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Circle 2 Conference on European Climate Change Adaptation

‘A multifactorial pluvial flood damage model’

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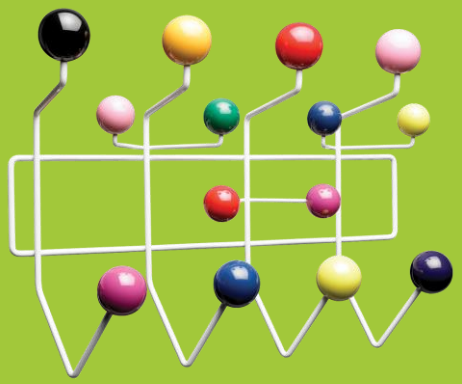

Contributions to damage research

Traditional flood damage research:

- A strong focus on fluvial floods
- A strong focus on depth as the only explanatory variable

→Our research:

- Focus on pluvial floods
- Construction of a multifactorial damage model

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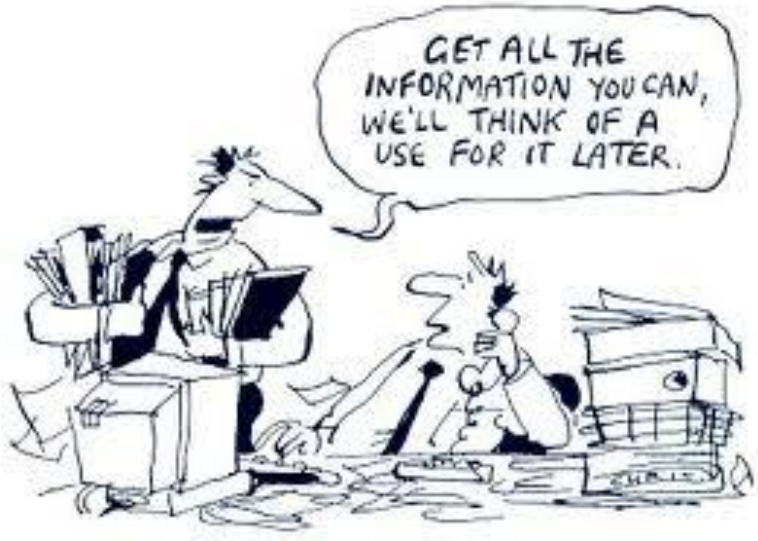
Investigated predictors for damage		
Hazard indicators	Non-hazard indicators	
Depth	Type of dwelling	Building characteristics
Duration	Size of dwelling	
	Presence and size of threshold	
	Ownership	Behavioral predictors
	Recurrence or flood experience	
	Risk awareness	
	Lead time	
	Emergency measures	
	Household size	Socio-economic indicators
	Gender	
	Age	
	Education	
	Income	
	Occupational situation	

Development and execution of a questionnaire



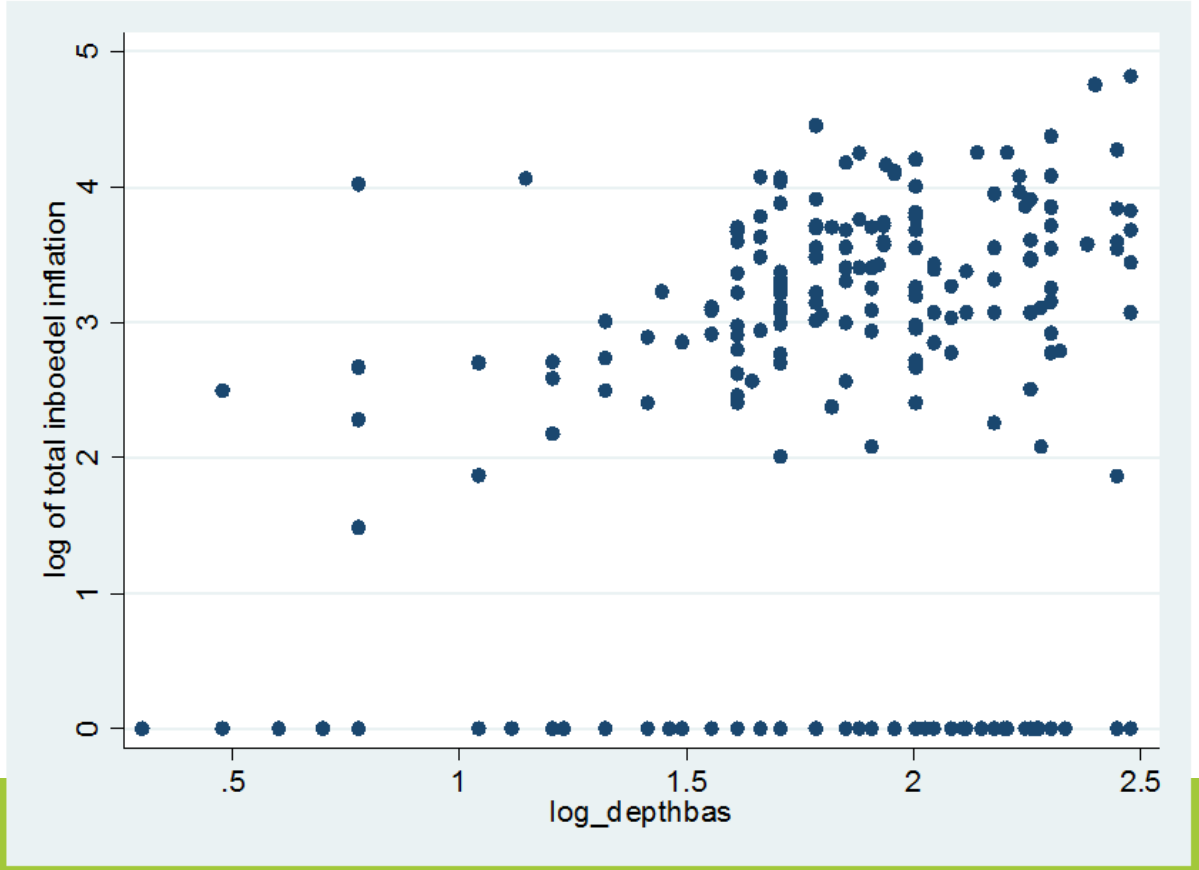
- To get damage figures for buildings and contents from victims

- To get information on the different types of predictors

Four models

- Damage to buildings vs. damage to contents
- Ground floor floods vs. basement floods

Damage to building – Ground floor	Damage to building - Basement
Damage to contents – Ground floor	Damage to contents - Basement



Dealing with zeros: the Tobit Model

- James Tobin's Probit Model

- Censoring vs. truncation
- Combination of Probit and OLS
- A latent vs. the observed dependent variable

$$y_i^* = \mathbf{x}_i\beta + \epsilon_i$$

$$y_i = y_i^* \quad \text{if} \quad y_i^* > 0$$

$$y_i = 0 \quad \text{if} \quad y_i^* \leq 0$$

Sigelman & Zeng, 1999

Results for the latent variable

Variables	Basement flood – building damage (log)	Basement flood – content damage (log)	Ground floor flood- building damage (log)	Ground floor flood – content damage (log)
Constant	0.802*	-1.388*	0.641	-3.821**
Depth basement/gr floor (log)	0.898***	1.527***	0.789***	2.189***
Gr floor/basement flooded	0.483***	0.296	-0.058	0.669*
Garage flooded	0.137	0.481	0.346**	-0.578
Type: Semi-detached building	0.066		0.193	
Type: Terraced building	-0.189		-0.390**	
Size of dwelling (log)			0.854***	1.194*
Recurrence	0.009	-0.117**	0.028	0.088
Risk Aware	0.135	-1.528***	-0.030	-0.733
Emergency measure: elevating contents to another floor		1.750***		0.382
Income Below 1000	0.824**	-0.644	0.309	0.597
Income 1500-1999	0.360	0.232	0.051	1.643***
Income 2000-2499	0.494*	1.383***	-0.113	1.253**
Income 2500+	0.256	-0.040	0.289	1.184*
Obs/Pos	240/214	260/152	141/136	152/97
Log lik.	-383.495	-433.062	-161.134	-256.062
Prob > chi^2	0.000	0.000	0.000	0.000
(Corr y ~ ^y)^2	0.187	0.09	0.340	0.105

*significant at 0.10 level **significant at 0.05 level ***significant at 0.01 level

Conclusions

- New elements in flood research:
  - Focus on pluvial floods
  - Focus on other explanatory variables than depth
  - Tobit model to include no damage cases
- Outcome:
  - Depth remains the most crucial determinant
  - But other predictors matter as well
  - The Tobit model generates very different results from OLS


Thank you very much for your attention
Le cataclysme à Louvain, le 14 mai 1906. — La rue des Chevaliers.
L. Lagaert. Brux. no 1