Weathering poverty

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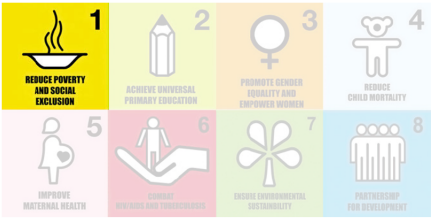
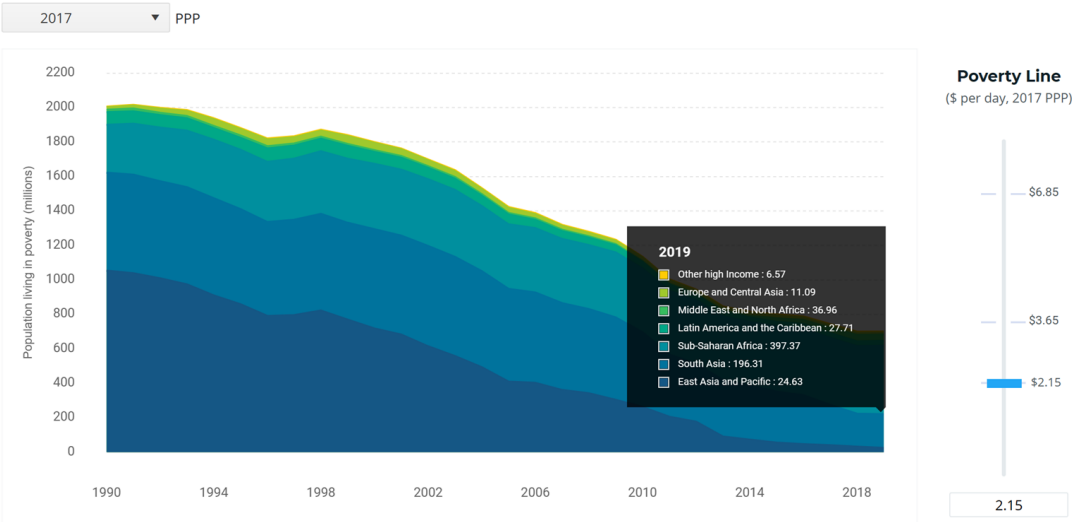
The goals of mankind: 1. eliminate poverty



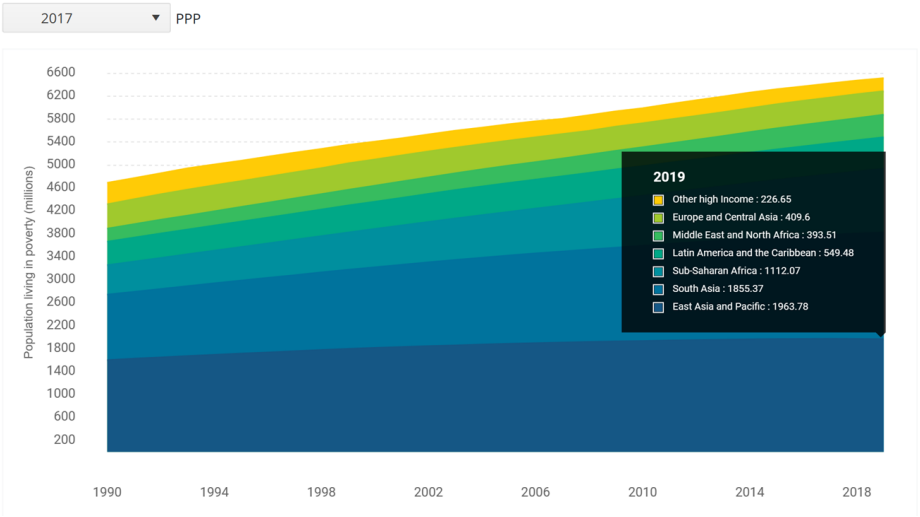
MDGs
2000

SDGs
2015

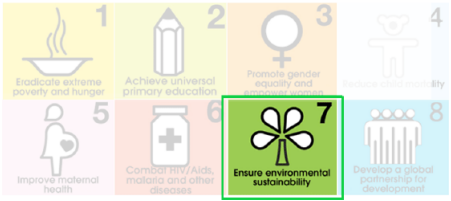
The “war” against poverty



The “war” against poverty



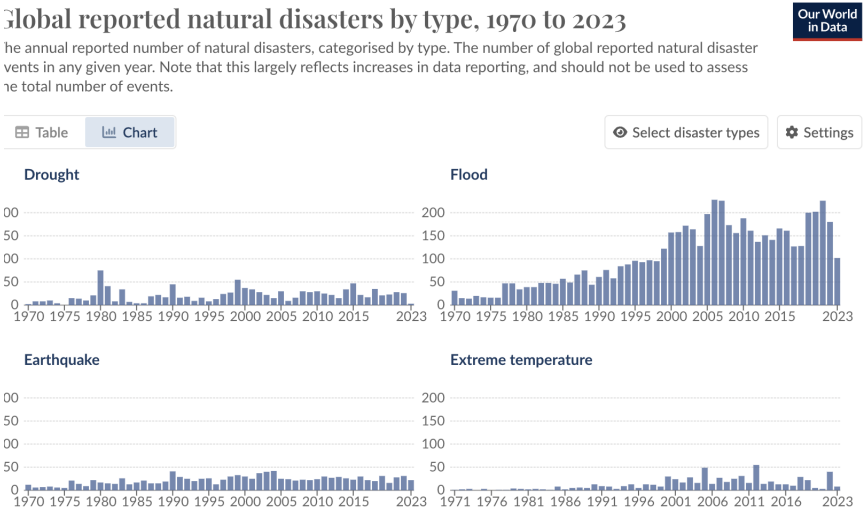
The goals of mankind 2: stop climate change



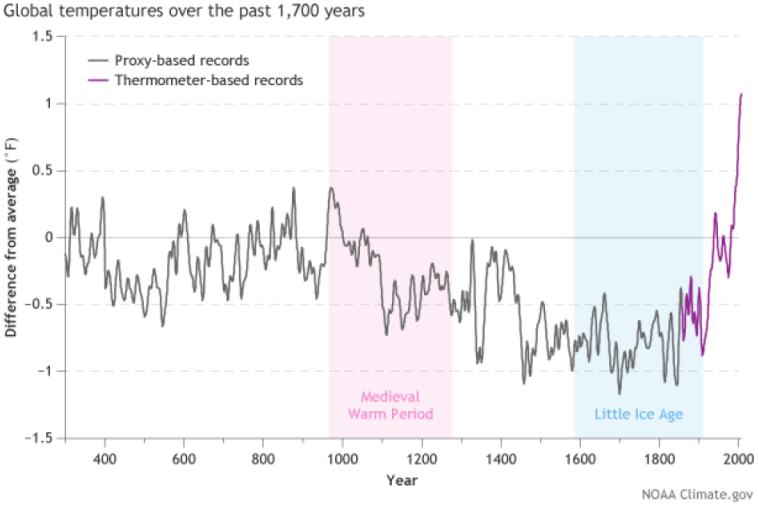
MDGs
2000

SDGs
2015

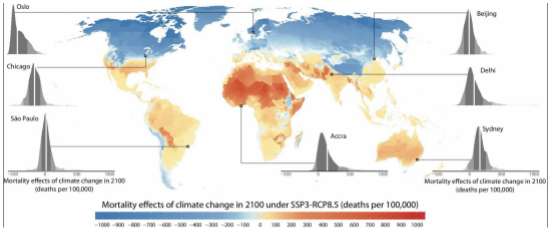
Natural vs manmade disasters

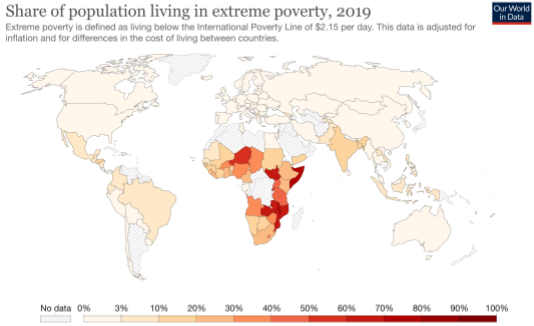


The world is getting hotter



Especially where the poorest live





This paper

- Does the graduation program make people more resilient to climate change?
  - using shocks after the program ends
  - tell us about whether graduation can be used as a program to enhance climate resilience
- Do climate shocks influence the effectiveness of the graduation program?
  - using shocks before the program
  - tells us about how people adapt to climate change

Data: household data

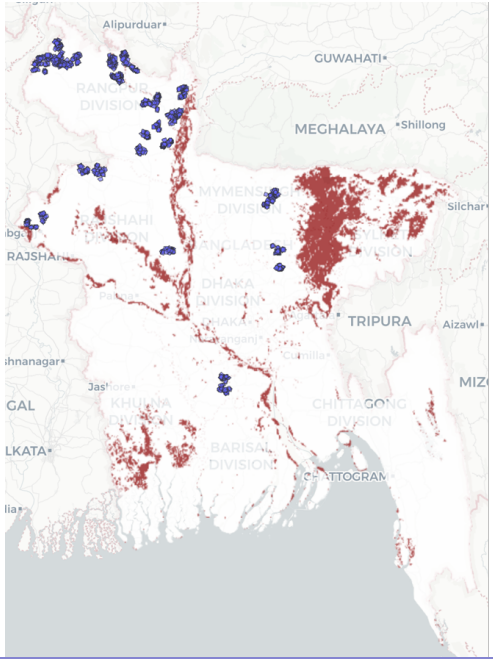
- Household-level data: BRAC's Targeting the Ultra-poor program in Bangladesh
- 23,000 households living in 1,309 villages in the 13 poorest districts of the country.
- Over 6,000 are considered extremely poor, half of which are randomly selected to receive a large asset transfer in 2007
- Beneficiaries are offered a choice from several asset bundles, all of which are valued at around $490 USD in PPP and can be used for income-generating activities (i.e., a cow)
- Program lasts for 24 months (2007-2009) and then ends = big push welfare program

Data: household data

- The survey covers all the poor and 10% of the other classes in each village.
- A baseline survey was conducted before the intervention in 2007, three follow-up surveys in 2009, 2011, 2014, and the initially ultra poor were again interviewed in 2018. Follow up survey happening in 2024.
- We focus in this paper on the 5-year period between the intervention and the second follow-up survey (2011 - before then control households are offered the treatment in 2017): we are able to track occupation, assets and welfare dynamics over this entire period.

Data: floods

- Flood data from the Global Flood Database: detailed daily flood information at 250×250 meter resolution from MODIS.
- We use the start and end date of a flood + number of days of flooding for each pixel.
- We consider a circular area with a radius of 2.5 kilometers around the village's center ($\sim$ 350 pixels) and calculate the share of this area that is flooded every day between January 2000 and December 2018
- We count the total number of flooded days 6/12/24/60 month before the survey date, weighted by the flooded share in the village circle.
- In the 12 months before the 2011 survey wave, the average flooded day is 0.33 out of 360 days.



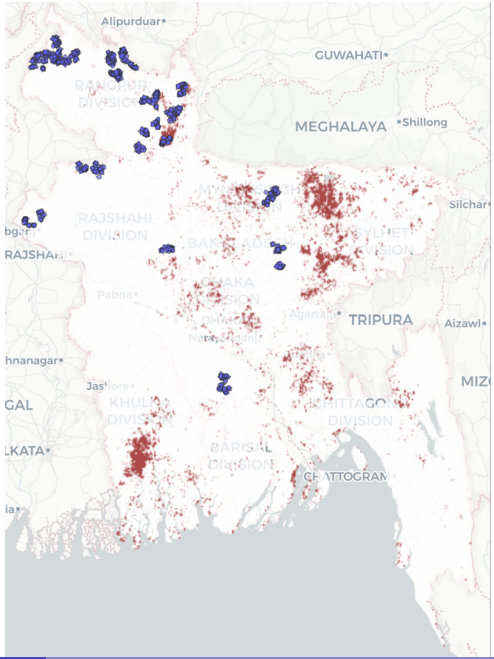
Oct 14th, 2010

Data: construct natural disaster measure – flood

- For the 2.5km buffer around the village center, calculate the share of the pixels that are classified as flood for each day
- Calculate the sum of the share in the last 360 days before the survey date
- $\mathbf{C}\{\text{flood shock}\} = \frac{\sum_{360 \text{ days}} \text{flooded pixels in this village}}{\text{total pixels in this village}}$

Data: droughts

- Food and Agriculture Organization: Vegetation Health Index (VHI) database, processed from the METOP-AVHRR and NOAA-AVHRR data
- Data is accessible from 2000 to 2018 for intervals spanning every 10 days
- It is presented at a spatial resolution of 1 x 1 kilometer
- VHI combines two things:
  1. how much the current greenness deviates from the historical minimum
  2. how much the current temperature deviates from the historical minimum
- It's a value between 0 and 1. Value smaller than 0.35 is defined as drought (Kogan, 1995)
- We count the total number of drought dekads 6/12/24/60 month before the survey date, weighted by the drought share in the 2.5km village circle ($\sim$22 pixels)
- In the 12 months before the 2011 survey wave, the average drought dekad is 1.77 out of 36 dekads.



June 1st dekad, 2011

Data: construct natural disaster measure – drought

- For the 2.5km buffer around the village center, calculate the share of the pixels that are classified as drought for each 10-days (dekad)
- calculate the sum of the share in the last 36 dekads before the survey date
- $\mathbf{C}\{\text{drought shock}\} = \frac{\sum_{36 \text{ dekads}} \text{drought pixels in this village}}{\text{total pixels in this village}}$
- Corr(flood shock, drought shock) $= 0.6427$

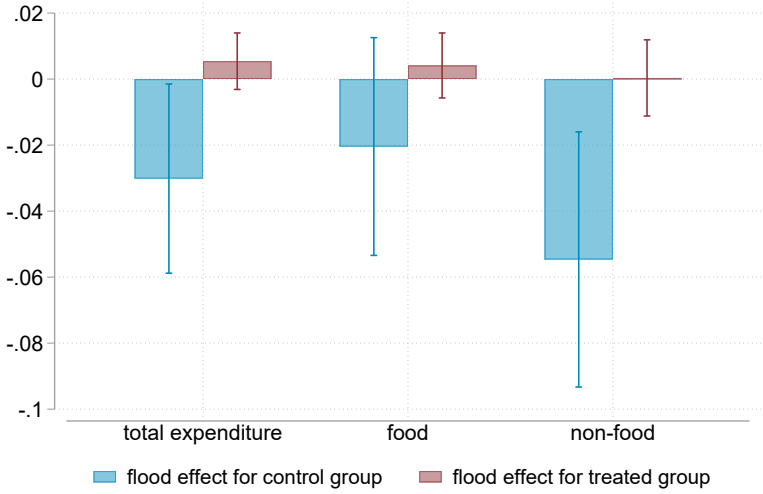
Identification

- we estimate

$$Y_{it} = \alpha + \beta \times T_i + \gamma \times \mathbf{C}\{\mathrm{D}\}_{v(i),t-1} + \delta \times T_i \times \mathbf{C}\{\mathrm{D}\}_{v(i),t-1} + \varepsilon_{it}$$

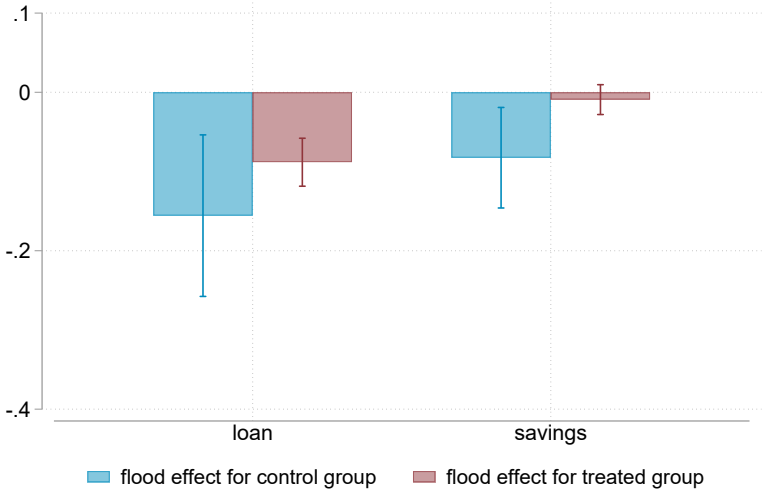
- $v(i)$ is the village of household i. $T_i = 1$ if household i lives in a treated village and 0 otherwise. $\mathbf{C}\{\mathrm{D}\}_{v(i),t-2}$ equals exposure to natural disasters over the last years. Y_{it} is the log outcome.
- γ captures the effect of climate shock for household in the control group, and $\gamma + \delta$ captures the effect of climate shock for household in the treatment group
- we can identify the effect of the graduation program on resilience under the assumption that migration out of the village (and out of our sample) is orthogonal to treatment status $\times$ natural disasters
- here supported by low attrition - average age of beneficiaries is 37 years, most with children, and the illiteracy rate is 93%, so limited migration

Resilience: flood



level asinh

Resilience: flood



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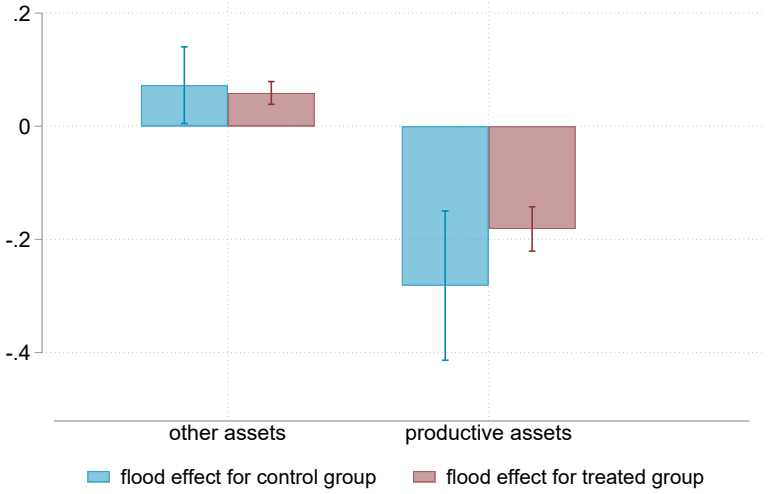
Resilience: flood



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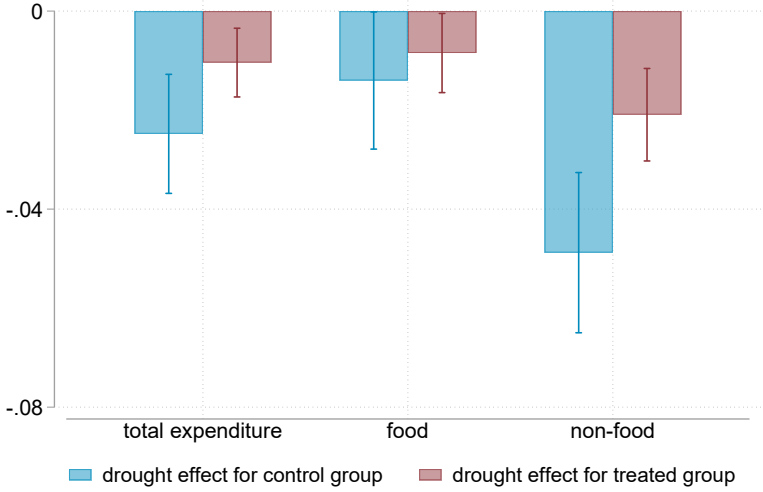
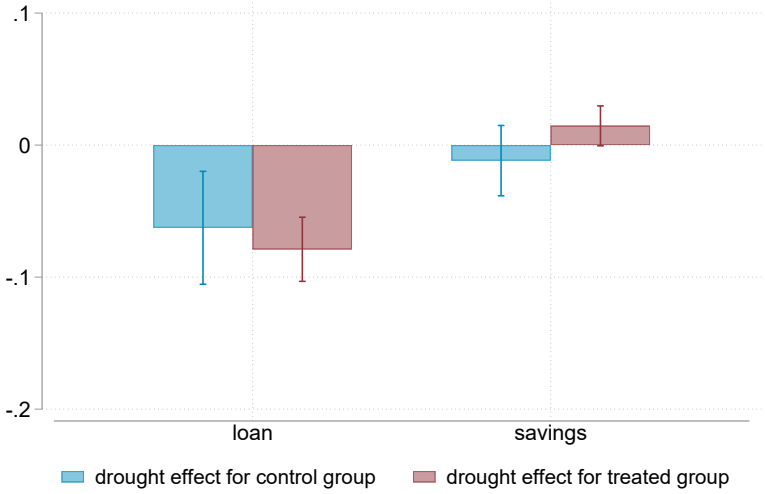
Resilience: drought



level asinh

Resilience: drought



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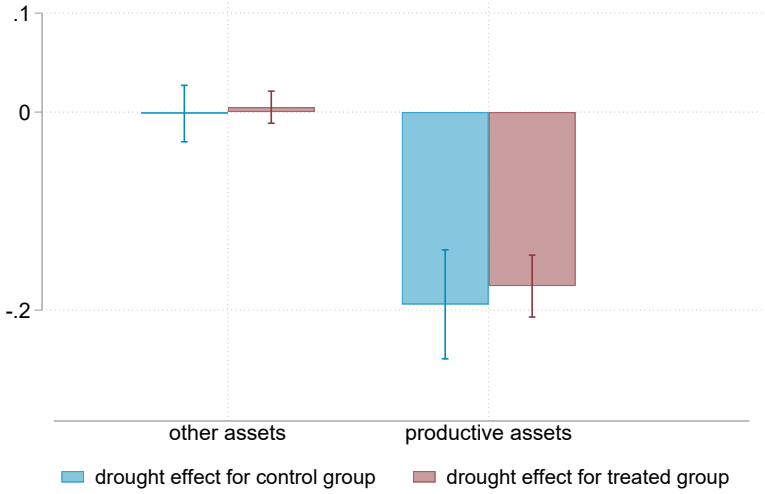
Resilience: drought



level asinh

Investment and the graduation program

- The goal of the graduation program is to shift the poorest women in the poorest villages to more remunerative and stable occupations
- In practice: from casual labor to livestock rearing
- Investment is the key mechanism through which the program operates
- In Balboni et al (2022) we show that the program breaks the low earnings-zero investment poverty trap and sets the poor on a sustainable trajectory of increasing investment and income
- Investing in an asset that will provide higher income in the future is tied to the expected returns on that asset.
- Higher uncertainty $\rightarrow$ lower investment
- If beneficiaries adapt by reducing investment, then this could lower program effectiveness

Identifying adaptation

- we want to measure the effect of expected shocks on investment today
- to do this we need:
  1. to separate the effect of expected shocks from current shocks
  2. a counterfactual level of investment in the absence of adaptation
- for ①, we look at the shock two years before the program
- for ②, we compare treatment and control group, in the absence of climate shock

Identification

- At $t = 0$ potential beneficiaries have no investment and no savings.
- The graduation program enables the treatment group to save and invest
- We study how their response depends on their exposure to climate shock before the treatment controlling for contemporaneous shocks

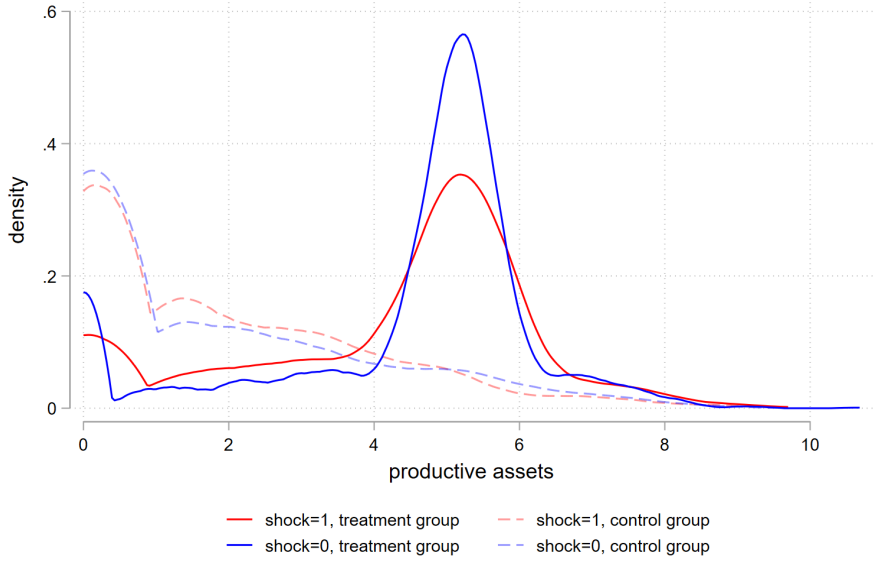
$$Q_{k_{(t,i)}}(\tau|e_{t-6,v(i)}) = \beta_0(\tau) + \beta_1(\tau) \times e_{t-2,v(i)} + \beta_2(\tau) \times T_i + u_t$$

- $\tau = [15, ..., 90]$ are percentiles of the assets (savings) distribution.
- $e_{t-6,v(i)}$ is the exposure to climate shock up to two years before the interview date in 2007, indicating whether the shock is above the 50th percentile for flood or drought
- $T_i = 1$ if household i lives in a treated village and 0 otherwise
- The differences in program impacts on asset accumulation and savings by exposure to severe weather shocks before baseline are indicative of adaptation strategies.

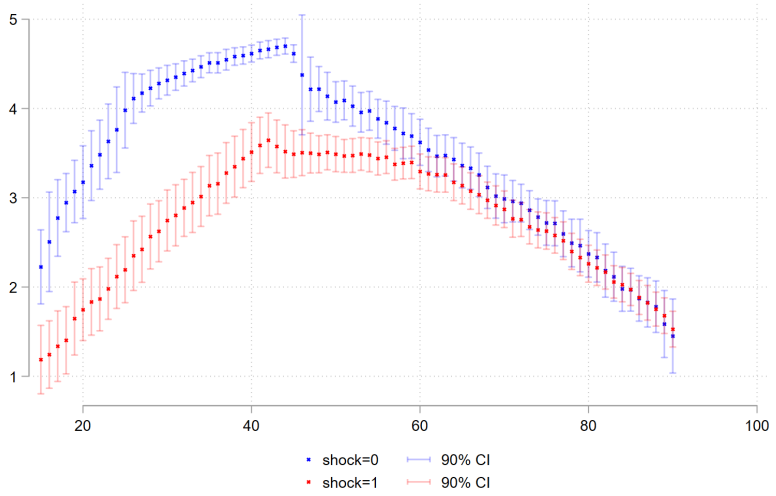
More details

- We split the villages into “shock” and “no shock” groups based on whether
  - the flooded days between 2005-2007 is above the 50th percentile
  - the drought dekads between 2005-2007 is above the 50th percentile
- we look at productive assets in 2011
  - the list of productive assets comprises land, cows, goats, sheep, chickens, ducks, power pump, plough, tractor, mowing machine, unit for keeping livestock, shop premises, boat, fishnet, rickshaw/van, trees, and cart.

Flood

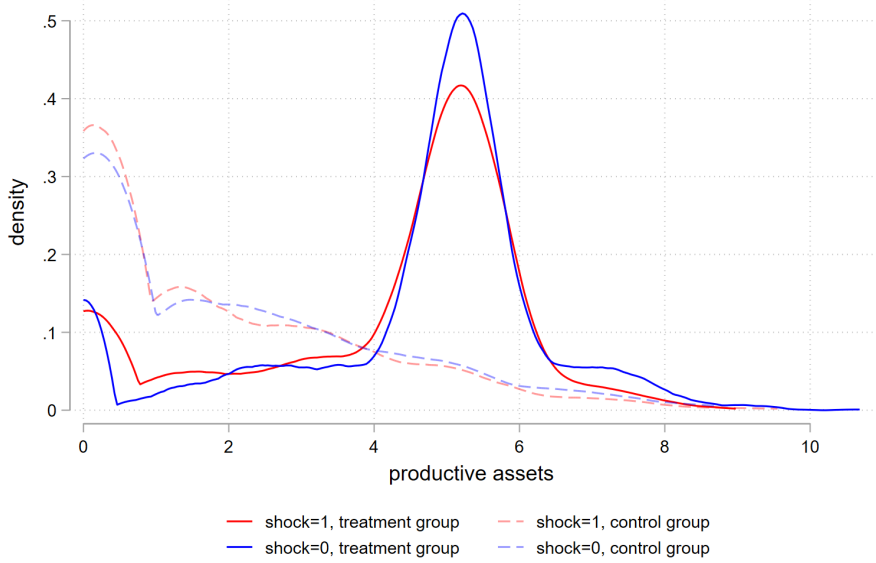

.6
.4
.2
0
density
0
2
4
6
8
10
productive assets
shock=1, treatment group
shock=0, treatment group
shock=1, control group
shock=0, control group

Flood

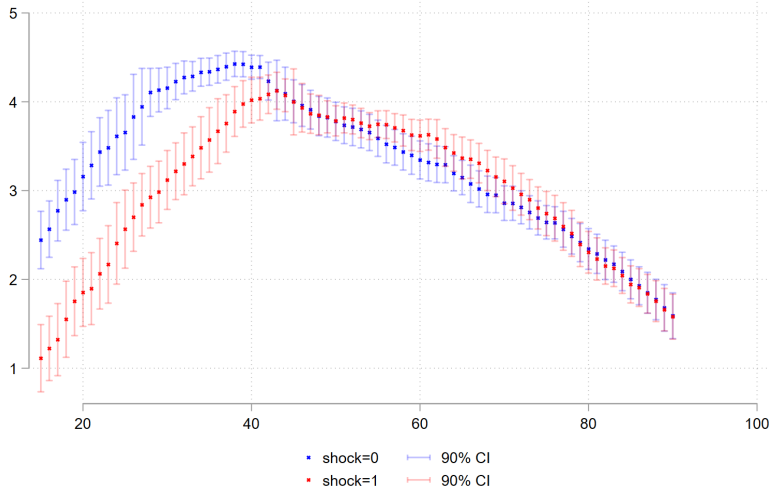


level | 60-month

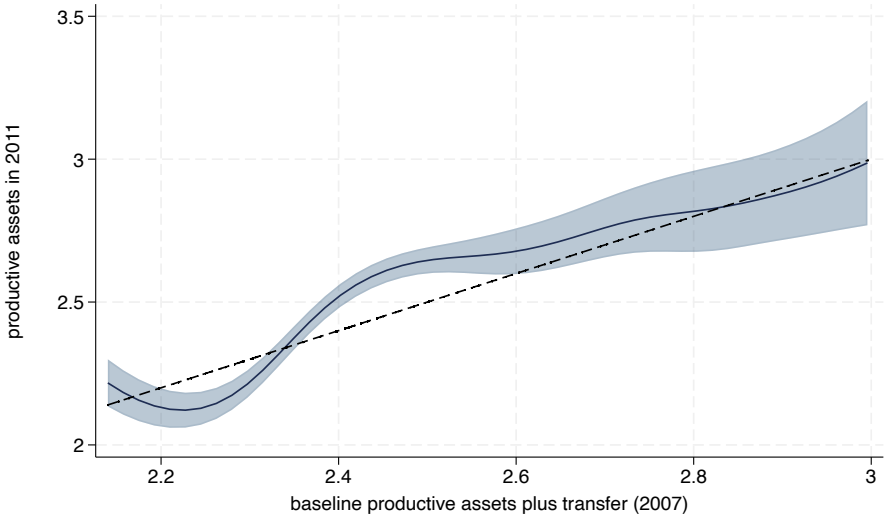
Drought


.5
.4
.3
.2
.1
0
density
0
2
4
6
8
10
productive assets
shock=1, treatment group
shock=0, treatment group
shock=1, control group
shock=0, control group

Drought



Investment is key to escape the trap



How can insurance help?

- Climate shocks create uncertainty → lower productive investment
  - the graduation program program risks missing its target
- Weather-specific insurance or conditional loans reduce uncertainty:
  - Faster, more certain, and larger payouts to households after a disaster (Kousky, 2019)
  - Larger production and investment ex-ante (Cole et al., 2013, Karlan et al., 2014)
- graduation programs relying on the accumulation of capital could be complemented by insurance for this capital
  - Households perceiving a high degree of risk would still be inclined to invest

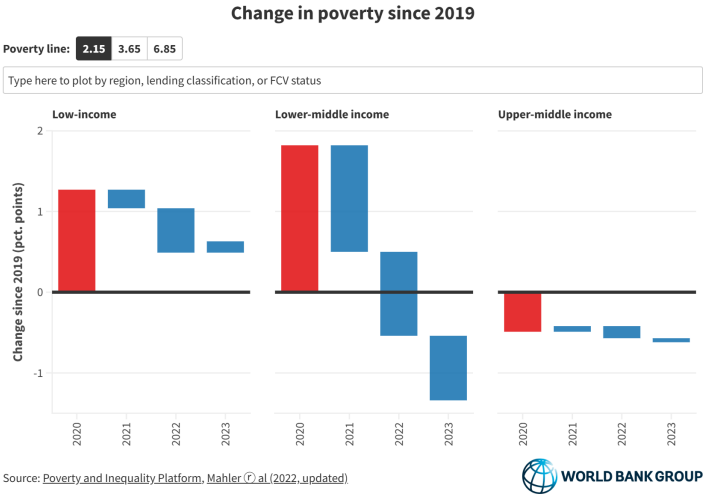
Individual versus community based insurance

- Individual insurance fails to reach the poorest because it's not affordable at full price and can lead to excessive risk taking if subsidized
  - Low take-up in many high-risk areas (Cai et al., 2020)
  - Encourage unsustainable development in high-risk areas (Bagstad et al., 2007)
- Community based insurance: a single policy, purchased a community-based organization which covers a group of properties
- Community based insurance has four advantages:
  1. more widespread coverage due to lower premium
  2. adaptation strategies (e.g. building barriers) can be cheaper and more effective
  3. use local information to target those who are most affected or have no alternative support
  4. use social pressure to minimize risk taking

Conclusions

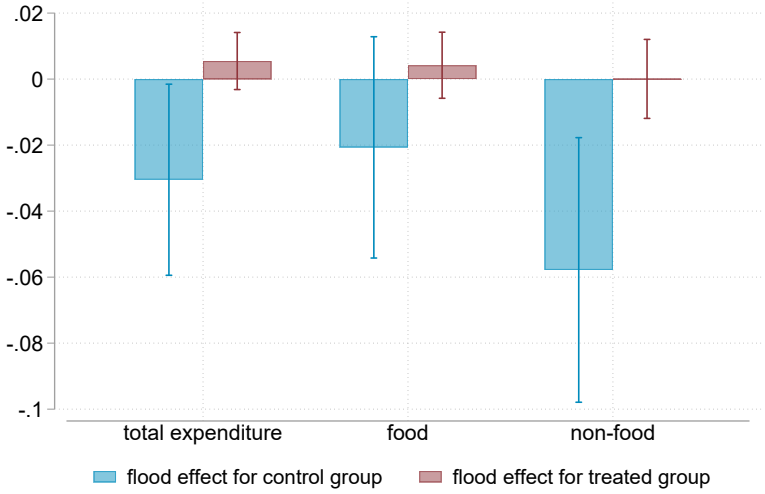
1. Big push anti-poverty program increases resilience to climate shocks
2. But climate shocks dent investment and reduce the effectiveness of the anti-poverty program
3. Working with BRAC to 'climate proof' the graduation program
4. Working with BRAC on insurance programs
5. The existence of poverty traps makes the returns to weather insurance huge
6. Because it helps the poor escape
7. And prevents others from falling in

Transitory shocks, permanent impacts



Appendix

Resilience: flood (asinh)



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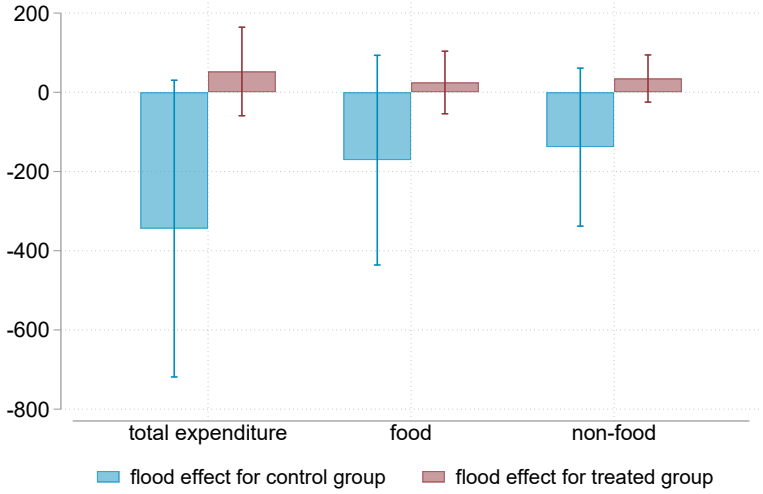
Resilience: flood (level)



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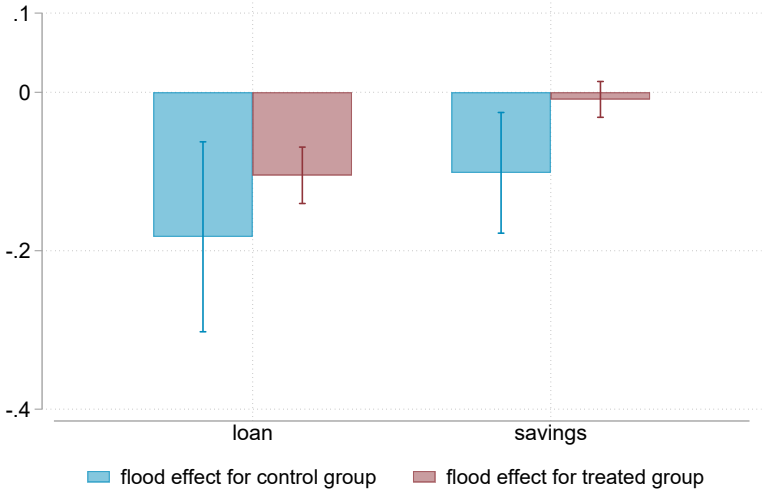
Resilience: flood (asinh)



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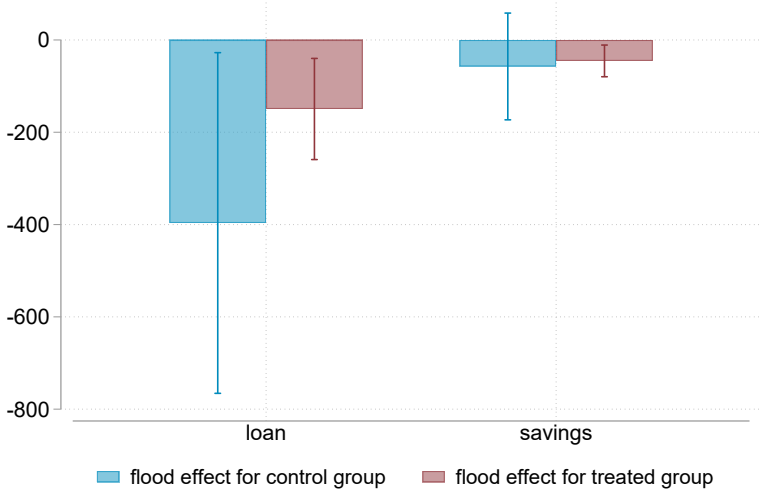
Resilience: flood (level)



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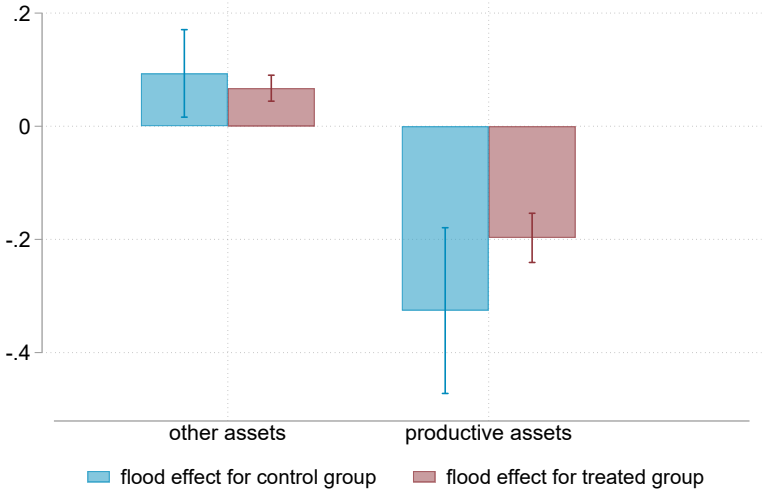
Resilience: flood (asinh)



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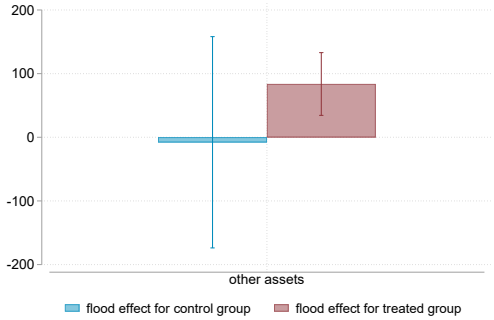
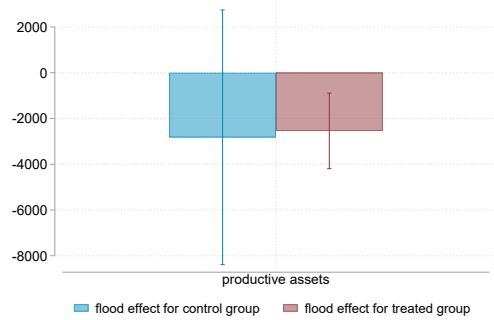
Resilience: flood (level)





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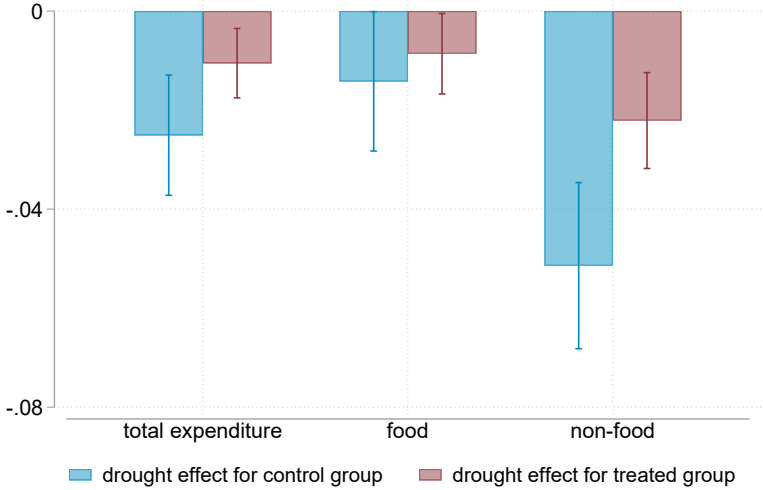
Resilience: drought (asinh)



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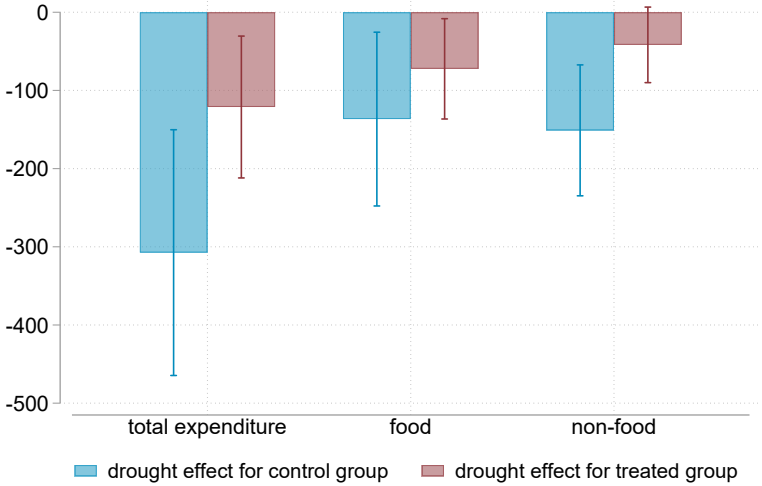
Resilience: drought (level)



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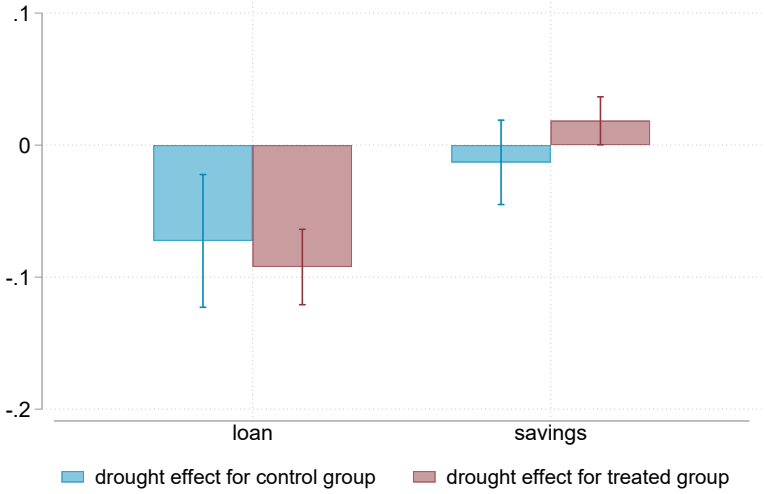
Resilience: drought (asinh)



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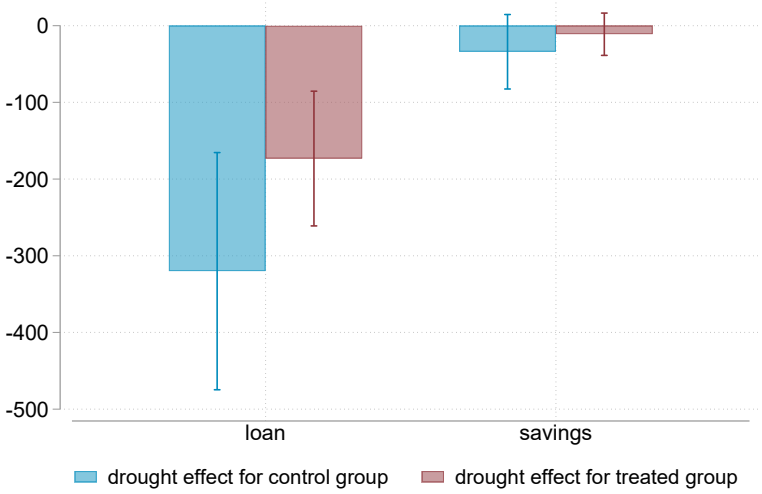
Resilience: drought (level)



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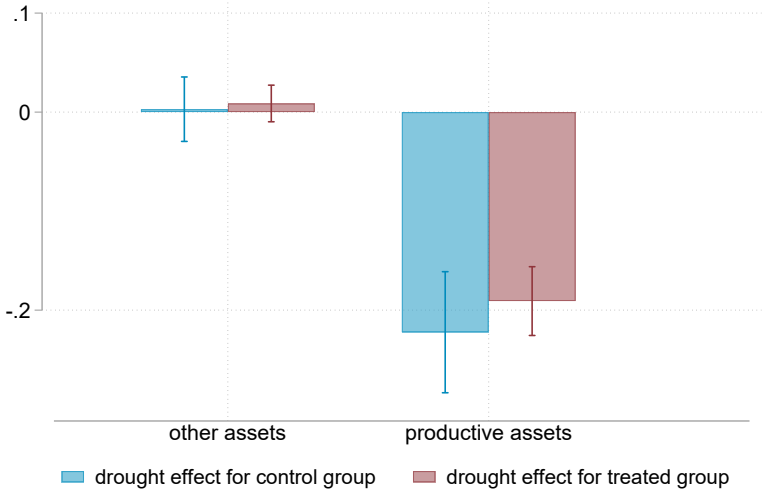
Resilience: drought (asinh)



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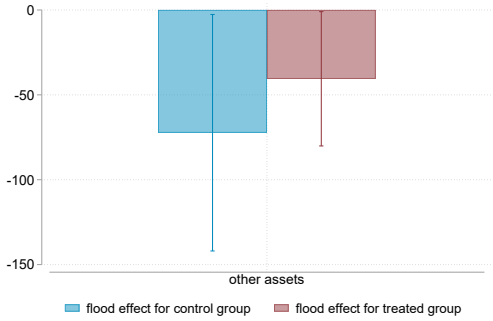
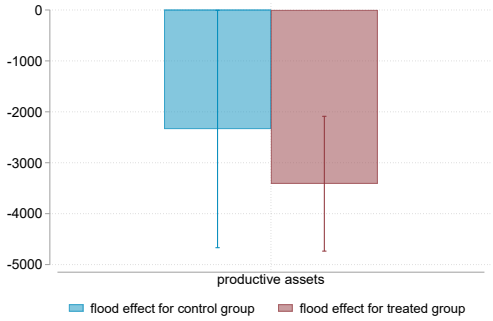
Resilience: drought (level)





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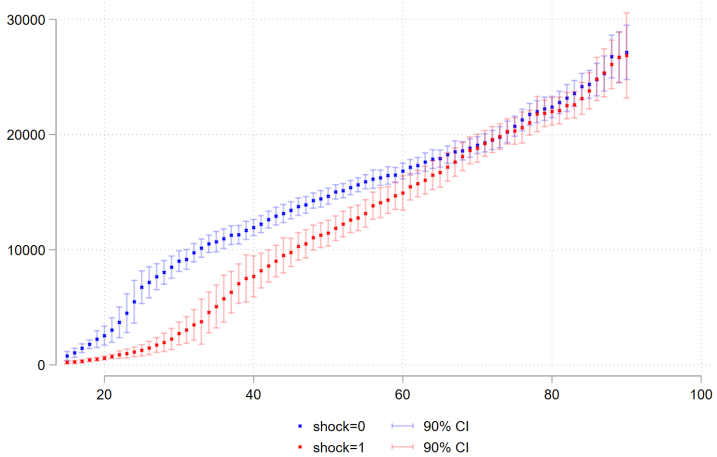
Adaptation: flood (level)



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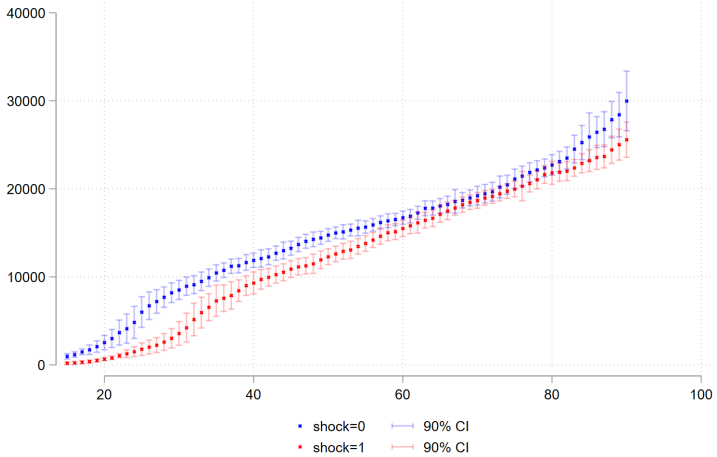
Adaptation: drought (level)



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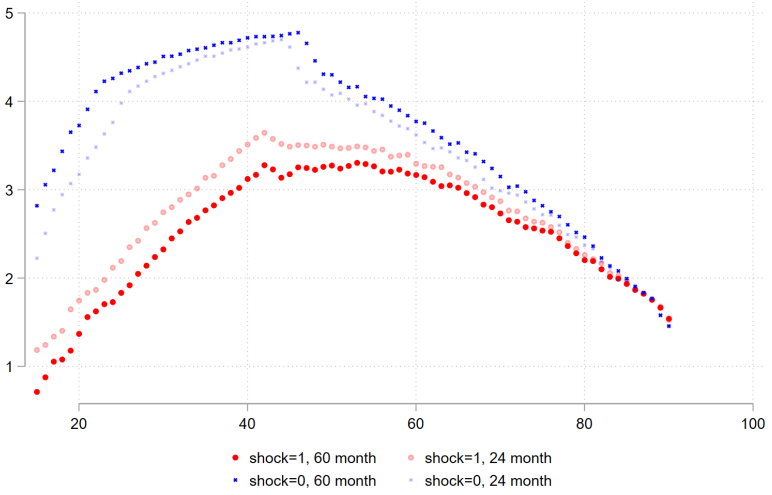
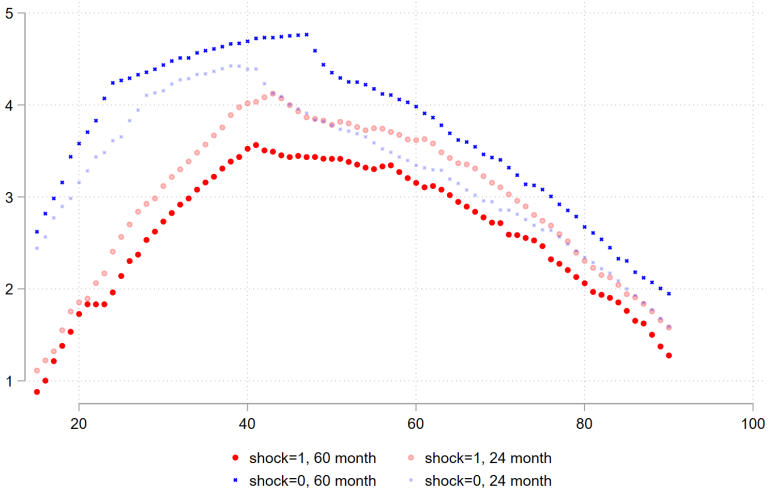
Flood


5
4
3
2
1
20
40
60
80
100
shock=1, 60 month
shock=1, 24 month
shock=0, 60 month
shock=0, 24 month

Back

Drought



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