03	0.00	10724.90	1179
	[1181.81]				[1227.28]				[1199.04]			
Share of members who completed age-appropriate years of education	0.04	0.00	1.00	654	0.10	0.00	1.00	219	0.06	0.00	1.00	873
	[0.15]				[0.28]				[0.19]			
Herd management expenditure (USD)	139.34	0.00	3648.66	666	269.68	0.00	5722.84	398	188.10	0.00	5722.84	1064
	[290.75]				[505.02]				[390.02]			
Annual milk income (USD)	562.75	0.00	29929.54	781	43.39	0.00	14132.17	398	387.43	0.00	29929.54	1179
	[1940.55]				[710.37]				[1650.42]			
Livestock lost in the past 12 months (CMVE)	3.00	0.00	56.80	781	9.95	0.00	352.32	398	5.35	0.00	352.32	1179
	[6.38]				[24.68]				[15.59]			
N of lost camel	1.08	0.00	28.00	578	0.57	0.00	25.00	398	0.87	0.00	28.00	976
	[3.25]				[2.29]				[2.91]			
N of lost cattle	0.53	0.00	40.00	578	8.36	0.00	300.00	398	3.73	0.00	300.00	976
	[2.46]				[22.47]				[14.97]			
N of lost goats/sheep	17.95	0.00	270.00	578	1.02	0.00	52.32	398	11.05	0.00	270.00	976
	[32.47]				[3.09]				[26.40]			
Distress sale in the past 12 months (CMVE)	0.49	0.00	25.60	781	.	.	.	0	0.49	0.00	25.60	781
	[2.01]				[.]				[2.01]			
Share of children working full-time	.	.	.	0	0.28	0.00	1.00	376	0.28	0.00	1.00	376
	[.]				[0.31]				[0.31]			
Share of children working part-time	.	.	.	0	0.18	0.00	1.00	376	0.18	0.00	1.00	376
	[.]				[0.30]				[0.30]			
Share of children studying full-time	.	.	.	0	0.23	0.00	1.00	376	0.23	0.00	1.00	376
	[.]				[0.29]				[0.29]			
IBLI uptake in the past 12 months (=1 if purchased)	0.00	0.00	1.00	781	0.15	0.00	1.00	398	0.05	0.00	1.00	1179
	[0.04]				[0.36]				[0.22]			
IBLI uptake in the past 12 months (CMVE)	0.02	0.00	13.80	781	1.80	0.00	100.00	398	0.62	0.00	100.00	1179
	[0.49]				[7.22]				[4.30]			
Observations	781				398				1179			

Notes: All columns present mean, standard deviation (in square brackets), and the number of observations for each variable.

Table C2: Checking monotonicity assumption

	Number of seasons purchase IBLI (%)			
Number of coupons recipient's received	0	1	2	3
0	80.000	16.250	3.750	0.000
1	67.797	27.119	4.802	0.282
2	51.646	38.821	9.185	0.347
3	48.214	34.524	17.262	0.000

	Number of seasons purchase IBLI (%)	
Number of coupons recipient's received	0	1
0	80.000	20.000
1	67.797	32.203
2	51.646	48.354
3	48.214	51.786

Table C3: Education - School-aged during experiment

	Maximum years of education	Total years of education	Average years of education
	(1)	(2)	(3)
Any insurance purchased	1.930	5.163*	2.268**
	(1.361)	(3.003)	(1.134)
Controls	✓	✓	✓
Control mean	6.715	8.488	4.860
Observations	770	1179	770

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. The outcomes were measured for the cohort of household members who were 5-17 years old at one point during the pilot experiment. Maximum years of education is the maximum number of years education among cohort, total years of education is the sum of the number of years education among cohort, and the average years of education is the average number of years education among cohort members.

Table C4: Effects on various measures of educational attainment

	Maximum years of education	Total years of education	Average years of education	Share of household members: 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	1.930	5.163*	2.268**	0.146**	0.219*	0.164	0.131	-0.006
	(1.361)	(3.003)	(1.134)	(0.061)	(0.124)	(0.128)	(0.113)	(0.052)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	6.715	8.488	4.860	0.048	0.646	0.549	0.204	0.033
Observations	770	1179	770	770	770	770	770	770

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Please refer to Table C3 for the definition of maximum years of education, total years of education, and average years of education. Other variables are the share of cohort members who completed age-appropriate education, any schooling, 4 years of primary school (half of the primary education), primary education, and secondary education. Cohort members are the household members who were school-aged children at least once during the experiment.

Table C5: Effects on educational attainment by gender

	Share of members who completed age-appropriate education	Maximum years of education	Total years of education	Average years of education
	(1)	(2)	(3)	(4)
Panel A: Male				
Any insurance purchased	0.099*	3.894**	6.218*	3.137**
	(0.057)	(1.656)	(3.181)	(1.402)
Controls	✓	✓	✓	✓
Control mean	0.049	6.289	8.668	4.900
Observations	533	533	533	533
Panel B: Female				
Any insurance purchased	0.120	0.621	0.281	0.949
	(0.077)	(1.342)	(2.680)	(1.301)
Controls	✓	✓	✓	✓
Control mean	0.052	6.186	8.135	5.557
Observations	427	427	427	427

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Please refer to Table C3 for the definition of maximum years of education, total years of education, and average years of education.

Table C6: Education – missing values imputed with average

	Share of members who completed age-appropriate years of education			
	Without missing values imputed		With missing values imputed	
	(1)	(2)	(3)	(4)
Any insurance purchased	0.142**	0.146**	0.077*	0.080*
	(0.061)	(0.061)	(0.043)	(0.043)
Controls		✓		✓
Control mean	0.048	0.048	0.055	0.055
Observations	770	770	1179	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Please refer to Table C1 for the definition of outcome variables.

Table C7: Effects on the number of young adults (18-25 years old, Kenya only)

	N of young adults		Share of young adults	
	(1)	(2)	(3)	(4)
Any insurance purchased	0.144	0.133		
	(0.312)	(0.304)		
Baseline N of young adults	0.039	0.026		
	(0.039)	(0.039)		
Baseline average education of young adults			0.011***	0.009***
			(0.002)	(0.002)
Baseline share of young adults			-0.255***	-0.237***
			(0.040)	(0.040)
Controls		✓		✓
Control mean	0.778	0.778		
Observations	781	781	479	479

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D^{t=6}_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Please refer to Table C1 for the definition of outcome variables.

Table C8: Herd composition large versus small ruminants - short-run and long-run

	N of animals (CMVE) / Total herd size (CMVE)					
	Camels and cattle			Goats and sheep		
	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run
	(1)	(2)	(3)	(4)	(5)	(6)
Any insurance purchased	0.076	0.133	0.230**	-0.076	-0.133	-0.230**
	(0.070)	(0.089)	(0.115)	(0.070)	(0.089)	(0.115)
Controls	✓	✓	✓	✓	✓	✓
Control mean	0.669	0.643	0.596	0.331	0.357	0.404
Observations	1085	1009	987	1085	1009	987

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D^{t=6}_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C9: Herd size, earnings, and education —short-run and long-run

	Herd size (CMVE)			Total household cash earning (USD)			Share of members who completed age-appropriate years of education		
	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Any insurance purchased	-4.286	-0.562	3.328	-234.657	329.315	-98.678	-0.032	0.054	0.146**
	(6.111)	(5.584)	(8.792)	(252.644)	(306.211)	(394.083)	(0.031)	(0.034)	(0.061)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	20.648	17.931	14.265	575.291	772.971	693.382	0.031	0.030	0.048
Observations	1165	1118	1179	1165	1118	1179	982	948	770

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D^{t=6}_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C10: Education - short-run and long-run

	Maximum years of education			Total years of education			Average years of education		
	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Any insurance purchased	-0.037	0.818	1.930	-0.404	0.278	5.163*	-0.048	0.188	2.268**
	(0.603)	(0.895)	(1.361)	(0.895)	(1.941)	(3.003)	(0.254)	(0.564)	(1.134)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	1.212	4.712	6.715	1.617	8.023	8.488	0.487	2.119	4.860
Observations	982	948	770	1165	1118	1179	982	948	770

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D^{t=6}_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Please refer to Table C1 for the definition of outcome variables.

Table C11: Herd composition — short-run and long-run

	Outcome: N of animal type in CMVE / Total N of animals in CMVE											
	Camel			Cattle			Goat			Sheep		
	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Any insurance purchased	0.083	0.078	0.120	-0.006	0.057	0.107	-0.049	-0.180**	-0.235**	-0.028	0.055	0.009
	(0.059)	(0.074)	(0.092)	(0.058)	(0.069)	(0.083)	(0.065)	(0.072)	(0.097)	(0.031)	(0.050)	(0.052)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	0.301	0.258	0.263	0.369	0.385	0.332	0.221	0.228	0.284	0.109	0.128	0.121
Observations	1085	1009	987	1085	1009	987	1085	1009	987	1085	1009	987

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ij}} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C12: Herd management expenditure and milk income — short-run and long-run

	Herd management expenditure (USD)			Annual milk income (USD)		
	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run
	(1)	(2)	(3)	(4)	(5)	(6)
Any insurance purchased	556.612	447.220	-4.606	419.689	132.892	677.707
	(3445.516)	(1729.392)	(106.454)	(419.429)	(103.842)	(471.170)
Controls	✓	✓	✓	✓	✓	✓
Control mean	3489.562	2370.027	187.793	291.025	106.449	339.362
Observations	1156	1118	1064	1165	1118	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C13: Distress sale and livestock sale — short-run and long-run

	Distress sales (CMVE)			Livestock sale (CMVE)		
	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run
	(1)	(2)	(3)	(4)	(5)	(6)
Any insurance purchased	0.276	0.028	-0.342	-0.879	2.339	-0.988
	(1.764)	(4.028)	(0.523)	(2.633)	(4.174)	(1.485)
Controls	✓	✓	✓	✓	✓	✓
Control mean	2.669	4.045	0.292	6.605	8.775	1.872
Observations	1096	1089	781	1064	1046	1131

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C14: Livestock loss by animal type — short-run and long-run

	N of lost animals								
	Camel			Cattle			Goats/Sheep		
	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Any insurance purchased	-0.519	0.226	0.231	0.281	-0.794	1.144	15.743	0.786	-7.176
	(1.241)	(0.381)	(1.135)	(2.049)	(0.810)	(2.023)	(12.163)	(5.502)	(9.483)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	1.832	0.585	0.982	2.058	1.110	3.539	19.940	9.337	11.788
Observations	943	823	896	943	823	896	943	823	896

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ij}} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C15: Time use of children -— short-run and long-run

	Working full-time			Working part-time			Studying full-time		
	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run	3rd sales season	End of experiment	10-year long-run
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Any insurance purchased	-0.069	-0.002	-0.327	0.158	0.106	-0.263	-0.138	-0.113	0.462*
	(0.099)	(0.088)	(0.285)	(0.103)	(0.098)	(0.256)	(0.098)	(0.089)	(0.278)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	0.427	0.409	0.271	0.289	0.291	0.201	0.177	0.167	0.232
Observations	1040	1030	376	1040	1030	376	1040	1030	376

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D^{t=6}_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C16: Payout effect 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)
Any insurance purchased (γ_1)	2.010	3.444	-115.0	-122.9	0.148**	0.152**
	(9.019)	(9.097)	(405.5)	(404.0)	(0.0640)	(0.0632)
Any insurance purchased × Indemnity rate (γ_2)	0.000472	-0.000794	0.177	0.166	-0.0000415	-0.0000412
	(0.00279)	(0.00264)	(0.366)	(0.322)	(0.0000382)	(0.0000351)
Coef: $\gamma_1 + \gamma_2$	2.011	3.443	-114.831	-122.687	0.148	0.152
p-val.: $\gamma_1 + \gamma_2$	0.824	0.705	0.776	0.761	0.021	0.016
Controls		✓		✓		✓
Control mean	14.265	14.265	693.382	693.382	0.048	0.048
Observations	1179	1179	1179	1179	770	770

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \gamma_0 + \gamma_1 \widehat{I_{ij}} + \gamma_2 \widehat{\text{Payout}}_{ij} + \gamma_3 y_{ij0} + \gamma_4 X_{ij0} + \gamma_5 D^T_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but not more than three times, within the initial three seasons. Any payout receipt similarly refers to whether a household received any payout during the same period. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C17: Payout effect 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)
Any insurance purchased (γ_1)	0.121	0.117	0.116	0.116	-0.231**	-0.242**	-0.00900	0.00791
	(0.0930)	(0.0936)	(0.0832)	(0.0834)	(0.0974)	(0.0988)	(0.0537)	(0.0532)
Any insurance purchased × Indemnity rate (γ_2)	0.0000136	0.0000177	-0.0000544	-0.0000630	0.0000447	0.0000519	0.0000112	0.00000498
	(0.0000544)	(0.0000543)	(0.0000997)	(0.000103)	(0.0000808)	(0.0000825)	(0.0000196)	(0.0000168)
Coef: γ_1 + γ_2	0.121	0.117	0.116	0.116	-0.231	-0.242	-0.009	0.008
p-val.: γ_1 + γ_2	0.194	0.209	0.164	0.164	0.018	0.014	0.867	0.882
Controls		✓		✓		✓		✓
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

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \gamma_0 + \gamma_1 \widehat{I_{ij}} + \gamma_2 \widehat{\text{Payout}}_{ij} + \gamma_3 y_{ij0} + \gamma_4 X_{ij0} + \gamma_5 D^T_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but not more than three times, within the initial three seasons. Any payout receipt similarly refers to whether a household received any payout during the same period. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C18: Payout effects on secondary outcomes: 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)	(6)	(7)	(8)	(9)	(10)
Any insurance purchased (γ_1)	-8.055	-0.416	655.2	754.9	1.597	1.745	-0.345	-0.359	-1.330	-1.146
	(100.6)	(101.0)	(475.3)	(494.8)	(2.977)	(2.854)	(0.552)	(0.547)	(1.501)	(1.487)
Any insurance purchased × Indemnity rate (γ_2)	0.0117	-0.00896	-0.505*	-0.528*	0.00150	0.00136	0.0000814	0.000100	0.00128	0.00102
	(0.0877)	(0.0828)	(0.289)	(0.293)	(0.00183)	(0.00157)	(0.000133)	(0.000153)	(0.00102)	(0.000883)
Coef: $\gamma_1 + \gamma_2$	-8.044	-0.425	654.738	754.333	1.598	1.746	-0.345	-0.359	-1.328	-1.145
p-val.: $\gamma_1 + \gamma_2$	0.936	0.997	0.168	0.127	0.592	0.540	0.531	0.511	0.375	0.441
Controls		✓		✓		✓		✓		✓
Control mean	182.827	182.827	339.362	339.362	5.448	5.448	0.292	0.292	1.872	1.872
Observations	1179	1179	1179	1179	1179	1179	781	781	1179	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \gamma_0 + \gamma_1 \widehat{I_{ij}} + \gamma_2 \widehat{\text{Payout}}_{ij} + \gamma_3 y_{ij0} + \gamma_4 X_{ij0} + \gamma_5 D^T_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but not more than three times, within the initial three seasons. Any payout receipt similarly refers to whether a household received any payout during the same period. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C19: Payout effects on secondary outcomes: 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)	(6)	(7)	(8)	(9)	(10)
Any insurance purchased (γ_1)	-8.055	-0.416	655.2	754.9	1.597	1.745	-0.345	-0.359	-1.330	-1.146
	(100.6)	(101.0)	(475.3)	(494.8)	(2.977)	(2.854)	(0.552)	(0.547)	(1.501)	(1.487)
Any insurance purchased × Indemnity rate (γ_2)	0.0117	-0.00896	-0.505*	-0.528*	0.00150	0.00136	0.0000814	0.000100	0.00128	0.00102
	(0.0877)	(0.0828)	(0.289)	(0.293)	(0.00183)	(0.00157)	(0.000133)	(0.000153)	(0.00102)	(0.000883)
Coef: $\gamma_1 + \gamma_2$	-8.044	-0.425	654.738	754.333	1.598	1.746	-0.345	-0.359	-1.328	-1.145
p-val.: $\gamma_1 + \gamma_2$	0.936	0.997	0.168	0.127	0.592	0.540	0.531	0.511	0.375	0.441
Controls		✓		✓		✓		✓		✓
Control mean	182.827	182.827	339.362	339.362	5.448	5.448	0.292	0.292	1.872	1.872
Observations	1179	1179	1179	1179	1179	1179	781	781	1179	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \gamma_0 + \gamma_1 \widehat{I_{ij}} + \gamma_2 \widehat{\text{Payout}}_{ij} + \gamma_3 y_{ij0} + \gamma_4 X_{ij0} + \gamma_5 D^T_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but not more than three times, within the initial three seasons. Any payout receipt similarly refers to whether a household received any payout during the same period. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C20: Payout effects on secondary outcomes: IBLI purchase

	IBLI uptake in the past 12 months (=1 if purchased)		IBLI uptake in the past 12 months (CMVE)	
	(1)	(2)	(3)	(4)
Any insurance purchased (γ_1)	0.0346	0.0366	-1.005	-0.966
	(0.0446)	(0.0445)	(0.926)	(0.959)
Any insurance purchased × Indemnity rate (γ_2)	-0.00000820	-0.0000113	0.000218	0.000323
	(0.0000103)	(0.0000113)	(0.000212)	(0.000324)
Coef: γ_1 + γ_2	0.035	0.037	-1.005	-0.965
p-val.: γ_1 + γ_2	0.439	0.411	0.278	0.314
Controls		✓		✓
Control mean	0.042	0.042	0.539	0.539
Observations	1179	1179	1179	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \gamma_0 + \gamma_1 \widehat{I_{ij}} + \gamma_2 \widehat{\text{Payout}}_{ij} + \gamma_3 y_{ij0} + \gamma_4 X_{ij0} + \gamma_5 D^T_{ij4} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but not more than three times, within the initial three seasons. Any payout receipt similarly refers to whether a household received any payout during the same period. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table C21: Number of animals by animal type

	N of animals (CMVE)				Raw N of animals			
	Camel	Cattle	Goat	Sheep	Camel	Cattle	Goat	Sheep
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any insurance purchased	1.894	-1.379	-0.601	-0.387	1.056	-1.379	-7.895	-4.892
	(5.291)	(5.773)	(1.128)	(0.656)	(3.242)	(5.773)	(9.465)	(5.829)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	7.842	5.017	2.308	1.487	4.680	5.017	20.222	13.617
Observations	1017	1017	1017	1017	1017	1017	1017	1017

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ij} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Online Appendix

D Robustness Check

D.1 Herd size, livestock loss, animals insured in TLU (in contrast to CMVE)

In the analysis above, we used cattle market-value equivalent (CMVE) to aggregate the number of animals across animal species, instead of tropical livestock unit (TLU) that are typically used as a measure of the value of livestock assets. Since CMVE is a new aggregation unit to be us ed, we also construct variables in TLU i) to confirm that the values in CMVE is reasonable, and ii) to run the same estimations again with variables in TLU to check if the results are robust to changes in aggregation units.

Table D5 (rows 3 to 11) reports the summary statistics of the variables in TLU. The main difference between CMVE and TLU conversions is that the CMVE puts a larger weight on camels and shoats than does the TLU conversion.

Table D1 shows that our findings in the previous section regarding the herd sizes are robust to the changes in the unit of aggregation. The results are consistent with the results using CMVE measure in terms of sign, magnitude, and statistical significance, as expected. Note that the pattern for the composition for each country is also consistent. We confirm all the null results on TLU lost, TLU distress sales, TLU sold, and recent purchase of IBLI in the last 12 months window.

The extreme values mentioned above may have been driven by a few individuals who work as traders and own/manage a large herd. Since it is not possible with our data to separate the traders out, we include the sub-sample analysis using baseline heard quantiles and winsorized herd size value at 99th percentile. The results reported in Table D3 suggest that by winsorizing the value at 99th percentile we have an estimate with higher precision, especially from Ethiopia. Also the sign of the coefficient in Ethiopia has been changed to positive (Compare to Column (1)-(2) of Table 3) and the sub-sample analysis seem to suggest that the magnitude of the positive coefficients on herd size is driven by the herders from the lower baseline herd size quantile. Combining all these results indicates that the extreme values do not seem to be driving the results presented in the main analysis.

We also present the results from quantile regression, looking at the effects at 15th, 25th, 50th, 75th, and 85th percentile values. Table D4 shows that the estimated coefficients are positive at all quantiles, and was statistically significant at 25th and 50th percentile, suggesting that even mechanically IBLI increases the herd size at a low-middle quantile. Note that only 37% of the sample households maintains the original herd size quartile until the endline.

D.2 Adding round 2 outcomes as control

In our main specification, we only control for baseline (round 1) outcome variable. Since we use IBLI purchase experiences and coupon receipt status of the initial three sales seasons as an endogenous variables and instruments, the information collected in round 2 could serve as a baseline for the information from the sales season 2 and 3 in Kenya and sales season 3 in Ethiopia. Therefore, we check if our results are robust to the inclusion of the outcome variables from round 2 of the panel, in addition to the current specification.

Overall, we find consistent results with the main regression in terms of signs and statistical significance. For most outcome variables, we have the information from the round 2.

Table D6 reports that on the primary outcomes. The magnitude and signs are similar to the main results in general. One change to note is that the children's education variable, in the current version, suffers from a large decrease in sample size – which results in a change in statistical significance of the coefficient estimates in column (8).

Table D7 reports that on the livestock compositions. The signs and statistical significance are similar. The magnitude of the coefficient estimates becomes larger for camel, cattle, and goat (in absolute value), which is in line with the hypothesis of shifting to the larger asset.

Table D8 shows that on the secondary outcomes. Note that we exclude the variable "IBLI uptake in the past 12 months (CMVE)" because we do not control for the round 2 as well as baseline. Again, we find similar results that all the coefficient of variables of interests are null. Herd management expenditure becomes positive once we control for the one at round 2, but it is still very close to zero.

Table D9 shows that on livestock losses. Signs are similar. Magnitude of coefficients are larger for camel and smaller for cattle as compared to the original estimates. Note that sample size is smaller.

Table D1: Effects on herd size in Tropical Livestock Units

		Share of aniamls							
	Herd size	Camel	Cattle	Goat	Sheep	Livestock loss	Distress sales	Sold	IBLI purchase (in the last 12 months)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Any insurance purchased	3.101	0.107	0.124	-0.237**	0.005	0.759	-0.288	-1.146	-0.430
	(7.993)	(0.089)	(0.083)	(0.096)	(0.052)	(2.242)	(0.488)	(1.387)	(0.524)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control mean	12.922	0.249	0.363	0.270	0.117	5.109	0.287	1.689	0.319
Observations	1179	987	987	987	987	1124	781	1131	1179

Notes: Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation:$y\_i,u,j,t = T = \beta^0 + \beta^1 y\_i,u,j,t = 0 + \beta^2 x\_i,u,j,t = 0 + \beta^3 C\_i,u,j + \beta^{LATE} \widehat{IBLI}\_i,u,j + \gamma\_j + \varepsilon\_i,u,j,t = T$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects.

Table D2: Herd size — Cattle Market Value Equivalent versus Tropical Livestock Units

	N of animals / Total herd size		N of animals		
	CMVE	TLU	CMVE	TLU	RAW
	(1)	(2)	(3)	(4)	(5)
Panel A: Goats and sheep					
Any insurance purchased	-0.121**	-0.121**	-0.510	-0.656	-6.563
	(0.058)	(0.058)	(0.660)	(0.564)	(5.639)
Controls	✓	✓	✓	✓	✓
Control mean	0.202	0.194	1.898	1.692	16.920
Observations	1974	1974	2034	2034	2034
Panel B: Camel and cattle					
Any insurance purchased	0.133*	0.134*	0.039	-0.186	-0.393
	(0.070)	(0.069)	(4.103)	(3.876)	(3.441)
Controls	✓	✓	✓	✓	✓
Control mean	0.298	0.306	6.430	5.852	4.849
Observations	1974	1974	2034	2034	2034

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y\_ijT = \beta\_0 + \beta\_LATE\widehat{I}\_ij + \beta\_1y\_ij0 + \beta\_2X\_ij0 + \beta\_3D\_ij4^{t=6} + \rho\_j + \varepsilon\_ijT$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables.

Table D3: Heterogeneous effects on herd size (CMVE) by baseline herdsize

	(1)	(2)	(3)	(4)	(5)
Any insurance purchased	11.301	7.072	10.305	11.255	5.651
	(7.097)	(10.543)	(13.540)	(7.094)	(6.077)
Any insurance purchased × 25 to 50%-quantile	-1.184				
	(25.544)				
Any insurance purchased × 50 to 75%-quantile	-10.912				
	(16.525)				
Any insurance purchased × more than 75%-quantile	-15.740	-11.896			
	(22.397)	(24.270)			
Any insurance purchased × more than 50%-quantile			-12.250		
			(18.812)		
Any insurance purchased × more than 25%-quantile				-9.367	
				(13.930)	
Controls	✓	✓	✓	✓	✓
Control mean	14.265	14.265	14.265	14.265	13.145
Observations	1179	1179	1179	1179	1179

Notes: Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation:XXX. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Please refer to Table C1 for the definition of outcome variables. Column (5) shows the results of main regression with wisonrize herd size at 99%.

Table D4: Effects on herd size at different quantile in endline

	15th percentile	25th percentile	50th percentile	75th percentile	85th percentile
	(1)	(2)	(3)	(4)	(5)
Any insurance purchased	1.293	2.342	4.955**	10.377*	7.320
	(1.228)	(1.442)	(2.152)	(5.421)	(14.736)
Controls					
Control mean	14.265	14.265	14.265	14.265	14.265
Observations	1179	1179	1179	1179	1179

Notes:

Table D5: Summary statistics of additional outcome variables

	Kenya				Ethiopia				Pooled			
	Mean/SD	Min	Max	Obs	Mean/SD	Min	Max	Obs	Mean/SD	Min	Max	Obs
Camel+Cattle/Herd size (CMVE)	0.52	0.00	1.00	619	0.75	0.00	1.00	395	0.61	0.00	1.00	1014
	[0.41]				[0.19]				[0.36]			
Goat+Sheep/Herd size (CMVE)	0.48	0.00	1.00	619	0.25	0.00	1.00	395	0.39	0.00	1.00	1014
	[0.41]				[0.19]				[0.36]			
Herd size in TLU	12.17	0.00	336.09	781	14.00	0.00	440.23	398	12.79	0.00	440.23	1179
	[22.88]				[33.46]				[26.92]			
Camel/Herd size (TLU)	0.30	0.00	1.00	619	0.08	0.00	1.00	395	0.22	0.00	1.00	1014
	[0.37]				[0.18]				[0.33]			
Cattle/Herd size (TLU)	0.21	0.00	1.00	619	0.73	0.00	1.00	395	0.41	0.00	1.00	1014
	[0.35]				[0.22]				[0.40]			
Goat/Herd size (TLU)	0.35	0.00	1.00	619	0.14	0.00	1.00	395	0.27	0.00	1.00	1014
	[0.34]				[0.15]				[0.30]			
Sheep/Herd size (TLU)	0.14	0.00	1.00	619	0.05	0.00	0.83	395	0.11	0.00	1.00	1014
	[0.20]				[0.07]				[0.17]			
Livestock loss (TLU)	2.87	0.00	52.69	781	9.32	0.00	332.70	398	5.05	0.00	332.70	1179
	[5.99]				[23.79]				[14.96]			
Distress sales (TLU)	0.48	0.00	22.86	781	.	.	.	0	0.48	0.00	22.86	781
	[1.90]				[.]				[1.90]			
Livestock sale (TLU)	1.49	0.00	53.66	781	2.38	0.00	40.71	398	1.79	0.00	53.66	1179
	[3.98]				[3.91]				[3.98]			
TLU insured in the past 12 months	0.02	0.00	12.43	781	1.05	0.00	57.14	398	0.36	0.00	57.14	1179
	[0.44]				[4.16]				[2.49]			
Total years of eduction in a HH (among children 5-17 yo)	9.80	0.00	49.00	729	6.13	0.00	38.00	398	8.50	0.00	49.00	1127
	[9.38]				[6.21]				[8.58]			
Average years of eduction in a HH (among children 5-17 yo)	3.20	0.00	12.50	729	1.42	0.00	7.60	398	2.57	0.00	12.50	1127
	[2.63]				[1.45]				[2.44]			
N of camel (CMVE)	9.37	0.00	128.00	619	3.09	0.00	107.50	398	6.91	0.00	128.00	1017
	[18.08]				[9.37]				[15.57]			
N of cattle (CMVE)	3.19	0.00	200.00	619	10.28	0.00	358.00	398	5.96	0.00	358.00	1017
	[11.69]				[26.30]				[19.11]			
N of goat (CMVE)	2.25	0.00	20.00	619	2.24	0.00	96.00	398	2.25	0.00	96.00	1017
	[2.71]				[5.67]				[4.12]			
N of sheep (CMVE)	1.55	0.00	15.00	619	0.90	0.00	48.00	398	1.30	0.00	48.00	1017
	[2.29]				[2.83]				[2.53]			
Observations	781				398				1179			

Notes: Notes: All columns present mean, standard deviation (in square brackets), and the number of observations for each variable. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep. Herd size in CMVE is the sum of the animals herded by the household, aggregated using cattle market-value equivalent. The variables are constructed by the sum of ratio of cattle market-value equivalent ratio.

Table D6: Effects on primary outcomes (Adding outcomes at R2 as controls)

	Herd size (CMVE)		Total household cash earning (USD)		Max. years of education		Max. years of education (Children)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any insurance purchased	2.418	3.765	-71.105	-97.836	1.663	1.517	2.653*	2.944**
	(9.818)	(9.866)	(442.200)	(439.077)	(1.173)	(1.163)	(1.404)	(1.419)
Controls		✓		✓		✓		✓
Control mean	14.265	14.265	719.999	719.999	7.127	7.127	4.776	4.776
Observations	1166	1166	1166	1166	781	781	924	924

Table D7: Effects on livestock composition (Adding outcomes at R2 as controls)

	N of animals in CMVE / Total herd size in CMVE							
	Camel		Cattle		Goat		Sheep	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Any insurance purchased	0.153	0.148	0.137	0.135	-0.265**	-0.272**	-0.018	0.001
	(0.104)	(0.105)	(0.094)	(0.094)	(0.111)	(0.112)	(0.060)	(0.059)
Controls		✓		✓		✓		✓
Control mean	0.263	0.263	0.332	0.332	0.284	0.284	0.121	0.121
Observations	973	973	973	973	973	973	973	973

Table D8: Effects on secondary outcomes (Adding outcomes at R2 as controls)

	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)
Any insurance purchased	19.055	23.328	794.293	923.976*	1.139	1.262	-0.383	-0.400	-1.135	-0.992
	(107.323)	(107.216)	(529.371)	(558.833)	(2.667)	(2.562)	(0.514)	(0.512)	(1.445)	(1.432)
Controls		✓		✓		✓		✓		✓
Control mean	193.424	193.424	366.105	366.105	5.448	5.448	0.292	0.292	1.872	1.872
Observations	1166	1166	1166	1166	1179	1179	779	779	1179	1179

Table D9: Effects on livestock loss by animal type (adding outcomes at R2 as controls)

	N of lost animals					
	Camel		Cattle		Goat/Sheep	
	(1)	(2)	(3)	(4)	(5)	(6)
Any insurance purchased	1.038	1.125	0.202	-0.051	-8.366	-8.178
	(1.169)	(1.154)	(2.664)	(2.453)	(9.793)	(9.606)
Controls		✓		✓		✓
Control mean	0.982	0.982	3.539	3.539	11.788	11.788
Observations	691	691	691	691	691	691

E Additional Tables and Figures Referenced in Text

Table E1: The average market values of animals

	(1)	(2)	(3)	(4)	(5)	(6)
	Marsabit, Kenya			**Borana, Ethiopia**		
	KES	Cattle Equivalent	Data Rounds	Birr	Cattle Equivalent	Data Rounds
Camel	25,132	1.6	1-7	7,447	2.5	1-4
Cattle	15,617	1.0	1-7	3,023	1.0	1-4
Sheep	1,515	0.1	7			
Goats	1,561	0.1	7			
Sheep or Goat	2,308	0.15	1-6	484	0.16	1-4

Table E2: Balance of coupon distribution in Kenya

	Received coupon vs. No coupon						
Sales Season:	2010 JF	2011 JF	2011 AS	2012 AS	2013 JF	2013 AS	F-test
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age of the household head	1.45	1.12	0.0112	-0.276	1.24	-2.39*	7.25
	(1.19)	(1.20)	(1.21)	(1.07)	(1.05)	(1.31)	{0.298}
	[0.0801]	[0.0553]	[0.00141]	[-0.0144]	[0.0754]	[-0.144]	
Male headed household (=1)	-0.0167	-0.0141	-0.0286	-0.0309	0.0148	-0.0293	3.52
	(0.0296)	(0.0291)	(0.0291)	(0.0298)	(0.0304)	(0.0369)	{0.741}
	[-0.0349]	[-0.0343]	[-0.0556]	[-0.0585]	[0.0270]	[-0.0594]	
Education of household head	-0.281	-0.0645	-0.0430	0.122	-0.261	0.290	5.42
	(0.216)	(0.213)	(0.214)	(0.204)	(0.206)	(0.235)	{0.492}
	[-0.0884]	[-0.0156]	[-0.00885]	[0.0441]	[-0.0852]	[0.0942]	
Adult equivalent	0.114	0.119	-0.0305	-0.0232	-0.177	-0.120	3.88
	(0.130)	(0.136)	(0.136)	(0.137)	(0.134)	(0.180)	{0.693}
	[0.0564]	[0.0635]	[-0.0147]	[-0.00878]	[-0.0829]	[-0.0592]	
Dependency ratio	0.00525	-0.00582	0.00206	0.0223	0.00104	-0.00847	3.38
	(0.0143)	(0.0135)	(0.0137)	(0.0136)	(0.0129)	(0.0158)	{0.760}
	[0.0253]	[-0.0282]	[0.0130]	[0.113]	[0.00562]	[-0.0373]	
Herd size (CMVE)	1.37	-0.743	1.21	-0.688	1.09	-1.02	2.69
	(2.02)	(2.00)	(1.83)	(1.38)	(1.11)	(1.64)	{0.847}
	[0.0316]	[-0.0178]	[0.0151]	[-0.0378]	[0.0605]	[-0.0514]	
Annual income per AE (USD)	-17.0	-19.6	-1.73	13.9	3.46	-19.3	4.40
	(13.1)	(19.5)	(18.2)	(14.1)	(17.1)	(24.5)	{0.623}
	[-0.0845]	[-0.0671]	[-0.00778]	[0.0632]	[0.0128]	[-0.0678]	
Own or farm agricultural land	-0.0215	-0.0206	0.0428**	0.0206	-0.0227	-0.00401	13.0
	(0.0168)	(0.0160)	(0.0168)	(0.0179)	(0.0181)	(0.0234)	{0.0440}
	[-0.0394]	[-0.0566]	[0.131]	[0.0395]	[-0.0537]	[0.00644]	
F statistics of Joint F-test:	6.785	5.215	9.014	7.057	7.741	7.754	
P-value of Joint F-test:	0.560	0.734	0.341	0.530	0.459	0.458	

Notes: Each cell reports the results from individual regression estimaing Equation (7):$y_{ijt} = \alpha + \beta_1 \text{Received Coupon}_{ijt} + \gamma_j + \varepsilon_{ijt}$, where y_{ijt} denotes a characteristic of a household i in area j in sales season t. Columns (1) to (6) report mean differences, robust standard errors (in parentheses), and and normalized difference (in square brackets) between the coupon recipients and non-recipients. All estimations include country and community fixed effects. Columns (1) to (6) report mean differences, robust standard errors (in parentheses), and and normalized difference (in square brackets) between the coupon recipients and non-recipients.Column (7) reports joint signifiance test for each variable across seasons where the first row presents the Chi-statistics and the second row presents the p-value of the test statistic in bracketsDependency ratio is the ratio of dependents – people younger than 15 or older than 64 – to the working-age population, those ages 15-64.See Table 1 notes for definitions of variables. * denotes significance at 0.10; ** at 0.05; and *** at 0.01.

Table E3: Balance of coupon distribution in Ethiopia

	Received coupon vs. No coupon						
Sales Season:	2012 AS	2013 JF	2013 AS	2014 JF	2014 AS	2015 JF	F-test
	(1)	(2)	(3)	(4)	(5)	(6)	
Age of the household head	-2.23	2.11	-0.939	0.825	1.39	4.27**	8.37
	(2.22)	(2.10)	(1.84)	(2.07)	(2.03)	(1.88)	{0.212}
	[-0.125]	[0.120]	[-0.0449]	[0.0426]	[0.0885]	[0.239]	
Male headed household (=1)	-0.0316	-0.0631	-0.0486	-0.0546	-0.0216	-0.0182	6.21
	(0.0450)	(0.0435)	(0.0433)	(0.0418)	(0.0437)	(0.0439)	{0.400}
	[-0.0810]	[-0.168]	[-0.126]	[-0.143]	[-0.0616]	[-0.0556]	
Education of household head	-0.115	-0.0322	-0.0341	0.00161	-0.112	-0.0191	1.75
	(0.238)	(0.230)	(0.115)	(0.0886)	(0.0996)	(0.0727)	{0.941}
	[-0.0672]	[-0.0196]	[-0.0283]	[0.00246]	[-0.128]	[-0.0389]	
Adult equivalent	-0.359	-0.127	-0.319	-0.00255	-0.0307	-0.181	4.43
	(0.277)	(0.242)	(0.239)	(0.221)	(0.250)	(0.254)	{0.618}
	[-0.167]	[-0.0695]	[-0.160]	[0.00102]	[-0.0175]	[-0.0861]	
Dependency ratio	-0.0241	0.00260	0.0141	-0.0139	0.0517***	-0.0191	10.9
	(0.0195)	(0.0207)	(0.0192)	(0.0173)	(0.0199)	(0.0196)	{0.0920}
	[-0.127]	[0.00747]	[0.0876]	[-0.0773]	[0.281]	[-0.108]	
Herd size (CMVE)	0.473	-1.43	-4.26	-3.17	-1.26	-3.89	3.47
	(2.47)	(2.34)	(3.82)	(3.81)	(3.01)	(4.30)	{0.748}
	[0.00220]	[-0.0605]	[-0.156]	[-0.118]	[-0.0491]	[-0.127]	
Annual income per AE (USD)	30.0***	-4.73	-7.54	3.58	-19.0*	-21.2	13.4
	(11.5)	(20.3)	(11.5)	(9.81)	(11.0)	(13.4)	{0.0370}
	[0.233]	[-0.0218]	[-0.0876]	[0.0223]	[-0.190]	[-0.193]	
Own or farm agricultural land	-0.0514	0.0457	-0.0613*	0.0260	-0.00126	-0.00522	5.81
	(0.0468)	(0.0477)	(0.0356)	(0.0377)	(0.0327)	(0.0324)	{0.444}
	[-0.120]	[0.106]	[-0.112]	[0.0914]	[0.0277]	[0.00581]	
F statistics of Joint F-test:	12.397	5.190	6.158	5.790	12.697	11.247	
P-value of Joint F-test:	0.134	0.737	0.629	0.671	0.123	0.188	

Notes: Each cell reports the results from individual regression estimaing Equation (7):$y_{ijt} = \alpha + \beta_1 \text{Received Coupon}_{ijt} + \gamma_j + \varepsilon_{ijt}$, where y_{ijt} denotes a characteristic of a household i in area j in sales season t. Columns (1) to (6) report mean differences, robust standard errors (in parentheses), and and normalized difference (in square brackets) between the coupon recipients and non-recipients. All estimations include country and community fixed effects. Columns (1) to (6) report mean differences, robust standard errors (in parentheses), and and normalized difference (in square brackets) between the coupon recipients and non-recipients.Column (7) reports joint signifiance test for each variable across seasons where the first row presents the Chi-statistics and the second row presents the p-value of the test statistic in bracketsDependency ratio is the ratio of dependents – people younger than 15 or older than 64 – to the working-age population, those ages 15-64.See Table 1 notes for definitions of variables. * denotes significance at 0.10; ** at 0.05; and *** at 0.01.

Table E4: First stage regression results

	Number of seasons respondent purchased ANY IBLI – all six seasons											
	Pooled				Kenya				Ethiopia			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cum. coupon receipt (N)	0.127***				0.160***				0.045			
	(0.021)				(0.024)				(0.042)			
Coupon Receipt (Season 1)		0.256***		0.156*		0.266***		0.193*		0.188		0.188
		(0.059)		(0.087)		(0.067)		(0.114)		(0.117)		(0.149)
Coupon Receipt (Season 2)		0.169***		0.075		0.219***		0.104		0.004		-0.078
		(0.061)		(0.084)		(0.068)		(0.109)		(0.130)		(0.161)
Coupon Receipt (Season 3)		0.120**		0.054		0.245***		0.191*		-0.267**		-0.372**
		(0.059)		(0.090)		(0.067)		(0.115)		(0.120)		(0.163)
Coupon Receipt (Season 4)		0.058		-0.067		0.072		0.025		-0.012		-0.223
		(0.059)		(0.088)		(0.068)		(0.113)		(0.115)		(0.153)
Coupon Receipt (Season 5)		0.056		-0.107		0.015		-0.090		0.145		-0.064
		(0.061)		(0.085)		(0.070)		(0.107)		(0.127)		(0.156)
Coupon Receipt (Season 6)		0.073		-0.037		0.156**		0.119		-0.086		-0.301*
		(0.066)		(0.090)		(0.074)		(0.108)		(0.129)		(0.161)
Discount rate (Season 1)			0.005***	0.003			0.006***	0.002			0.004**	0.002
			(0.001)	(0.002)			(0.002)	(0.003)			(0.002)	(0.003)
Discount rate (Season 2)			0.003***	0.003			0.005***	0.003			0.002	0.002
			(0.001)	(0.002)			(0.002)	(0.003)			(0.002)	(0.002)
Discount rate (Season 3)			0.003**	0.002			0.005***	0.002			0.000	0.003
			(0.001)	(0.002)			(0.002)	(0.003)			(0.002)	(0.003)
Discount rate (Season 4)			0.002*	0.003*			0.002	0.001			0.003	0.005**
			(0.001)	(0.002)			(0.002)	(0.003)			(0.002)	(0.002)
Discount rate (Season 5)			0.003**	0.004**			0.001	0.003			0.004**	0.005**
			(0.001)	(0.002)			(0.002)	(0.003)			(0.002)	(0.002)
Discount rate (Season 6)			0.002**	0.003*			0.002*	0.001			0.003	0.005**
			(0.001)	(0.001)			(0.001)	(0.002)			(0.002)	(0.002)
Effective F-stat	35.965	5.809	7.930	4.664	43.297	8.033	6.768	4.220	1.129	1.514	2.527	2.550
10% Critical Value	16.380	12.680	12.843	13.479	16.380	12.684	12.965	13.627	16.380	13.411	14.164	14.260
N	1179	1168	1168	1168	781	781	781	781	398	387	387	387

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equations: $IBLI_{i,u,j} = \alpha^0 + \alpha^1 y_{i,u,j,t=0} + \alpha^2 x_{i,u,j,t=0} + \alpha^3 Discount_{i,u,j} + \gamma + \mu_{i,u,j}$, where $IBLI_{i,u,j} = \sum_{t \in [C]} I^{IBLI}_{i,u,j,t}$ where $I^{IBLI}_{i,u,j,t} = 1$ if $IBLI_{i,u,j,t} > 0$, $Discount_{i,u,j} = \sum_{t \in [C]} I^{Discount}_{i,u,j,t}$ where $I^{Discount}_{i,u,j,t} = 1$ if $Discount_{i,u,j,t} > 0$ and C=[2010JF, 2011JF, 2011AS, 2012AS, 2013JF, 2013AS in Kenya, and 2012AS, 2013JF, 2013AS, 2014JF, 2014AS, 2015JF in Ethiopia. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include country and community fixed effects. In columns (1), (5) and (9), the reported 10% critical values are from Stock and Yogo (2005) and in other columns they are from Olea and Pflueger (2013), which are the cutoffs that we compare effective F-statistics with to determine whether the instrument is weak.

Table E5: First stage – using coupon receipt status of individual sales season

	Outcome: Respondent purchased ANY IBLI in each season					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Pooled sample						
Coupon Receipt (Season 1)	0.236***					
	(0.023)					
Coupon Receipt (Season 2)		0.078***				
		(0.022)				
Coupon Receipt (Season 3)			0.128***			
			(0.017)			
Coupon Receipt (Season 4)				0.067***		
				(0.017)		
Coupon Receipt (Season 5)					0.070***	
					(0.016)	
Coupon Receipt (Season 6)						0.058***
						(0.013)
Effective F-stat	105.823	12.690	55.896	15.817	19.533	19.782
10% Critical Value	16.380	16.380	16.380	16.380	16.380	16.380
N	1168	1168	1176	1175	1173	1171
Panel B: Kenya						
Coupon Receipt (Season 1)	0.236***					
	(0.027)					
Coupon Receipt (Season 2)		0.095***				
		(0.025)				
Coupon Receipt (Season 3)			0.148***			
			(0.021)			
Coupon Receipt (Season 4)				0.050**		
				(0.020)		
Coupon Receipt (Season 5)					-0.001	
					(0.016)	
Coupon Receipt (Season 6)						0.043***
						(0.012)
Effective F-stat	77.545	14.627	49.695	6.225	0.008	13.244
10% Critical Value	16.380	16.380	16.380	16.380	16.380	16.380
N	781	781	781	781	781	781
Panel C: Ethiopia						
Coupon Receipt (Season 1)	0.233***					
	(0.043)					
Coupon Receipt (Season 2)		0.022				
		(0.045)				
Coupon Receipt (Season 3)			0.068***			
			(0.026)			
Coupon Receipt (Season 4)				0.115***		
				(0.030)		
Coupon Receipt (Season 5)					0.284***	
					(0.034)	
Coupon Receipt (Season 6)						0.091***
						(0.033)
Effective F-stat	29.017	0.238	7.062	14.461	68.124	7.661
10% Critical Value	16.380	16.380	16.380	16.380	16.380	16.380
N	387	387	395	394	392	390

Notes: Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equations: $IBLI_{i,u,j} = \alpha^0 + \alpha^1 y_{i,u,j,t=0} + \alpha^2 x_{i,u,j,t=0} + \alpha^3 Discount_{i,u,j} + \gamma + \mu_{i,u,j}$, where $IBLI_{i,u,j} = 1$ if $IBLI_{i,u,j,t} > 0$, $Discount_{i,u,j} = 1$ if $Discount_{i,u,j,t} > 0$. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include country and community fixed effects. In all columns, the reported 10% critical values are from Stock and Yogo (2005), which are the cutoffs that we compare effective F-statistics with to determine whether the instrument is weak.

Table E6: 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'		
No. of coupons received – first three seasons	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_{ig}: Recipient's		-0.025***	0.123***		0.142***	-0.003***		-0.002
		(0.003)	(0.017)		(0.029)	(0.001)		(0.001)
$\overline{D}_{-ig}$: Peers'	-31.145***			-3.672***	0.747		0.111***	0.060
	(2.397)			(0.670)	(1.035)		(0.024)	(0.051)
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

Notes: All columns present coefficient estimates and cluster standard errors at the community level (in parentheses).

Column (1) and (2) presents the results on outcome D_{ig} and $\overline{D}_{-ig}$, respectively.
Column (1): $D_{ig} = \theta_0 + \theta_1 \overline{D}_{-ig} + \theta_2 X_{ig0} + \theta_3 \overline{X}_{-ig0} + \nu_{1g} + \eta_{1ig}$,
Column (2): $\overline{D}_{-ig} = \theta_4 + \theta_5 D_{ig} + \theta_6 X_{ig0} + \theta_7 \overline{X}_{-ig0} + \nu_{2g} + \eta_{2ig}$,

Column (3) to (5) presents the results on outcome I_{ig}.
Column (3): $I_{ig} = \alpha + \beta_1 D_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,
Column (4): $I_{ig} = \alpha + \beta_2 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,
Column (5): $I_{ig} = \alpha + \beta_1 D_{ig} + \beta_3 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,

Column (6) to (8) presents the results on outcome $\overline{I}_{-ig}$.
Column (6): $\overline{I}_{-ig} = \alpha + \beta_4 D_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,
Column (7): $\overline{I}_{-ig} = \alpha + \beta_5 \overline{D}_{-ig} + \beta_6 I_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,
Column (8): $\overline{I}_{-ig} = \alpha + \beta_4 D_{ig} + \beta_6 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \delta_g + \varepsilon_{ig}$,

* denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons.

Table E7: Spillover effects on prespecified primary outcomes: Herd size, earnings, education with two endogenous variables

	Herd size (CMVE)			Total household cash earning (USD)			Share of members who completed age-appropriate years of education		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	2.485	3.878	0.208	-125.555	-135.190	-430.321	0.105	0.125	0.157
	(11.228)	(11.276)	(20.490)	(430.674)	(429.388)	(1130.550)	(0.190)	(0.193)	(0.168)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	17.482	23.198	-119.587	-1544.928	-1530.794	-13502.212	-1.438	-0.812	0.435
	(168.443)	(167.174)	(873.663)	(6743.689)	(6755.025)	(40697.165)	(7.249)	(7.303)	(6.388)
Recipient controls (i)		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓
Control mean	14.265	14.265	14.265	693.382	693.382	693.382	0.048	0.048	0.048
Clustered standard errors	village	village	village	village	village	village	village	village	village
Observations	1179	1179	1179	1179	1179	1179	770	770	770

Notes: All columns present coefficient estimates and cluster standard errors at the village level (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ig}} + \gamma_1\widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$ where we instrument $\widehat{I_{ig}}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table E8: Spillover effects on Prespecified primary outcome: Herd composition with two endogenous variables

	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)	(9)	(10)	(11)	(12)
$\widehat{I}_{ig}$: Any insurance purchase - first three seasons	0.220*	0.216*	-0.613	0.019	0.008	0.472	-0.240**	-0.244**	-0.111	-0.007	0.016	0.279
	(0.125)	(0.123)	(0.567)	(0.131)	(0.138)	(0.310)	(0.101)	(0.104)	(0.344)	(0.051)	(0.051)	(0.245)
$\widehat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	4.044	3.870	-26.989	-3.674	-4.002	13.384	-0.643	-0.392	4.522	0.009	0.298	10.033
	(3.602)	(3.437)	(21.439)	(3.591)	(3.913)	(11.324)	(1.173)	(1.230)	(12.453)	(0.620)	(0.667)	(8.780)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓
Control mean	0.263	0.263	0.263	0.332	0.332	0.332	0.284	0.284	0.284	0.121	0.121	0.121
Clustered standard errors	village	village	village	village	village	village	village	village	village	village	village	village
Observations	987	987	987	987	987	987	987	987	987	987	987	987

Notes: All columns present coefficient estimates and cluster standard errors at the village level (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ig} + \gamma_1 \widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$ where we instrument $\widehat{I}_{ig}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table E9: Spillover effects on prespecified secondary outcomes with two endogenous variables

	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)	(11)	(12)	(13)	(14)	(15)
$\widehat{I}_{ig}$: Any insurance purchase - first three seasons	-65.605	-62.834	477.054	714.312	844.286	-26.448	5.119	5.156	-2.744	-0.495	-0.565	-0.546	-0.823	-0.581	-5.780
	(148.886)	(148.687)	(424.064)	(516.903)	(549.032)	(788.260)	(6.787)	(6.508)	(10.524)	(0.678)	(0.697)	(0.693)	(1.886)	(1.903)	(3.843)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	-2530.910	-2560.477	18649.720	5660.998	6995.305	-27398.439	140.758	134.314	-169.486	-7.195	-9.772	-10.480	13.647	17.309	-185.911
	(3834.294)	(3805.441)	(16999.063)	(6642.075)	(7649.229)	(31791.967)	(204.793)	(195.178)	(441.015)	(42.322)	(42.312)	(41.652)	(38.681)	(40.774)	(148.740)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓			✓
Control mean	182.827	182.827	182.827	339.362	339.362	339.362	5.448	5.448	5.448	0.292	0.292	0.292	1.872	1.872	1.872
Clustered standard errors	village	village	village	village	village	village	village	village	village	village	village	village	village	village	village
Observations	1179	1179	1179	1179	1179	1179	1179	1179	1179	781	781	781	1179	1179	1179

Notes: All columns present coefficient estimates and cluster standard errors at the village level (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ig} + \gamma_1\widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$ where we instrument $\widehat{I}_{ig}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table E10: Spillover effects on prespecified secondary outcomes: 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)	(11)	(12)	(13)	(14)	(15)
$\widehat{I}_{ig}$: Any insurance purchase - first three seasons	0.030	0.037	-0.063	-1.985	-1.997	7.742	0.074	0.257	-0.138	-0.145	-0.006	0.257	-0.654	-0.585	-0.353
	(0.070)	(0.070)	(0.180)	(1.902)	(2.015)	(6.663)	(0.797)	(1.008)	(0.942)	(0.620)	(0.778)	(1.029)	(1.684)	(1.588)	(1.427)
$\widehat{\widehat{I}}_{-ig}$: Peers' any insurance purchase – first three season	-0.147	0.066	-3.831	-43.215	-45.213	337.409	10.420	16.304	4.912	1.911	7.228	13.639	-30.763	-29.293	-21.110
	(1.285)	(1.268)	(8.122)	(55.114)	(58.114)	(291.627)	(26.915)	(33.017)	(29.167)	(19.695)	(24.651)	(31.329)	(53.801)	(50.585)	(42.576)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓			✓
Control mean	0.042	0.042	0.042	0.539	0.539	0.539	0.271	0.271	0.271	0.201	0.201	0.201	0.232	0.232	0.232
Clustered standard errors	village	village	village	village	village	village	village	village	village	village	village	village	village	village	village
Observations	1179	1179	1179	1179	1179	1179	376	376	376	376	376	376	376	376	376

Notes: All columns present coefficient estimates and cluster standard errors at the village level (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ig} + \gamma_1\widehat{\widehat{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \rho_j + \varepsilon_{ijT}$ where we instrument $\widehat{I}_{ig}$ and $\widehat{\widehat{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table E11: Spillover effects: First stage and mechanical correlation without community FE

	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'		
No. of coupons received – first three seasons	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_{ig}: Recipient's		-0.019***	0.117***		0.103***	-0.008		-0.020***
		(0.002)	(0.017)		(0.018)	(0.006)		(0.006)
$\overline{D}_{-ig}$: Peers'	-2.456***			-1.019***	-0.767***		-0.630***	-0.680***
	(0.298)			(0.215)	(0.220)		(0.075)	(0.076)
Pathway (DAG)	(12)	(13)	(11)	(2)	(2);(11)	(1)	(10)	(1);(10)
Recipient controls (i)	✓	✓	✓	✓	✓	✓	✓	✓
Peers' controls (-i)	✓	✓	✓	✓	✓	✓	✓	✓
community FE								
Control mean	1.707	1.707	0.200	.	0.200	0.426	.	0.426
Observations	1179	1179	1179	1179	1179	1179	1179	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses).

Column (1) and (2) presents the results on outcome D_{ig} and $\overline{D}_{-ig}$, respectively.
Column (1): $D_{ig} = \theta_0 + \theta_1 \overline{D}_{-ig} + \theta_2 X_{ig0} + \theta_3 \overline{X}_{-ig0} + \eta_{1ig}$,
Column (2): $\overline{D}_{-ig} = \theta_4 + \theta_5 D_{ig} + \theta_6 X_{ig0} + \theta_7 \overline{X}_{-ig0} + \eta_{2ig}$,

Column (3) to (5) presents the results on outcome I_{ig}.
Column (3): $I_{ig} = \alpha + \beta_1 D_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \varepsilon_{ig}$,
Column (4): $I_{ig} = \alpha + \beta_2 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \varepsilon_{ig}$,
Column (5): $I_{ig} = \alpha + \beta_1 D_{ig} + \beta_3 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \varepsilon_{ig}$,

Column (6) to (8) presents the results on outcome $\overline{I}_{-ig}$.
Column (6): $\overline{I}_{-ig} = \alpha + \beta_4 D_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \varepsilon_{ig}$,
Column (7): $\overline{I}_{-ig} = \alpha + \beta_5 \overline{D}_{-ig} + \beta_6 I_{ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \varepsilon_{ig}$,
Column (8): $\overline{I}_{-ig} = \alpha + \beta_4 D_{ig} + \beta_6 \overline{D}_{-ig} + \rho X_{ig0} + \gamma \overline{X}_{-ig0} + \varepsilon_{ig}$,

* denotes significance at 0.10; ** at 0.05; and *** at 0.01 Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons.

Table E12: Spillover effects on prespecified primary outcomes: Herd size, earnings, education with two endogenous variables

	Herd size (CMVE)			Total household cash earning (USD)			Share of members who completed age-appropriate years of education		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	4.246	5.837	3.246	-34.125	-49.175	-76.016	0.135	0.135	0.134**
	(11.012)	(10.497)	(8.995)	(425.361)	(410.447)	(395.531)	(0.092)	(0.089)	(0.063)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	131.264**	109.288***	16.337	2904.802	1143.433	1176.920	1.130*	1.054*	0.234
	(54.730)	(40.753)	(14.690)	(2025.919)	(2090.670)	(877.264)	(0.629)	(0.592)	(0.168)
Recipient controls (i)		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓
Control mean	14.265	14.265	14.265	693.382	693.382	693.382	0.048	0.048	0.048
Village FE									
Observations	1179	1179	1179	1179	1179	1179	770	770	770

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ig}} + \gamma_1\hat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \varepsilon_{ijT}$ where we instrument $\widehat{I_{ig}}$ and $\hat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table E13: Spillover effects on Prespecified primary outcome: Herd composition with two endogenous variables

	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)	(9)	(10)	(11)	(12)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.098	0.090	0.123	0.175	0.187	0.127	-0.261	-0.261	-0.253**	-0.030	-0.008	0.003
	(0.152)	(0.098)	(0.096)	(1.747)	(0.499)	(0.089)	(0.193)	(0.201)	(0.107)	(0.135)	(0.094)	(0.053)
$\widehat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	-2.474**	-0.636	-0.129	32.427	9.033	0.599**	-2.534***	-2.671***	-0.304	-2.356	-1.505	-0.258*
	(1.232)	(0.539)	(0.223)	(69.077)	(6.982)	(0.264)	(0.886)	(0.943)	(0.258)	(2.079)	(0.976)	(0.143)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓
Control mean	0.263	0.263	0.263	0.332	0.332	0.332	0.284	0.284	0.284	0.121	0.121	0.121
Village FE												
Observations	987	987	987	987	987	987	987	987	987	987	987	987

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ig}} + \gamma_1\widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \varepsilon_{ijT}$ where we instrument $\widehat{I_{ig}}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table E14: Spillover effects on prespecified secondary outcomes with two endogenous variables

	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)	(11)	(12)	(13)	(14)	(15)
$\widehat{I}_{ig}$: Any insurance purchase - first three seasons	47.855	46.751	4.484	428.243	539.787	684.536	5.267	5.393	2.098	0.393	0.033	-0.150	-0.793	-0.644	-0.846
	(149.948)	(129.044)	(98.308)	(580.105)	(528.242)	(489.003)	(7.473)	(7.331)	(2.646)	(1.559)	(1.106)	(0.561)	(1.677)	(1.694)	(1.466)
$\hat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	2406.204***	1778.021**	374.711	-7207.097***	-4253.614**	658.532	136.511***	131.975***	11.430	29.887**	21.041***	7.547***	17.302***	18.953***	9.060**
	(864.750)	(787.955)	(266.159)	(2611.759)	(2104.267)	(812.105)	(35.796)	(37.817)	(19.721)	(12.457)	(7.645)	(2.508)	(6.239)	(6.506)	(3.921)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓			✓
Control mean	182.827	182.827	182.827	339.362	339.362	339.362	5.448	5.448	5.448	0.292	0.292	0.292	1.872	1.872	1.872
Village FE															
Observations	1179	1179	1179	1179	1179	1179	1179	1179	1179	781	781	781	1179	1179	1179

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I}_{ig} + \gamma_1\widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D_{ij4}^{t=6} + \varepsilon_{ijT}$ where we instrument $\widehat{I}_{ig}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.

Table E15: Spillover effects on prespecified secondary outcomes: 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)	(11)	(12)	(13)	(14)	(15)
$\widehat{I_{ig}}$: Any insurance purchase - first three seasons	0.102	0.097	0.047	-0.164	-0.130	-0.711	-0.206	-0.039	0.248	-0.894	-1.192	14.928	6.858	5.380	4.731
	(0.158)	(0.145)	(0.056)	(1.926)	(1.955)	(0.980)	(0.731)	(1.537)	(7.350)	(2.249)	(2.821)	(1301.756)	(527.741)	(205.961)	(864.250)
$\widehat{\bar{I}}_{-ig}$: Peers' any insurance purchase – first three season	2.978***	2.667***	0.582***	35.806***	36.191***	10.361**	2.629	5.581	38.544	-11.805	-12.276	554.404	204.618	107.197	429.108
	(0.808)	(0.781)	(0.190)	(11.250)	(13.958)	(5.268)	(14.857)	(21.042)	(303.449)	(21.258)	(22.912)	(48508.699)	(16604.937)	(4383.620)	(84789.019)
Recipient controls (i)		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓
Peers' controls (-i)			✓			✓			✓			✓			✓
Control mean	0.042	0.042	0.042	0.539	0.539	0.539	0.271	0.271	0.271	0.201	0.201	0.201	0.232	0.232	0.232
village FE															
Observations	1179	1179	1179	1179	1179	1179	376	376	376	376	376	376	376	376	376

Notes: All columns present coefficient estimates and robust standard errors (in parentheses) from the following equation: $y_{ijT} = \beta_0 + \beta_{LATE}\widehat{I_{ig}} + \gamma_1\widehat{\bar{I}}_{-ig} + \beta_1 y_{ij0} + \beta_2 X_{ij0} + \gamma_2 X_{-ig0} + \beta_3 D^{t=6}_{ij4} + \varepsilon_{ijT}$ where we instrument $\widehat{I_{ig}}$ and $\widehat{\bar{I}}_{-ig}$ by both D_{ig} and D_{-ig}. * denotes significance at 0.10; ** at 0.05; and *** at 0.01. All columns include community fixed effects. Any insurance purchased refers to the act of purchasing insurance at least once, but up to three times, within the initial three seasons. Cattle market-value equivalent (CMVE) is a unit to aggregate the animals across different animal types based on their market values using panel survey data. In Kenya, 1 CMVE= 0.625 camel=1 cattle=10 goats/sheep, and in Ethiopia, 1 CMVE=4 camel=1 cattle=6.25 goats/sheep.