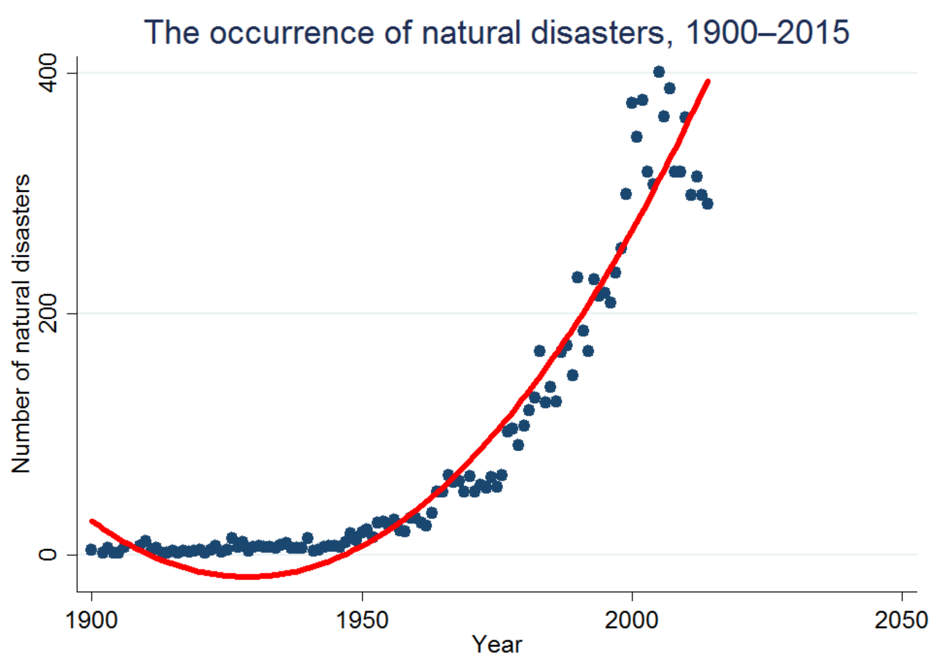
Res Publica: Natural disasters and (future) government debt

Ian Koetsier



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Introduction

- Post-disaster interventions, a Res publica?
- The ex-post costs for the government of a natural disaster (relief and reconstruction, and other secondary costs).
- How do natural disasters affect government debt? (captures the other aspects of government finances)
- Contributions:
  - o The post-disaster trajectory (short, medium and long-term effects).
  - o Fiscal costs
  - o Methodological: panel synthetic control method
  - o Policy implications

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Is it a core task?

- Why do we not buy private natural disaster insurance?
  - o Nonexistence / insufficient private insurance market.
- Why is it nonexistent or insufficient?
  - o Distorted demand side: irrational behavior (underestimation) and bail-out expectations.
  - o Distorted supply side: correlated risks
- With no private option, it is the responsibility of the government to provide disaster relief and reconstruction.
  - o A moral obligation
  - o Macroeconomic policy perspective: counter-cyclical policies.

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Data (1)

- Data from EM-DAT for natural disasters and other sources for the macroeconomic variables (amongst others, World Bank, IMF etc.)
- Data per subject
  - Climate change analysis
    - Period 1900-2015
    - All countries
  - Synthetic control analysis
    - Period 1971-2012
    - 70 countries

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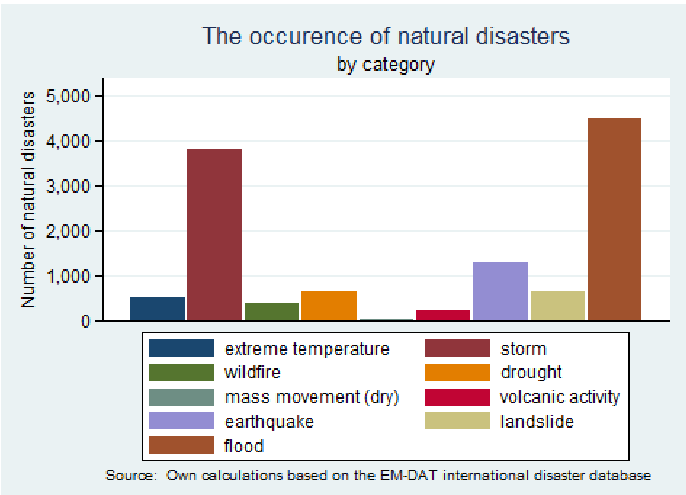
Data (2)



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Data (3)

country	year	deaths per 100,000	name disaster
Haiti	2010	2226	Haiti earthquake
Myanmar	2008	271	Cyclone Nargis
Honduras	1998	244	Hurricane Mitch
Sri Lanka	2004	183	Indian Ocean earthquake and tsunami
Indonesia	2004	74	Indian Ocean earthquake and tsunami
Nicaragua	1998	68	Hurricane Mitch
Pakistan	2005	48	Kashmir earthquake
Iran	2003	39	Bam earthquake
Japan	2011	16	Tōhoku earthquake and tsunami

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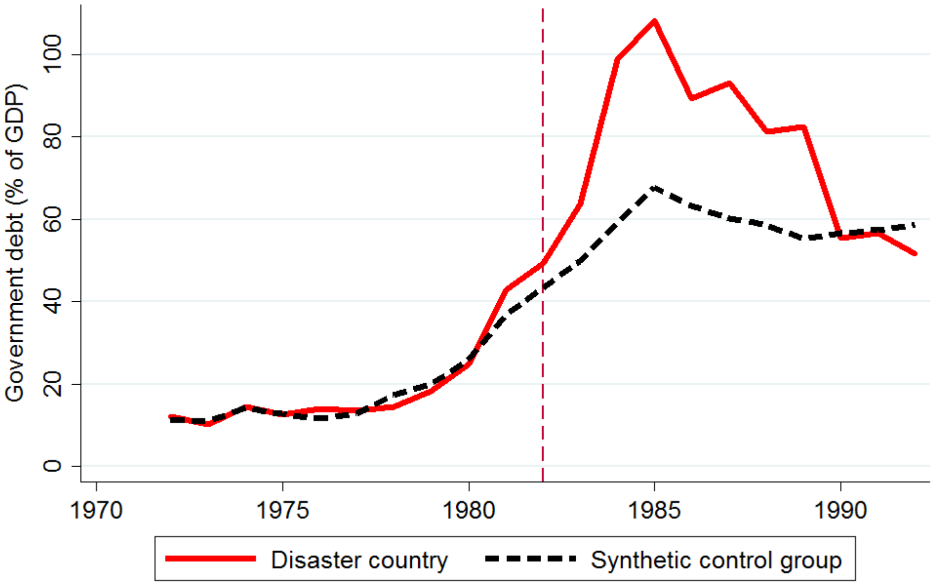
Methodology

- Synthetic control method:
  - The synthetic control method developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010).
  - Requires a mix of affected and unaffected countries
  - The counterfactual is constructed from multiple unaffected countries (add up to 1) which resemble the affected country best.
  - Average the disaster results to provide generalizable conclusions of the effect on the government's fiscal position after a natural disaster.

A graphical representation of the synthetic control method for El Salvador, 1982



Source: Own calculations.

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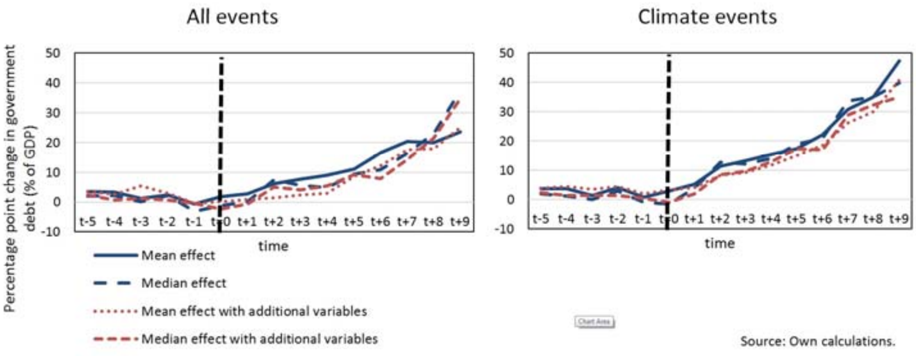
The mean and median effects of natural disasters controlling for sovereign default



Source: Own calculations.

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Results

- All events
  - The long-term estimates range from an increase of government debt from approximately 23 percentage points to 37 percentage points.
  - Our short-term results come close to the short-term effects found by Rasmussen (2004) and Noy and Nualsri (2011).

- Split the disaster in climate and non-climate events
  - Climate event: extreme temperature, drought, flood, storm
  - Non-climate event: volcanic, earthquake

- Climate events
  - The effect on government debt, between 34 per cent of GDP and 47 per cent of GDP, is very substantial.
  - Melecky and Raddatz (2011) for the budget deficit.

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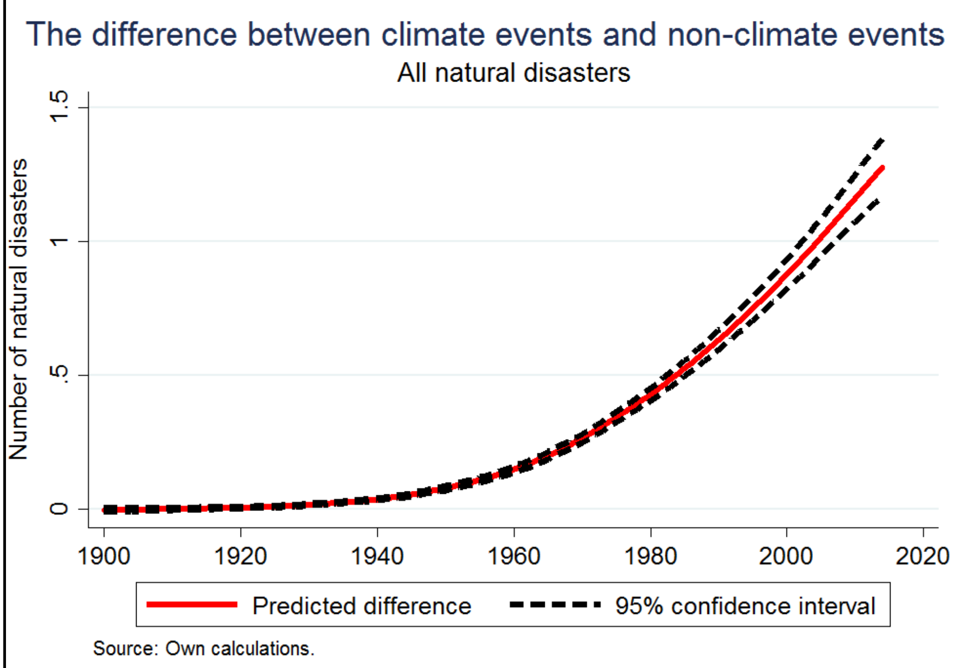
The climate change effect

- The evidence on anthropological climate change shows that the frequency and intensity of climate disasters will increase in the future (see IPCC, 2014; CRED/UNISDR, 2015).

- Is the increase in disasters climate change?
  - Improvement in reporting
  - Growing population



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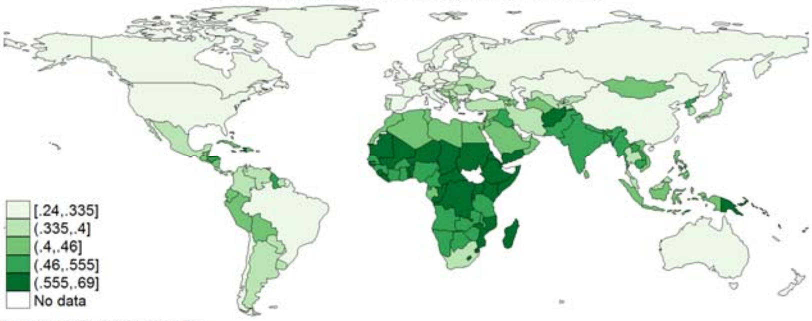
ND GAIN vulnerability index 2014



Source: ND-GAIN (2015).

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Policy recommendation

- Advantages of cat bonds:
  - Immediate pay-out due to a factual trigger
  - No damage assessment necessary
  - Makes other government debt more secure
  - No upfront payment like a fund
  - Spreading the risk to international investors
  - No correlation with other investment categories
  - Search for return

- Disadvantages of cat bonds:
  - Potential high risk premium (illiquid market)
  - Might be insufficient when a major disaster strikes
  - A new financial instrument

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Main messages

- Post-disaster interventions are a Res Publica!

- A large natural disaster leads to an increase in government debt, especially climate events.

- Increasing importance if current projections on climate change hold.

- Climate change might be more important for low/middle-income countries. They are more vulnerable.

- Policymakers can issue cat bonds to deal with large natural disasters. Furthermore, more fiscal costs estimates are needed (implementation of prevention measures).

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Thank you for your attention

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Appendices

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Literature review

- For the Caribbean:
  - o Rasmussen (2004) finds a median public debt increase by a cumulative 6.5 percentage points over three years.
  - o Acevedo (2014) finds debt only increases with floods.

- For developed and developing countries:
  - o Noy and Nualsri (2011) find that government outstanding debt increases more than 8% of GDP over a year and a half for developed countries.
  - o A negative effect is found for developing countries.

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The role of the government (1)

- Why does the government have to step in (the case of natural disasters)?

- Market failure:
  - o No market for disaster insurance
  - o Correlated probabilities
- Humanitarian reasons
- Behavioral reasons
  - o People expect help
- "an insurance company with an army" (Paul Krugman)

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Methodology (1)

- $\alpha_{1t} = DEBT_{1t}^{I} - DEBT_{1t}^{N} = DEBT_{1t} - DEBT_{1t}^{N}$
- $\hat{\alpha}_{1t} = DEBT_{1t} - \sum_{j=2}^{J+1} \omega_j^* DEBT_{jt}$
- $\bar{\alpha} = \left(\bar{\alpha}_{T_0+1}, \dots, \bar{\alpha}_T\right) = \frac{1}{G}\sum_{g=1}^{G}(\hat{\alpha}_{g,T_0+1}, \dots, \hat{\alpha}_{g,T})$

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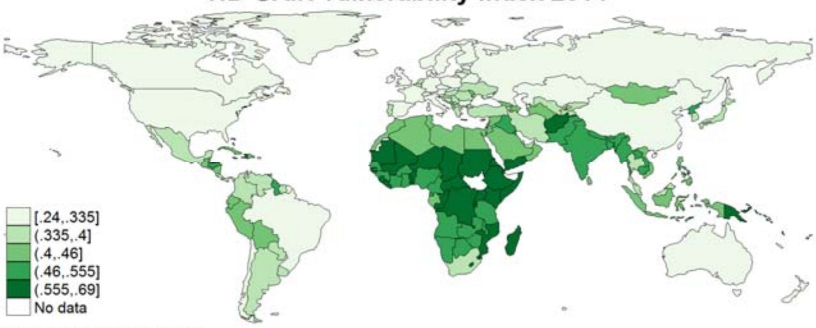
Income (2)

ND GAIN vulnerability index 2014



Source: ND-GAIN (2015).

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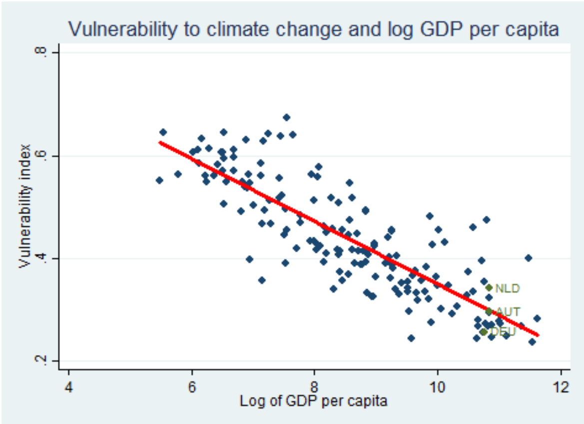
Income (3)



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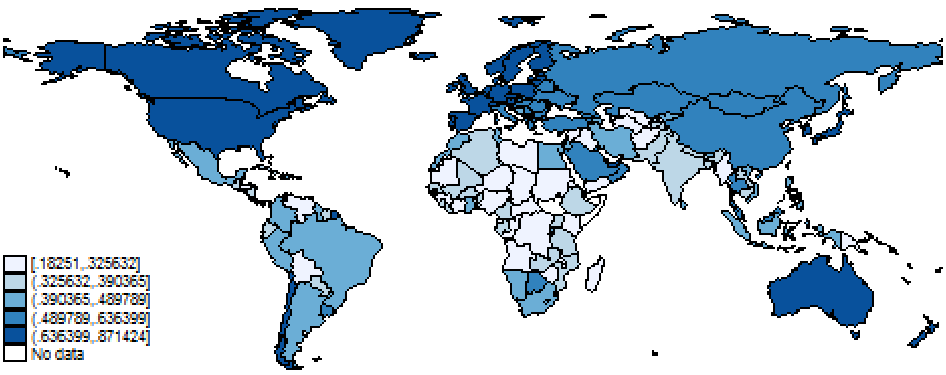
Income (4) Preparedness



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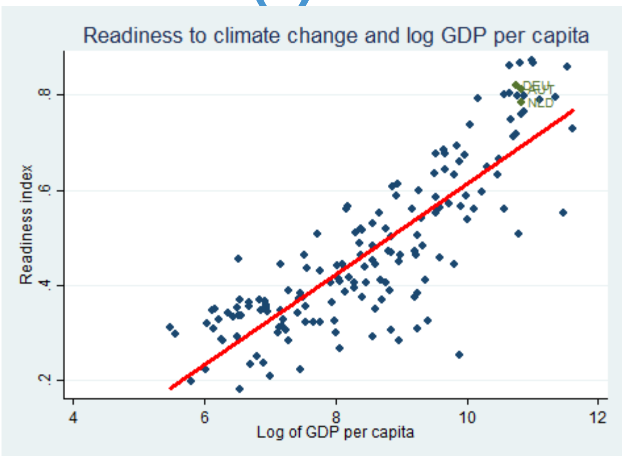
Income (5)



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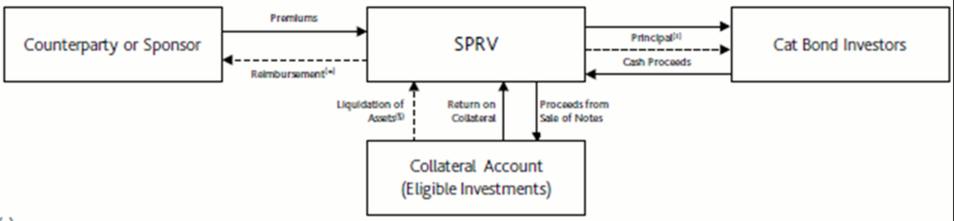
Policy recommendation (1)



(*) Event Contingent
(†) At maturity
(§) Event contingent or at maturity
Source: Moody's Investors Service

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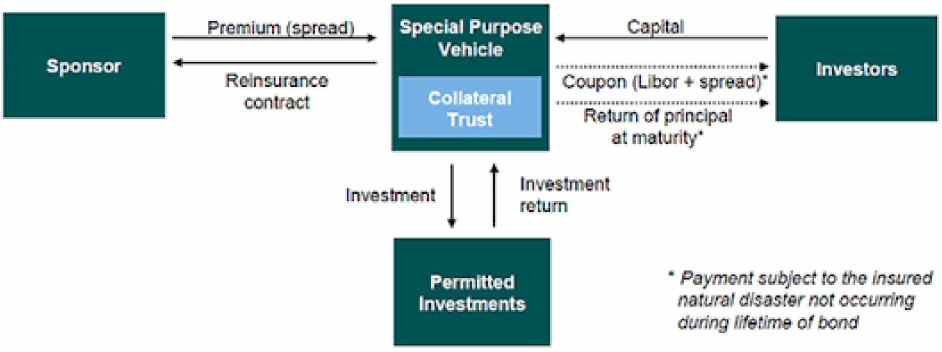

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