



ILMATIETEEN LAITOS  
METEOROLOGISKA INSTITUTET  
FINNISH METEOROLOGICAL INSTITUTE

# Interpreting Welfare Effects in Induced Economic Impact Evaluation of Extreme Events

**Hanna Virta<sup>1</sup>, Antti Simola<sup>2</sup> and  
Adriaan Perrels<sup>1</sup>**

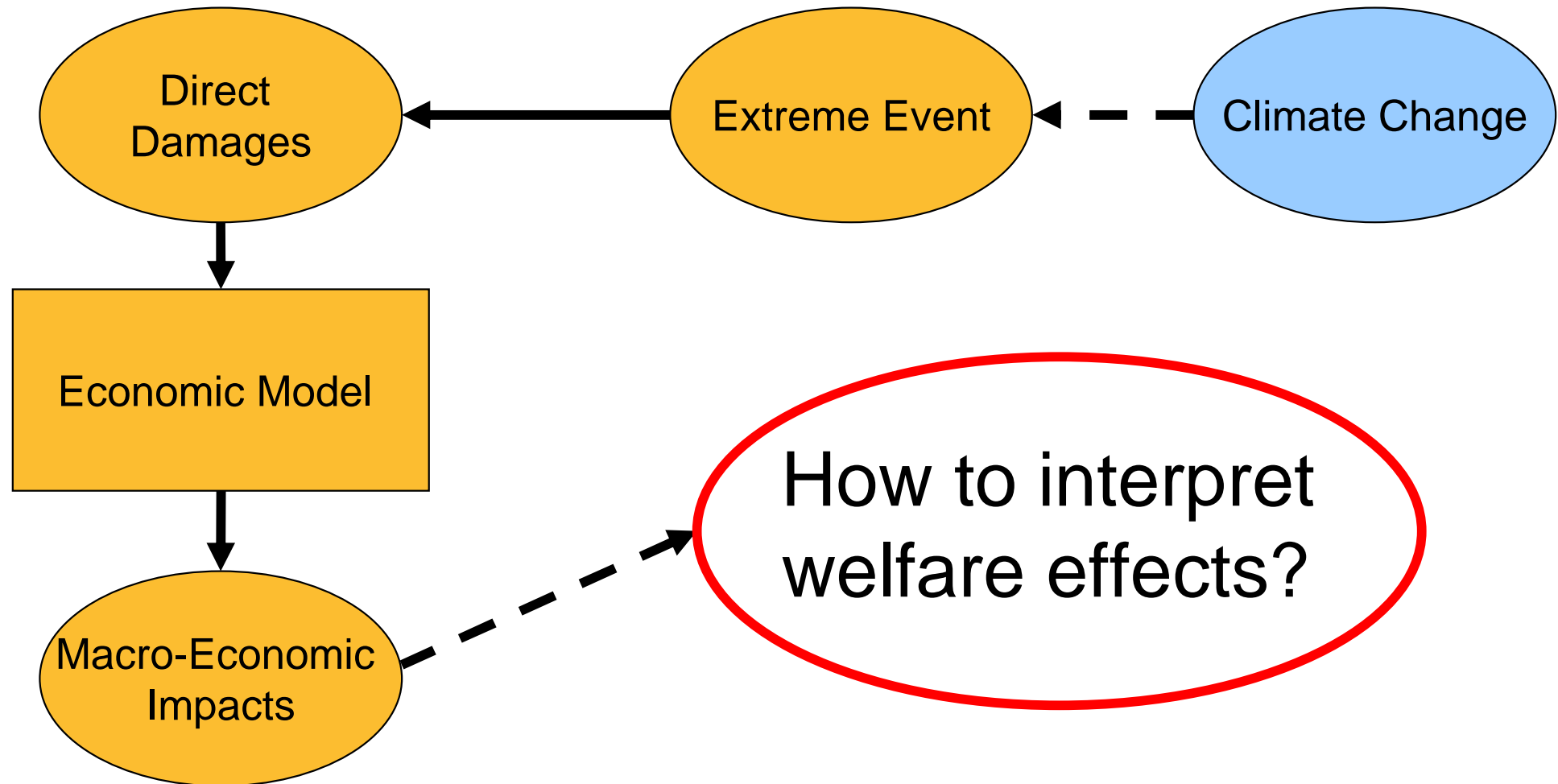
**<sup>1</sup> Finnish Meteorological Institute FMI**

**<sup>2</sup> Government Institute for Economic  
Research VATT**





# Ex-Ante Assessment of Economic Impacts of Extreme Events





# Outline

- 1. Introduction to the case study**
- 2. Results**
- 3. Discussion & Concluding remarks**



# 1. Introduction to the case study



# Case: R100 Downpour in Greater Helsinki

- **Direct damage € 110 million**
  - Homes 40M€ (privately owned houses not included), commercial services 20M€, public services 20M€, transport network 15M€, energy network 15M€
  - Estimated from earlier studies and actual case reviews
- **Limited access for 12 weeks**
  - Production interruptions and delays



# Case: R100 Downpour in Greater Helsinki

- **Case from project IRTORISKI**
  - Cost-benefit analysis of climate change induced extreme events as part of decision making
  - Financed by Climate Change Adaptation Research Programme (ISTO)
  - Further information: Virta et al. (2011), Perrels et al. (2011)



# Compensation Options

- 1. No external compensation (R100)**
- 2. Full compensation by state (State Support)**
  - Not earmarked for repair efforts
- 3. Full compensation by insurance sector (Insurance)**
- 4. Full compensation by insurance sector, state covers the losses (Insurance + State Support)**





# Economic Model

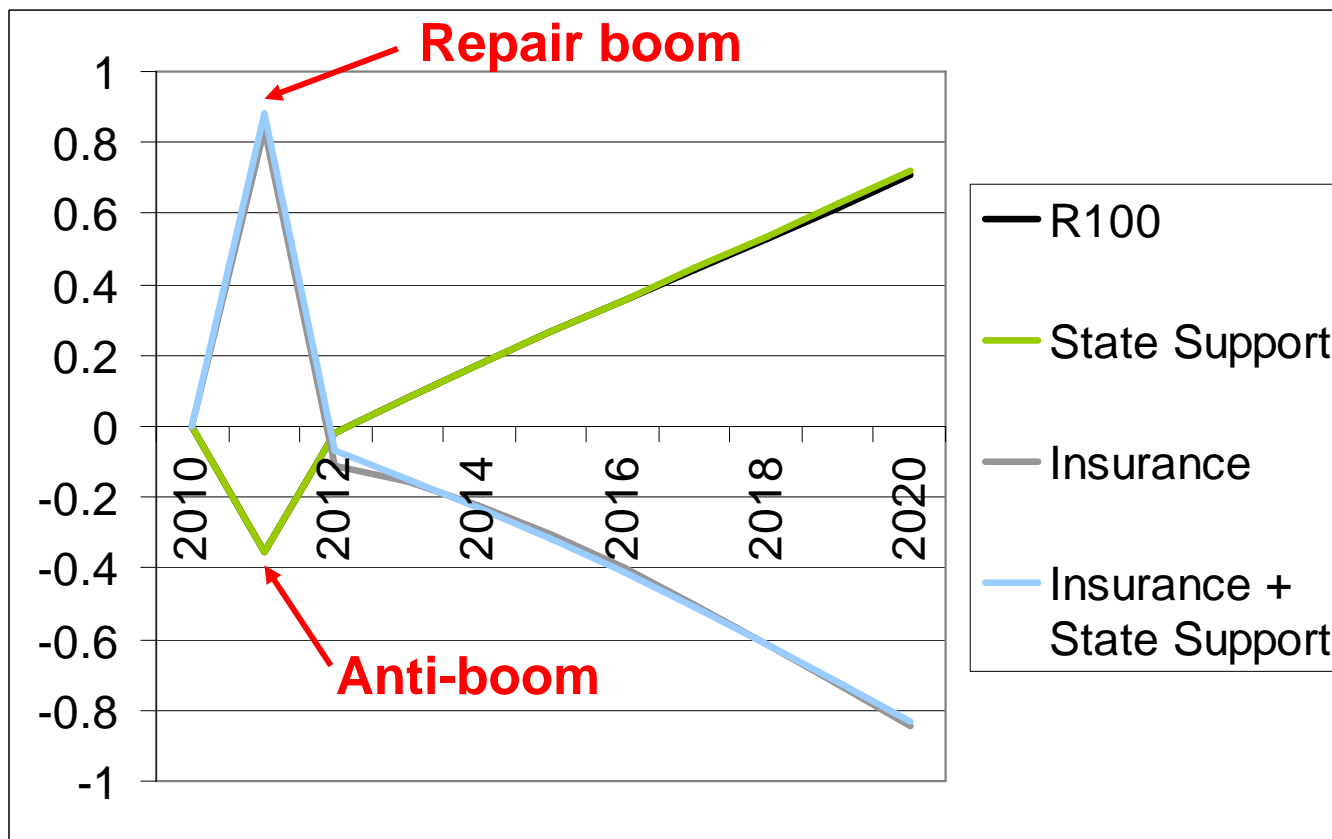
- **VERM: Regionalised dynamic general equilibrium model of the Finnish economy**
  - Developed in Government Institute for Economic Research VATT
  - Extension of VATTAGE (Honkatukia 2009)



## 2. Results



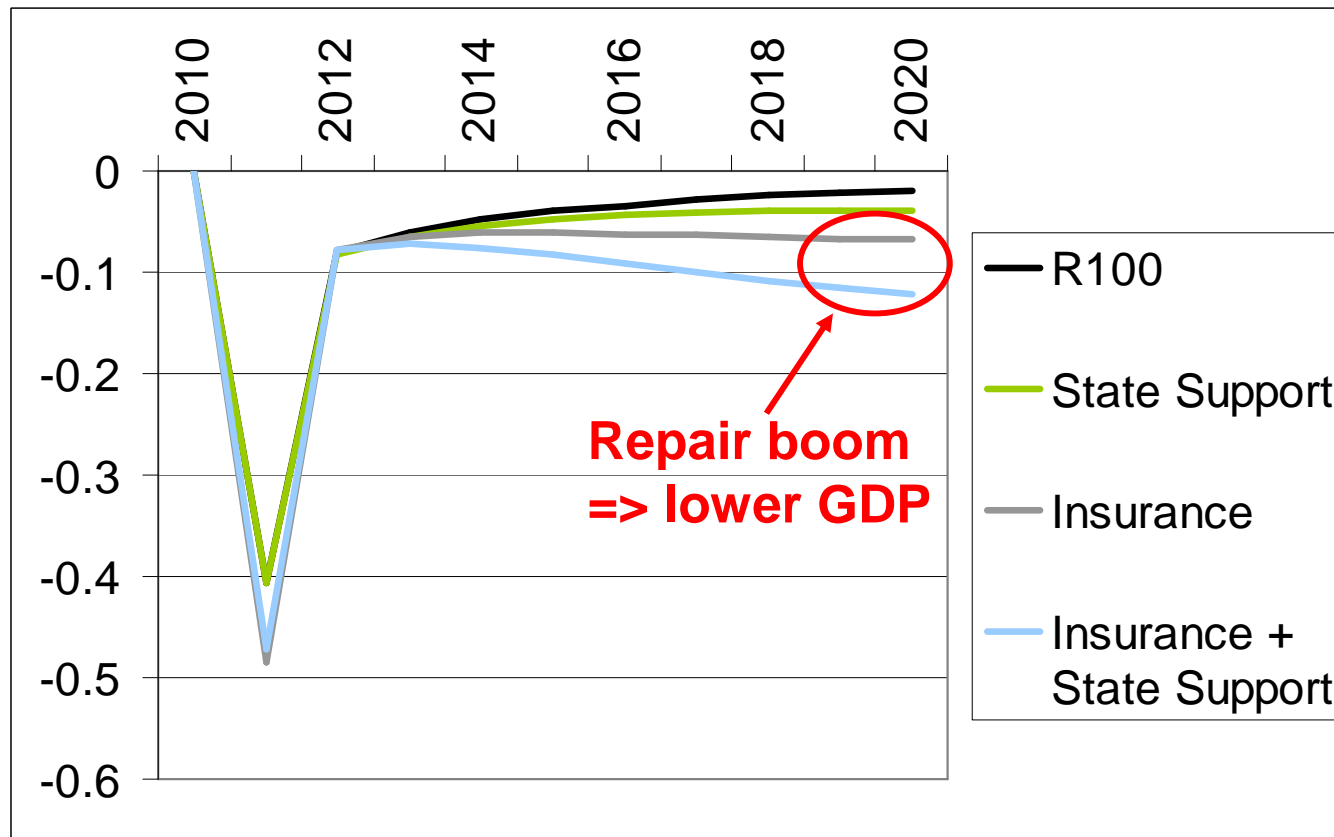
# R100 Downpour in Greater Helsinki: Regional Investments Development



deviation from baseline (%)



# R100 Downpour in Greater Helsinki: National Welfare Development – GDP



deviation from baseline (%)



## 3. Discussion & Concluding remarks



# Is Repair Boom Rational?

- **GDP: NO**

- Less growth in GDP in future

- **Consumers: YES**

- Flooded homes = degraded residence services

- Decrease in residence services > decrease in the capital stock of homes

- Repair cost e.g. 10–20% of the real estate value
- Temporary reduction in service level often 50–100%

- Commitments to mortgages and rental payments

- Strive for quick repair of homes

- **Welfare is not just GDP!**



# Learnings 1/2

- **Repair booms can be rational despite of the decreased GDP development**
- **Repair booms should be managed to minimize adverse effects**
  - Spread out extra demand for labour and material
  - Promote market functioning
    - E.g. provide alternative suppliers information
  - Prioritize repairs
  - Change insurance policies
    - E.g. change compensation conditions to incite people to prioritize repairs



## Learnings 2/2

- **Extreme events are hard to represent in standard economic models**
  - Production based indicators (e.g. GDP) do not sufficiently account for the loss of welfare of consumers
  - Built-in assumptions not always suitable for extreme impacts
    - E.g. limitations in investment growth



# References

- **Honkatukia, J. (2009).** VATTAGE – A dynamic, applied general equilibrium model of the Finnish economy. VATT Research Reports 150, Government Institute for Economic Research (VATT). 164 p. [http://www.vatt.fi/file/vatt\\_publication\\_pdf/t150.pdf](http://www.vatt.fi/file/vatt_publication_pdf/t150.pdf)
- **Perrels, A., Simola, A, Rosqvist, T, Virta, H. & Honkatukia, J. (2011).** Quantifying direct and induced economic costs of climate change sensitive natural hazards at regional levels – example Finland. Presentation in Climate Economics and Law Conference 16 and 17 June 2011, University of Bern, Bern, Switzerland. [http://www.nccr-climate.unibe.ch/conferences/climate\\_economics\\_law/papers/Perrels\\_Adriaan.pdf](http://www.nccr-climate.unibe.ch/conferences/climate_economics_law/papers/Perrels_Adriaan.pdf)
- **Virta, H., Rosqvist, T., Simola, A., Perrels, A., Molarius, R., Luomaranta, A. & Honkatukia, J. (2011).** Cost-benefit analysis of climate change induced extreme events as part of public decision making. Final project report of IRTORISKI. Reports 2011:3, Finnish Meteorological Institute, Helsinki. 97 p. In Finnish, with extended English summary. <http://hdl.handle.net/10138/26744>



# Contact Information

- [hanna.virta@fmi.fi](mailto:hanna.virta@fmi.fi)
- [antti.simola@vatt.fi](mailto:antti.simola@vatt.fi)
- [adriaan.perrels@fmi.fi](mailto:adriaan.perrels@fmi.fi)

[en.ilmatieteelaitos.fi](http://en.ilmatieteelaitos.fi)

[www.vatt.fi/en/](http://www.vatt.fi/en/)