Ultra-Poor Graduation and Environmental Shocks: Evidence from the 2019 Malawian Floods

Tara Bedi

with Michael King, Ilan Noy and Julia Vaillant
(TIME, Trinity College Dublin, Victoria University of Wellington and the World Bank)

December 6, 2022

Overview/Motivation

1. Growing evidence multifaceted anti-poverty programmes for ultra poor (Graduation) are effective.
2. Climate change, natural disasters, other shocks may undermine the ability of participants to graduate from poverty, and sustain gains.
3. Natural disaster occurred during implementation of graduation intervention.
4. Unique circumstances to study:
   - How natural disaster affects the household's ability to cope with such shocks

Literature:Impact of Natural Disasters

- Substantial negative effects on HH consumption, income, and durable assets, with greater effects for poorer HHs ((Carter et al. (2007), (Antilla-Hughes and Hsiang (2012) and (Baez et al. (2016)).
- Studies find poorer HH dis-invest in health/education to smooth food consumption (long term damage).

Without complete insurance, environmental risks may undermine hard won improvements in livelihoods.

Literature: Cash Transfer Programmes and Protection Against Shocks/Disasters

- Households who received top-up cash transfers post Tropical Cyclone Winston, were more likely to report faster financial recovery (Ivaschenko et al. (2019)).
- In Zambia, cash transfers were found to have a mitigating role against the negative effects of weather shocks (Asfaw et al. (2017)).
- Each additional year of exposure to cash transfers post a rainfall shock in birth year increases probability of employment at age 18 by 8 per-cent (Adhvaryu et al. (2018)).

Research Questions

1. How does a natural disaster affect Graduation households' food security?
2. Do multifaceted anti-poverty programmes protect households from impacts of natural disasters?
3. What mechanisms play a role in influencing the trajectory of participating HHs pre- and post flood? Examine role played by:
   - Loss of productive resources
   - Relief
   - Psychological bandwidth

Contribution to the Literature

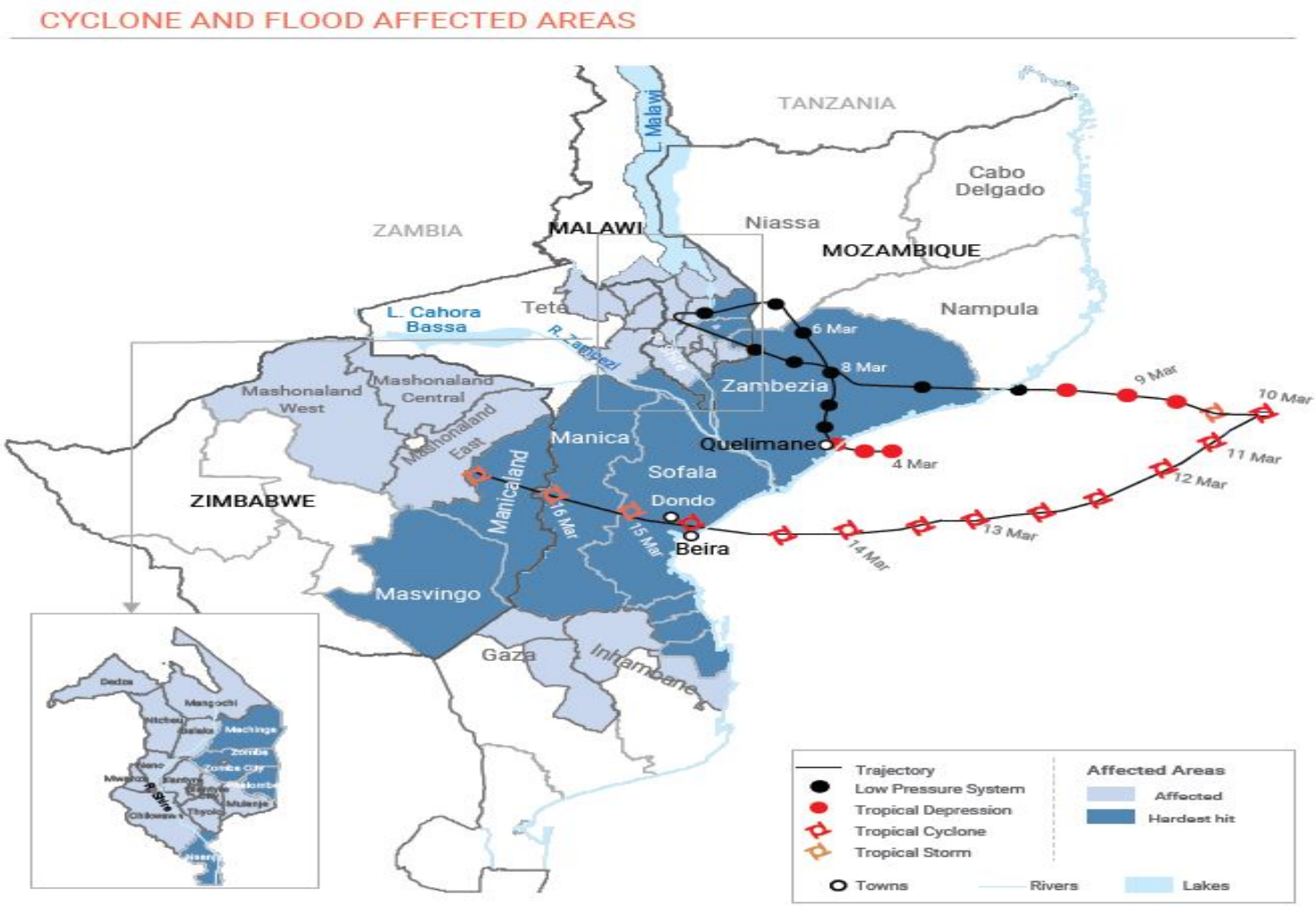
- Adds evidence of how multi faced anti-poverty programmes for the Ultra Poor protect households from real shocks/environmental disasters.
- Able to understand the impacts of these shocks over time.

3. Context - Cyclone Idai

- IPCC identify Malawi as high-risk country for climate change.
  - Malawi has experienced 19 major floods and 7 droughts in the last 50 years.
- Hit Southern/Central regions of Malawi twice in March 2019 affecting 1m people, displacing 86,976, killing 60, and destroying or damaging 300,000 houses (Government of Malawi, 2019).

Cyclone Idai

Figure: The Path of Cyclone Idai



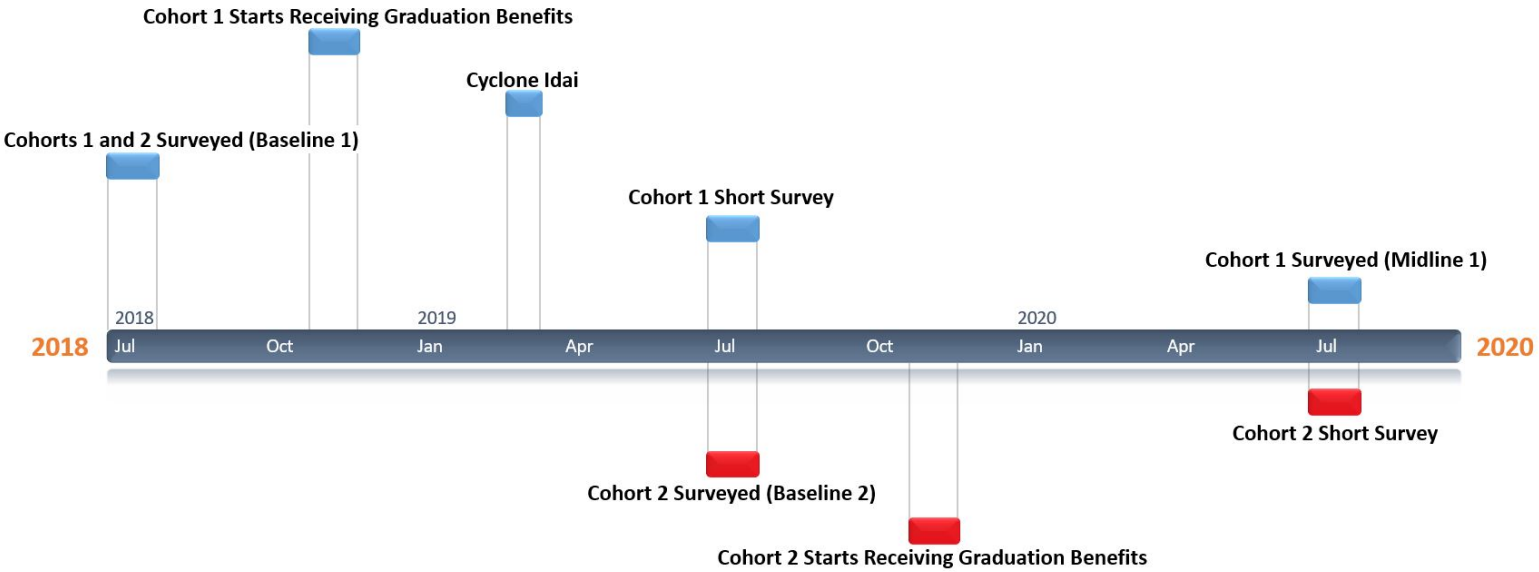
Context - Graduation Model

- The graduation programme is a "big-push" intervention designed to move people out of poverty by simultaneously boosting livelihoods, income, and access to financial services.
- Our overall study aims to better understand the gender dimensions of the programme by randomising the gender of the recipient and testing the impact of an additional couples training intervention.
- This study uses the randomisation of the roll out of the programme to understand how the households cope with shocks.
- Cyclone Idai hit during year one (for cohort one) of the implementation of Concern's graduation model.

Overall Sample and Treatment Arms

- The study covers 200 villages, stratified across Mangochi and Nsanje districts, and covers a total of 2563 couples.
  - Eligible households selected via community wealth ranking, or proxy means test based on household materials and livestock assets.
- All 200 sample villages randomly allocated to Research Cohorts 1 or 2
  - Cohort 1 treated villages began the Graduation program in 2018
  - Cohort 2 treated villages only informed and started the Graduation programme in 2019

Data Collection and the floods - Sample



Key Outcome - Food Security

We have two related measures of Food Security.

- Annual Food Security Index: 9 components, ranges from 0 (severely food insecure) to 9 (food secure).
- Recent Food Security Index: 3 components, ranges from 0 (severely food insecure) to 3 (food secure).

Key Outcome Variable 2 - Bandwidth

Low bandwidth, perhaps due to poverty, leads to poorer strategic longer term decisions (Mani et al. (2013)).

- BW Index: mean of the four standardized variables.
  - BW1: Average (over 10 tries) reaction time touching a randomly appearing figure on tablet.
  - BW2: Inhibitory control measured by hearts and flowers test.
  - BW3: Recite number back after 10 seconds. If correct given increasingly longer numbers.
  - BW4: Fluid intelligence through a raven's test.

Methodology

Estimation Equation

$$Y_{(i)hv} = \beta_1 + \beta_2 T_{hv} + \beta_3 T_{hv} * F_{hv} + \beta_4 F_{hv} + \beta_6 X(i)_{hv} + \beta_6 Z(i)_{hv} + \epsilon_{hv}$$

- β_2 captures the impact of our treatment indicator T_{hv}, which takes the value of 1 if household h in village v received the Graduation program, and 0 if it did not.
- β_3 captures the interaction term between being over the damage threshold and being on the Graduation program.
- β_4 captures the impact of being over the damage threshold in 2019.
- We also include time variant $(X(i)hv)$ and time invariant $(Z(i)hv)$ household and individual controls from baseline.
- ϵ_{hv} is our statistical error term, clustered at the level of randomisation.

Damage Threshold

- 82% of the full sample reported being affected by the flood, with 86% of non-treated households reported being affected compared to 76%
- When we measure the intensity of damage, we find no statistical difference between Graduation and non-Graduation households.

	Full Sample Mean	Non-Treated Mean	Treated Mean	p-value
Affected by Flood				
Self reported	0.82	0.86	0.76	0.00
Threshold Affected				
Damage of MWK 15K	0.70	0.71	0.67	0.08
Damage of MWK 35K	0.53	0.52	0.56	0.22
Observations	2,563	1,690	873	

Flooding Balance table: 2018 Data

		Non-Treated Mean	Treated Mean	p-value	Normalized Difference	Ttl Flood Obs
Under 35K Damage	Respondent age	34.29	34.17	0.86	0.01	1,187
	Respondent is Literate	0.32	0.34	0.54	-0.04	
	HH size	5.55	5.68	0.38	-0.07	
	Food Security Index (0-9)	4.21	4.14	0.65	0.03	
	Recent Food Security Index (0-3)	1.02	0.96	0.30	0.07	
Obs		799	388			
Above 35K Damage	Respondent age	36.61	35.81	0.24	0.07	1,353
	Respondent is Literate	0.29	0.33	0.21	-0.08	
	HH size	5.90	5.74	0.13	0.08	
	Food Security Index (0-9)	3.80	4.00	0.23	-0.09	
	Recent Food Security Index (0-3)	0.87	0.96	0.07	-0.12	
Obs		868	485			
Ttl Treatment Obs		1,692	881			

Impact of Graduation and Flooding on Food Security, 2019

Annual Food Security Score Joint Effects

- Graduation effect on households under the damage threshold: + 1.231
- Graduation effect on households over the damage threshold: + 0.862.
- Flooding effect on Graduation households: - 0.688
- Overall effect of flooding plus Graduation on households over the damage threshold: + 0.543.

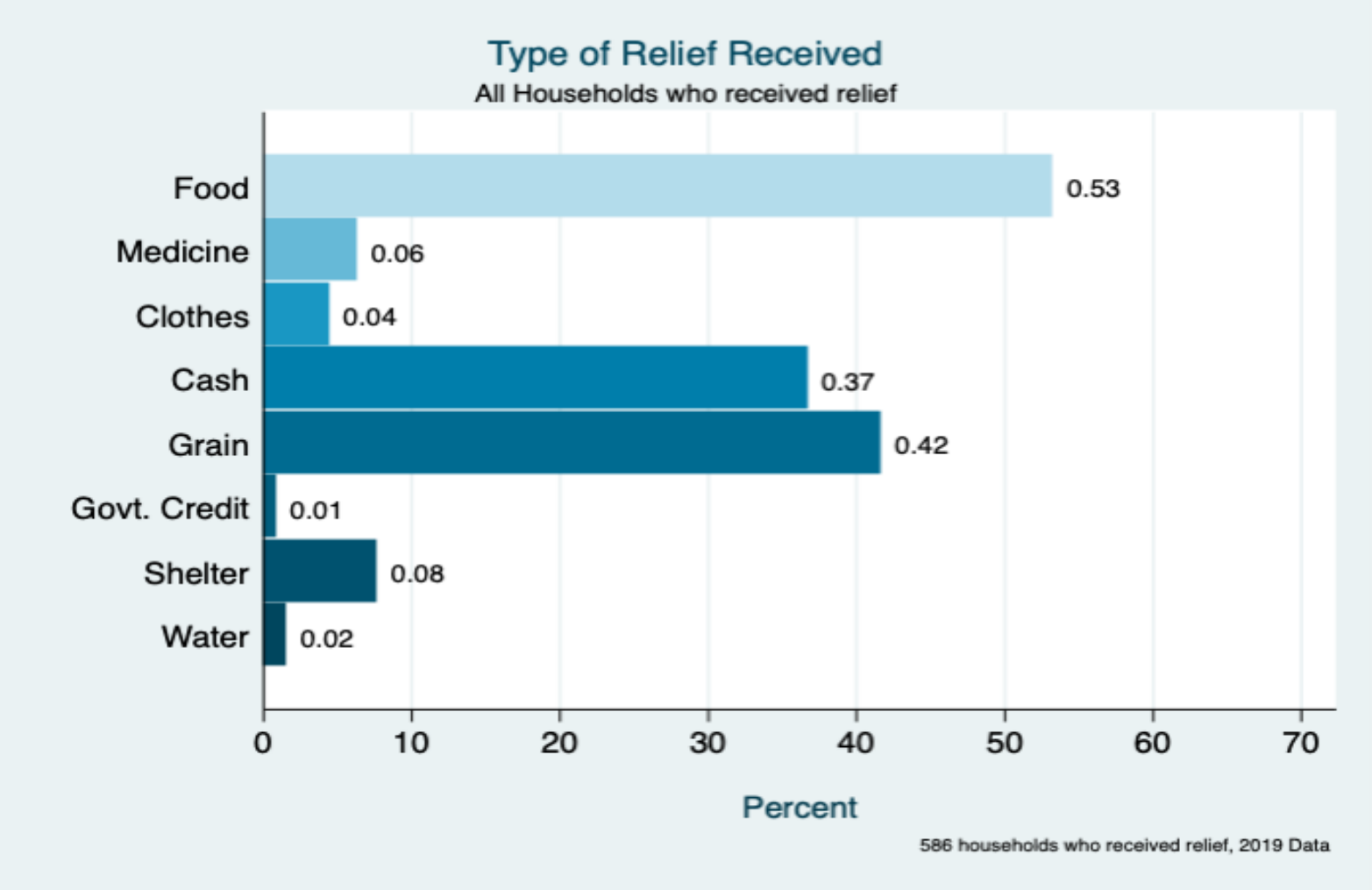
	(1)	(2)
VARIABLES	Food Sec Index	Food Sec Recent
trt_cohort_1 = 1, Treated	1.231***	0.498***
	(0.14)	(0.06)
35000 dam threshold*graduation = 1	-0.369**	-0.155**
	(0.16)	(0.08)
Damage of MWK 35000 or more, 2018 real = 1	-0.319***	-0.074
	(0.10)	(0.05)
Constant	3.836***	0.980***
	(0.22)	(0.08)
Observations	2,540	2,540
district Dummies	Yes	Yes
ANCOVA baseline control	Yes	Yes
Additional Baseline Controls	Yes	Yes
Treatment+Interaction	0.862	0.342
P value	2.78e-10	0.000285
Flood +Interaction	-0.688	-0.230
P value	4.63e-07	1.29e-08
Treatment+Flood +Interaction	0.543	0.268
P value	4.04e-05	5.06e-06
Mean Control	4.036	4.036
SD Control	2.115	2.115
Adjusted R-squared	0.160	0.114

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Mechanisms - Introducing the Relief Efforts

- Relief efforts began in March, with considerable international attention.
- NGOs (international/local), the Government and the UN all engaged in relief efforts. International NGOs playing the biggest role.
- Relief efforts often went through village head to decipher who in village would receive aid.
- Efforts made to give aid to HHs not already in anti-poverty programmes.

Types of Relief Received



Mechanisms - Lack of Relief for Treated Households?

For households over the 35,000 MWK of Damage

	All Affected HH Mean	Non-Treated Mean	Treated Mean	p-value
Types of Relief				
Received Relief	0.25	0.29	0.17	0.00
Received Cash Relief	0.09	0.11	0.05	0.00
Received Grain Relief	0.12	0.15	0.06	0.00
Received Food Relief	0.14	0.17	0.08	0.00
Relief Sources				
Total relief sources	0.28	0.33	0.19	0.00
Received Govt. Relief	0.04	0.05	0.03	0.06
Received Local NGO Relief	0.05	0.06	0.04	0.05
Received Int. NGO Relief	0.15	0.17	0.11	0.02
Received UN Relief	0.04	0.05	0.01	0.00
Observations	1,358	873	485	

Mechanisms - Impacted by Agriculture Loss?

		Non-Treated Mean	Treated Mean	p-value	Ttl Flood Observations
Under 35K Damage	Plot Damaged	0.50	0.33	0.00	1,187.00
	Lost stock	0.03	0.01	0.00	
	Business affected	0.02	0.01	0.52	
	Lost daily labour	0.47	0.23	0.00	
	Value of plot damage	5,315.71	3,821.30	0.01	
	Value of stock loss	300.38	85.05	0.01	
	Value of business loss	84.48	185.57	0.24	
	Value of income loss	3,333.35	2,081.43	0.00	
Observations		799	388		
Above 35K Damage	Plot Damaged	0.90	0.93	0.06	1,358.00
	Lost stock	0.24	0.19	0.07	
	Business affected	0.08	0.08	0.82	
	Lost daily labour	0.81	0.68	0.00	
	Value of plot damage	45,980.01	63,408.90	0.00	
	Value of stock loss	12,608.30	10,140.82	0.29	
	Value of business loss	1,646.63	3,457.53	0.07	
	Value of income loss	14,065.63	14,665.09	0.61	
Observations		873	485		
Ttl Treatment Obs		1,690	873		

Mechanisms - Impacted by Asset/Building Loss?

		Non-Treated Mean	Treated Mean	p-value	Ttl Flood Observations
Under 35K Damage	Percent with assets damaged	0.27	0.18	0.03	1,187.00
	Percent with building damaged	0.06	0.01	0.00	
	Percent with house damaged	0.20	0.07	0.00	
	Value of asset damage	951.13	467.66	0.01	
	Value of building damage	533.17	231.96	0.08	
	Value of house damage	2,747.81	1,094.07	0.00	
Observations		799	388		
Above 35K Damage	Percent with assets damaged	0.57	0.60	0.44	1,358.00
	Percent with building damaged	0.12	0.10	0.32	
	Percent with house damaged	0.53	0.39	0.00	
	Value of asset damage	9,150.16	10,211.11	0.52	
	Value of building damage	3,639.81	4,525.77	0.41	
	Value of house damage	23,954.01	26,389.69	0.44	
Observations		873	485		
Ttl Treatment Obs		1,690	873		

Bandwidth Findings

- Strong evidence that Graduation improved bandwidth.
- And that flooding also increased bandwidth.

	(1)
VARIABLES	Bandwidth
trt_cohort_1 = 1, Treated	0.078*
	(0.04)
35000 dam threshold*graduation = 1	-0.030
	(0.05)
Damage of MWK 35000 or more, 2018 real = 1	0.065**
	(0.03)
Constant	0.121**
	(0.05)
Observations	2,516
district Dummies	Yes
ANCOVA baseline control	No
Additional Baseline Controls	Yes
Treatment+Interaction	0.0479
P value	0.187
Flood +Interaction	0.0347
P value	0.373
Treatment+Flood +Interaction	0.113
P value	0.00284
Mean Control	4.016
SD Control	2.100
Adjusted R-squared	0.135

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusions

- Graduation households above the damage threshold have smaller food security gains than Graduation households under the damage threshold.
- Flooding effect for treated households was greater than for non-treated households.
- Potential mechanisms for this negative impact are greater losses for graduation households related to harvest and relief targeting strategies.
- Local decision-making structures use equity/fairness as a consideration in relief allocations.
- These negative impacts for Graduation households above the damage threshold linger for another year, but two years post flooding no difference between treated households above and under the damage threshold.