Foreign aid delivery in response to climate-related disasters

CERDI Phd Seminar

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Introduction

Motivation

- Major *losses and damages* due to climate-related extreme events, especially in LMICs (IPCC 2023)
- Lack of coordination between relief (*humanitarian*) and reconstruction (*development*) efforts
- Decisions on the recipient, the amount, but also on the *delivery channel*
- Potential detrimental impacts on recipient aid *ownership*

Research question

- **How do climate-related disasters affect the choice of aid channel of delivery?**

This Paper

What I do

- *Goal*: examine the impact of exogenous shocks due to climate extremes
- *Outcome*: use *dyadic* donor-recipient panel aid data, disagg. by channel of delivery
- *Treatment*: build a country-level *physical* exposure measure of hazard intensity
- *Method*: estimate *dynamic* effects through a multiple event study approach

*What I find (*to be completed*)*

- Climate-disasters increase development ODA across channels
- Shorter effect on non-State channels compared to State channels
- *Effect on humanitarian ODA*
- *Effect on humanitarian ODA by channel*

Related literature

Dynamic response of foreign aid to disasters (Yang 2008; David 2011; Becerra, Cavallo, and Noy 2014; Arezki et al. 2025)

- Disaggregate aid by *delivery* channels
- Use a global *multi*-hazard measure of *physical* exposure

Strategic choice of aid instruments (Raschky and Schwindt 2012; Dietrich 2013; Knack 2014)

- Estimate *dynamic* effects of exogenous shocks
- Differentiate between *types* (humanitarian and development)

Data

Data

Outcomes

- *Source*: project-level OECD Creditor Reporting System (CRS), 2000-present
- *Sample*: Top 20 (bilateral/multilateral) donors
- *Quantity*: Official Development Assistance (ODA) commitments, constant USD
- *Type*: humanitarian and development ODA
- *Variables*:
  - → ODA commitments through State channels: $log(Y_{State} + 0.01)$
  - → ODA commitments through non-State channels: $log(Y_{Non-State} + 0.01)$

Data

Treatment

- *Source*: EMDAT/GDIS , ERA-5, Landscan, and MODIS
- *Sample*: all ODA-recipient countries affected by a disaster between 2001 and 2018
- *Measure*: follow approach by Dellmuth et al. (2021)
  - → global measure of *exposure to hazard intensity* at the country-year level
  - → *Hazards*: wet (floods), wind (storms), dry (droughts), hot (extr. temperature)
  - → *Hazard intensity*: annual average # of daily extreme events in regions affected by a disaster
  - → *Extreme event*: daily weather value > 95th percentile baseline distribution (1980-2000)
  - → Aggregated at the country-level (population-weighted sum)

Empirical stragegy

Identification strategy

Main challenges

- Multiple recurring 'on-off' (non-absorbing) events ▸ Treatment status
- Carryover effects ($D_{t-n} \Rightarrow Y_t$)
- Non-binary treatment (hazard intensity)

Follow a similar approach as Bettin, Jallow, and Zazzaro (2025)

- Exploit the exogenous nature of disasters
- Non-parametric *event study* specification (Dobkin et al. 2018)
- *Multiple Dummies On (MDO)* approach (Sandler and Sandler 2014)
  - → Multiple event-time dummies at once to allow overlapping effect windows
- Binned endpoints to define the *effect window* (Schmidheiny and Siegloch 2023)
  - → Assume constant treatment effects outside the window, with outside obs. considered as controls

Empirical stragegy

Empirical specification: Event study (1)

$$Y_{drt} = \sum_{m=\underline{m}}^{\overline{m}} \beta_m \mathbb{B}_{rt}^m + \sum_{z \in Z} \beta_z X_{Z_{drt}} + \alpha_{dr} + \tau_t + \epsilon_{drt}$$

Y_{drt}: log-ODA commitments from donor *d* to recipient *r* at year *t*

$\mathbb{B}_{rt}^m$: continuous disaster indicator binned at the endpoints $[\underline{m}; \overline{m}]$

X'_{drt}: donor-year, region-year fixed effects, and recipient-specific linear trends

- *Potential confounders: global and regional climate dynamics, local land-use changes*

α_{dr}: donor-recipient pair fixed effects

τ_t: year fixed effects

Results

Baseline results

- *To be included*
- *Panel A: ES graph, estimates grouped by channels, facet by type (hum/dev)*
- ...

Next steps

- *Specification*: replace country linear trends by appropriate covariates
- *Robustness*: complement w/ parametric event studies?
- *Non-linear setting*: MDO GLM (PPML and/or Logit)? (Chen and Roth 2024)
- *Heterogeneity*: non-State channels (NGOs, Private sector, Multilateral), donors, recipients, treatment
- *Mechanisms*: consider recipient-side factors (ex: leader strategic behavior, domestic politics)

Appendix

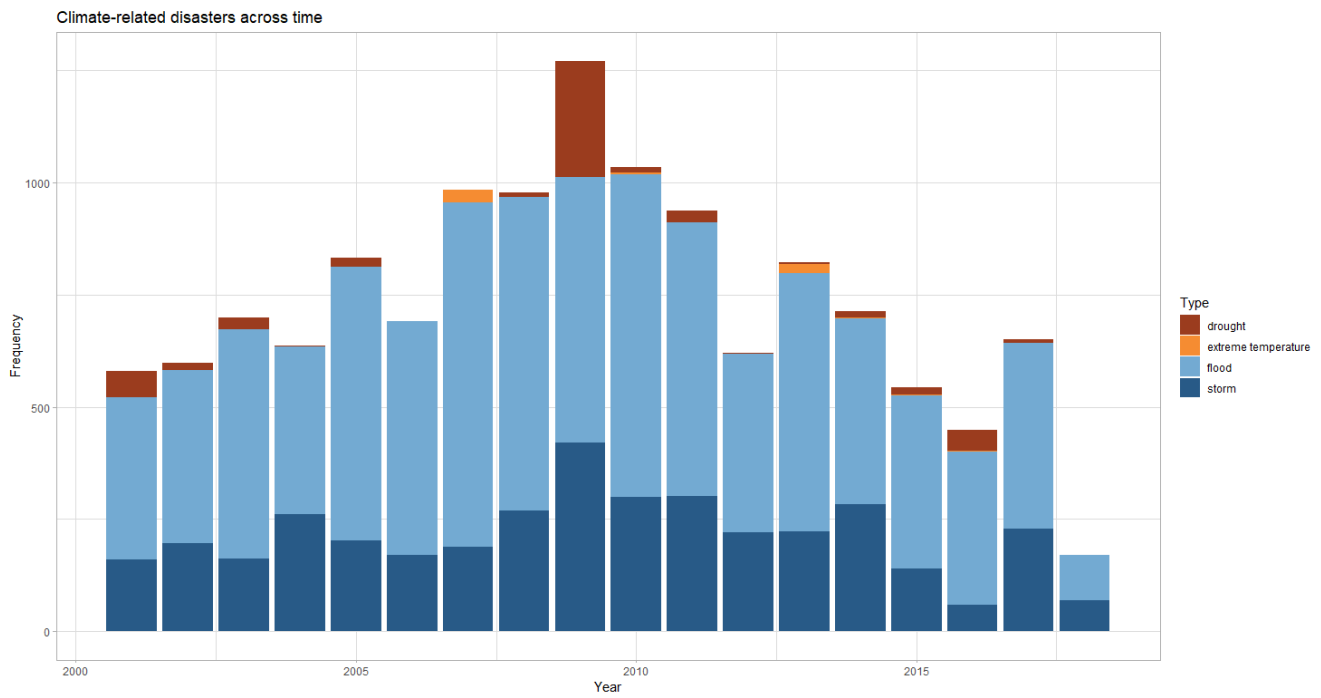

Climate-related disasters across time
Frequency
1000
500
0
2000
2005
2010
2015
Year
Source: GDIS
Type
drought
extreme temperature
flood
storm

Figure 1

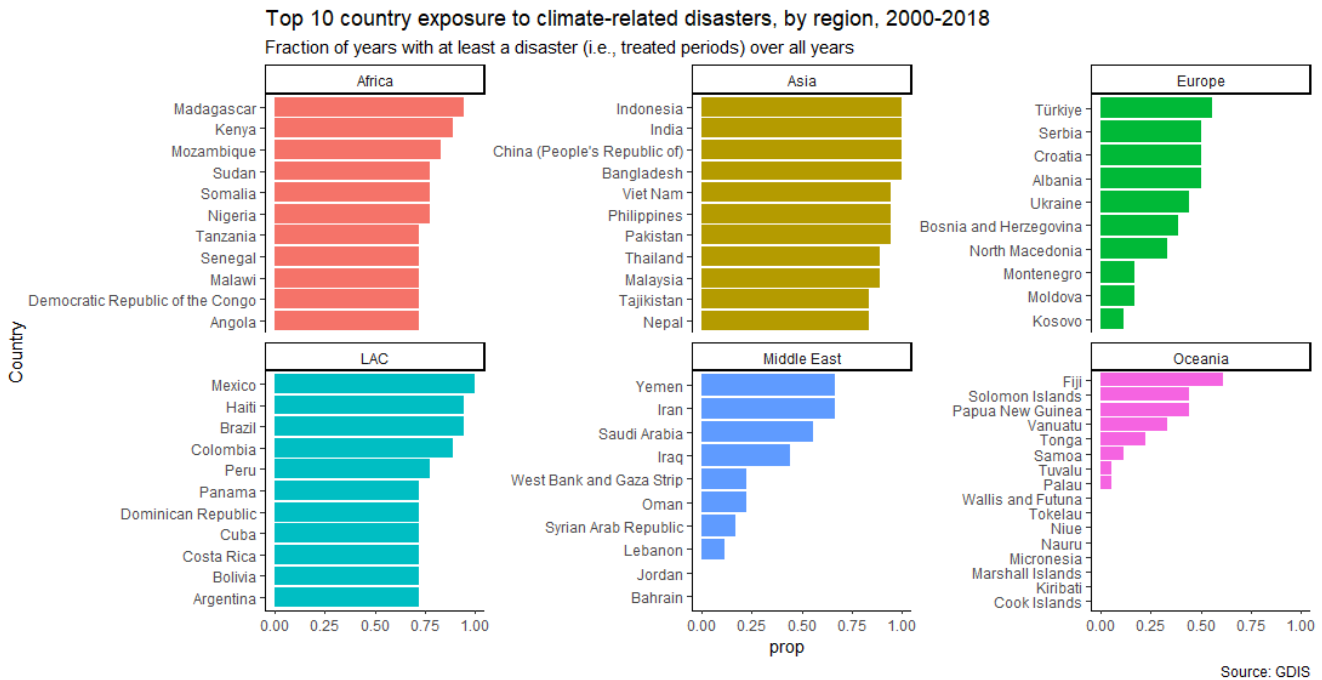
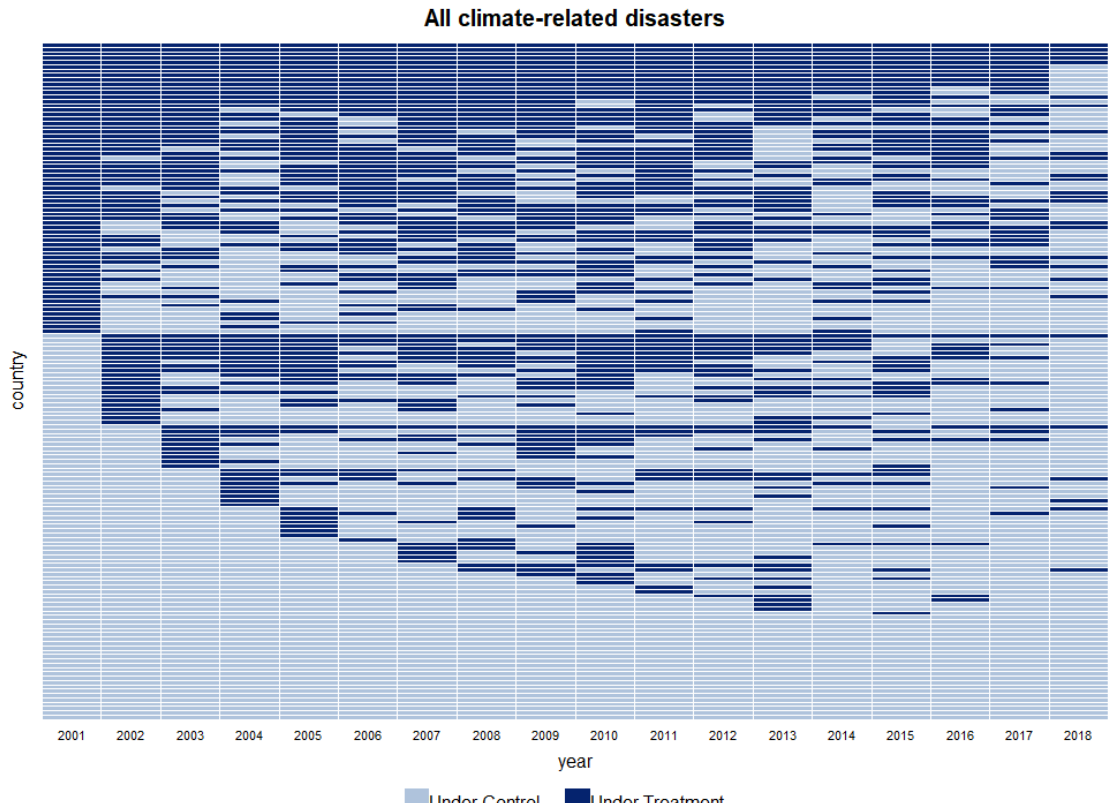

Top 10 country exposure to climate-related disasters, by region, 2000-2018
Fraction of years with at least a disaster (i.e., treated periods) over all years
Africa
Madagascar
Kenya
Mozambique
Sudan
Somalia
Nigeria
Tanzania
Senegal
Malawi
Democratic Republic of the Congo
Angola
Asia
Indonesia
India
China (People's Republic of)
Bangladesh
Viet Nam
Philippines
Pakistan
Thailand
Malaysia
Tajikistan
Nepal
Europe
Türkiye
Serbia
Croatia
Albania
Ukraine
Bosnia and Herzegovina
North Macedonia
Montenegro
Moldova
Kosovo
LAC
Mexico
Haiti
Brazil
Colombia
Peru
Panama
Dominican Republic
Cuba
Costa Rica
Bolivia
Argentina
Middle East
Yemen
Iran
Saudi Arabia
Iraq
West Bank and Gaza Strip
Oman
Syrian Arab Republic
Lebanon
Jordan
Bahrain
Oceania
Fiji
Solomon Islands
Papua New Guinea
Vanuatu
Tonga
Samoa
Tuvalu
Palau
Wallis and Futuna
Tokelau
Niue
Nauru
Micronesia
Marshall Islands
Kiribati
Cook Islands
Country
0.00
0.25
0.50
0.75
1.00
prop
Source: GDIS

Figure 2

Treatment status (binary)



▸ Back

Empirical stragegy

Example: Effect window matrix

Table

Effect window

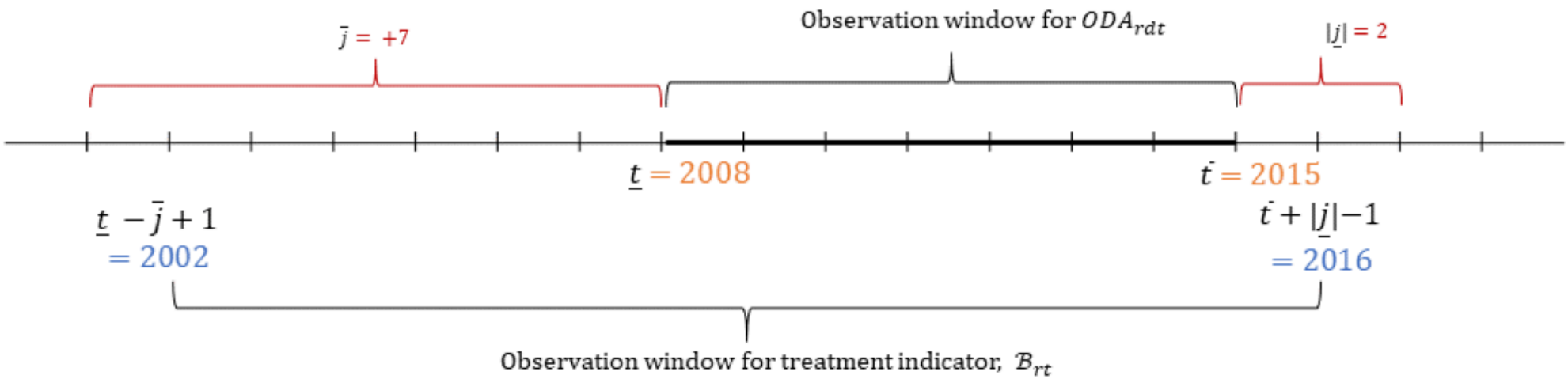


Figure 3: Effect window

- **Effect window**: $[\underline{m} = -2; \overline{m} = +7]$
- **Estimation sample**: 2008-2015

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