

# Macroeconomics of Natural Disasters: Meta-Analysis and Policy Options

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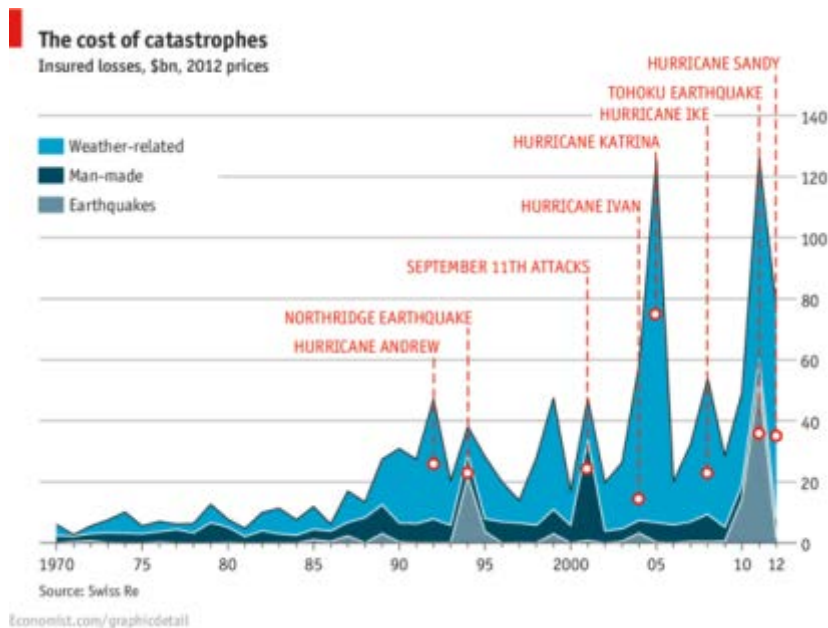


# The paper in a nutshell

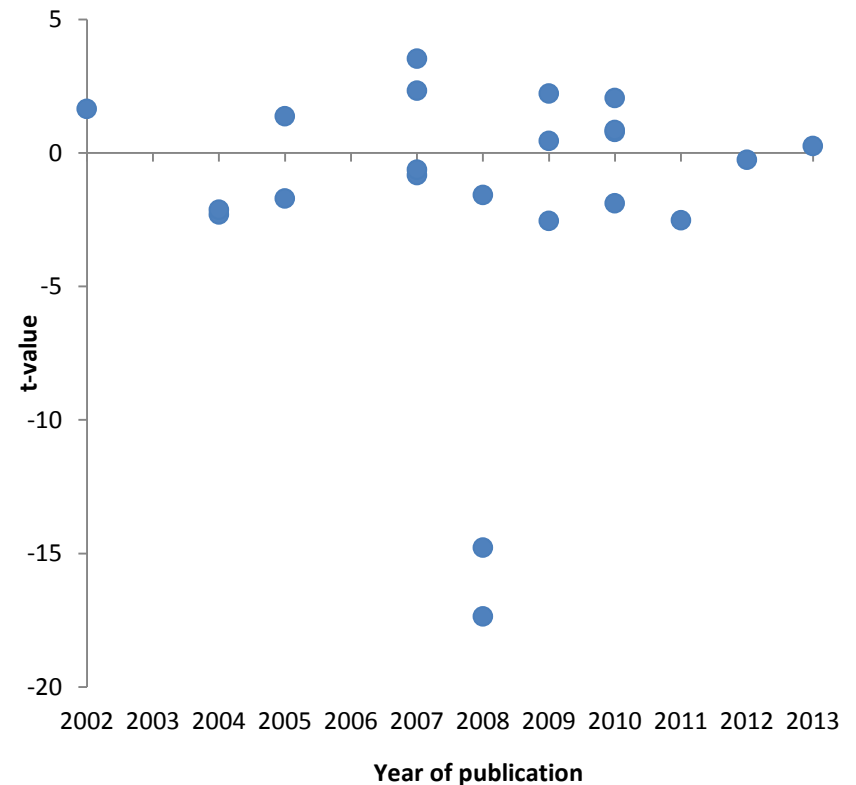
- Emerging field : *macro*economic impact of natural disasters
- Meta analysis of 20 macro-econometric studies (including 'grey' literature):
  - with and without control group
  - different sets of resilience factors
  - with and without disaster variable
  - Substantial heterogeneity in results
- Meta-regression analysis to assess the influence of empirical design (data and econometric specifications) and methodology
- Comparison with the leading research synthesis (IPCC narrative)
- *Major finding 1*: heterogeneity of results is due to modelling strategies and data set; importantly it distorts evaluation of mitigating instruments.
- *Major finding 2*: narrative could have been **more confident** on negative impact and **more transparent** on inclusion and qualification of studies if complemented by a meta-analysis
- *Most important research needs*:
  - Format for primary studies & best practice rules for search strategies & study selection.
  - Inclusion of population and institutions in primary studies.
  - Use of alternative data sets.

# Macroeconomics of natural disasters

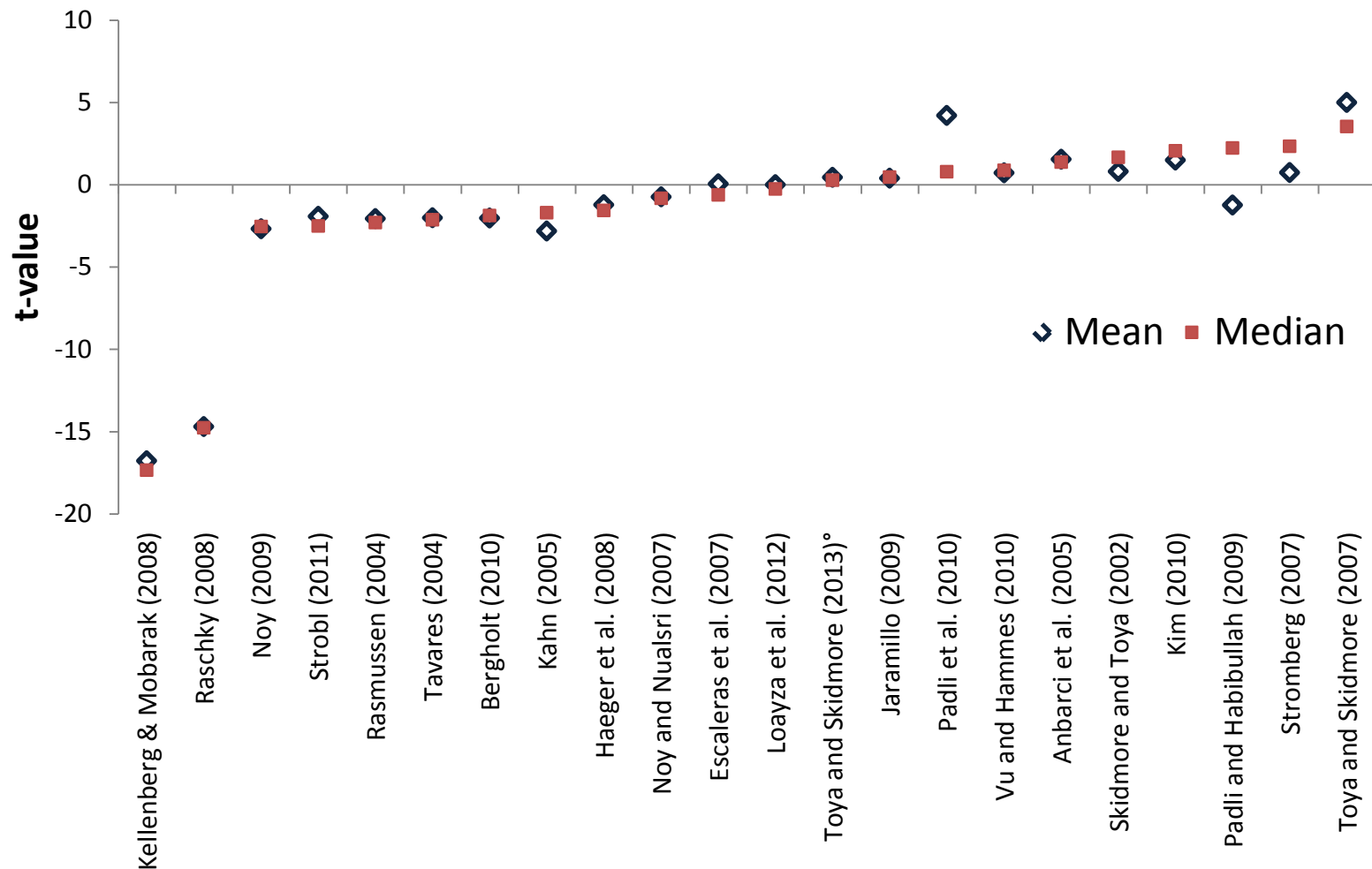
## Increasing costs of man-made, weather & earth related disasters



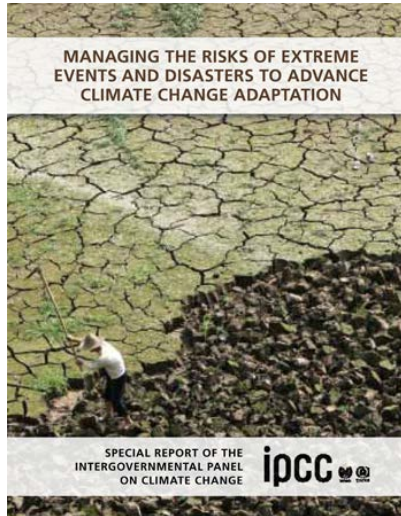
## Median t-value of the primary studies 2002-2013



# 447 t statistics statistics of 20 studies in the meta analysis



# IPCC Special Report for Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaption



- Highly political/controversial issue
  - since Albala-Bertrand (1993) (long run impact is small)
  - disaster vulnerability and development (non graduating LDCs)
- IPCC's (2012) major & highly influential research synthesis is **narrative**.
  - Aims to 'assess science in a way that is relevant to policy but not policy prescriptive'
  - Assigns '**medium confidence**' to the prevalence of a negative impact of disasters in the short run
  - '**Disagreement is due to analytical weaknesses**' (lack of counterfactual, failure to account for informal sector, insurance, aid and disaster type)

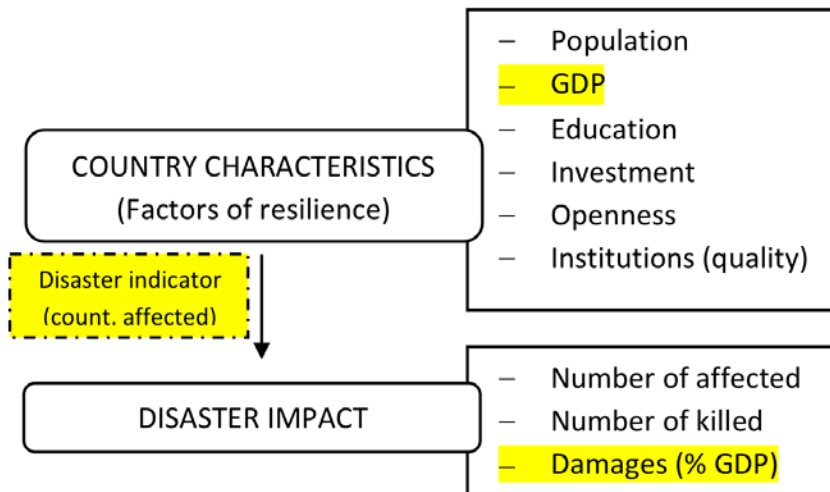
# Motivation for meta-analysis:

## Our reading of the reasons for heterogeneity

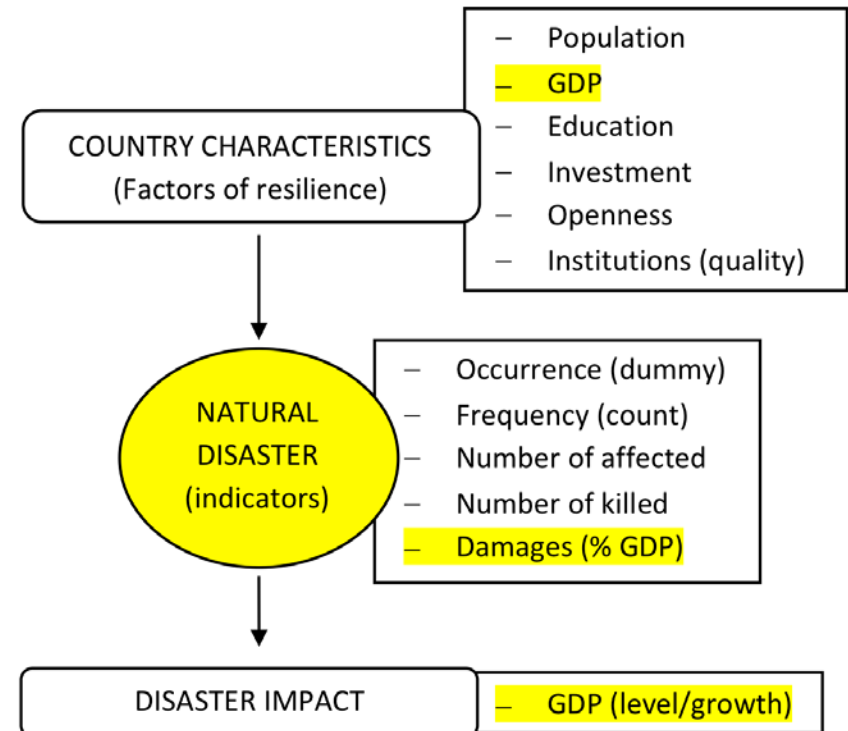
- **Methodological differences**
  - Research design decisions in emerging research field
  - Literature *looks* homogeneous (cross referencing & less heterogeneous than micro and case studies), but actually two literatures
- **Preliminary state of findings** (for example replication of Toya and Skidmore (2007) by Reed and Mercer (2013))
- **Intrinsic motivation and bias of the researchers** (cf Doucouliagos and Paldam 2009 on development aid)

# Two approaches: theory

## 1: Direct costs



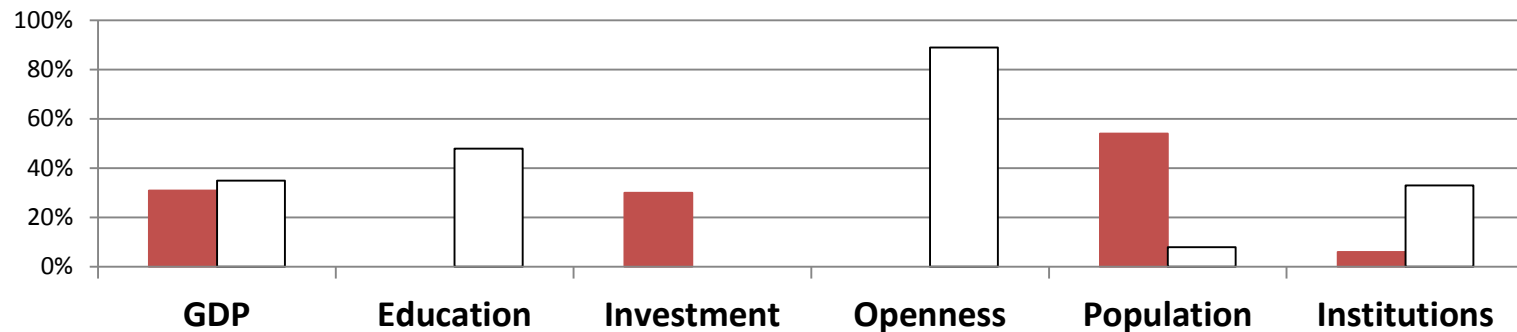
## 2: Indirect costs



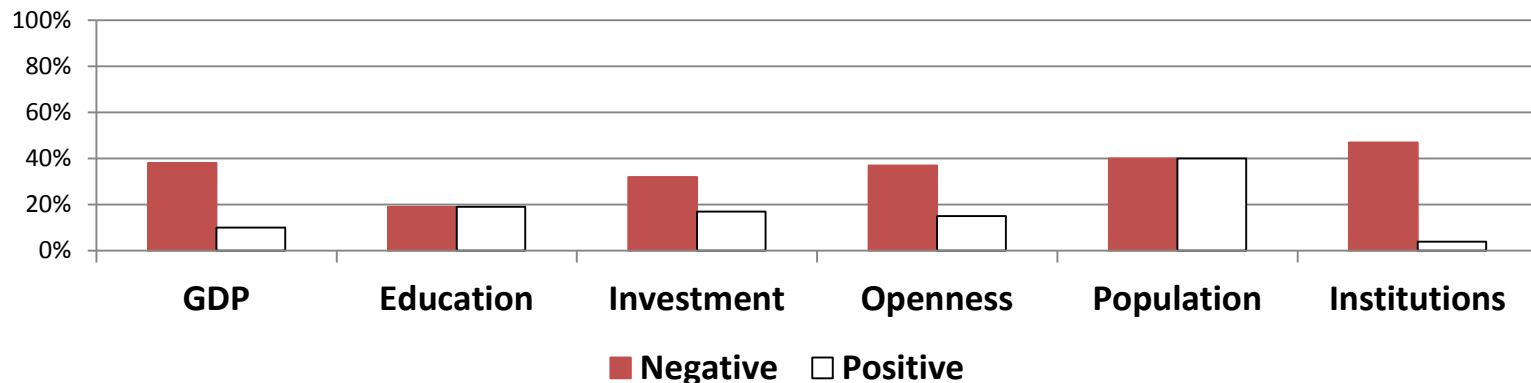
**IPCC narrative: ‘categories are rarely fully exclusive, and items or activities can have elements in all categories’**

# Two approaches: consequences for impact mitigating factors

## Model 1 direct costs

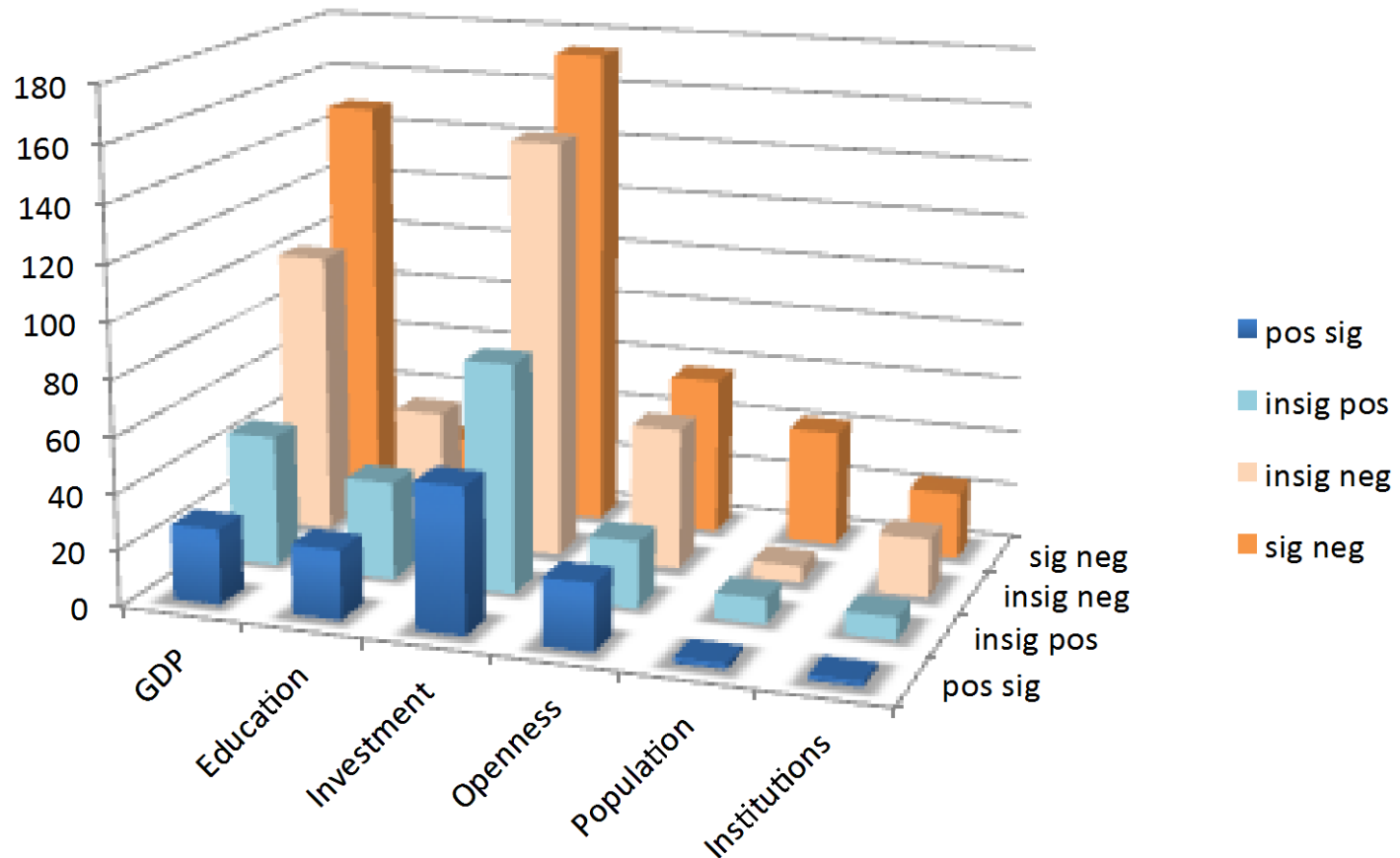


## Model 2 indirect costs





# Number of coefficients for different resilience variables

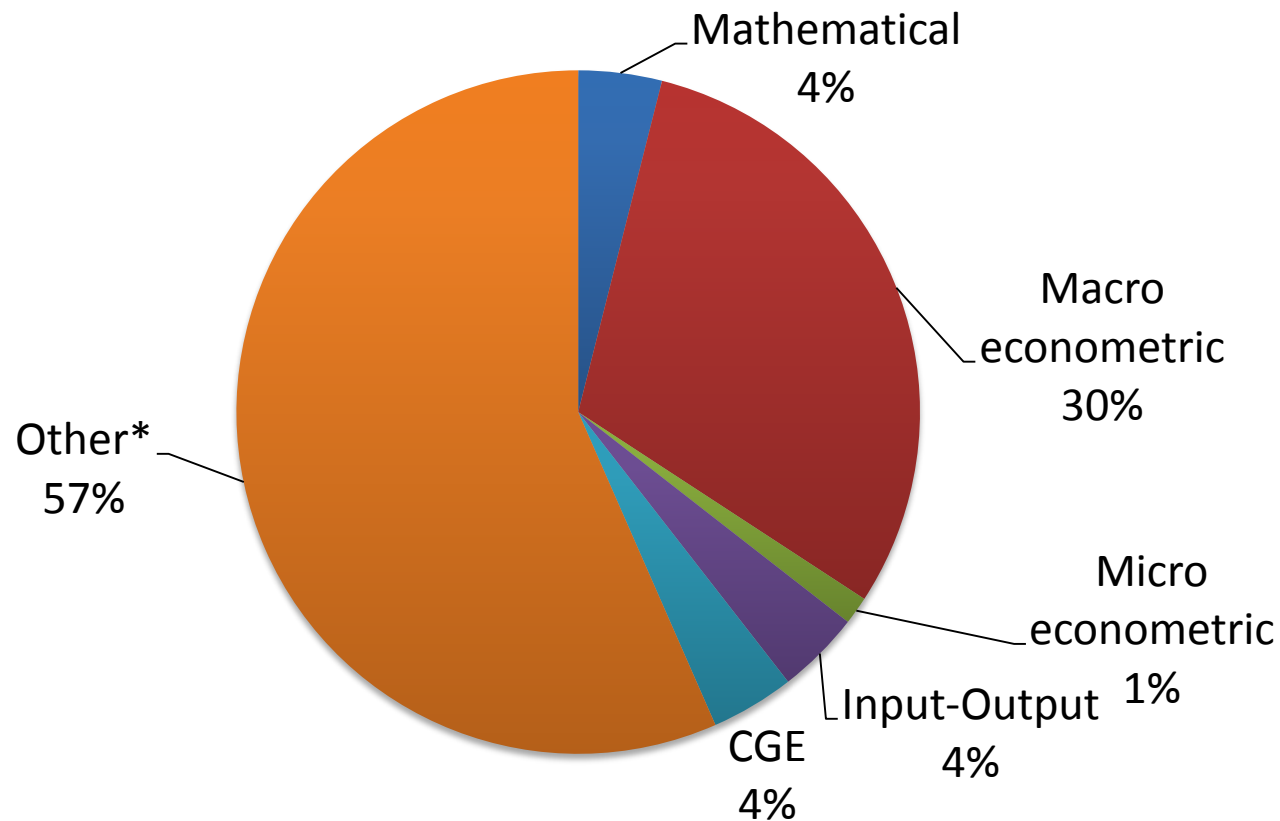


Source: Lazzaroni and van Bergeijk, 2013, Appendix Table A2

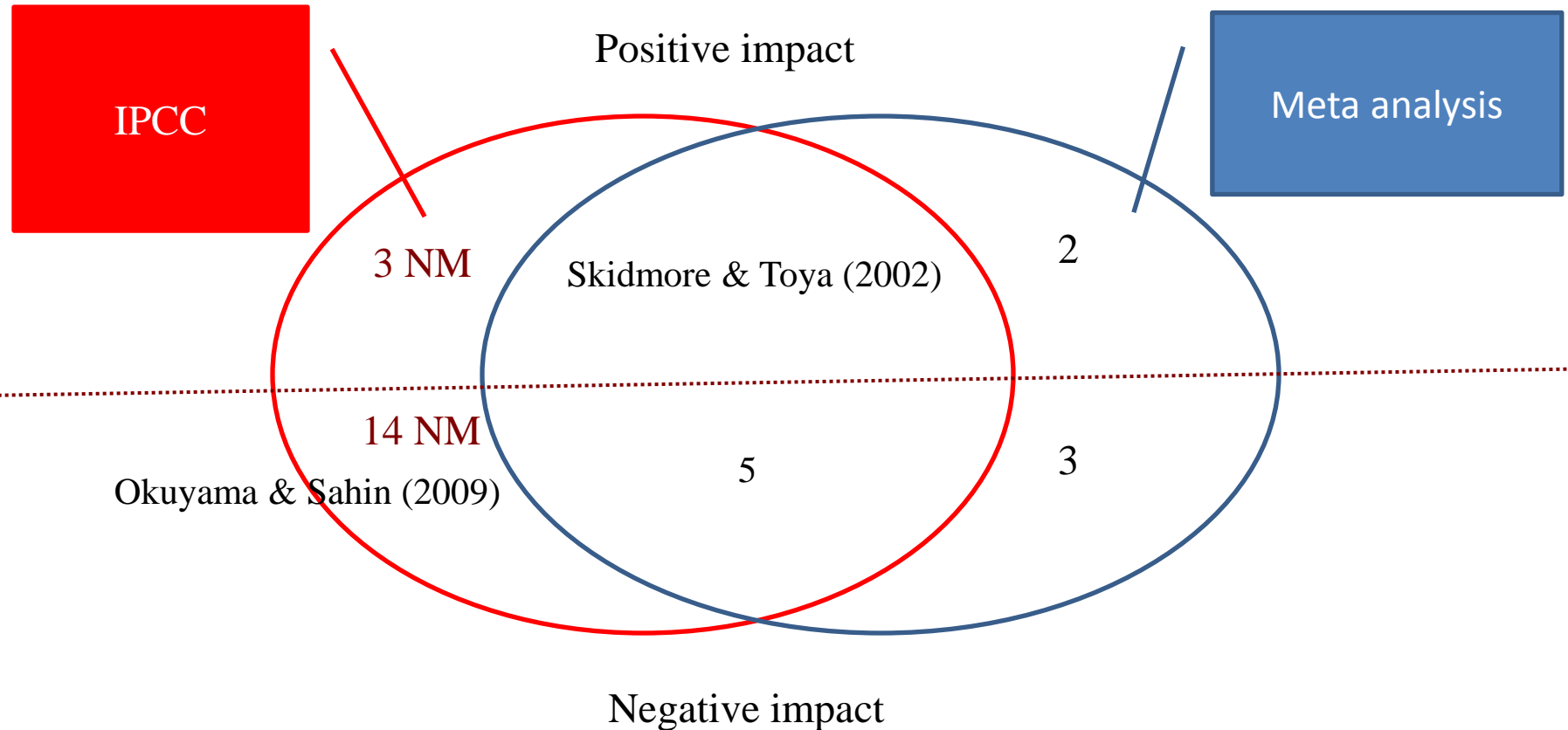
# Key findings from the meta (regression) analysis

- We can be confident about the negative impact of natural disasters based on the evidence in the 20 macro-econometric studies
- Indirect costs studies are less likely to find a negative impact of natural disasters (+ direct cost studies are more likely...)
- The use of EM-DAT (Center for Research on the Epidemiology of Disasters) decreases the likelihood of finding a negative disaster impact (+ alternative data sets increase...)
- Contradictions in terms of impact of mitigating factors related to research design
- Relatively little evidence is available for mitigating role of institutions and population
- Primary studies do not always report key statistics necessary for meta-analysis

# Studies (76) on disaster impacts in the IPCC Report by type of analysis



# Impact of natural disasters on economic development



NM: Non-macroeconometric studies

# Strengths and weaknesses of narrative and meta analysis

	Traditional literature review (IPCC 2012)	Meta analysis (Lazzaroni and van Bergeijk 2013)
Qualitative analysis and case studies	yes	no
Quantitative analysis	yes	Yes, but not CGE, VAR and Input-Output
Identification of methodological differences	yes	yes
Identification of <i>impact</i> of methodological differences	no	yes
Possibility to include 'incomplete studies'	yes	no
Coverage of literature relevant for method	Incomplete (selective)	Incomplete (search strategy)
Transparent non-subjective synthesis	no	yes

# Thank you

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