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
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 $\geq 1/100$
  - 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

- 29% purchased flood insurance voluntarily
- 14% purchased flood insurance mandatorily
- 50% no flood insurance
- 7% 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

- **Purchased flood insurance voluntarily**
- **Purchased flood insurance mandatorily**
- **No flood insurance**

<table>
<thead>
<tr>
<th>Activity</th>
<th>% of Respondents</th>
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<tbody>
<tr>
<td>Flood shields and sand bags available</td>
<td><strong>40</strong></td>
</tr>
<tr>
<td>Flood shields and sand bags installed</td>
<td><strong>50</strong></td>
</tr>
<tr>
<td>Move contents from flood-prone parts of house</td>
<td><strong>60</strong></td>
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</tbody>
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Note: ** indicates a significant difference at the 5% level with the no flood insurance group.
Wind insurance coverage (purchased by 80%)

- The overall absence of moral hazard confirms the few other studies on this topic

(Note: ** indicates a significant difference at the 5% level with the no wind coverage group)

(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!

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