The Geographic Distribution of Extreme Weather and Climate Risk Perceptions in the United States
Jinan Allan, Wesley Wehde, Makenzie Krocak, Joe Ripberger, Carol Silva, and Hank Jenkins-Smith
University of Oklahoma

Motivation
Weather and climate disasters pose an increasing risk to life and property in the United States. In 2017, there were 16 weather and climate disasters with losses exceeding $1 billion each. More significant than the number of events was the cumulative cost of $309.5 billion, the most in US history.

Managing risk requires objective information about the nature of the threat and subjective information how people perceive it.

- We know which parts of the US are most likely to experience drought, heat waves, flooding, snow or ice storms, tornadoes, and hurricanes.
- We know very little about the geographic distribution of risk perceptions across this array of events. Is drought a prominent concern in some places and not others? What about heat waves or flooding?

Do risk perceptions align with objective risk?
- Difficult to answer because analysts have yet to develop a comprehensive and spatially consistent methodology for measuring risk perceptions across geographic areas in the US.

Data
Severe Weather and Society Survey
National survey conducted annually by the Center for Risk and Crisis Management at the University of Oklahoma that measures weather and climate risk perceptions and information reception, comprehension, and response across hazards.

- Data from the 2017 & 2018 surveys
- Estimation sample: n = 7,000 respondents that are demographically representative of the US public
- Validation sample: Oversample of 1,500 respondents from a random sample of 30 NWS County Warning Areas (CWAs)
  - 50 respondents from each CWA

Preliminary Findings
- We use the Severe Weather and Society Survey and MRP to develop valid estimates of risk perceptions in small geographic areas across the US.
- Risk perceptions generally match objective risk, but the match varies by event type
  - Possible gaps: extreme temperatures, flooding, and wildfires?

Methodology
Multilevel Regression and Poststratification (MRP)
Common technique in survey research that uses national data to estimate preferences, perceptions, and behaviors in small (subnational) geographic areas.

1. Fit multilevel regression models:
\[ y_{ij} = \beta_0 + \beta_1 x_{ij} + \alpha_j + \epsilon_{ij} \]
where \( y_{ij} \) is the outcome for individual \( i \) in area \( j \), \( x_{ij} \) is the predictor, \( \alpha_j \) are area-specific intercepts, and \( \epsilon_{ij} \) are error terms.

2. Use the parameters from the models in combination with Census and storm events data to predict risk perceptions for demographic groups in each CWA
3. Use poststratification to aggregate the predictions across the demographic groups to estimate a risk perception score for each threat in each CWA
4. Validate predictions against observations in 30 CWAs from the validation sample
5. Compare subjective perceptions and objective risk across CWA

Resources

Support
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