

# Economic motivation of households to undertake private precautionary measures against floods

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## Overview

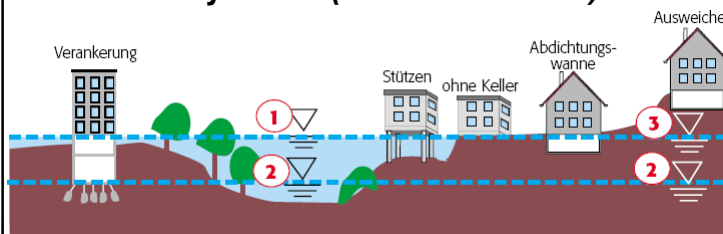
1. Precautionary measures at private buildings against floods
2. Economic motivation of households' precautionary measures
3. Economically “reasonable” precaution: Benefits and costs
4. Conclusions

## Flood risk precaution at private buildings

- Building without cellar
- Adapted building structure incl. waterproofed cellars
- Mobile flood walls
- Securing of oil tanks
- ... many other (*combinations?*)

„Schwache Wanne“ Intenditionsang  
 „Hohe Wanne“ a)  
**Reduction of damage potential by private precautionary measures for frequent floods (IKSR (2002))**

75-100%	
50-75%	
25-50%	
0-25%	



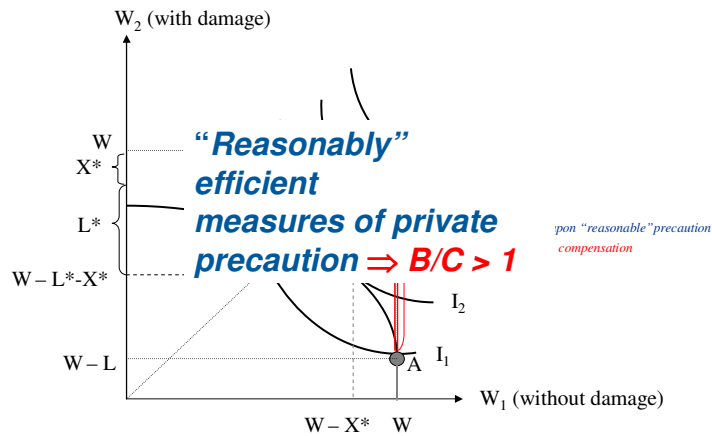
## Motivation of households' precaution

1. Prerequisite I: Risk information and perception
2. Prerequisite II: Economic incentives

⇒ *Role of insurance and*



## Governmental aid as an economic incentive



## Benefits and Costs: Data and methods

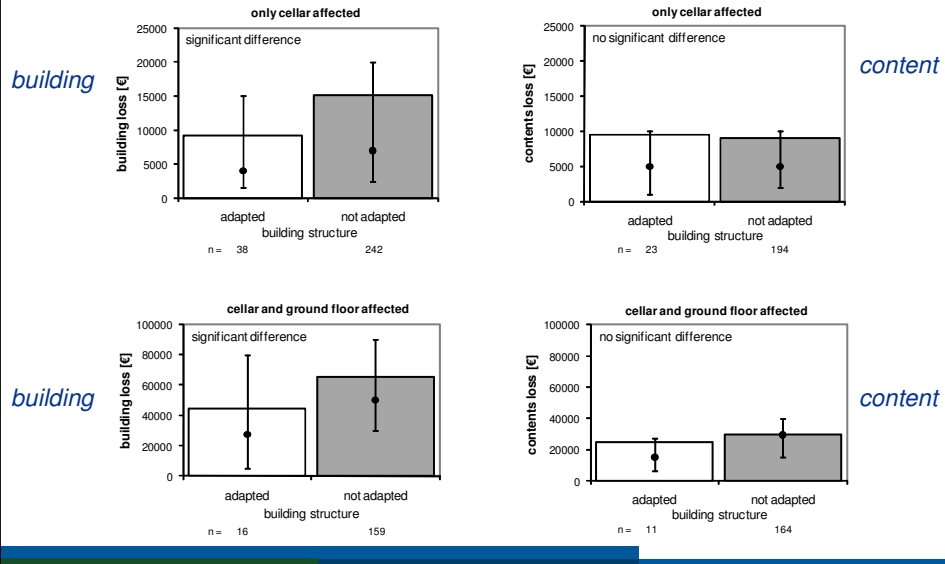
### Survey on damage reductions

Survey characteristics	Data and Methods
Region(s):	Elbe and Danube catchments in Germany
Period(s):	After floods in 2002, 2005 and 2006
Method(s):	Telephone interviews
Number	N=759
<b>Median values</b>	<b>750 m<sup>2</sup> (property), 140 m<sup>2</sup> (house), 65 m<sup>2</sup> (cellar)</b>
Mean values	1033 m <sup>2</sup> (property), 157 m <sup>2</sup> (house), 68 m <sup>2</sup> (cellar)
Validation	Data base of Saxon Bank of Reconstruction

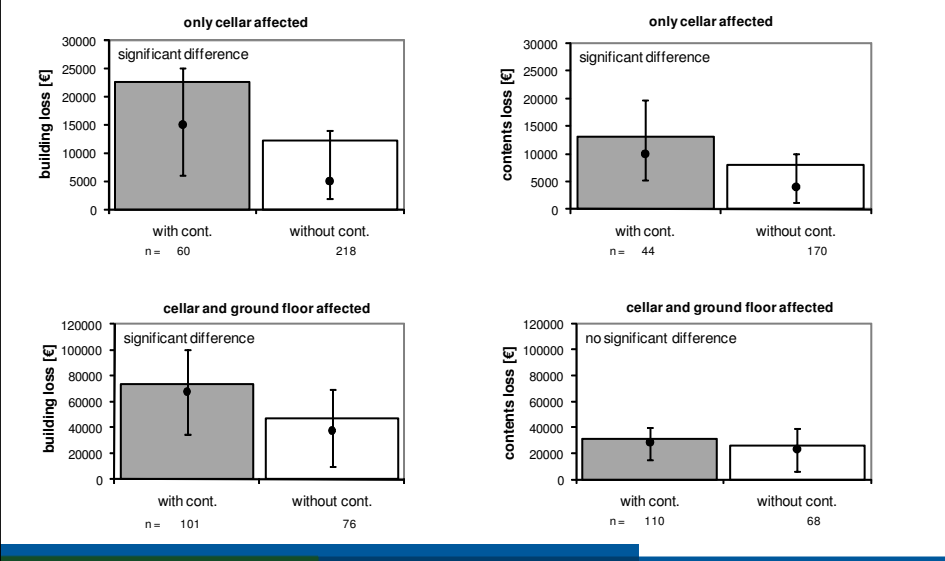
### “Model building” for costing

Building type	Detached, solid one-family houses with and without cellar
<b>Property area</b>	<b>750 m<sup>2</sup></b>
<b>Floor plan</b>	<b>10 m * 14 m</b>
<b>Cellar area</b>	<b>65 m<sup>2</sup></b>
Base plate thickness	25 cm
Exterior walls thickness	25 cm
Cellar ceiling thickness	20 cm
Ceiling height	2.50 m
Cellar windows	4
Soil properties	Clay

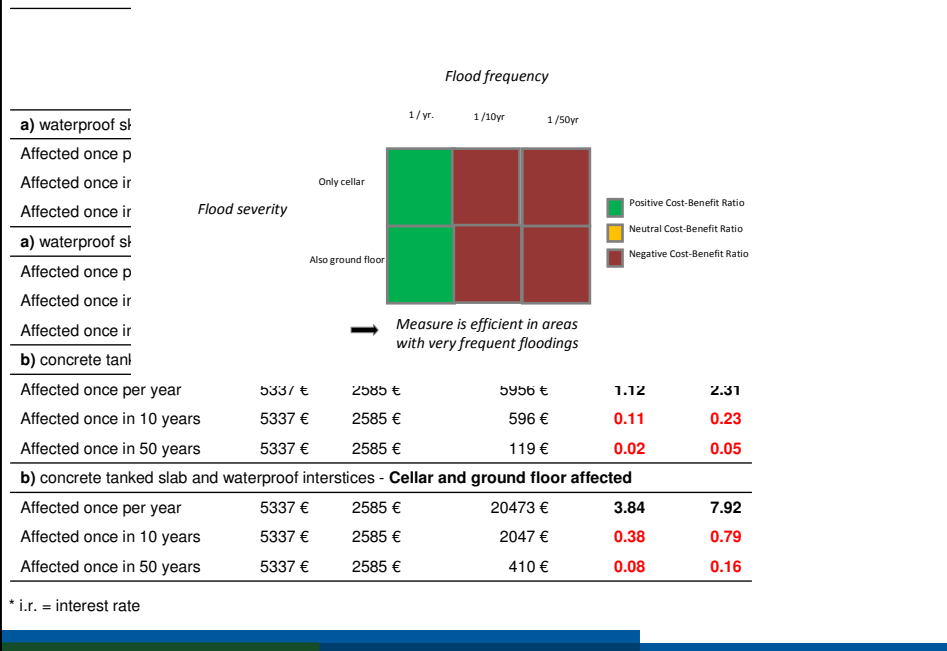
## Benefits: Adapted building structure



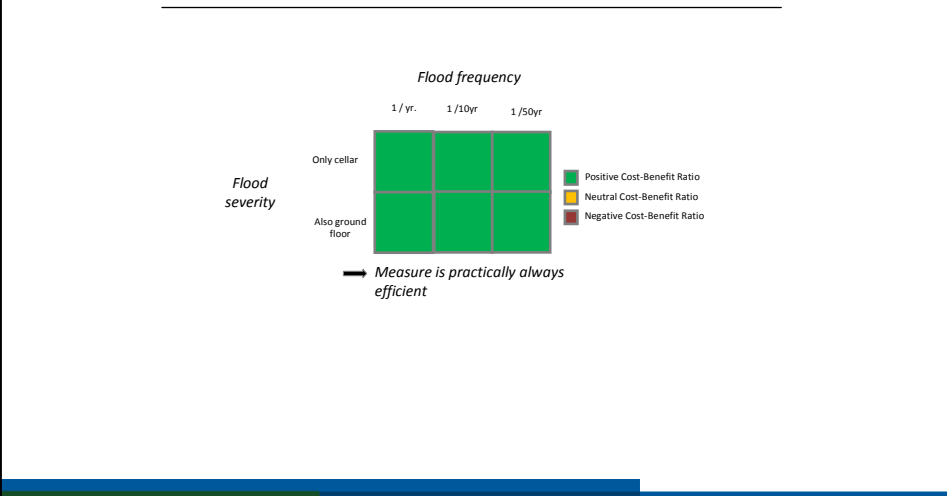
## Benefits: Securing of oil tanks



## B/C Ratios: Waterproofed cellar



## B/C Ratios: Securing of oil tanks

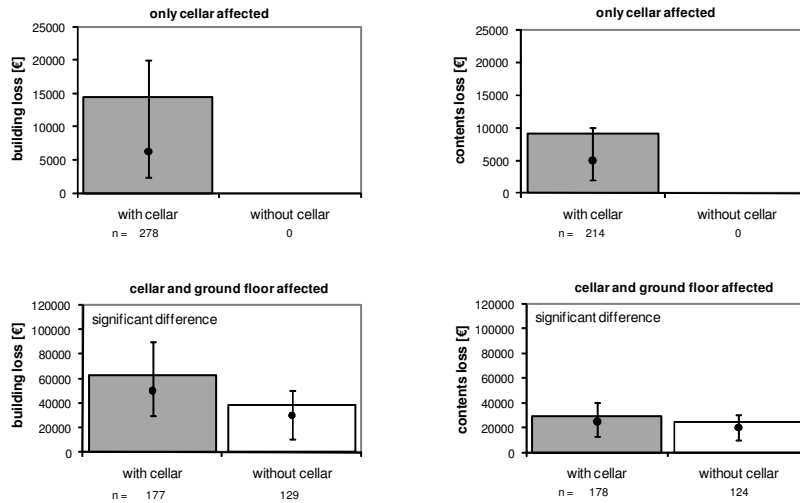


## Conclusions

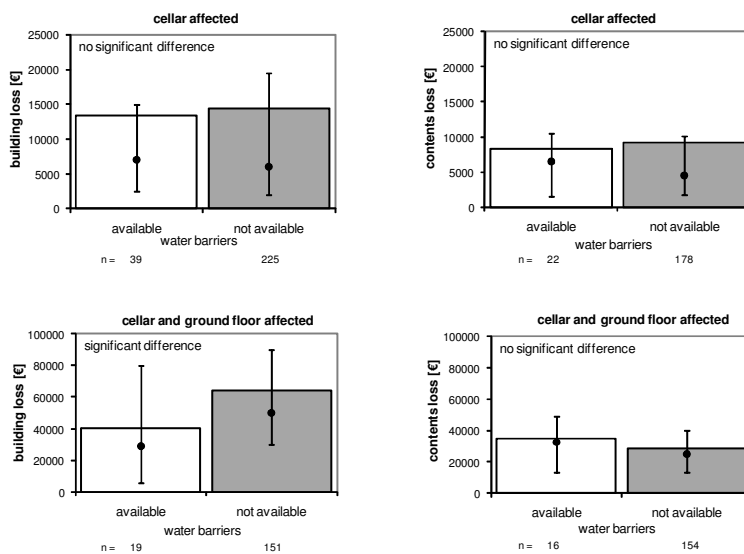
- **Large** investments (e.g. waterproofed cellars) are economically “reasonable”, if the building is located in highly endangered areas (where it shouldn’t)
- **Small** investments (e.g. securing oil tanks), are economically “reasonable”, even if the building is flooded only every 50 years (so they should be mandatory)
- Legislation should (therefore) 1) prevent the construction of buildings in flood endangered areas, 2) mandate “reasonable” precautionary measures for people living in flood risk areas
- The motivation could be improved via financial incentives (e.g. conditioning governmental aid on damages after “reasonable” precaution)

# SAVE

## Benefits: Building without cellar



## Benefits: Mobile flood walls



## B/C Ratios: Mobile flood walls

Cellar and ground floor affected	Costs per year		Benefit per year (Fig. 3)	Benefit-cost ratio	
	i.r.* 4%	i.r. 3%		i.r. 4%	i.r. 3%
Affected once per year	668 €	551 €	23491 €	35.17	42.63
Affected once in 10 years	668 €	551 €	2349 €	3.52	4.26
Affected once in 50 years	668 €	551 €	470 €	0.70	0.85

\* i.r. = interest rate

## B/C Ratios: Building without cellar

Only cellar affected	Opportunity costs: annual rental prices	Benefit per year (Fig. 1)	Benefit-cost ratio
Affected once per year	3120 €	23473 €	7.52
Affected once in 10 years	3120 €	2347 €	0.75
Affected once in 50 years	3120 €	469 €	0.15
<b>Cellar and ground floor affected</b>			
Affected once per year	3120 €	28323 €	9.08
Affected once in 10 years	3120 €	2832 €	0.91
Affected once in 50 years	3120 €	566 €	0.18



**Thank you for being reasonable!**

