# Beg or Bargain?
# The impact of climate extreme events on aid allocation

*CERDI PhD Seminar*

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March 27, 2025

# Motivation

- *Frequency and intensity* of climate extremes will *rise*, even at +1.5°C (IPCC 2023)
- Already major *losses and damages*, especially in LMICs
- Lack of *coordination* between relief and reconstruction efforts
- Potential detrimental impacts on recipient aid *ownership*

**Research question**

**What is the effect of climate-related extreme events on post-disaster aid allocation?**

- **Extreme events** = wet (heavy rainfall, floods) / dry (droughts) climate impact-drivers (IPCC 2023)

# This Paper

**What I do**:

- Link geolocalized disaster to meteorological data to build *hazard severity measures*
- Consider both aid volume *and* composition (design, implementation) as outcomes
- Estimate *dynamic* effects of hazard severity on aid outcomes

**What I find**:

- *Unstabilized* results
- Preliminary results mostly *non-significant* on aid volume
- *Revised* rainfall data coming soon

# Related literature

**Post-disaster foreign aid allocation** (Yang 2008; David 2011; Becerra, Cavallo, and Noy 2014; Arezki et al. 2025)

- Look at both aid volume *and* composition
- Use *physical* hazard severity measures
- Consider recipient's *leader strategic behavior* as potential mechanisms

**Aid composition** (Raschky and Schwindt 2012; Dietrich 2013; Knack 2014)

- Study *dynamic* effect of time-varying treatment
- Combine aid design and implementation phases

**Physical hazard severity measures** (Felbermayr and Gröschl 2014; Dellmuth et al. 2021)

- Use *more granular* data (daily precipitation 0.1°)

# Conceptual framework

- Empirical results find overall positive impacts of disasters on aid
  - → Humanitarian > Development (Arezki et al. 2025)
  - → non-State > State channels of delivery (Raschky and Schwindt 2012)
- Mostly donor-centered mechanisms suggested in the literature,
  - → *e.g., perception of needs, strategic interests, donor coordination, etc.*
- However, situations where cost of accepting aid > opportunity cost of rejecting aid
  - → *Domestic*: low political accountability (Flores and Smith 2013), punish domestic opponents (de Waal 2017)
  - → *International*: influence donors' perceptions of the leader's competence (Grossman 2024), demonstrate self-sufficiency (Carnegie and Dolan 2021), limit foreign influence (Aidt, Albornoz, and Hauk 2021)

# Empirical specification

**Local projection Difference-in-Differences approach (Dube et al. 2023)**

$$y_{c,t+h} - y_{c,t-1} = \beta_h \Delta D_{ct} + \delta_t^h + \eta X_{ct} + \epsilon_{ct}^h$$

- $y_{c,t+h} - y_{c,t-1}$: change in the outcome (aid volume, % channel, % modality) for country *c* from year *t−1* to *t+h*
- $\Delta D_{ct}$: binary treatment (extreme event occurrence) in country *c* at year *t*
- $\delta_t^h$: year FEs specific to horizon *h*
- $X_{ct}$: covariates, incl. region-specific year effects
- Standard-errors clustered by country

- **Observation window**: 2003-2018
- **Units**: 158 countries (DAC Recipients)

**Potential confounders**

Global and regional climate dynamics, local land-use changes

# Variable construction

## *Outcomes*

Source: OECD Creditor Reporting System (CRS), 2000-present

- **Amount**: Official Development Assistance (ODA) yearly commitments, in million, constant US$
  - → incl. humanitarian ODA
  - → excl. in-donor expenditures (e.g., refugee costs), administrative costs, and debt relief
- **Design** *(Policy influence)*: % of ODA by modality category
  - → Budgetary support, core/pooled contributions, project-type interventions (incl. TA)
- **Implementation** *(Technical control)*: % of ODA by channel of delivery
  - → State vs. non-State (NGOs, multilateral, private sector)

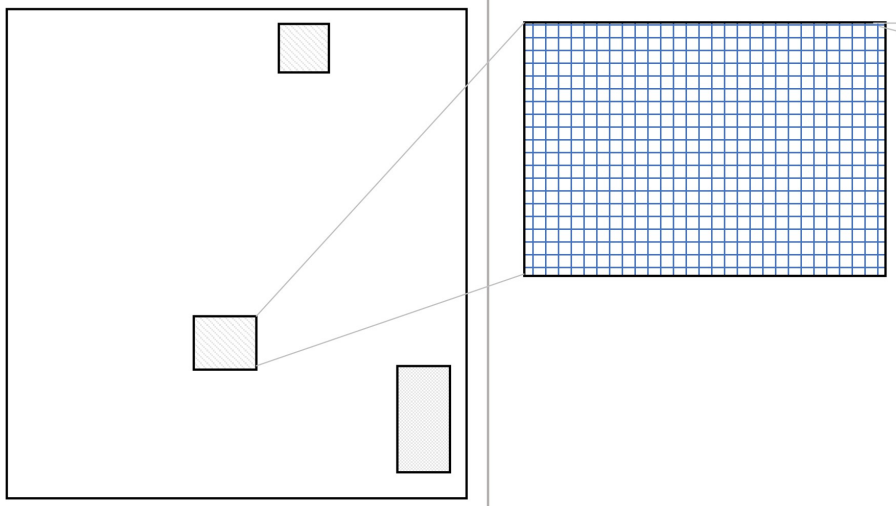
# Variable construction

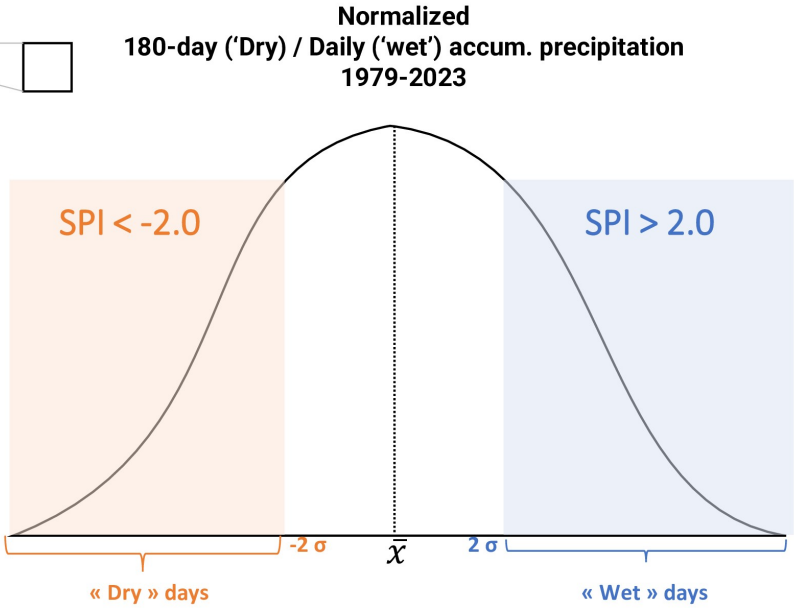
*Treatment*

- **Sources**:
  i. EM-DAT/GDIS *geolocalized 'disaster'* events (2000-2018)
  ii. MSWEP global *daily precipitation* data (1979-present)
- **Main idea**:
  → Distinguish hazards by *severity* ($\neq$ count events uniformly)
  → Use *meteorological* grid-level data ($\neq$ estimated damages)
  → Build *standardized* hazard severity measure (i.e., comparable across event types)
  → Account for *seasonality* (monsoon $\neq$ *extreme* monsoon)

# Extreme event binary treatment variable

| **Level** | Country | ADM | Grid |
|---|---|---|---|
| **Data** | EMDAT/GDIS | GDIS/MSWEP | MSWEP |
| **Period** | 2003-2018 | 1979-present | 1979-present |
| *Example* | *France* | *Puy-de-Dôme* | *Clermont-Ferrand (10km2)* |






1. Sum « wet/dry » days by grid-year
2. Average sums by disaster-year (*severity measure*)
3. Take 90th percentile (*extreme event*)
4. Treatment = 1 if event > 90th pct, = 0 otherwise

# Descriptive statistics

Treat. X Country | Treat. X Year | Treat.Reg | Outc.Vol

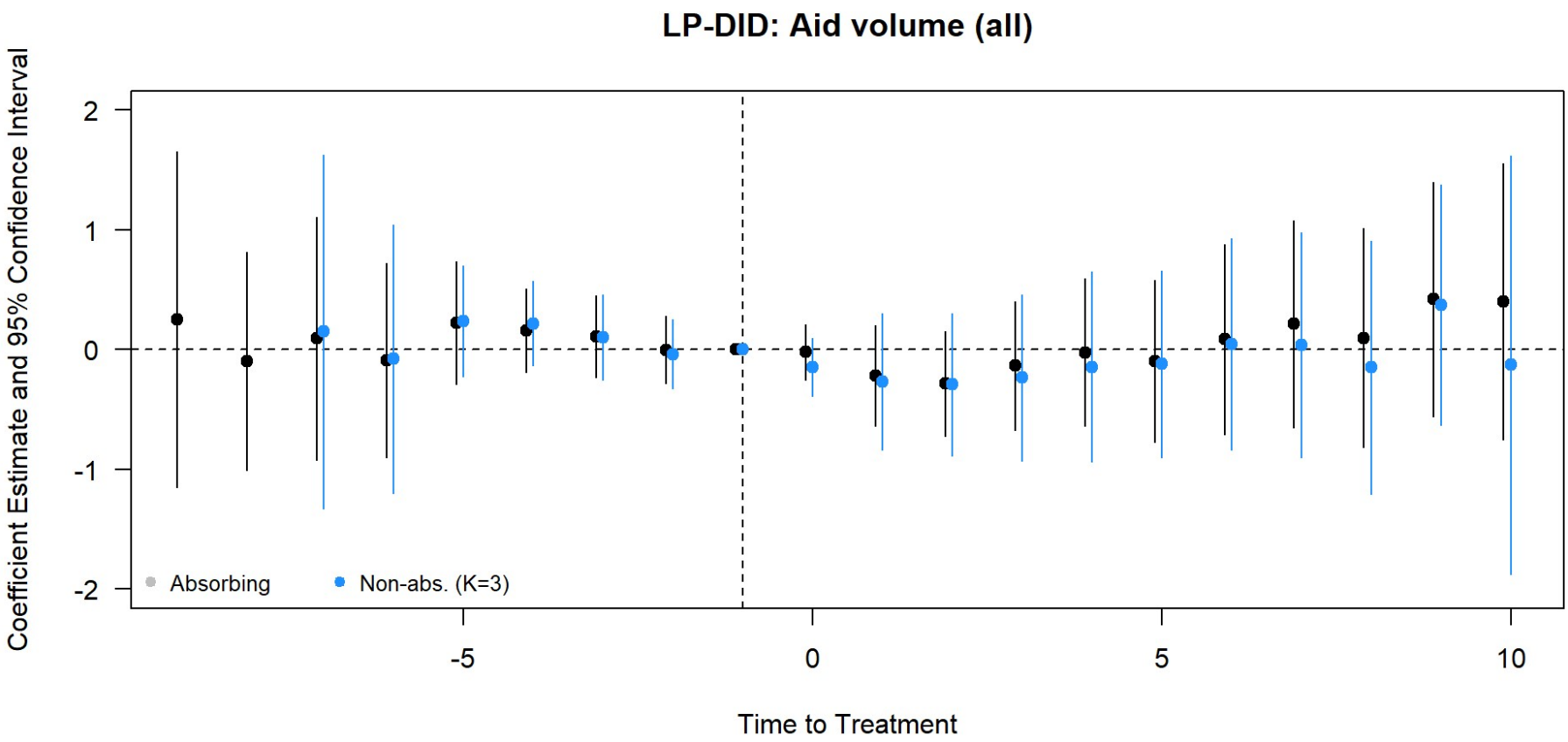
Country-level yearly ODA flows, by Region, 2003-2018

Source: OECD CRS

| Region | Min | Q1 | Median | Mean | Q3 | Max |
|---|---|---|---|---|---|---|
| Africa | 0.00 | 113.88 | 390.20 | 698.65 | 977.45 | 7,396.70 |
| Asia | 3.45 | 142.08 | 402.21 | 982.35 | 1,192.38 | 7,627.13 |
| Europe | 0.00 | 26.12 | 230.01 | 473.10 | 502.39 | 5,585.25 |
| LAC | 0.00 | 15.04 | 55.87 | 207.54 | 263.05 | 3,454.66 |
| Middle East | 0.00 | 4.68 | 323.03 | 942.37 | 1,502.69 | 9,151.72 |
| Oceania | 0.00 | 17.57 | 41.22 | 86.33 | 102.88 | 822.74 |

- *Censored* outcome with a *skewed* distribution

# Baseline results




n.b. *not stabilized* (*revised* rainfall data coming soon)

# Robustness checks

## *Treatment*

✓ **Deviation cut-off** (non-linearity assumption): use the 95$^{th}$ or 99$^{th}$ percentiles

× **Time-scale**: construct *year*-specific or *month*-specific distributions instead of day-specific

× **Baseline climate** (climate belief assumption): choose 20-year or 30-year long historical norms

## *Outcome*

× **Amount**: ODA disbursements

## *Estimation*

✓ **Lag length (stabilization period)**: no lag, 3-year, 5-year lags

✓ **Absorbing**: single (first-treated cohorts) and multiple (short/long-term) treatments (Deryugina 2017)

✓ **Estimators**: (*linear*) counterfactual/imputation estimators (Borusyak, Jaravel, and Spiess 2024; Liu, Wang, and Xu 2024), Generalized SCM (Xu 2017); (*nonlinear*) TWFE PPML, ETWFE (Wooldridge 2023)

× **Multinomial models**: alternative estimators, e.g., fractional multinomial logit model (Negi and Jeffrey M. 2024), SCM for Proportions (multinomial link) (Bogatyrev and Stoetzer 2025)

# Heterogeneity

## *Treatment*

✓ **Exposure**: population, agricultural land, built-up area

× **Climate extremes**: wet (flood) vs. dry (drought) events

## *Outcome*

✓ **Category**: humanitarian vs. development (Gov. & Civil society, Infrastructures)

× **Channels of delivery**: NGO, Multi., Private

× **Financial instruments**: grants vs. loans

× **Donors**: bilateral vs. multilateral

## *Recipient country*

✓ **Gov. responsiveness**: State of Emergency and/or request for international assistance

× **Domestic politics**: political regime and internal social conflict

× **Resources**: income group, government's fiscal and institutional capacity, Chinese aid

# Conclusion

- Study post-disaster aid allocation
  - → Consider wet/dry climate extremes (floods/droughts)
  - → Estimate dynamic effect on aid volume and composition
- Non-significant preliminary results on aid volume
- Potential explanations
  - → identification strategy: rainfall extremes $\not\Rightarrow$ flooding 'disasters'
  - → variable construction meth.: alternative rainfall 'extremes' measures
  - → level of analysis: miss sector-level effects and reallocation
- Revised precipitation data coming soon

# Annexes

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