THE AFFORDABILITY OF FLOOD RISK PROPERTY-LEVEL ADAPTATION MEASURES

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PROPERTY-LEVEL ADAPTATION

Part one of affordability, is it a worthwhile investment
WHAT CAN PEOPLE DO?

Dry flood-proofing

Wet flood-proofing
Is it effective?

Table 1  Damage-reducing effects of precautionary measures undertaken by private households on the building level

<table>
<thead>
<tr>
<th>Measure</th>
<th>Reduction</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet proofing</td>
<td></td>
<td></td>
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<tr>
<td>Flood-adapted use</td>
<td>46–48 %, 30–40 %</td>
<td>Kreibich et al. 2005a; ICPR 2002</td>
</tr>
<tr>
<td>Flood-adapted interior fitting</td>
<td>53 %, 15–35 %, 35–45 %</td>
<td>Kreibich et al. 2005a; ICPR 2002; DEFRA 2008</td>
</tr>
<tr>
<td>Installation of heating and electrical utilities in higher storeys</td>
<td>36 %</td>
<td>Kreibich et al. 2005a</td>
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<tr>
<td>Avoidance of contamination</td>
<td>35–52 %, &gt;50 %</td>
<td>Kreibich et al. 2005a; ICPR 2002</td>
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<tr>
<td>Dry proofing</td>
<td></td>
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<tr>
<td>Temporary resistance, e.g. mobile water barriers</td>
<td>29 %, 60–80 %, 50 %</td>
<td>Kreibich et al. 2005a; ICPR 2002; DEFRA 2008</td>
</tr>
<tr>
<td>Flood-adapted building structure, e.g. cellar sealing, permanent flood proof doors and windows</td>
<td>24 %, 10–85 %, 65–84 %</td>
<td>Kreibich et al. 2005a; ICPR 2002; DEFRA 2008</td>
</tr>
<tr>
<td>Building without cellar</td>
<td>22–24 %</td>
<td>Kreibich et al. 2005a</td>
</tr>
</tbody>
</table>

Kreibich et al. (2015)

[35%, 50%]

[24%, 60%]
Is it cost-effective and…

Lamond et al. (2018)
Affordability is a common policy objective for flood risk management or climate change adaptation...

...however its subjective nature means it is difficult to measure.

But we need to!
- But still has kinks
AFFORDABILITY DEFINITIONS

...the subjective part
WHAT IS AFFORDABILITY?

- That an expenditure doesn’t overly burden a person’s budget
  - Still subjective

- Some proposed definitions (from within flooding)
  - Doesn’t cost more than X% of annual income (expenditure)
    - 5% of disposable income, following Kousky and Kunreuther (2014)
  - Doesn’t reduce a person’s disposal income to a level lower than the poverty line (residual income)
    - 60% of national median disposable income
STILL A BIT MORE WORK NEEDED

Purchase affordability

- Can we afford it all in one go
  - Income + savings

- Assumes, in essence, that there are no other cost spreading mechanisms

Payment affordability

- Can we afford payments if the cost is spread overtime
  - Like a loan
    - 20 years
    - Interest rate = rate of inflation

- Can be from a bank, charity, govt. or a combination
Cost estimates
# One Table of Costs to Rule Them All

<table>
<thead>
<tr>
<th></th>
<th>Flood-proofing adaptation costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(scheme 1) Average Cost per building (Aerts, 2018)</td>
</tr>
<tr>
<td>Wet flood-proofing</td>
<td>€2,100 to €20,600</td>
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<tr>
<td></td>
<td>€1,700 to €23,000</td>
</tr>
<tr>
<td></td>
<td>€104 to €332 per m²</td>
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<tr>
<td></td>
<td>€33 per m²</td>
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<tr>
<td></td>
<td>96m²</td>
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<tr>
<td>Dry flood-proofing</td>
<td>€7,900 to €20,200</td>
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<td>€6,300 to €23,000</td>
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<tr>
<td></td>
<td>€423 and €695 per linear meter</td>
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<td></td>
<td>€285 per linear meter</td>
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<td></td>
<td>39m perimeter</td>
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</tbody>
</table>

Size of dwelling (across the European Union and income groups)
Results
THE HIGHEST QUINTILE FOR WHICH FLOOD-PROOFING IS FOUND PURCHASE UNAFFORDABLE, ON AVERAGE ACROSS COST SCHEMES

A) Average Quintile in which dry flood-proofing is found to be unaffordable

B) Highest average quintile finding wet flood-proofing unaffordable
Percentage change in the rate of unaffordability due to low cost loans under the residual income definition

A) Percentage decrease in the rate of unaffordability (percentile) for dry flood-proofing

B) Percentage decrease in the rate of unaffordability (percentile) for wet flood-proofing
Flood impact indicators and areas of overlap with unaffordability

\[ VHI = \frac{RU \cdot EAP}{P} \]

\[ REP = \frac{RU \cdot EA^D}{\bar{l}} \]
COMBINED SCORE OF VHI AND REP UNDER PURCHASE AFFORDABILITY

Legend

Sum of normalised VHI and REP values across Europe (Residual Income)

- Green: > 0.00 - 0.20
- Light Green: > 0.20 - 0.40
- Yellow: > 0.40 - 0.60
- Orange: > 0.60 - 0.80
- Red: > 0.80 - 1.00
- Dark Red: > 1.0

0 280 560 1.120 1.680 2.240 Kilometers
CONCLUSIONS
TAKE HOME MESSAGES

- We seem to assume that people have mechanisms, or resources, in place to buy these measures.
- If we don’t then we can have high rates of unaffordability.
- Introducing this idea of social loans might help:
  - Can be a partnership across sectors.
- Still some issues to work out with how a social loan scheme might work:
  - Moral hazard.
  - Social transfers if people don’t pay the loan back?


