Household Flood Preparedness During Hurricane Dorian
By prof.dr. Wouter Botzen
1. Adaptation measures in flood risk management

- Trends in global flood risk due to:
  - Population and economic growth
  - Possibly climate change

Source: Munich Re (2018)
Flood risk management approaches

◆ Traditional focus on flood-prevention infrastructure
  ◆ Engineering options: levees, dams, storm surge barriers
  ◆ Cost-effective in many flood-prone regions
  ◆ But, infeasible to limit flood risk to zero
Flood risk management approaches (2)

- Flood insurance for financial resilience

- Increased interest in damage mitigation by households
  - Household level measures can significantly limit flood damage
  - Up to 50% of damage savings in Netherlands, Germany and France (e.g., Poussin et al., 2015)
Boundedly rational behavior w.r.t. flood risk

- Biases imply insufficient preparedness for floods:
  - Underestimation of low-probability risk
  - Costs of information seeking about risk and coping measures
  - Myopia and discounting of the future
  - Charity or moral hazard of compensation
Survey research determinants of flood preparedness

- Challenges cross-sectional surveys after a disaster motivates real time and repeated surveying (Meyer et al., 2015)

Source: Bubeck et al. (2012)
2. Real time survey of flood preparedness for Dorian

- Conducted by phone between 29 August and 2 September
- Random sample in Florida flood zones, completion rate 71% (N=871)
- Location can be linked to objective flood risk
- 54 questions about:
  - Risk perceptions
  - Flood experience and expected compensation
  - Behavioral motivations for preparedness
  - Insurance purchases
  - Risk mitigation measures
  - Socio-economic characteristics
Forecast first day survey

From Cat 1 to Cat 2
Forecast midway survey

31 August: Cat 4
1 September: Cat 5
Forecast final day survey

2 September: Cat 4
Location respondents
3. Results: general flood risk perceptions

- High awareness flood risk, but not necessarily concern
  - About 80% in 1/100 year flood zone believe their flood probability ≥1/100
  - Still, a majority (54%) believes the flood probability is too low to be concerned about it

- In case they are flooded, people realize damage will be high (median expected damage =$80,000)

- Still, a majority (59%) is not worried about flooding
Perceptions particular to Dorian

- Overall high awareness
  - 92% know about the storm threat
  - Of those people, 83% realize they live in the impact area
  - 66% are worried about damage from Dorian

- Misperceptions
  - Still, about 1 in 4 people do not know about Dorian or that they can be impacted
  - Most misperceived hurricane strength when it was low (Cat 1, 2, 3), while most were accurate when it was high (Cat 4, 5)
4. Results: insurance purchases

- 7% purchased flood insurance voluntarily
- 29% purchased flood insurance mandatorily
- 50% no flood insurance
- 14% don't know
Factors related with flood insurance purchases

Risk perceptions:
- Flood probability (+)
- Concern about flood probability (+)
- Expecting higher risk from climate change (+)
- Worry about floods and Dorian (+)

Insurance attitudes:
- Confidence flood insurance will pay out (+)
- Regret not insuring when flood happens (+)
- Regret insuring without a flood (-)
- Social norm insuring (+)

Demographics:
- Education (+)
- Value home (+)
- Value home contents (+)
- Income (+)
Relation between flood insurance and ex ante flood-proofing

Note: ** indicates a significant difference at the 5% level with the no flood insurance group
Relation between flood insurance and emergency preparedness

Note: ** indicates a significant difference at the 5% level with the no flood insurance group
The overall absence of moral hazard confirms the few other studies on this topic

(Hudson et al., 2017, Botzen et al., 2019a)
5. Results: factors of influence on risk reduction

- A few significant correlations exist between risk perceptions and ex ante flood-proofing:
  - Concern about flood probability (-)
  - Worry about floods (-)
  - Aware of Dorian (+)
  - Worry about Dorian (-)

- Risk perceptions mainly drive emergency preparedness:
  - Flood probability (+)
  - Concern about flood probability (+)
  - Worry about floods (+)
  - Aware of Dorian (+)
  - Aware living in impact area Dorian (+)
  - Perceived strength Dorian (+)
  - Worry about Dorian (+)
Factors of influence on risk reduction (2)

- Consistent correlations between attitudes to coping measures and both emergency preparedness and ex ante flood-proofing

- Coping appraisals are important drivers across measures
  - Perceived coping-efficacy (+)
  - Perceived self-efficacy (+)

- Important influence of social norm flood risk reduction
Factors of influence on risk reduction (3)

- Expected federal disaster relief lowers emergency preparedness
  - (-) significant correlations for all emergency preparations
  - 35% expects relief, people overestimate relief amounts

- Confirms concerns for charity hazard found by other studies
  - Purchases NFIP coverage (Kousky et al., 2013)
  - Flood risk reduction measures NYC (Botzen et al., 2019b)
Factors of influence on risk reduction (4)

- Socio-demographic variables are mainly related with ex ante flood-proofing measures
  - Internal locus of control (+)
  - Low discounting (+)
  - Education (+)
  - Age (-)
  - Homeowner, value home and contents (+)
  - Income (+)

- A few socio-demographic variables are related with emergency preparedness measures
  - Age (-), home value (+)
  - Mainly driven by risk perception and flood experience
6. Conclusions: lessons for communication policy

◆ High awareness about flood probability and damage, does not necessarily translate into concern needed for reducing risk and purchasing flood insurance
  ✔ Raise concern, highlight potential regret of being uninsured

◆ Awareness about storm (Dorian) and its characteristics is an important driver of emergency preparedness measures
  ✔ 1 in 4 is insufficiently aware of the storm

◆ Communicate about effectiveness of risk reduction measures and how to take them

◆ Trigger social norms in risk reduction and flood insurance coverage
Conclusions: other lessons and future research

◆ Moral hazard of insurance coverage appears to be absent
  ◆ Opportunities for stimulating risk reduction via insurance

◆ Charity hazard crowds out emergency preparedness actions
  ◆ Communicate about uncertainty and low amounts of federal disaster relief

◆ Vulnerable groups insufficiently prepare for flooding
  ◆ Address affordability concerns

◆ Future research (second survey)
  ◆ Change in risk perception and other attitudes towards risk reduction
  ◆ Additional risk reduction undertaken and evacuation behavior
  ◆ Effectiveness of risk communication
  ◆ Detailed risk assessment per respondent
References


Thanks for your attention!

Contact information: wouter.botzen@vu.nl