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Charity hazard in climate disaster response: The effect of humanitarian cash transfers on demand for agricultural insurance

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Abstract

Providing assistance in the context of weather disasters can have unintended negative consequences if it disincentivizes households to adapt to climate risks. This dilemma, known as charity hazard, is well justified by economic theory, yet empirical evidence remains scarce. Our paper analyses the effect of randomly distributed cash transfers during an extreme winter event on the demand for agricultural insurance among pastoralist households in Mongolia. We find that receiving the transfer does not crowd out the uptake of insurance covering weather risks in the subsequent year. Among households that have purchased insurance in the past, we find that the cash transfers significantly increase the probability of repurchasing insurance.

Keywords: Anticipatory humanitarian assistance, extreme weather events, impact evaluation, randomized controlled trial, Mongolia

JEL codes: ***D61, 012, Q54***

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1. Introduction

The increasing frequency and intensity of extreme weather events are predicted to lead to massive economic losses, with poor and vulnerable households being disproportionately affected (Pörtner et al. 2022). As a result, the volume of humanitarian assistance directed to support households in coping with weather disasters is expected to rise sharply (IFRC 2020b). Yet, the provision of assistance in the context of weather disasters can have unintended negative consequences if it disincentivizes households to insure themselves against climate risks by nurturing a belief that help will always be available in times of need (Browne & Hoyt 2000). This dilemma, known as *charity hazard*, is well justified by economic theory (e.g., Brunette et al. 2013; Kaplow 1991; Kelly & Kleffner 2003; Lewis & Nickerson 1989; Raschky & Weck-Hannemann 2007; Robinson et al. 2021; Tesselaar et al. 2022). However, empirical evidence on charity hazard is limited.

Our paper addresses this knowledge gap by investigating if anticipatory humanitarian assistance, provided as part of a randomized field experiment in Western Mongolia, reduces households' demand for an index-based insurance product against weather risks. Both anticipatory assistance and index insurance are instruments designed to support households facing climate risks that have gained considerable traction in the policy community. Anticipatory assistance is an ex-ante instrument that provides vulnerable households with disaster aid to prevent or mitigate humanitarian needs before they fully unfold. Based on meteorological risk projections, anticipatory assistance to households is triggered as soon as a pre-determined risk level is reached (Arnold et al. 2011; German Red Cross 2017; German Red Cross & Red Cross Red Crescent Climate Centre 2016). In 2022, anticipatory assistance programs operated in 35 countries, covering more than 7.7 million people (Anticipation Hub 2022; Red Cross and Red Crescent Societies 2018).

While international organizations or NGOs provide anticipatory assistance to households, index insurance is a market-based instrument households must purchase proactively. The insurance is based on a statistical index measuring realized risk at an aggregated geographical level. Policyholders receive payouts whenever the index exceeds or falls short of a predefined threshold at the aggregated level, irrespective of whether a specific policyholder experienced damages (Skees, 2008). Index insurance has received substantial attention due to its potential to provide a low-cost insurance solution to underinsured agricultural households feasible (Cai et al. 2020; Fisher et al. 2019; GPFI, 2015; Greatrex et al. 2015; Hazell & Hess

2017).[1] However, despite an enthusiastic discourse surrounding index insurance, its uptake remains low (Binswanger-Mkhize 2012; Carter et al. 2017; Jensen & Barrett 2017).

Our analysis tests whether unconditional anticipatory cash transfers affected households' demand for index-based livestock insurance (IBLI) in Mongolia during the extreme winter of 2020/21. We build on a randomized field experiment conducted among households participating in the *Coping with Shocks in Mongolia Household Panel Survey*, a long-running household panel survey representative of western Mongolia's population. In the field experiment, pastoralist households at risk of extreme winter conditions were randomly selected to receive unconditional cash transfers worth about 236 USD from the NGO People in Need (PIN) in March 2021.[2] For both recipient and control households, four waves of household panel survey data are available from before the intervention, while the fifth panel wave was collected after the 2020/21 winter event. Information on index insurance uptake is sourced from the customer database from the *Mongolian National Reinsurance Company* (MongolianRe), which oversees the Mongolian IBLI program.

Results show that receiving anticipatory cash transfers does not decrease the demand for index-based livestock insurance that covers climate risks in the next year. For the households that have purchased insurance in the past, we find that receiving the anticipatory cash transfers increases the probability of repurchasing the insurance.

To our knowledge, we provide the first study of the charity hazard effects in ex-ante humanitarian assistance, which allows us to contribute to the literature in several ways. First, our analysis adds to the theoretical and empirical studies on the impact of (ex-post) disaster aid on insurance uptake (e.g., Landry et al. 2021; Lewis & Nickerson 1989; Raschky et al. 2013; Raschky & Schwindt 2016; Sakurai & Reardon 1997; Tesselaar et al. 2022). While existing research has focused mostly on rich countries where governments provide emergency assistance after an extreme weather event occurs, our study is one of the few investigating charity hazard in the light of non-governmental aid in a low- or middle-income country.

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[1] Compared to conventional indemnity-based insurance schemes, index-based insurance is characterized by generally lower administration costs due to loss verification based on aggregated data (Miranda & Farrin 2012). Moreover, index-based insurance is by design resistant to adverse selection and moral hazard because policyholders do not gain from individual damage (Barnett & Mahul 2007; Mahul & Stutley 2010).

[2] The value of the cash assistance was equivalent to approximately 1.7 months of earnings at the national minimum wage, or the market price of four sheep at the time of the intervention. Relative to the baseline data, the cash assistance represented 2% of the median herd value, 6% of the median annual household income, and 54% of the median annual herd-related investments. Exchange rates from MTN to USD were stable between May 2020 and May 2022, averaging at 2,866 MTN per USD. All MNT values in this study are converted to USD using this average exchange rate.

Second, this study adds more general terms to the small knowledge base on the effectiveness of anticipatory cash transfers. Studies have shown that anticipatory cash transfers can affect welfare indicators, such as assets and food consumption, psychological stress, and well-being (Gros et al. 2019; Gros et al. 2022; Mogge et al. 2024; Pople et al. 2021). Our study is the first to provide evidence on the effects of anticipatory cash transfers on climate adaptation behavior.

Third, we add to the literature on demand for index insurance. Despite enthusiasm about index insurance in the international development community, uptake rates among rural households in the Global South are low. Cole et al. (2013) and Karlan et al. (2014) have analyzed the effect of cash transfers on index insurance, showing that relieving cash constraints can increase demand. Our study adds to this literature by exploring the effect of a cash transfer during a weather disaster on insurance uptake.

The remaining paper is organized as follows. The next section outlines the state of knowledge. Section 3 introduces our empirical context. Section 4 describes the experimental framework and the data. Section 5 displays the results. Section 6 concludes.

2. State of knowledge on the charity hazard

The theoretical justification for charity hazard based on utility frameworks is well established (e.g., Brunette et al. 2013; Kaplow 1991; Kelly & Kleffner 2003; Lewis & Nickerson 1989; Raschky & Weck-Hannemann 2007; Robinson et al. 2021; Tesselaar et al. 2022).[3]

In contrast to the unequivocal conclusions of theoretical studies, empirical research provides ambiguous evidence. For instance, Andor et al. (2020) use cross-sectional data from 6,000 German homeowners, suggesting that trust in governmental financial aid reduces the demand for flood insurance among individuals living in flood-prone areas. Other studies contradict the hypothesis of a negative relationship between disaster assistance and insurance uptake. Browne and Hoyt (2000) study the effect of disaster grants provided by the Federal Emergency Management Agency of the United States (FEMA) to households affected by floods on demand for flood insurance in the US between 1983 and 1993. Contrary to their hypothesis of a negative relationship between governmental aid and flood insurance uptake, they find a positive effect; thus, there is no evidence in line with charity hazards. However, Browne and Hoyt caution that their results might be biased due to insufficient control of risk exposure. Davlasheridze and Miao (2019) address this concern by using objective precipitation data to measure risk exposure.

[3] The charity hazard is closely related to the concept of the *Samaritan's dilemma* (Buchanan 1975). Focusing on governments instead of individuals, the *Samaritan's dilemma* describes how the expectation of official development assistance from foreign donors, in case a disaster strikes, decreases incentives for the recipient government to invest in protective efforts (Gibson et al. 2005; Raschky & Schwindt 2016).

Davlasheridze and Miao found that receiving FEMA grants had a negative impact on flood insurance uptake. Exploiting cross-sectional survey data from property owners, Petrolia et al. (2013) document that households' perceived eligibility for disaster assistance increases the likelihood of holding a flood policy. Using the same dataset, Landry et al. (2021) apply flood damage compensation awarded to the county and the number of regional US Senators that served on Stafford subcommittees as an instrument for the expectation of damage relief. The authors show that coastal households with positive expectations of disaster aid eligibility are 25 to 42 percent less likely to hold flood insurance.

Raschky et al. (2013) compare survey data on individuals' stated preferences from Austria, where governmental relief to affected households is certain but incomplete, with data from Germany, where governmental relief is uncertain but more complete. They find supporting evidence for the theoretical assumption that charity hazard is more pronounced when aid payments are certain. Considering that charity payments are often uncertain and risk exposure varies, Robinson et al. (2021) demonstrate that demand for insurance is higher when the probability of government compensation is ambiguous compared to certain aid. Similarly, Tesselaar et al. (2022) show in their model simulation of European flood insurance markets that the crowding-out effect of governmental aid on demand for insurance is smaller if the compensation of uninsured damage is uncertain and the regional flood risk is high. According to Mahul and Stutley (2010), charity hazard further increases the problem of adverse selection in insurance uptake since households with low risk that might be only affected by large-scale disasters are unwilling to buy insurance because large-scale events are more likely to trigger governmental disaster aid.

Only a few studies focus on crowding-out effects on insurance in the Global South. Exploiting households panel data from Burkina Faso, Sakurai and Reardon (1997) apply a household fixed effects approach to show that expectations of receiving public food aid decrease investments in informal self-insurance among farmer households. Based on a utility model, the authors find a reduced willingness to pay for hypothetical drought insurance. Using a choice experiment and cross-sectional data from flood-prone Vietnam, Ngoc Que Anh et al. (2019) find no significant negative impact of rice farmers' expectations on aid and relief by the government and other organizations for post-flood recovery on their willingness to pay for agricultural flood insurance.

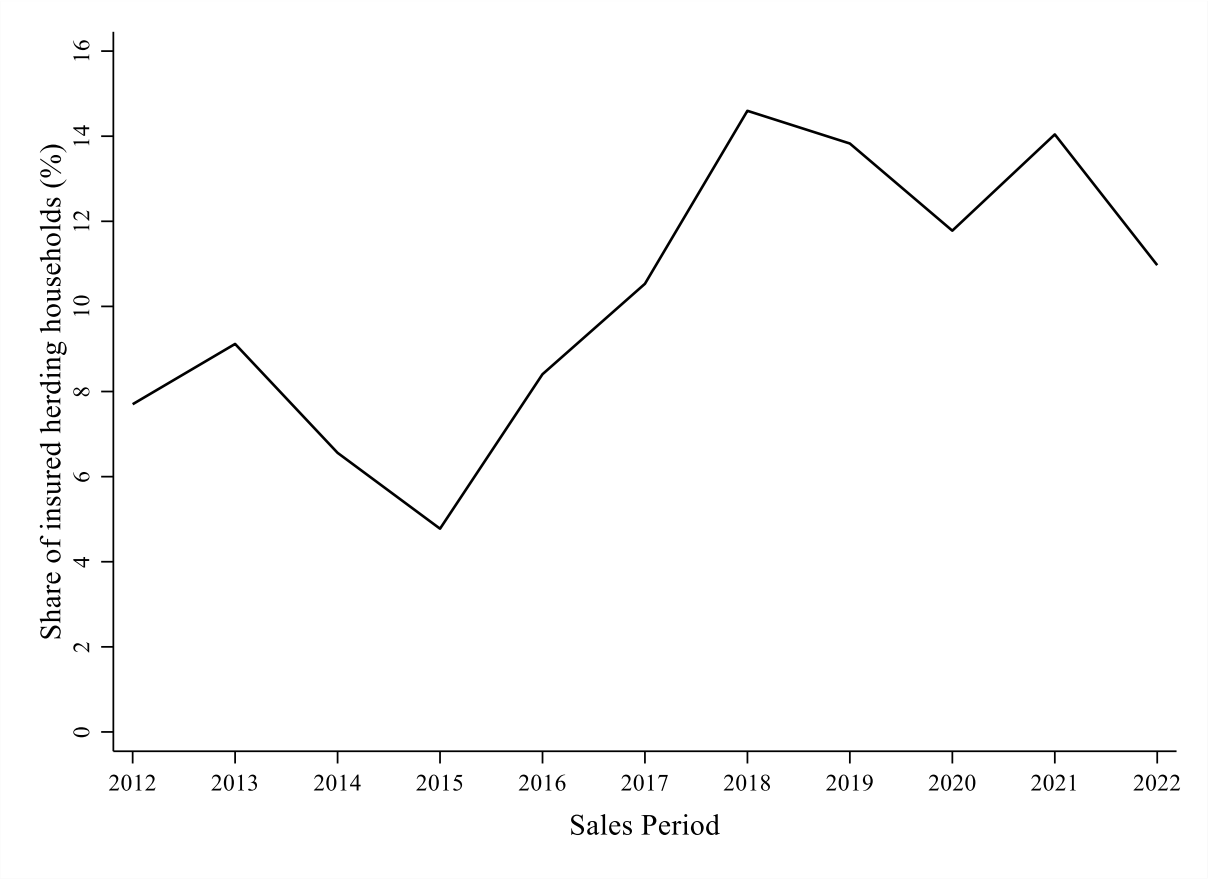
All the above-mentioned studies have in common that they rely on quasi-experimental study designs. Our study is the first to study whether the receipt of humanitarian assistance crowds in or crowds out households' investment in adaptation strategies using a randomized study design. It is one of the few studies investigating charity hazards in the Global South and the first to consider the demand for existing formal agriculture insurance in the Global South.

3. Empirical context: Extreme weather events and adaptation in Mongolia

Mongolia is a lower-middle-income country that is increasingly afflicted by extreme weather events (World Bank & Asian Development Bank 2021). Extremely cold and snowy winter conditions following dry summers lead to massive livestock mortality and threaten the livelihood of households involved in animal husbandry (Nandintsetseg et al. 2018). The extreme winter events of 1999/00, 2000/01, and 2001/02 caused the death of over 11 million livestock. During the 2009/10 extreme event, Mongolia's husbandry sector lost 8.5 million livestock, approximately 20% of the country's total livestock population. Additional minor winter disasters occurred in 2015/16, 2017/18, 2019/20, and 2020/21 (European Commission 2010; IFRC 2020a; United Nations Mongolia Country Team 2010). Such extreme winter events have long-lasting welfare-reducing effects on herding households (e.g., Fluhrer & Kraehnert 2022; Groppo & Kraehnert 2016, 2017) and lead to massive outmigration from affected areas (Roeckert & Kraehnert 2022).

In the last two decades, Mongolia has emerged as an innovator in formulating policy responses to address these events. Notably, Mongolia stands out as one of the few countries worldwide with a functioning privately operated index insurance scheme. In response to the three consecutive extreme winters in 1999-2001, the Mongolian Government developed IBLI with technical support from the World Bank (Mahul & Skees 2007; World Bank 2016). Its key objective is "to reduce herders' livelihood vulnerability caused by […] natural disasters" (PIU, 2012). Since 2012, IBLI has been offered in all provinces in Mongolia. IBLI is marketed in the form of annual contracts by commercial insurance companies and local banks, the latter offering policies bundled with loans with reduced interest rates (MongolianRe 2021). Policyholders receive IBLI indemnity payments when the district-level livestock mortality rate of a given species exceeds the threshold of 6%, irrespective of whether a specific policyholder experienced damage. Herders can purchase IBLI for the five commonly held species (sheep, goats, cattle, horses, or camels). They decide on how many animals of each species and for how much of the animals' market value (between 1-100 percent) they wish to purchase IBLI coverage. The sales period is from January to June, when neither herders nor insurance companies can predict conditions in the upcoming winter, preventing adverse selection. Insurance policies cover livestock losses between December and June of the following year. In an extreme weather event, indemnity payments are made to policyholders in August of the following year (MongolianRe 2021). In 2021, 16% of all herder households purchased IBLI, while some fluctuation exists across years (Fig. 1).

Fig. 1: IBLI uptake among herder households (2012-2021)



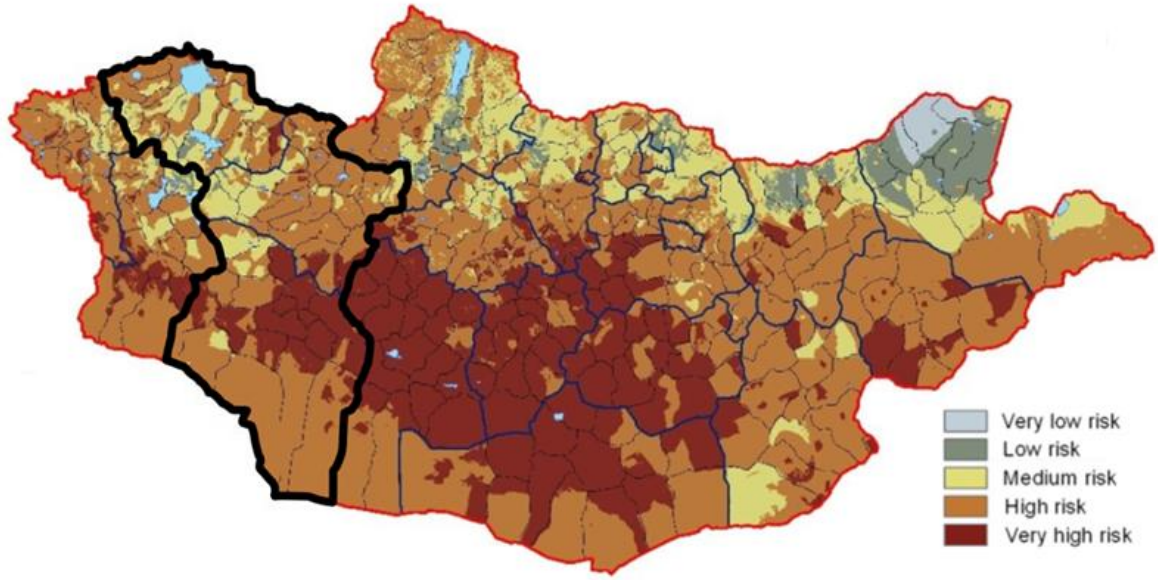
Notes: Share of herding households purchasing IBLI each year. Source: National Statistical Office of Mongolia (2022)

Mongolia is also among the global pioneers introducing anticipatory assistance schemes and one of the first countries in which, during the 2017/18 extreme winter, risk projections triggered anticipatory humanitarian assistance (IFRC 2020b). The basis of anticipatory assistance in Mongolia is risk maps published by IRIMHE. The maps show the predicted risk of extreme winter conditions at a fine spatial resolution. The prediction uses 14 indicators, including summer rainfall, forecasted winter temperature, and pasture capacity, resulting in 5 different levels of risk (very high, high, normal, low, and very low) (IFRC 2020a). In winter 2017/18, the MRCS released 277,000 USD from the IFRC Disaster Relief Emergency Fund (DREF) to assist 2,000 pastoralist households living in areas predicted to be at high or very high risk with emergency supplies, including 100 USD per household (IFRC 2018). Using the same risk maps, in the winter of 2018/19, an anticipatory assistance mechanism by World Vision and Save the Children was triggered. In seven districts in Western Mongolia, a total of 244,720 USD was allocated among herder households with less than 200 livestock. In addition to unconditional cash, households also received hay and fodder for livestock and a booklet on protecting children and family members (Start Network 2019). In

the winter of 2019/20, DREF approved more than 300,000 USD from its Forecast-based Action mechanism for the MRCS to provide unconditional cash transfers and livestock nutrition kits to herder households with up to 400 livestock. Anticipatory assistance was triggered when at least three provinces had very high risk projected in more than 20% of their provincial area, according to the risk map in November (IFRC 2020a). One thousand pastoralist households from 40 districts across 12 provinces received about 90 USD, and another 1,000 households received livestock nutrition kits.

For the winter of 2020/21, the early warning system predicted a very high risk of extreme winter conditions in several regions of the country. The risk map published on November 20, 2020, indicated that 85% of Mongolia faced a very high, high, or medium risk of extreme winter conditions, particularly in the central and western regions (IRIMHE 2021). The updated risk map, published on January 10, 2021 (Fig. 2), showed a further increase in the projected risk level. In response, four organizations – the Mongolian Red Cross Society (MRCS), supported by IFRC, along with FAO, People in Need, and World Vision – implemented Anticipatory Humanitarian Action programs in Mongolia during the winter of 2020/21.

Fig. 2: Risk map for the 2020/21 winter, published January 10, 2021



Notes: The survey area of the Coping with Shocks in Mongolia Household Panel Survey is bold-rimmed. Source: IRIMHE (2021).

4. Experimental framework and data

During the extreme winter of 2020/21, we carried out a randomized field experiment consisting of the randomized distribution of unconditional cash transfers in Western Mongolia to pastoralist households. This intervention was part of an evaluation project funded by the German Federal Foreign Office to assess

the impact of anticipatory cash transfers on livestock assets, income, investments, or consumption across the study population. Within this project, the authors were responsible for designing and conducting the randomized impact evaluation, as well as creating the household survey. People in Need implemented the Anticipatory Humanitarian Action intervention following the randomized design, while the NSO was in charge of conducting the household survey.

The anticipatory cash transfer project builds on the data collected in the *Coping with Shocks in Mongolia Household Panel Survey*, which the authors conducted in collaboration with the National Statistical Office of Mongolia (NSO) (Kraehnert et al. 2022). The survey consists of five panel waves, collected from the neighboring provinces of Govi-Altai, Zavkhan, and Uvs in western Mongolia. (Fig. A1 in the Appendix). The first three waves were collected between 2012 and 2015. Data for wave 4 was collected between June 2020 and May 2021. Panel wave 5 took place between June 2021 and May 2022. The survey is conducted continuously, interviewing one-twelfth of the sample households each month to ensure coverage across all seasons. In every panel wave, households are interviewed in the same month as they were in previous waves.

The randomized anticipatory cash transfer intervention was implemented among households that meet three eligibility criteria: Firstly, they must have participated in the *Coping with Shocks Panel Survey*. Secondly, they must reside in an area classified as very high, high, or medium risk for extreme winter conditions, as per the risk map published on January 10, 2021. All sample households in the Coping with Shocks Survey met this second criterion. Thirdly, the households must own livestock. Approximately half of the households sampled in the *Coping with Shocks* survey are pastoralists. As of February 2021, data from wave 4 of the *Coping with Shocks Panel Survey* showed that 925 households met the three eligibility criteria (Table 1). Out of these 925 households, 421 were randomly assigned to the treatment group and 504 to the control group. The treatment group was designated to receive an average of 236 USD.[4] Randomization was carried out at the sub-district level to avoid spillover effects.[5]

[4] The determination of the cash assistance amount was based on existing Anticipatory Humanitarian Action programs conducted by humanitarian organizations in Mongolia.

[5] For a detailed description of the experiment, see Mogge et al. (2024).

Table 1: Sample

	Treatment	Control	Total
Number of households meeting the eligibility criteria, based on data available in February 2021	421	504	925
Number of households meeting the eligibility criteria, based on complete wave 4 data	378	452	830
Number of households receiving cash transfers as part of Anticipatory Humanitarian Action intervention	381	-	381
Number of eligible households for whom wave 5 data were successfully collected	373	442	815
Number of eligible households that still owned livestock by the time of wave 5	359	417	776
Number of eligible households that still owned livestock by the time of wave 5 and for whom IBLI demand data is available (sample used in analysis)	319	387	706
Number of sub-districts in which eligible households reside (sample used in analysis)	47	54	101

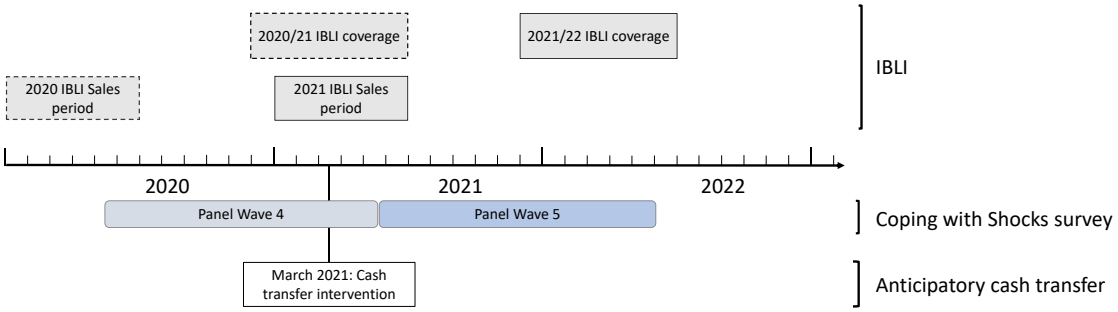
Source: Coping with Shocks in Mongolia Household Panel Survey (waves 3-5).

In February 2021, the NSO gathered pre-intervention data via in-person visits to the treatment households, most of which follow a nomadic or semi-nomadic lifestyle. NSO enumerators successfully located and surveyed 381 out of the 421 selected households for treatment. Each of these 381 households consented to participate in the study. Subsequently, these households were informed of their random selection to receive a cash transfer from People in Need in the coming weeks. In the second week of March 2021, the cash was transferred to the 381 households' bank accounts. Immediately following the completion of the bank transactions, People in Need notified the recipient households of the received transfers, either through phone calls or text messages.

From June 2021 to May 2022, the NSO conducted the fifth wave of the *Coping with Shocks Panel Survey*. For the population that met the project intervention's eligibility criteria, data for wave 5 was successfully collected from 815 households. Out of the eligible households with complete wave 5 data, 39 that discontinued herding have been excluded from the analysis, leaving a sample of 776 eligible households that still owned livestock by the time of wave 5.

The timing of the anticipatory cash transfer intervention coincided with the 2021 sale period for index-based livestock insurance, which started in January 2021 and lasted until June (Fig. 3). During these months, households could purchase insurance that would cover livestock losses during the following winter period from December 2021 to June 2022. Since the sales period started up to three months before anticipatory cash transfers were received, we cannot rule out that some households might have bought IBLI that would not have bought insurance after treatment. If a payout-triggering disaster strikes, IBLI payouts are made in August of the following year.

Fig. 3: Timeline of data collection, Anticipatory cash transfers and insurance seasons.



Source: The authors.

Merging the *Coping with Shocks Panel Survey* with the customer database of MongolianRe provides us with information on the uptake of index insurance in the sales periods 2015, 2016, 2017, 2018, 2019, 2020, and 2021. The merging exercise was successfully completed for 706 out of 776 eligible and livestock-owning households.[6]

Table 2 compares the mean value of household baseline characteristics across treatment and control groups. The comparison of means indicates that the treatment and control groups are well-balanced across a wide range of household characteristics. When considering the normalized difference in means across treatment and control groups (Imbens & Rubin 2015), household location in the provincial center and the forecasted risk of extreme weather are identified as unbalanced, with the absolute normalized difference exceeding 0.2. Households in the treatment group have a 12 percentage point lower probability of living in a provincial center and a 10 percentage point higher probability of living in a district with only medium risk, according to the risk projection published January 10, 2021.

[6] Matching was done based on the national ID of the head of the household. The ID was not recorded in the Coping with Shocks survey itself but retrospectively assigned to survey households by the NSO based on names and addresses. This exercise could not be completed for some households.

Table 2: Balance tests

	Mean values, treatment group (N=319)	Mean values, control group (N=387)	T-test p-value	Normalized difference
	(1)	(2)	(3)	(4)
Insurance characteristics (2015-2020)				
Household purchased insurance in sales period 2020	0.20	0.18	0.52	-0.06
Household purchased insurance in any sales period from 2015-2020	0.43	0.37	0.26	-0.12
Household purchased received an insurance payout in 2020	0.02	0.01	0.81	-0.05
Household purchased insurance in any year period from 2016-2020	0.12	0.09	0.35	-0.09
Household characteristics (pre-treatment)				
Female head of household (0-1)	0.14	0.12	0.23	-0.08
Age of head of household	48.18	49.49	0.18	0.11
Education of head of household: none (0-1)	0.16	0.13	0.39	-0.10
Education of head of household: primary (0-1)	0.24	0.24	0.73	-0.01
Education of head of household: above primary (0-1)	0.60	0.63	0.81	0.08
Household size	4.18	3.97	0.20	-0.12
Herd size in SFU (ln)	5.83	5.87	0.57	0.04
Number of goats (ln)	4.52	4.52	0.71	-0.00
Number of sheep (ln)	4.25	4.32	0.41	0.05
Number of large animals (cattle, horses, and camels) (ln)	2.90	2.94	0.81	0.03
Total income in USD (ln)	8.16	8.23	0.54	0.08
Income from livestock byproducts in USD (ln)	6.50	6.51	0.71	0.00
Income from sold animals in USD (ln)	4.01	4.28	0.39	0.07
Total expenditures on herding in USD (ln)	5.69	5.76	0.91	0.04
Fodder expenditures in USD (ln)	4.89	4.94	0.92	0.03
Fuel expenditures in USD (ln)	4.95	4.97	0.94	0.01
Number of livestock consumed (ln)	3.19	3.18	0.87	-0.01
Expenditures on non-food consumption in USD (ln)	7.16	7.13	0.66	-0.04
Household lives in province center (0-1)	0.12	0.24	0.13	0.30
Winter intensity				
Livestock mortality rate in district 2021 (%)	3.33	2.89	0.67	-0.10
Forecasted risk of extreme weather event in district: very high (0-1)	0.18	0.20	0.65	0.05
Forecasted risk of extreme weather event in district: high (0-1)	0.57	0.65	0.45	0.16
Forecasted risk of extreme weather event in district: medium (0-1)	0.24	0.14	0.14	-0.25
F-test of joint significance (F-stat)			1.48*	
F-test, number of observations			685	

Notes: Col. 3 displays the p-value from OLS regressions of each variable on the indicator for treatment, controlling for interview-month and province fixed effects and clustering standard errors at the sub-district level. Col. 4 reports the normalized difference between the treatment and control group means. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Sources: Coping with Shocks in Mongolia Household Panel Survey (waves 4-5), MongolianRe customer database, Mongolia Livestock Census, and IRIMHE (2021).

5. Empirical results

To test whether receiving unconditional anticipatory cash transfers helped affected households' demand for index insurance, we estimate

$$IBLI_h = \beta_0 + \beta_1 treatment_h + \beta_2 X_{h,d} + \delta_m + \varphi_p + \varepsilon_{hdm} \quad (1)$$

where $IBLI_h$ is equal to one if a household purchased index-based livestock insurance in the selling period of January to June 2021, providing coverage for the 2021/22 winter, $treatment_h$ indicates whether household h was selected to receive an unconditional cash transfer from People in Need and $X_{h,s}$ is a vector of household controls comprising of the unbalanced variables (household location in the provincial center and the forecasted risk of extreme weather). The equation contains interview month fixed effects δ_m and province fixed effects (φ_p) to account for the survey design. Standard errors are clustered at the level of randomization, the sub-district, as the treatment assignment is correlated within the clusters. The estimated coefficient β_1 measures the causal impact of cash transfers on IBLI uptake.

Table 3 reports the intent-to-treat effect of anticipatory cash transfers on insurance uptake in 2021, obtained with OLS. In column 1, the point estimate of receiving the anticipatory cash transfers is 0.03 and not significant at conventional levels.

In a second step, we investigate whether the observed treatment effect is driven by a subset of households characterized by common traits. We include an interaction term between treatment and insurance uptake in the previous year (2020). The coefficient of the interaction term is large and highly significant, while the effect of the treatment alone remains insignificant at conventional levels (col. 3-4). The receipt of anticipatory cash transfers increases the likelihood of purchasing IBLI on average by 26 percentage points among households that had already purchased IBLI in the preceding year compared to treated households that have not purchased IBLI in the preceding year, holding all other variables constant. Next, we explore whether the receipt of anticipatory cash transfers had similar effects for households living in areas with different realized risk levels (col. 5-6). The best measure available to capture realized risk is livestock mortality at the district level, calculated from the Mongolia Livestock Census. The coefficient is negative and not significant at any conventional level. Lastly, we explore the heterogeneity of effects of the intervention with respect to pre-shock wealth (col. 7-8). Wealthier farmers might be more able to purchase insurance, while the relative importance of cash transfer is greater for poorer farmers.

Table 3: The effects of cash transfers on insurance uptake (OLS)

Dependent variable: IBLI uptake in 2021	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Selected for treatment	0.03	0.02	-0.02	-0.03	0.03	0.02	0.04	0.04
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.04)
IBLI uptake in 2020			0.17**	0.17**				
			(0.06)	(0.06)				
Selected for treatment × IBLI uptake in 2020			0.26**	0.27**				
			(0.09)	(0.09)				
Livestock mortality in district					0.01	0.01		
					(0.01)	(0.01)		
Selected for treatment × livestock mortality in district					-0.01	-0.00		
					(0.01)	(0.01)		
Pre-treat. herd size (ln)							0.07***	0.07***
							(0.02)	(0.02)
Selected for treatment × pre-treat. herd size (ln)							0.04	0.04
							(0.03)	(0.03)
Located in province center		-0.03		-0.02		-0.02		0.02
		(0.05)		(0.05)		(0.05)		(0.05)
High predicted risk in district		-0.09*		-0.09**		-0.10*		-0.09*
		(0.05)		(0.05)		(0.05)		(0.05)
Very high predicted risk in district		-0.01		-0.02		-0.03		-0.04
		(0.08)		(0.07)		(0.09)		(0.08)
Constant	-0.06	0.03	-0.11**	-0.02	-0.04	0.07	-0.09	-0.03
	(0.04)	(0.08)	(0.05)	(0.07)	(0.06)	(0.10)	(0.06)	(0.07)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.10	0.11	0.20	0.21	0.10	0.11	0.14	0.15
Observations	706	706	706	706	706	706	706	706

Note: Effects from OLS regressions with standard errors clustered at the sub-district level and reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Sources: Coping with Shocks in Mongolia Household Panel Survey (waves 4-5), MongolianRe customer database, Mongolia Livestock Census, and IRIMHE (2021).

In further extensions of the study, we discuss the robustness of our results across multiple dimensions. The intervention was initially designed with two treatment arms, each providing different amounts of AHA cash transfers to households: one arm received a lower amount (178 USD), and the other received a higher amount (297 USD). Our main analysis does not differentiate between the treatment arms due to their small sample sizes, with 162 households in the lower-amount treatment arm and 157 in the larger-amount treatment arm. Results in Table A.1 in the Appendix show that our main findings are confirmed when considering the two treatment arms separately, with the lower and larger transfer amount increasing insurance uptake (only) for households that purchased insurance in the previous year.

Second, we limit the sample to 280 households that have purchased IBLI at any time between 2015 and 2020. The sample is more homogenous in that these households have all had experience with insurance. The results displayed in Table A.2 are similar to our main findings, with large and positive effects for the interaction term between treatment and IBLI uptake in 2020.

Third, we explore the relationship between the treatment and previous purchases of IBLI. Considering the effect of interaction effects between the treatment and IBLI purchases in previous sales periods (from 2015 to 2019), we find that only purchases in 2019 significantly increased the treatment effect, whereas there is no such effect for earlier purchases of IBLI (Table A.3). We also use data on pre-treatment purchases of IBLI to run a pseudo-test with IBLI bought in 2020 being the dependent variable. We do not find that the treatment is correlated with IBLI purchases in 2020 or that there is a significant interaction effect between treatment and purchases in 2019 (Table A.4)

Table A.5 presents results from different attrition analyses. Results show the treatment does not significantly affect the likelihood of being in the main analysis sample (N=706) among households that met the eligibility criteria based on data in February 2021 (N=925). The reasons for not being in the main sample are either a failure to merge *Coping with shocks* survey data and IBLI customer data, survey nonresponse, or stopping herding before wave 5 data is collected. The treatment does not explain the likelihood of a successful merging between the *Coping with shocks* survey data and customer data provided by MongolianRe, nor does it explain the likelihood of a survey nonresponse in either wave 4 or wave 5 of the *Coping with shocks* survey. There is indicative evidence that among households that (i) were eligible based on data in February 2021 and (ii) interviewed in wave 4 and wave 5, the treatment has reduced the probability of stopping herding. The estimated treatment effect is 3 percentage points with a p-value of 0.149. When considering households that were (i) eligible for the treatment based on data in February 2021, (ii) interviewed in wave 4 and wave 5, *and* (iii) for which survey data could be merged with IBLI customer data, we do see that IBLI uptake in 2020 is negatively correlated with quitting herding but this effect does not change depending on the treatment group

Finally, we explore whether the treatment has affected the perception of risk in households, proxied by the expectations regarding the weather conditions in the upcoming winter. An increase in perceived weather risk might increase the demand for IBLI by households who want to insure themselves against that risk. We do not find that the cash transfer treatment has significantly changed the expectations of households (Table A.6). However, we should treat these results with caution due to a relatively small number of households for whom expectations regarding the winter 2021/22 are available (N=470).[7]

[7] Due to the rolling basis of the Coping with Shocks survey, expectations regarding weather conditions in the winter 2021/22 were elicited in partly wave 4 (for households interviewed between December 2020 and May 2021) and wave 5 (for households interviewed between May 2021 and December 2021). We consider information from wave 4 for N = 93 households interviewed after March 2021, i.e. after the treatment, and information from wave 5 for N = 377 households interviewed before December 2021.

6. Discussion and conclusion

Among practitioners and policymakers, anticipatory assistance and index insurance are widely considered effective tools to assist vulnerable households in coping with extreme weather events. Yet, the empirical evidence on the effectiveness of anticipatory cash transfers in general and on the interdependencies of anticipatory cash transfers with households' adaptation strategies is scarce. Literature on crowding-out effects of conventional disaster aid suggests that the expectation and the receipt of disaster aid after an extreme weather event leads to a decrease in households' demand for insurance - a phenomenon called charity hazard. This study is the first to address whether anticipatory assistance crowds out households' investment in adaptation strategies. Exploiting a randomized experiment, we investigate how the receipt of anticipatory cash transfers influences the demand for index-based livestock insurance in Mongolia. We use two waves of household panel data collected before and after the field experiment. We complement the household survey data with customer data from the national reinsurance company.

Results show that the receipt of anticipatory cash transfers does not crowd out households' demand for index insurance in the following sales period. Our results are robust to controlling for objective risk exposure and households' insurance history in contrast to earlier studies focusing on the crowding-in effects of conventional disaster aid (Browne & Hoyt 2000; Petrolia et al. 2013). We find a robust positive effect of the cash transfers only on insurance demand for households that have purchased insurance in the previous sales period. Those households' probability of repurchasing IBLI increases by 27% compared to treated households not insured in the preceding year.

Our study's setting and experimental design provide a rare opportunity to inform policymakers, international aid organizations, and insurance providers about the interaction effects between two innovative shock-coping instruments. However, we caution that the lack of a charity hazard should be interpreted within the empirical context. Anticipatory cash transfers provided by international donors are incomplete and very uncertain, characteristics that may have reduced the likelihood of charity hazards (Raschky et al. 2013; Robinson et al. 2021; Tesselaar et al. 2022). Moreover, due to the design of index insurance, the disincentivizing effect of disaster aid on insurance uptake could be small in comparison to traditional insurance since policyholders receive payouts regardless of their own losses.

6. References

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7. Appendix

Fig. A1: Map of Mongolia, survey provinces are darkly shaded.



Table A.1: The effects of cash transfers on insurance uptake (OLS)

Dependent variable: IBLI uptake in 2021	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Selected for 178 USD Cash transfer	0.00 (0.98)	-0.00 (0.93)	-0.05 (0.17)	-0.05 (0.13)	0.00 (0.94)	-0.00 (0.97)	0.01 (0.74)	0.01 (0.84)
Selected for 297 USD Cash transfer	0.06 (0.23)	0.05 (0.31)	0.00 (0.95)	-0.01 (0.88)	0.06 (0.26)	0.05 (0.37)	0.06 (0.19)	0.06 (0.20)
IBLI uptake in 2020			0.17** (0.01)	0.17** (0.01)				
178 USD × IBLI uptake in 2020			0.28** (0.01)	0.30** (0.00)				
297 USD × IBLI uptake in 2020			0.24* (0.05)	0.24* (0.04)				
Livestock mortality in district					0.01 (0.48)	0.01 (0.59)		
178 USD × livestock mortality in district					-0.01 (0.60)	-0.00 (0.83)		
297 USD × livestock mortality in district					-0.00 (0.59)	-0.00 (0.89)		
Pre-treat. herd size (ln)							0.07*** (0.00)	0.07*** (0.00)
178 USD × pre-treat. herd size (ln)							0.01 (0.75)	0.01 (0.80)
297 USD × pre-treat. herd size (ln)							0.07 (0.11)	0.07 (0.11)
Located in province center		-0.02 (0.62)		-0.01 (0.82)		-0.02 (0.70)		0.03 (0.56)
High predicted risk in district		-0.09 (0.08)		-0.09 (0.05)		-0.10 (0.08)		-0.10 (0.06)
Very high predicted risk in district		-0.01 (0.90)		-0.02 (0.76)		-0.02 (0.80)		-0.04 (0.62)
Constant	-0.05 (0.23)	0.04 (0.63)	-0.10* (0.03)	-0.01 (0.87)	-0.03 (0.57)	0.07 (0.53)	-0.08 (0.13)	0.01 (0.86)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.10	0.11	0.20	0.21	0.10	0.11	0.15	0.15
Observations	706	706	706	706	706	706	706	706

Note: Effects from OLS regressions with standard errors clustered at the sub-district level and reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Sources: Coping with Shocks in Mongolia Household Panel Survey (waves 4-5), MongolianRe customer database, Mongolia Livestock Census, and IRIMHE (2021).

Table A.2: The effects of cash transfers on insurance uptake among households that purchased IBLI between 2015 and 2020 (OLS)

Dependent variable: IBLI uptake in 2021	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Selected for treatment	0.08 (0.06)	0.08 (0.06)	-0.05 (0.06)	-0.05 (0.06)	0.08 (0.06)	0.08 (0.06)	0.04 (0.06)	0.04 (0.06)
IBLI uptake in 2020			0.03 (0.07)	0.03 (0.07)				
Selected for treatment × IBLI uptake in 2020			0.27** (0.09)	0.28** (0.09)				
Livestock mortality in district					-0.00 (0.01)	-0.00 (0.01)		
Selected for treatment × livestock mortality in district					-0.01 (0.01)	-0.01 (0.01)		
Pre-treat. herd size (ln)							0.03 (0.05)	0.04 (0.05)
Selected for treatment × pre-treat. herd size (ln)							0.13 (0.07)	0.12 (0.07)
Located in province center		0.02 (0.12)		0.01 (0.13)		0.02 (0.13)		0.06 (0.12)
High predicted risk in district		-0.06 (0.08)		-0.07 (0.07)		-0.05 (0.08)		-0.07 (0.07)
Very high predicted risk in district		0.02 (0.13)		0.03 (0.13)		0.01 (0.14)		-0.03 (0.12)
Constant	-0.05 (0.12)	-0.02 (0.20)	-0.06 (0.12)	-0.02 (0.19)	-0.09 (0.12)	-0.05 (0.21)	-0.10 (0.13)	-0.03 (0.20)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.19	0.20	0.24	0.24	0.20	0.20	0.22	0.23
Observations	280	280	280	280	280	280	280	280

Note: Effects from OLS regressions with standard errors clustered at the sub-district level and reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The sample is limited to households that have purchased IBLI at any time between 2015 and 2020. Sources: Coping with Shocks in Mongolia Household Panel Survey (waves 4-5), MongolianRe costumer database, Mongolia Livestock Census, and IRIMHE (2021).

Table A.3: The effects of cash transfers on insurance uptake: Interaction effects for uptake in 2015 - 2019 (OLS)

Dependent variable: IBLI uptake in 2021	(1)	(2)	(3)	(4)	(5)	(6)
Selected for treatment	-0.03	0.01	0.01	0.01	0.03	-0.02
	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)
IBLI uptake in 2019	0.15*					
	(0.07)					
Selected for treatment × IBLI uptake in 2019	0.20*					
	(0.09)					
IBLI uptake in 2018		0.10				
		(0.09)				
Selected for treatment × IBLI uptake in 2018		0.08				
		(0.12)				
IBLI uptake in 2017			0.06			
			(0.06)			
Selected for treatment × IBLI uptake in 2017			0.05			
			(0.09)			
IBLI uptake in 2016				0.13		
				(0.08)		
Selected for treatment × IBLI uptake in 2016				0.15		
				(0.10)		
IBLI uptake in 2015					0.09	
					(0.17)	
Selected for treatment × IBLI uptake in 2015					-0.05	
					(0.22)	
IBLI uptake between 2015 and 2020						0.19***
						(0.05)
Selected for treatment × IBLI uptake between 2015 and 2020						0.10
						(0.07)
Located in province center	0.00	-0.02	-0.02	-0.02	-0.03	0.01
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
High predicted risk in district	-0.09	-0.08	-0.09	-0.10*	-0.09	-0.08
	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)
Very high predicted risk in district	-0.03	-0.00	-0.01	-0.01	-0.01	-0.02
	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)	(0.07)
Constant	0.03	0.03	0.01	0.03	0.03	-0.06
	(0.07)	(0.08)	(0.08)	(0.07)	(0.08)	(0.09)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.18	0.12	0.11	0.14	0.11	0.19
Observations	706	706	706	706	706	706

Note: Effects from OLS regressions with standard errors clustered at the sub-district level and reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The sample is limited to households that have purchased IBLI at any time between 2015 and 2020. Sources: Coping with Shocks in Mongolia Household Panel Survey (waves 4-5), MongolianRe costumer database, Mongolia Livestock Census, and IRIMHE (2021).

Table A.4: Pseudo-test regarding the effects of cash transfers in 2021 on insurance uptake in 2020 (OLS)

Dependent variable: IBLI uptake in 2020	(1)	(2)	(3)	(4)
Selected for treatment	0.01 (0.03)	0.01 (0.03)	-0.02 (0.02)	-0.00 (0.02)
IBLI uptake in 2019			0.42*** (0.04)	0.45*** (0.07)
Selected for treatment × IBLI uptake in 2019				-0.07 (0.08)
Located in province center		-0.05 (0.03)		
High predicted risk in district		-0.03 (0.05)		
Very high predicted risk in district		0.02 (0.07)		
Constant	0.20*** (0.06)	0.23** (0.08)	0.18*** (0.04)	0.17*** (0.04)
Month FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
R-squared	0.04	0.05	0.22	0.22
Observations	706	706	706	706

Note: Effects from OLS regressions with standard errors clustered at the sub-district level and reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The sample is limited to households that have purchased IBLI at any time between 2015 and 2020. Sources: Coping with Shocks in Mongolia Household Panel Survey (waves 4-5), MongolianRe costumer database, Mongolia Livestock Census, and IRIMHE (2021).

Table A.5: Attrition analysis (OLS)

Dependent variable:	Household not in main sample	Merging with IBLI database failed	Not surveyed in in wave 4 or wave 5	Stops herding between wave 4 and wave 5		
	(1)	(2)	(3)	(4)	(5)	(6)
Selected for treatment	-0.01 (0.03)	0.01 (0.02)	0.00 (0.02)	-0.03 (0.02)	-0.03 (0.02)	-0.03 (0.02)
IBLI uptake in 2020					-0.06** (0.02)	-0.06** (0.02)
Selected for treatment × IBLI uptake in 2020					0.04 (0.03)	0.05 (0.03)
Located in province center						0.04 (0.03)
High predicted risk in district						-0.06* (0.03)
Very high predicted risk in district						-0.06 (0.04)
Constant	0.85*** (0.09)	-0.03 (0.02)	-0.11*** (0.03)	0.10 (0.09)	0.11 (0.08)	0.17* (0.08)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.32	0.67	0.09	0.06	0.07	0.08
Observations	925	925	925	815	737	737
Sample description	Households meeting the eligibility criteria, based on data available in February 2021			Households for whom wave 5 data is collected	Households for whom wave 5 data is collected and IBLI demand data is available	

Note: Effects from OLS regressions with standard errors clustered at the sub-district level and reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Sources: Coping with Shocks in Mongolia Household Panel Survey (waves 4-5), MongolianRe costumer database, Mongolia Livestock Census, and IRIMHE (2021).

Table A.6: The effects of cash transfers on weather expectations (OLS)

Dependent variable: Expectations on weather conditions during next winter (0-10)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Selected for treatment	-0.07 (0.19)	-0.14 (0.19)	-0.09 (0.19)	-0.17 (0.19)	-0.07 (0.18)	-0.13 (0.18)	-0.09 (0.19)	-0.15 (0.18)
IBLI uptake in 2020			-0.08 (0.27)	-0.11 (0.28)				
Selected for treatment × IBLI uptake in 2020			0.10 (0.32)	0.14 (0.32)				
Livestock mortality in district					-0.15** (0.05)	-0.15** (0.05)		
Selected for treatment × livestock mortality in district					0.07 (0.05)	0.05 (0.05)		
Pre-treat. herd size (ln)							0.05 (0.13)	0.00 (0.12)
Selected for treatment × pre-treat. herd size (ln)							0.32 (0.16)	0.35* (0.16)
Located in province center		-0.36 (0.25)		-0.36 (0.25)		-0.45 (0.26)		-0.28 (0.24)
High predicted risk in district		-0.15 (0.26)		-0.16 (0.26)		0.04 (0.26)		-0.18 (0.26)
Very high predicted risk in district		-0.44 (0.38)		-0.44 (0.38)		-0.20 (0.38)		-0.49 (0.37)
Constant	8.01*** (0.23)	8.31*** (0.39)	8.03*** (0.23)	8.34*** (0.40)	7.57*** (0.27)	7.63*** (0.48)	7.99*** (0.25)	8.32*** (0.37)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.43	0.44	0.43	0.44	0.45	0.46	0.44	0.45
Observations	470	470	470	470	470	470	470	470

Note: Effects from OLS regressions with standard errors clustered at the sub-district level and reported in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Sources: Coping with Shocks in Mongolia Household Panel Survey (waves 4-5), MongolianRe costumer database, Mongolia Livestock Census, and IRIMHE (2021).