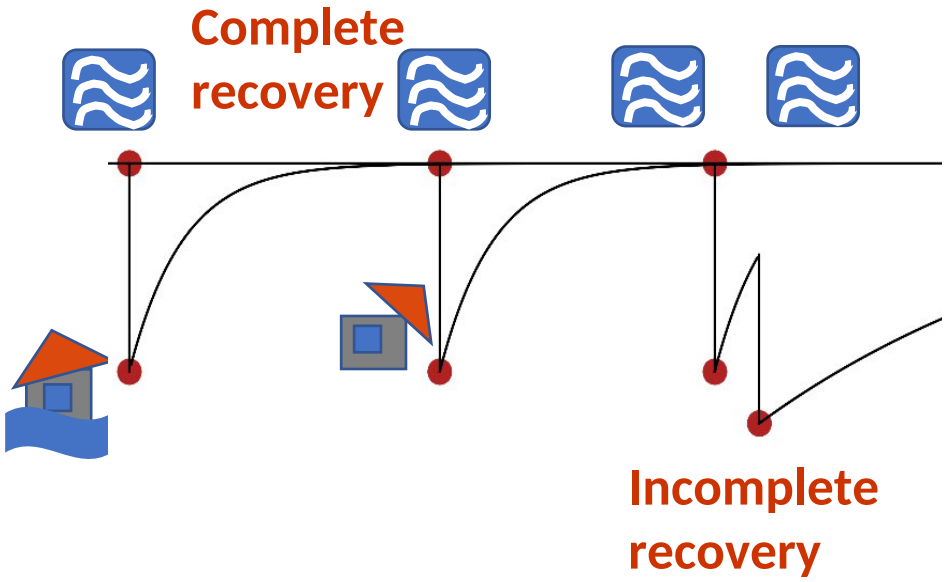
Understanding the dynamics under recurrent floods in the Philippines

Inga Sauer, Brian Walsh, Katja Frieler, David Bresch, and Christian Otto

Introduction



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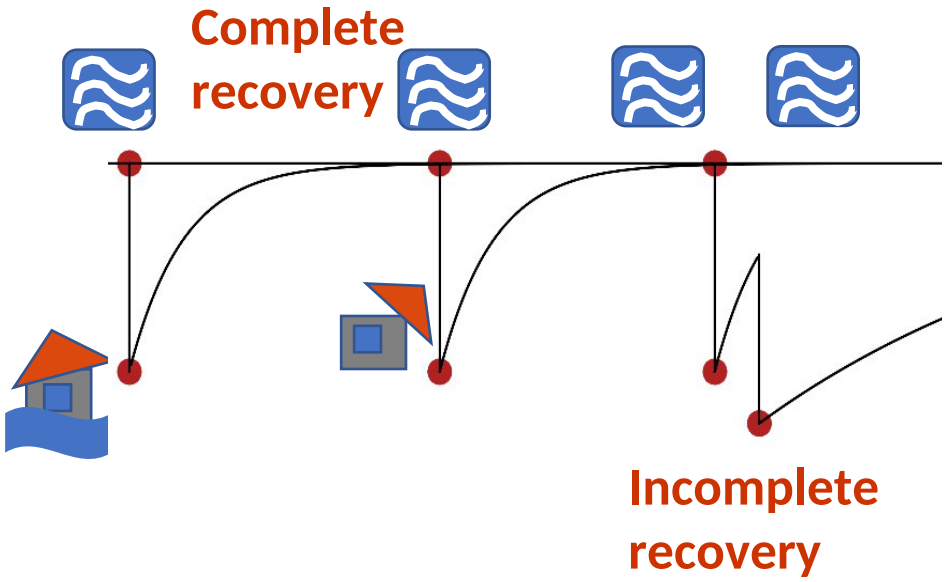

How do impacts change if disasters occur in a sequence causing incomplete recoveries?

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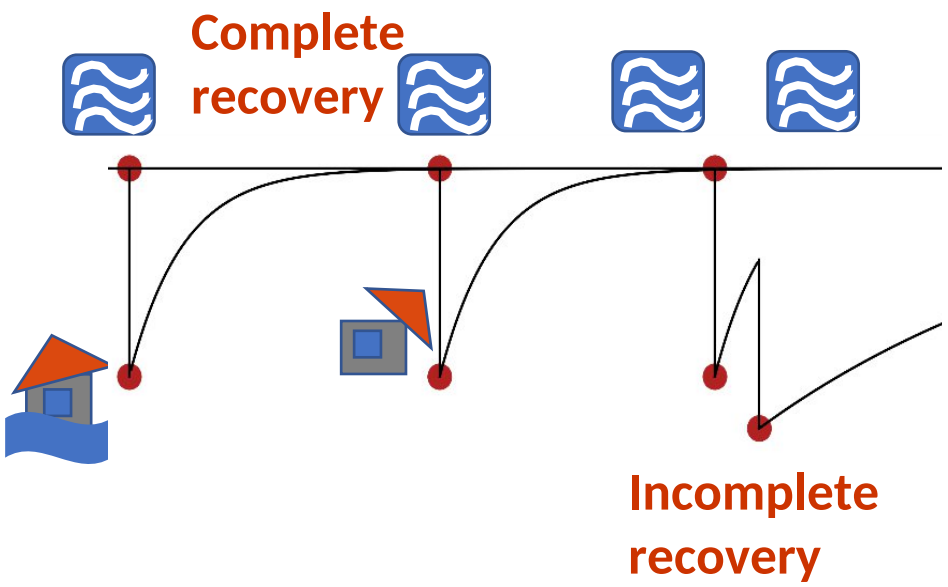
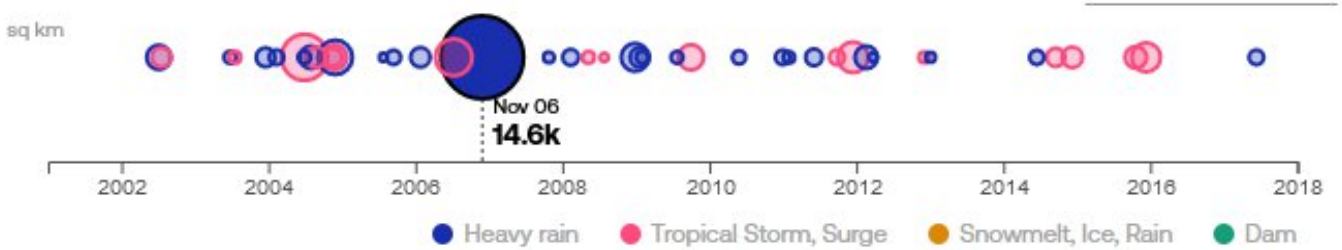


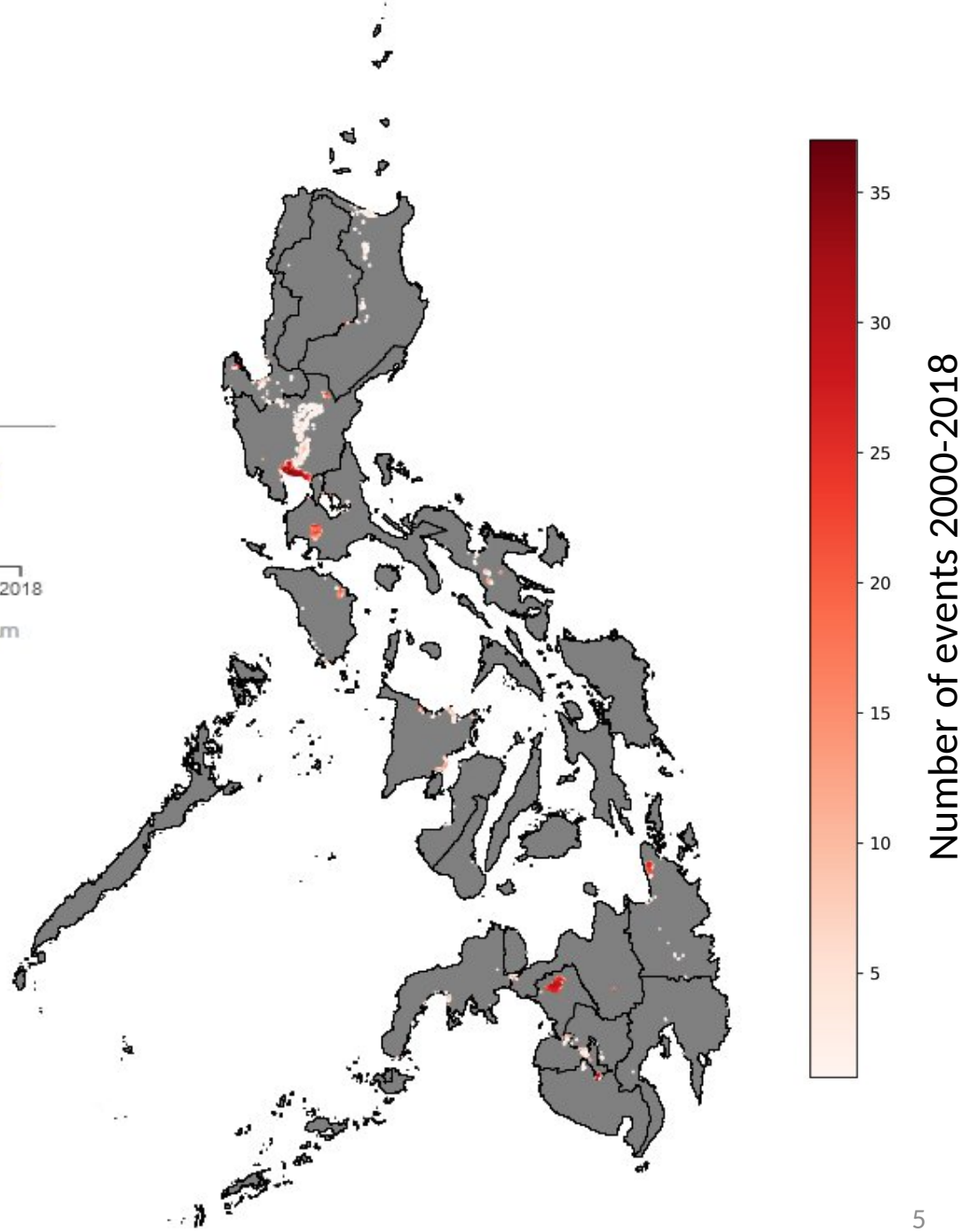
How do impacts change if disasters occur in a sequence causing incomplete recoveries?

What are the effects of incomplete recovery experienced by households from different income groups?

Results – Case study Philippines



Global Flood Database, 2021



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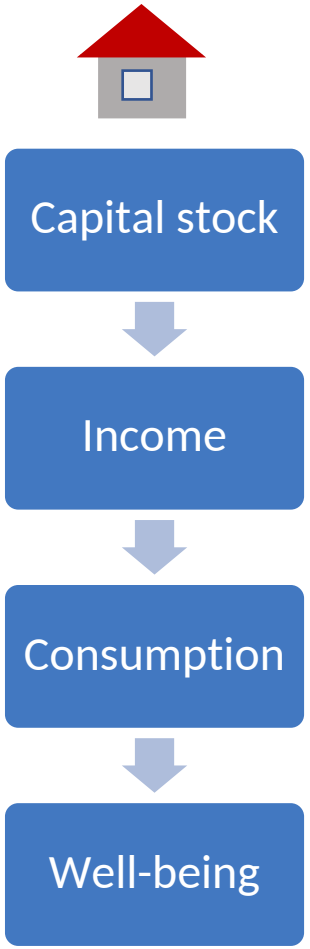
The household resilience model



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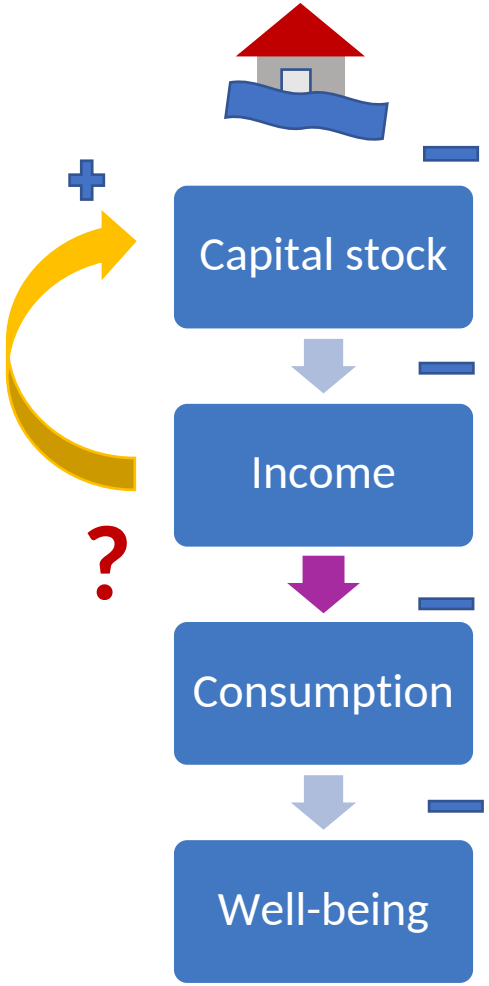

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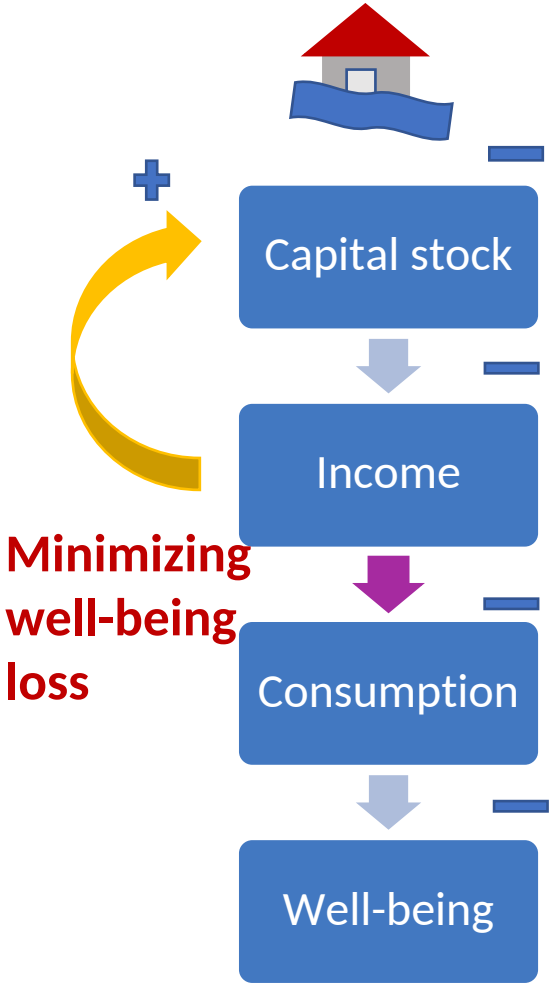

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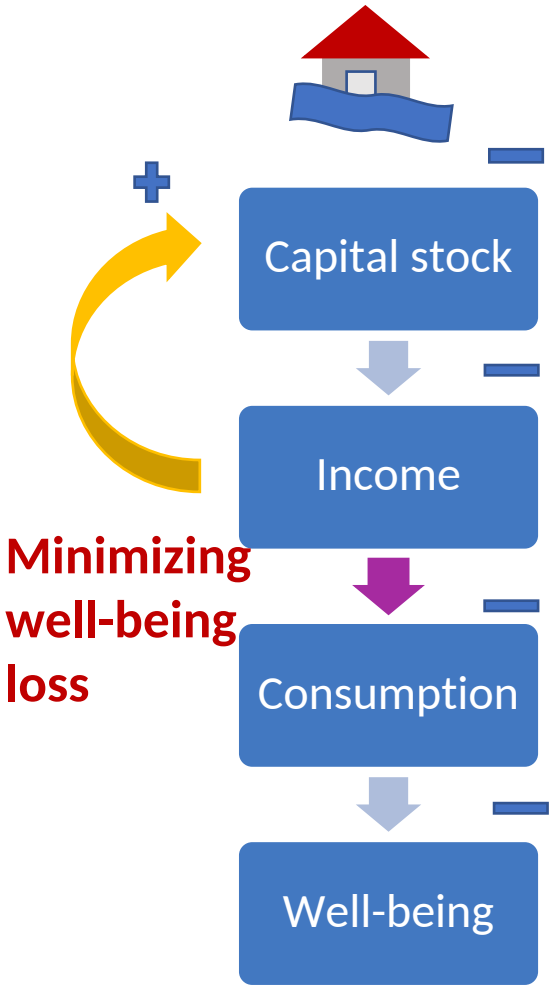
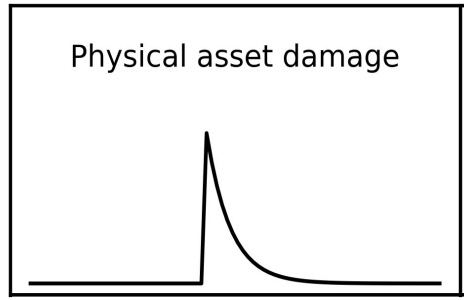


Minimizing well-being loss

Walsh &Hallegatte 2018

$$\Delta k_h(t) = \Delta k_h(t_{shock})\ e^{-\lambda_h (t - t_{shock})}$$



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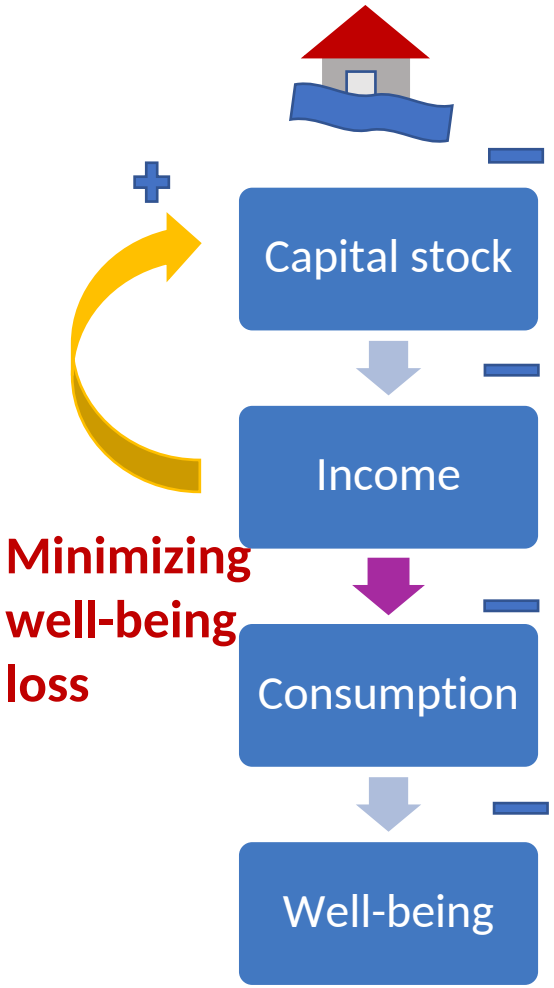

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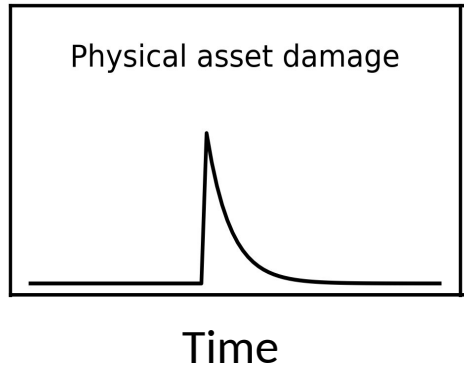

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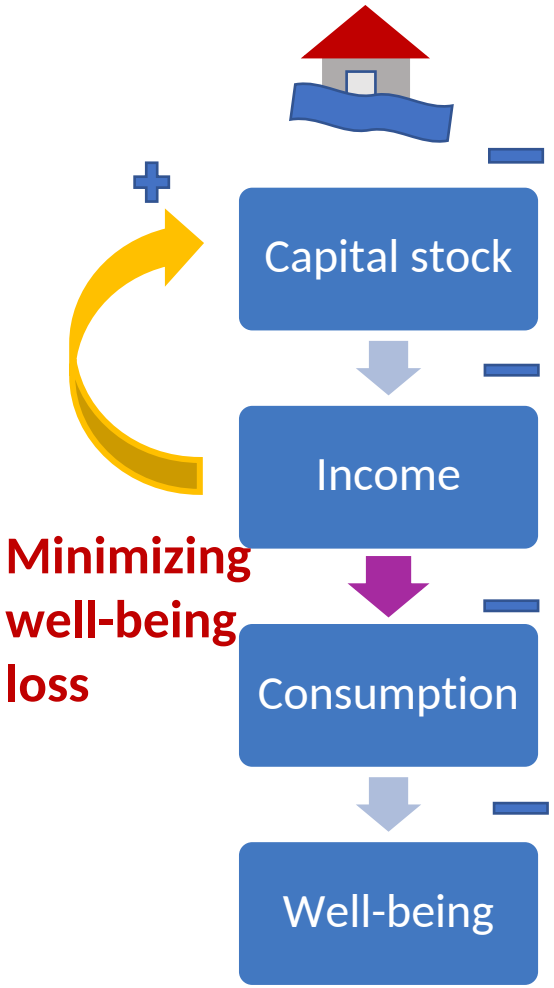

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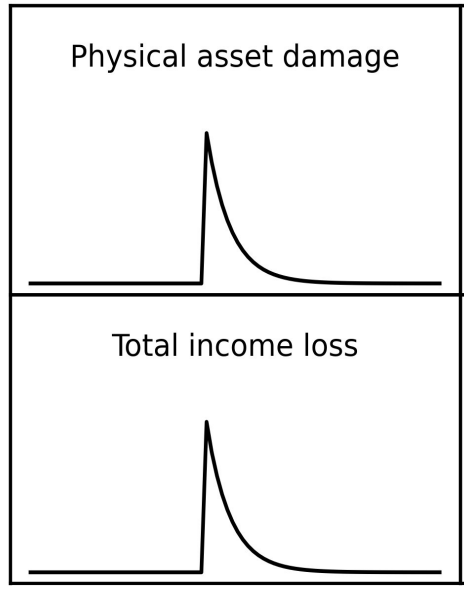

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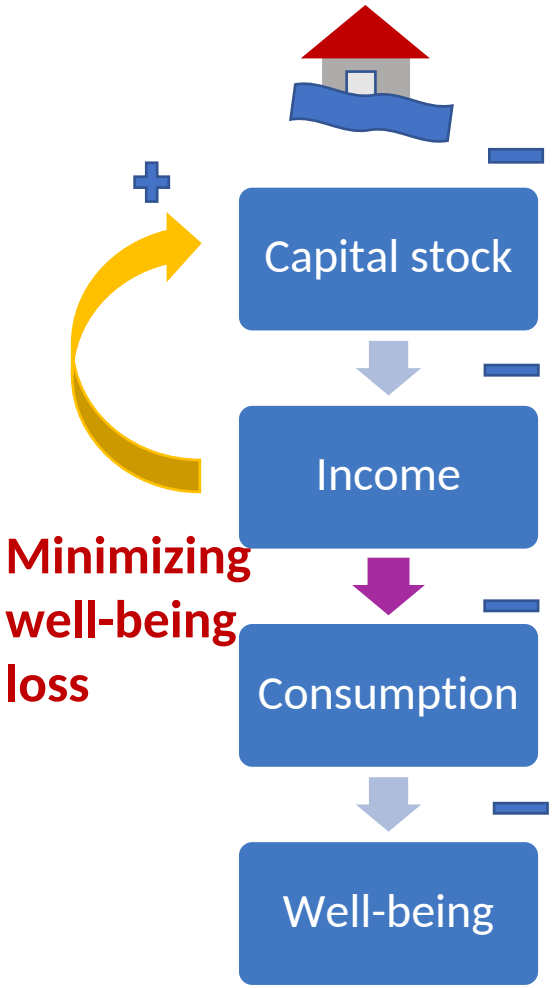

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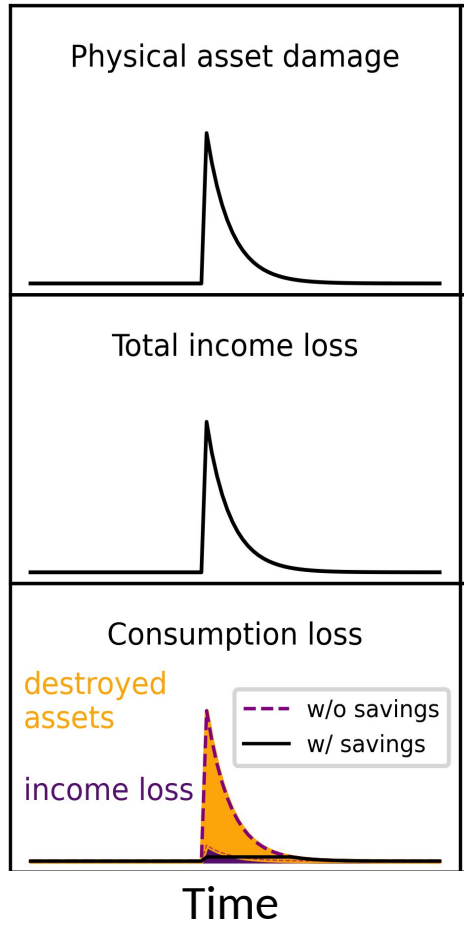

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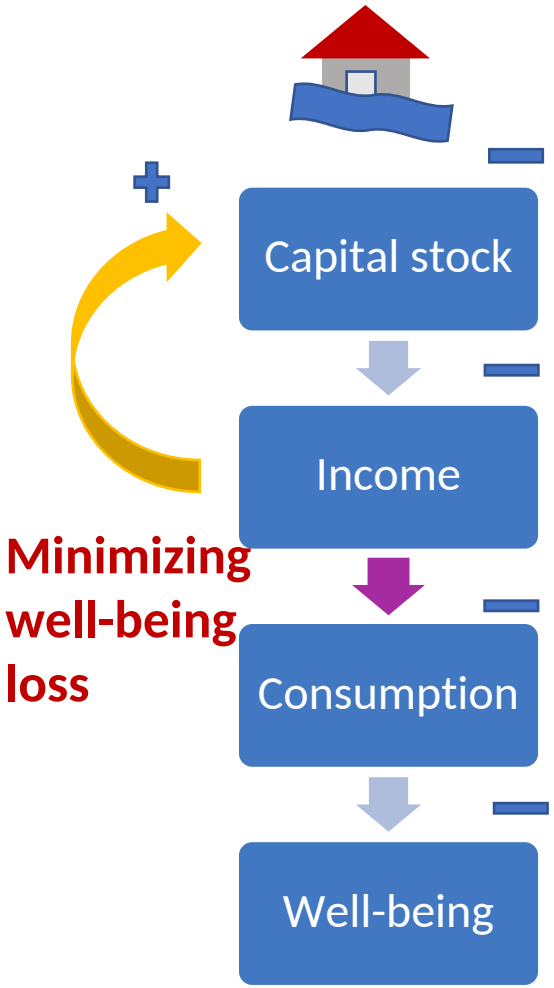

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Income loss **Reconstruction**

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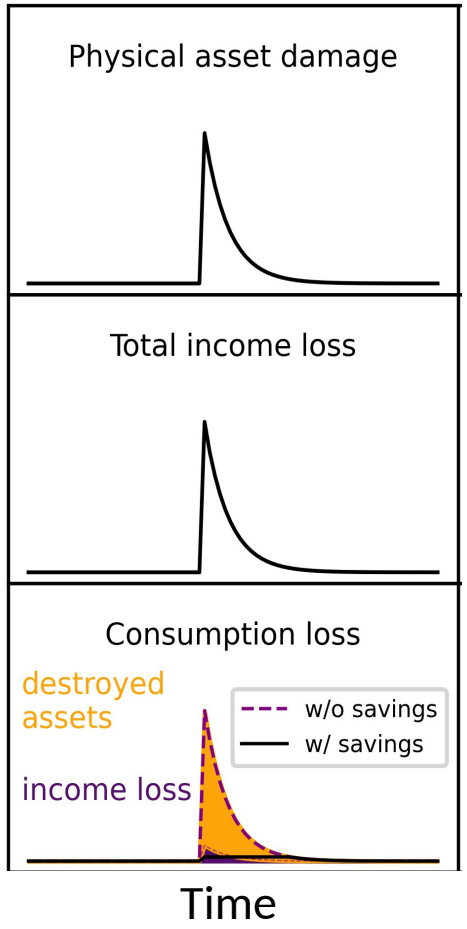
Savings



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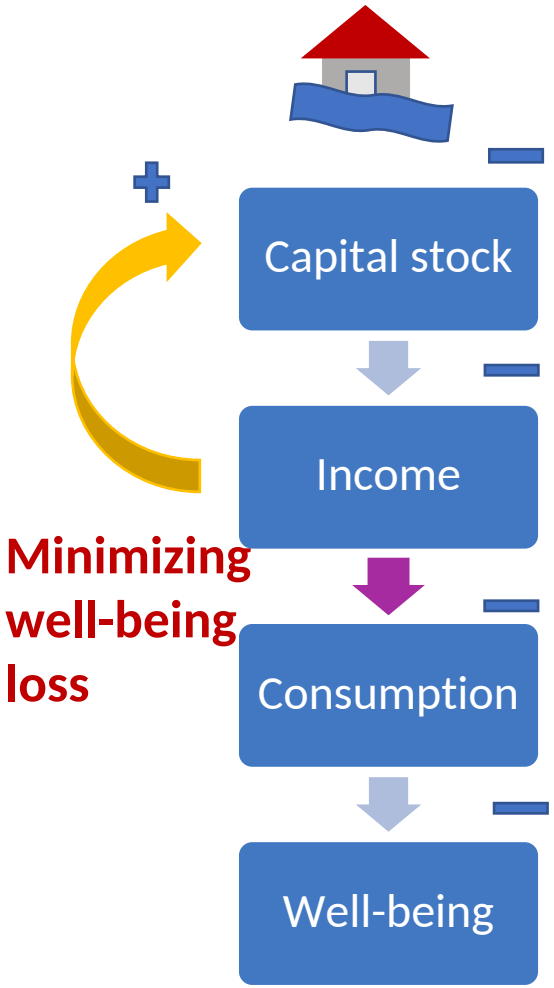

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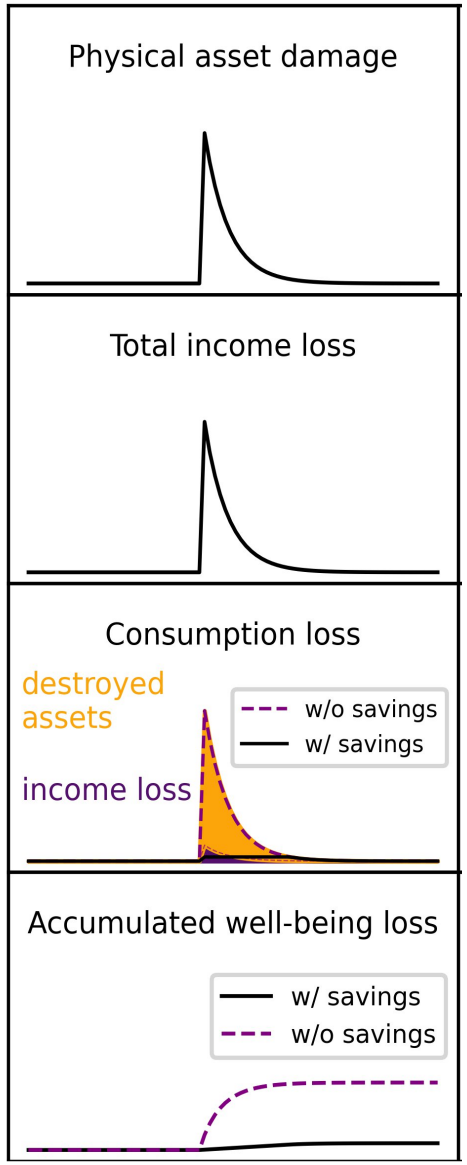

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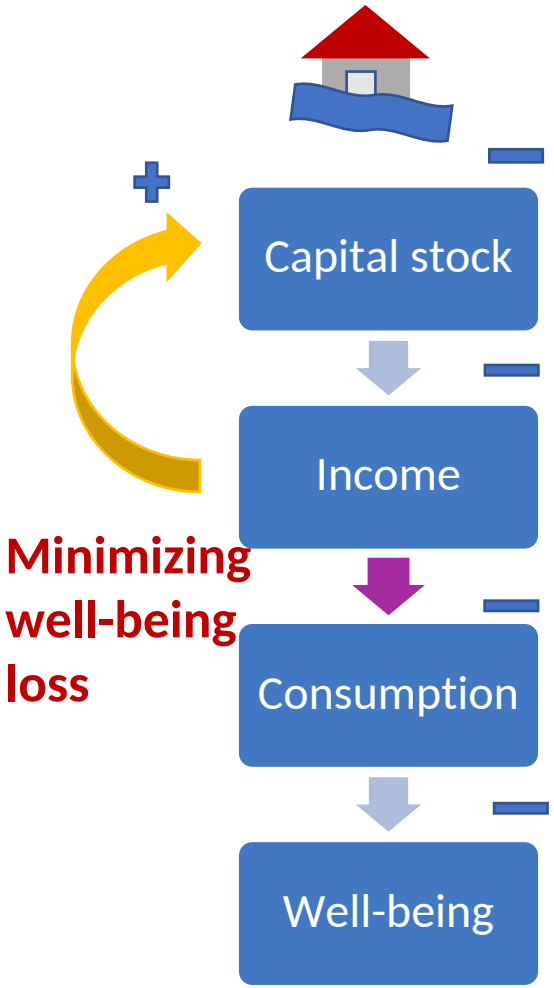

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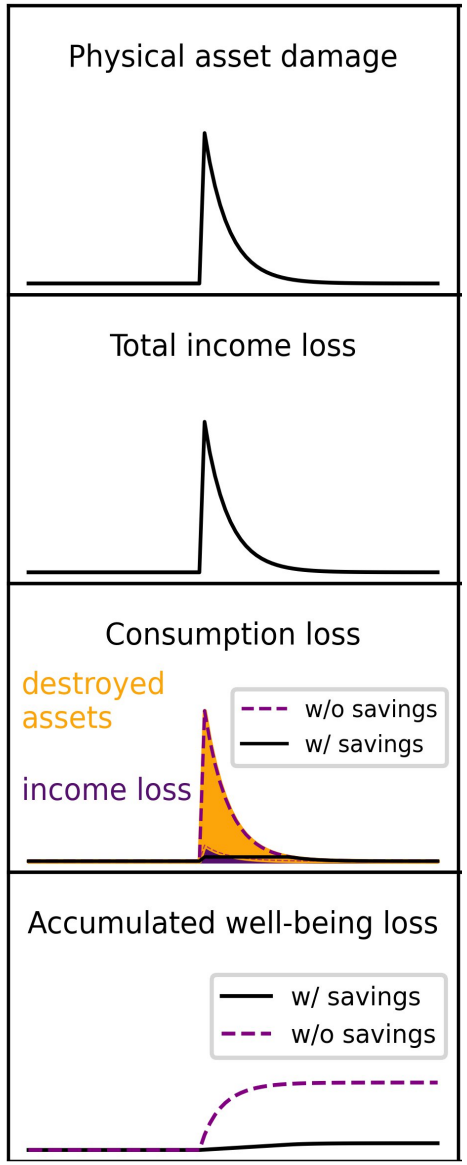
Unperturbed consumption

Consumption under recovery



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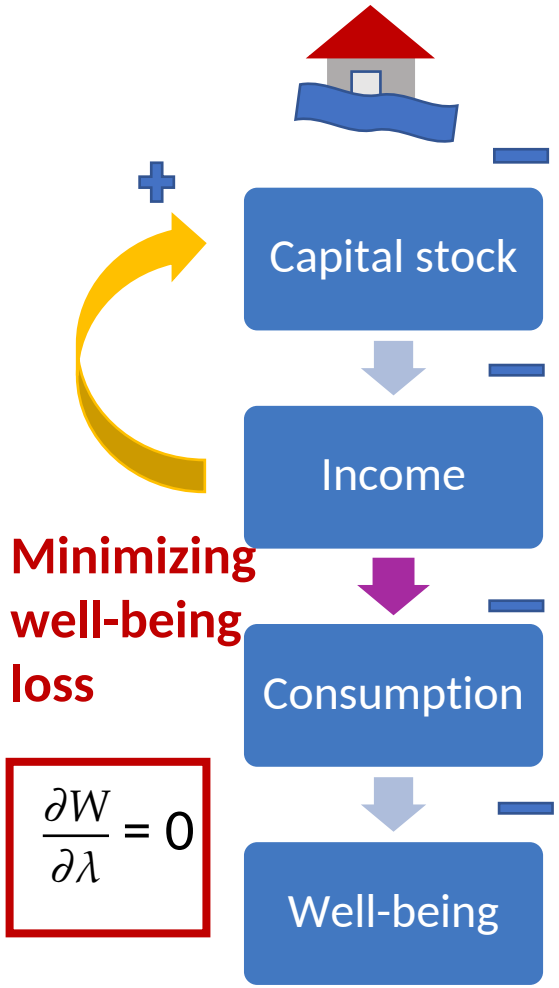

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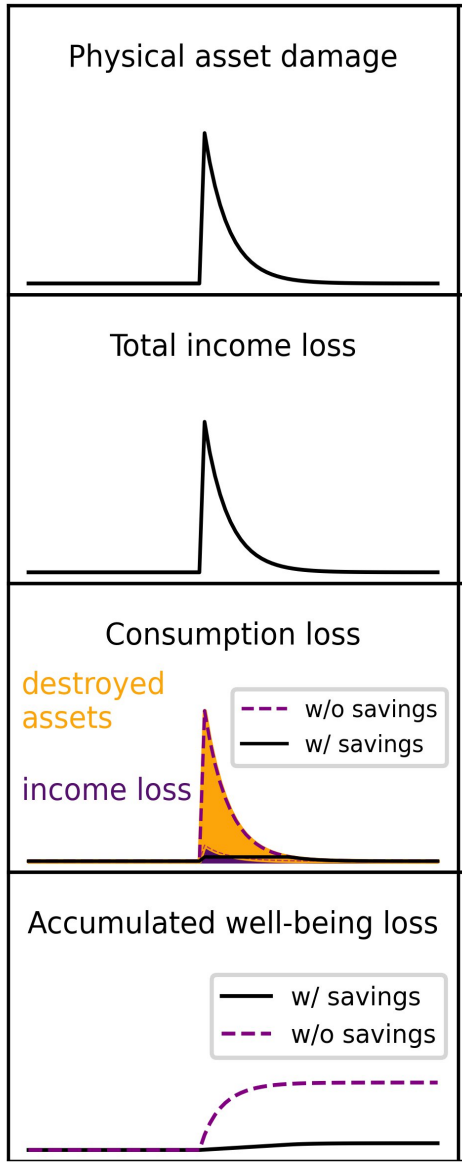

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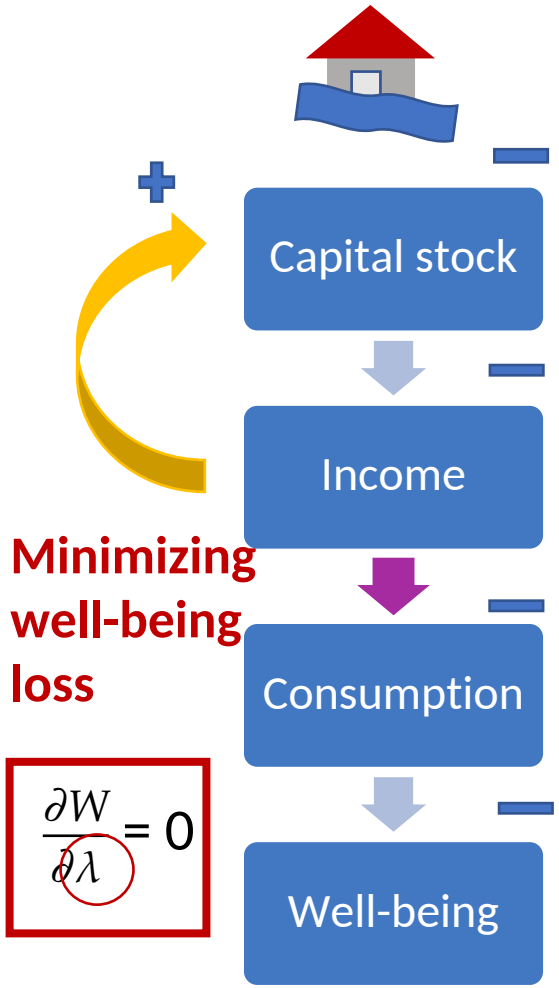

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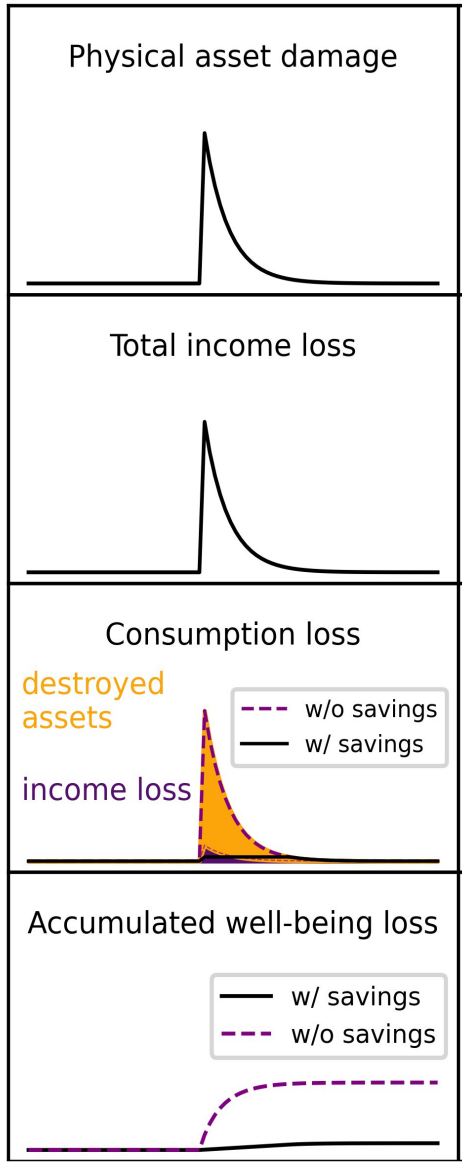

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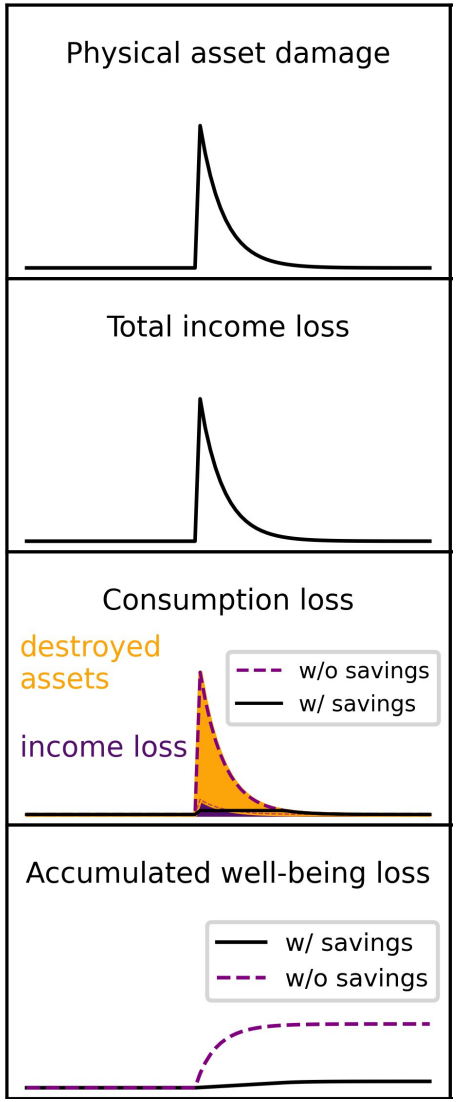
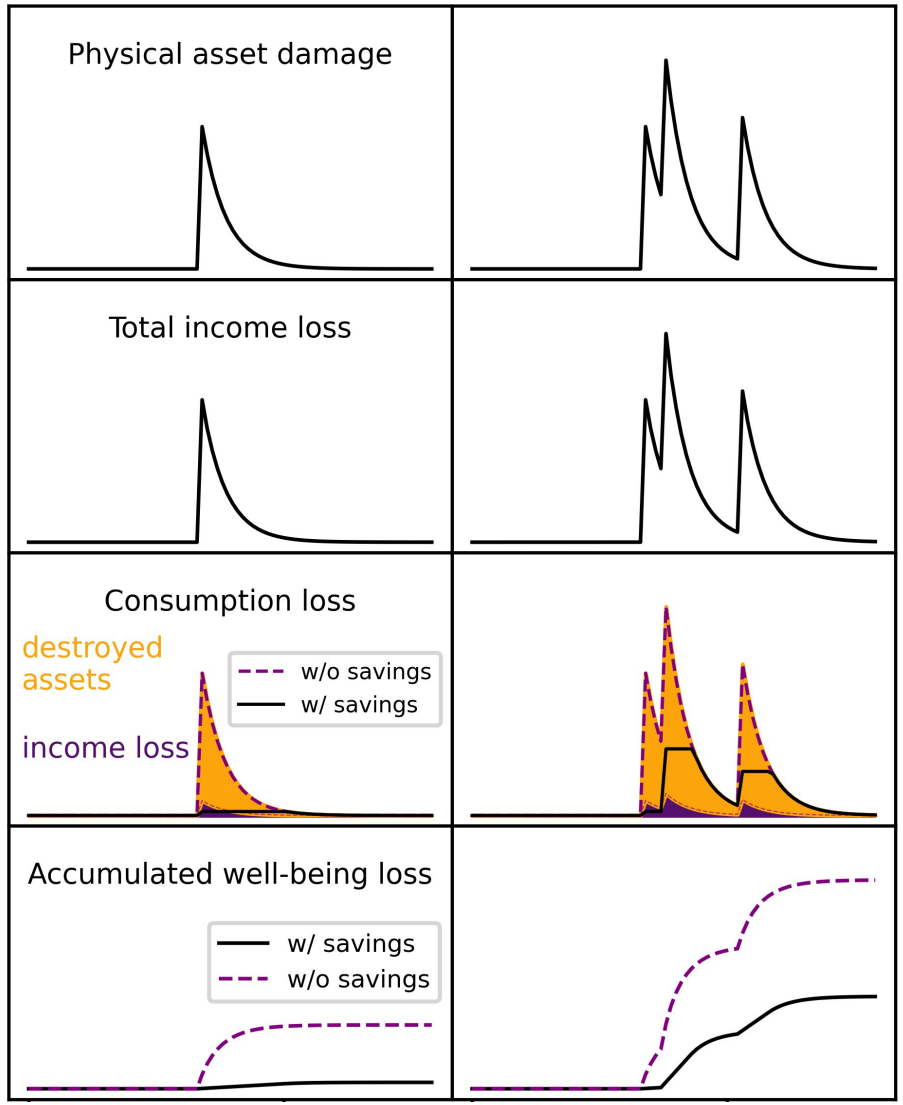


Recovery after crossing subsistence line

Sauer et al 2023 under review

Model extension



Sauer et al 2023

First shock:

$$\Delta k_h(t_{shock}) = v\, k_h^*$$

Further shocks:

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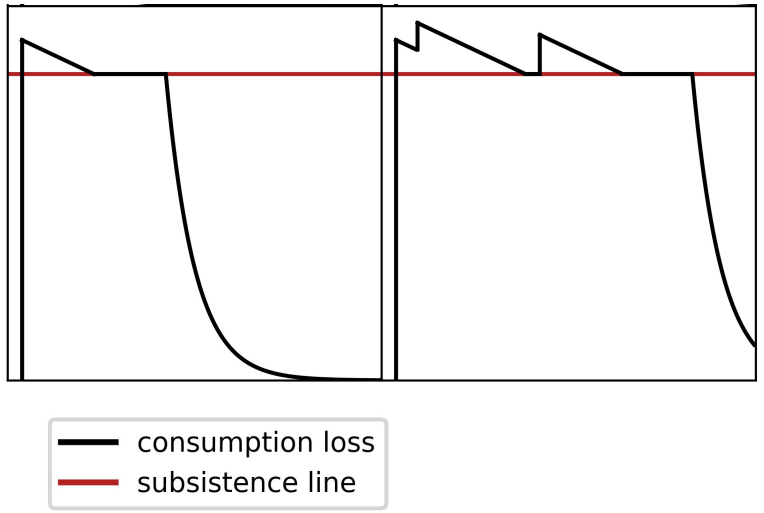

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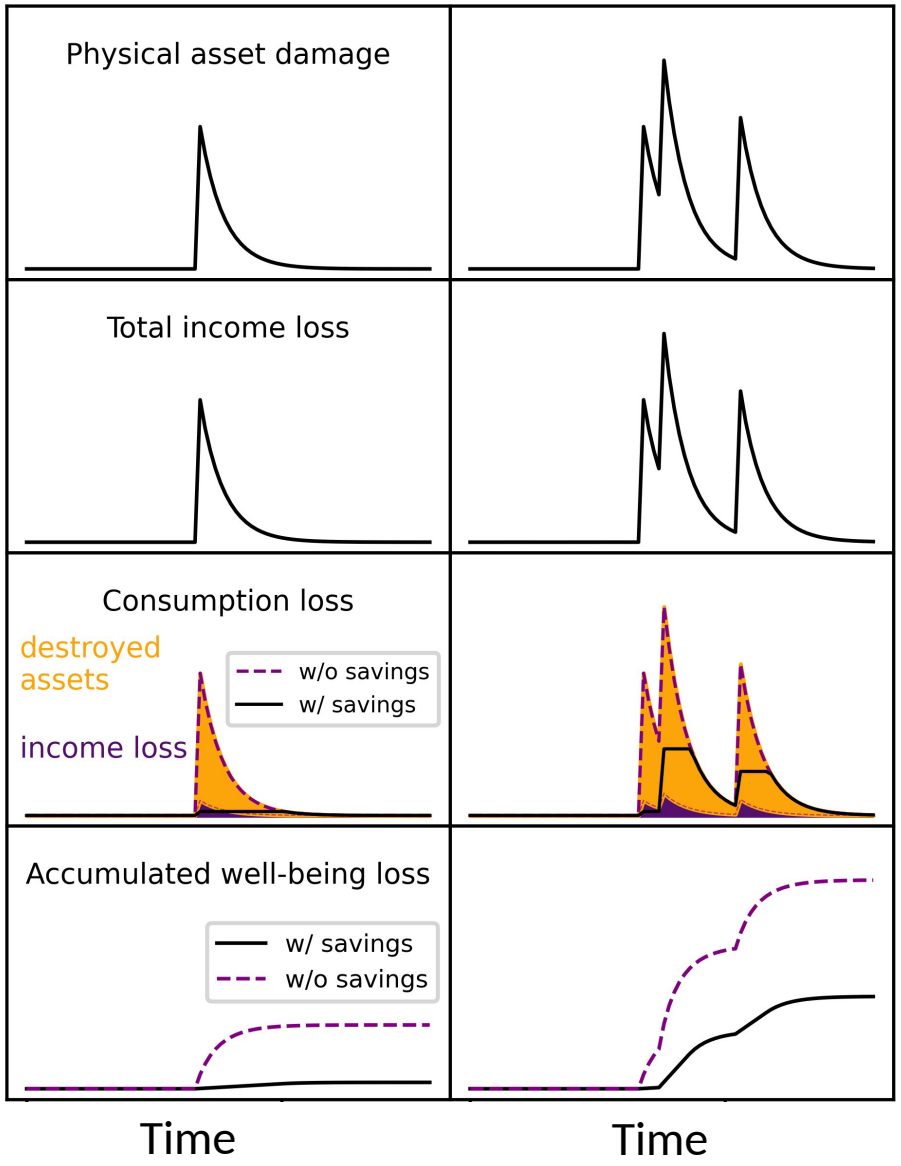

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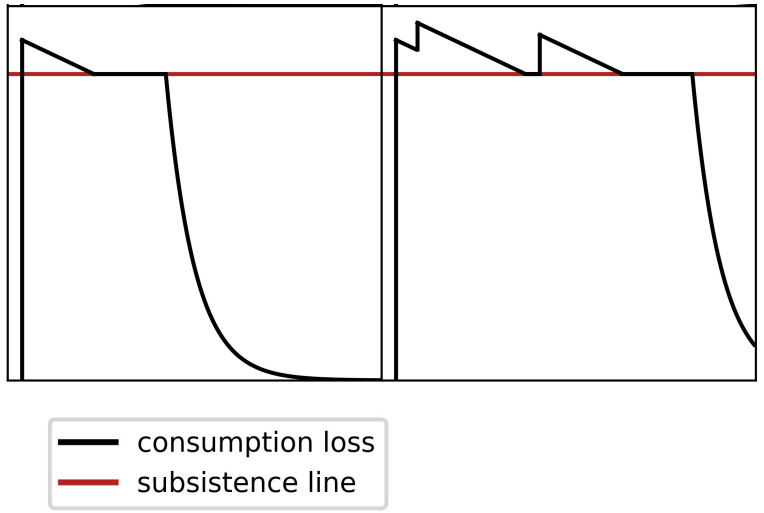
Remaining assets

Recovery after crossing subsistence line



Sauer et al 2023 under review

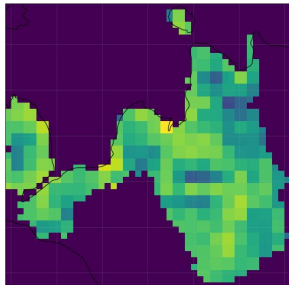
Calibration to the Philippines

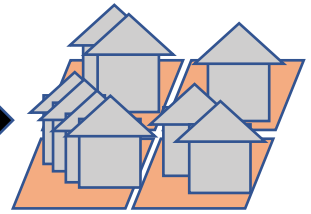
Exposure

Household survey (FIES)

HH-VUL	HH - income	region
0.3	100000	1
0.5	30000	2
…	….	….

Population distribution





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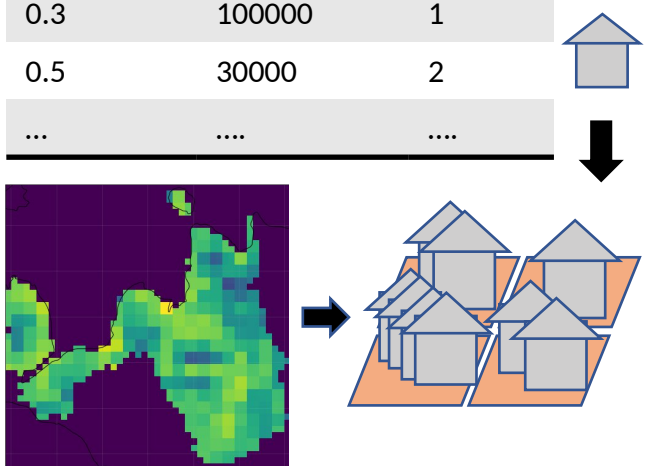
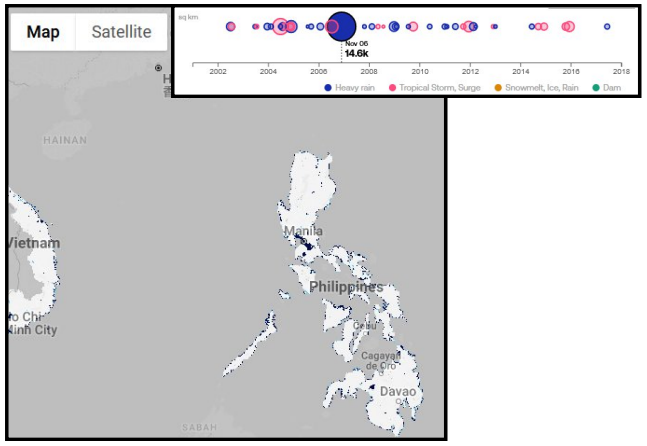


Population distribution

Hazard

Time stamps & Flood maps



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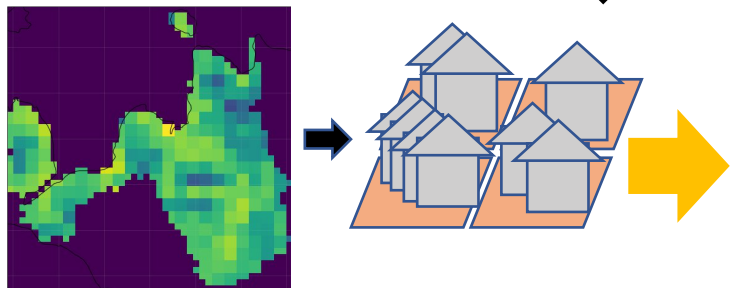

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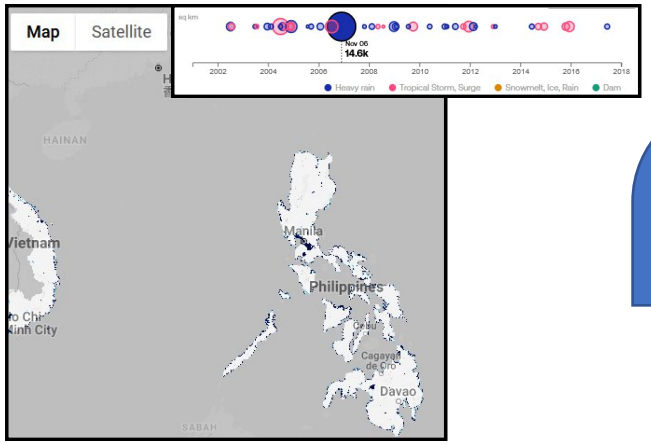
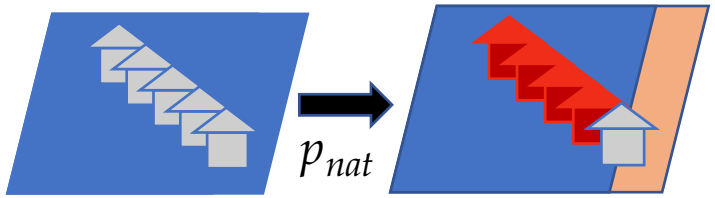


Selection of affected households

$$p_{nat} = \frac{affected\ people\ (EM\text{–}DAT)}{exposed\ population}$$



exposed population

Affected households

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Cascades-Receipt 2023

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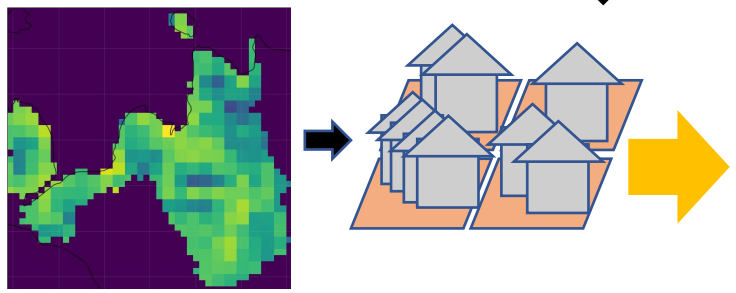

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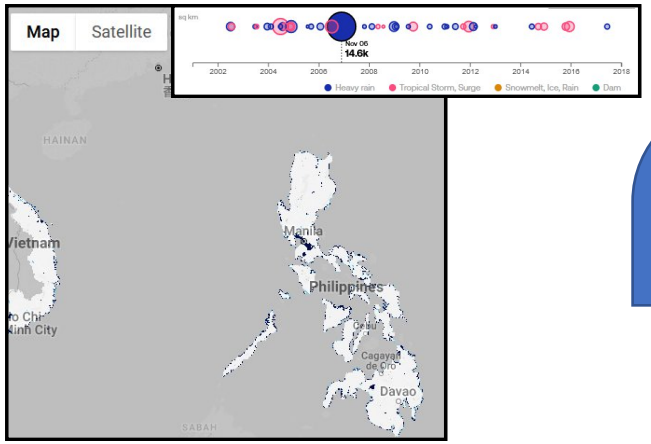

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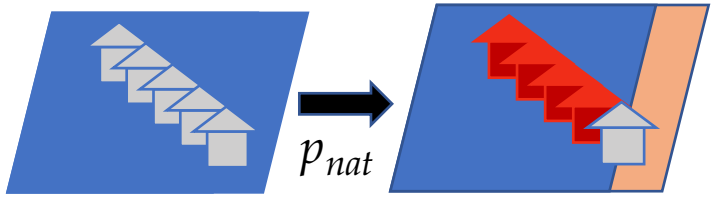
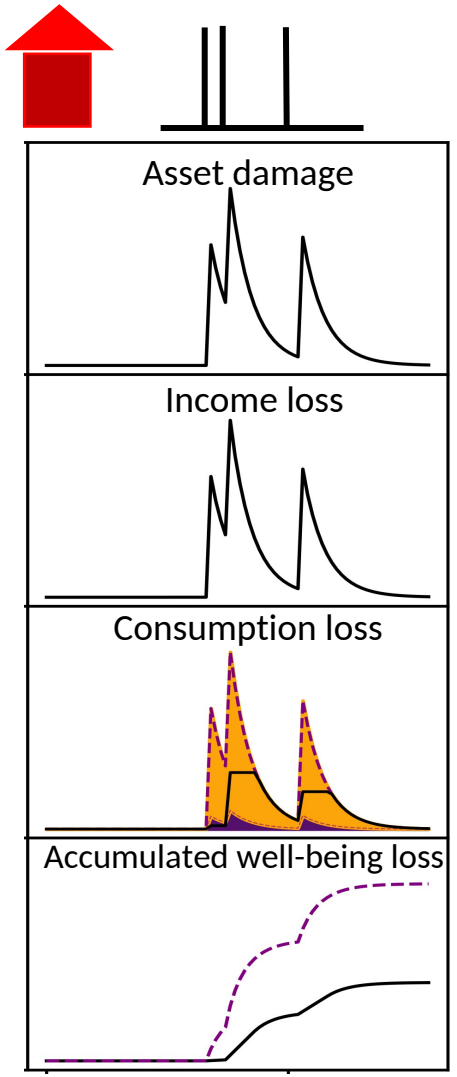


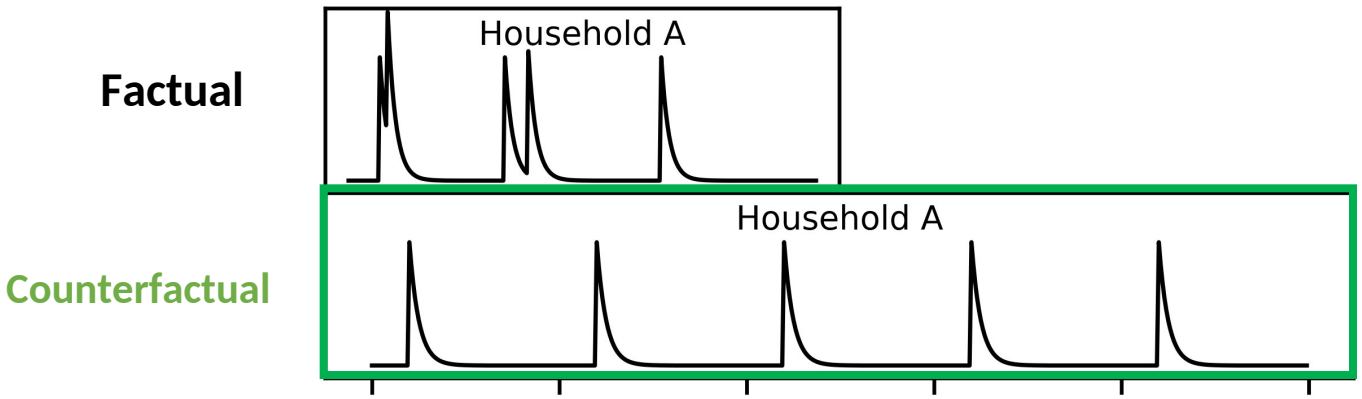
exposed population

Affected households

Household resilience model



Results - Effect of incomplete recoveries in-between events



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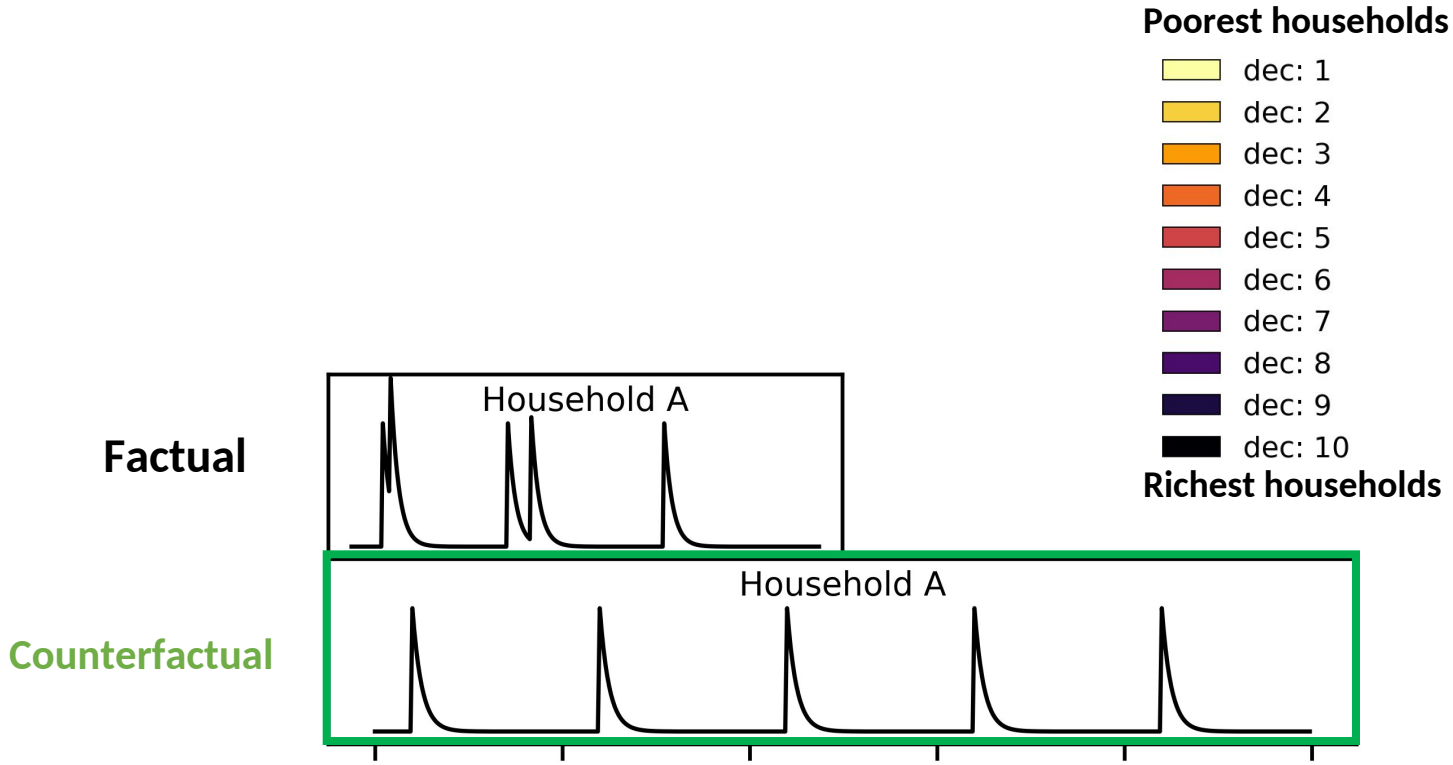

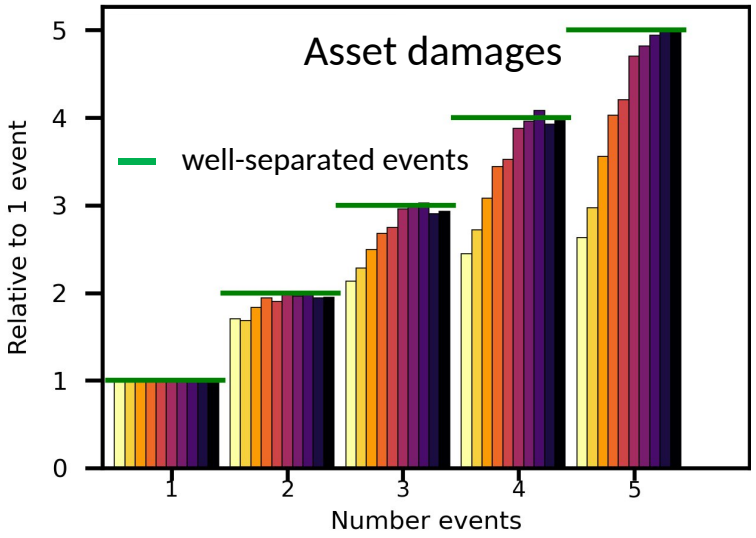

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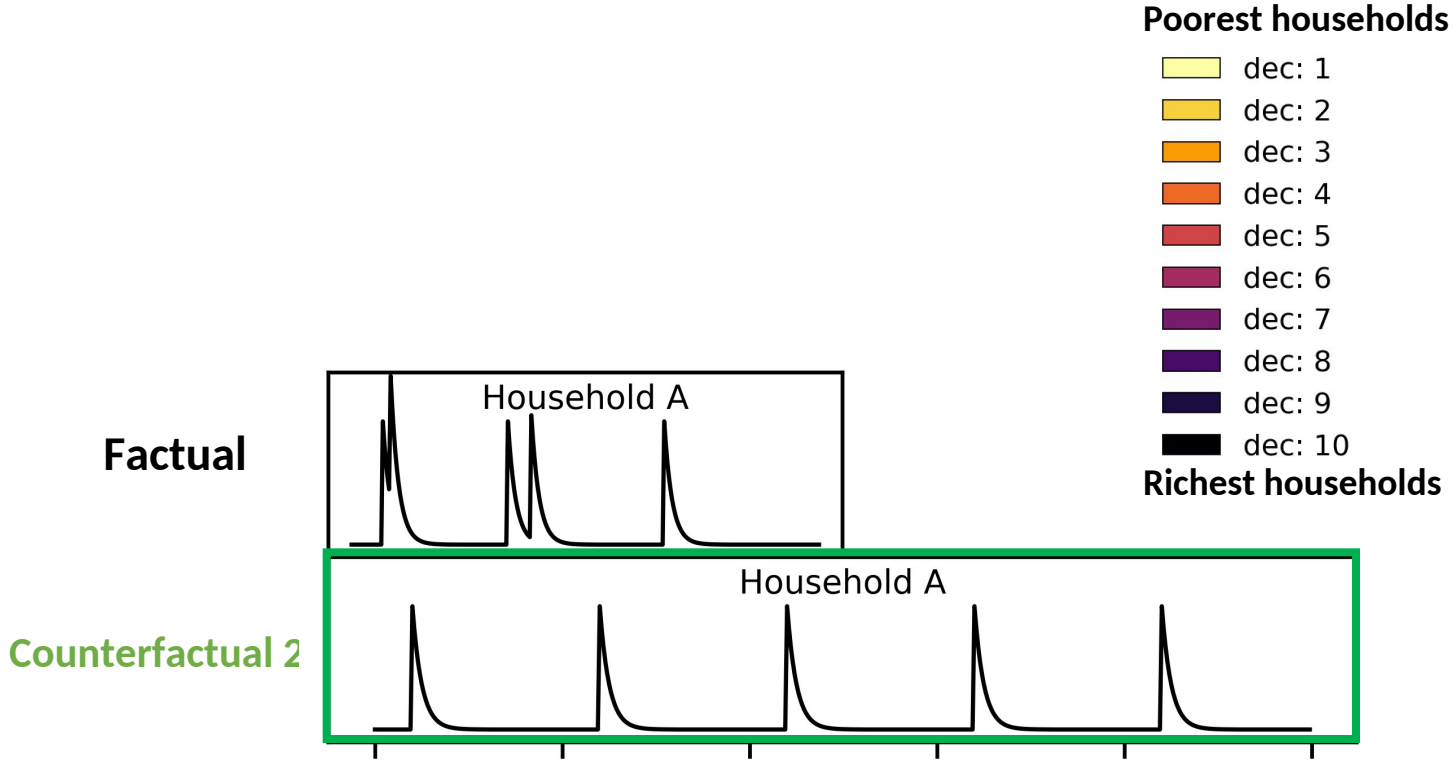
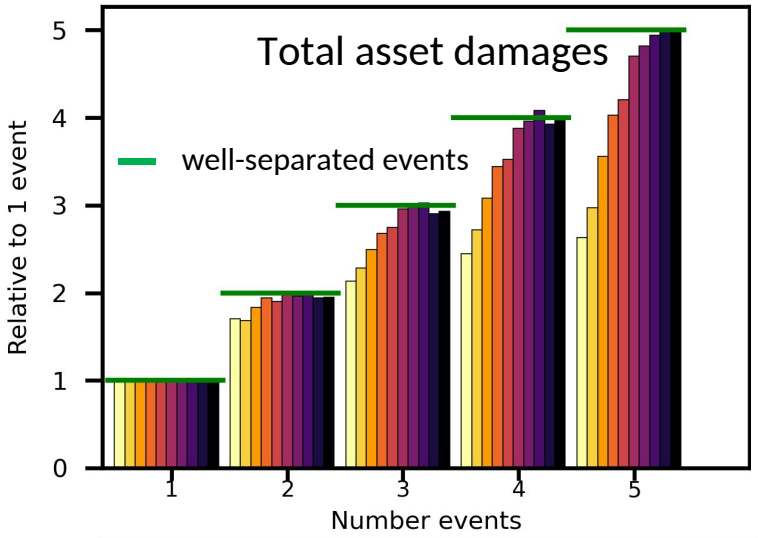
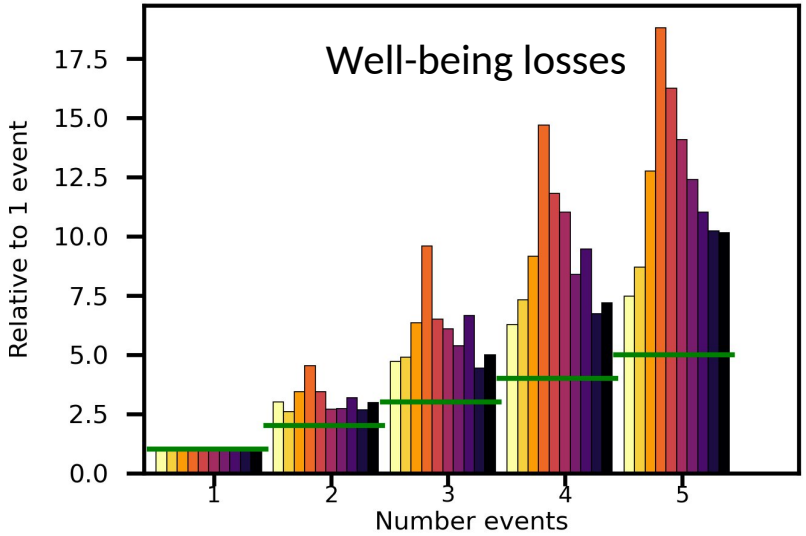
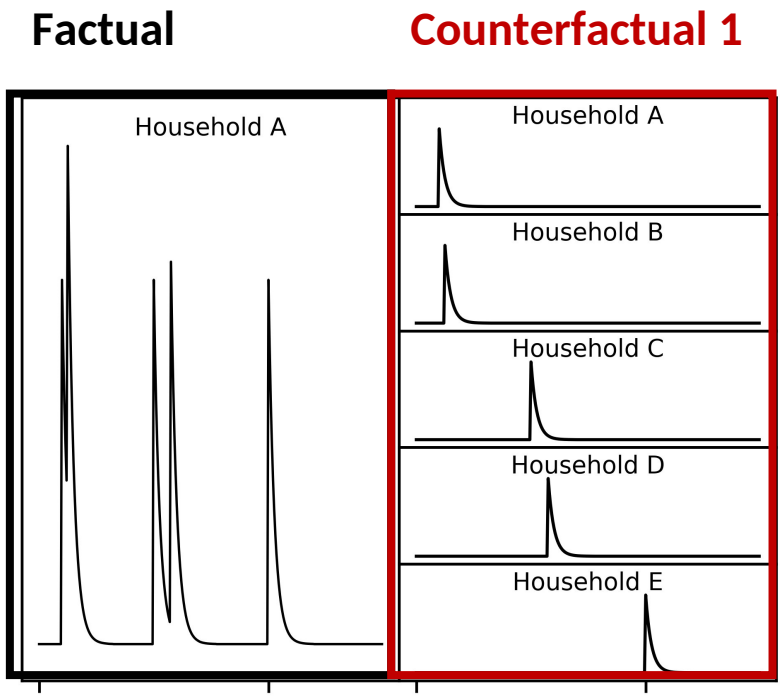


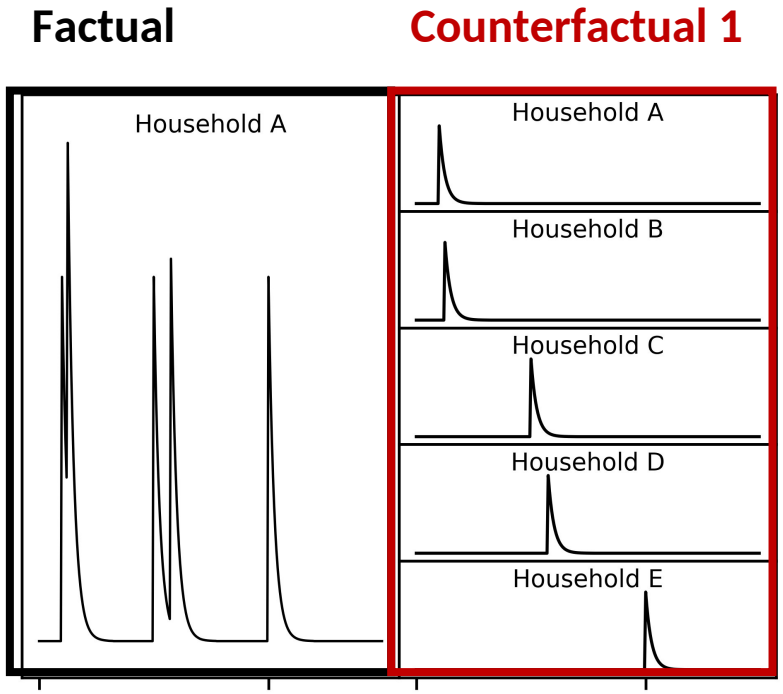


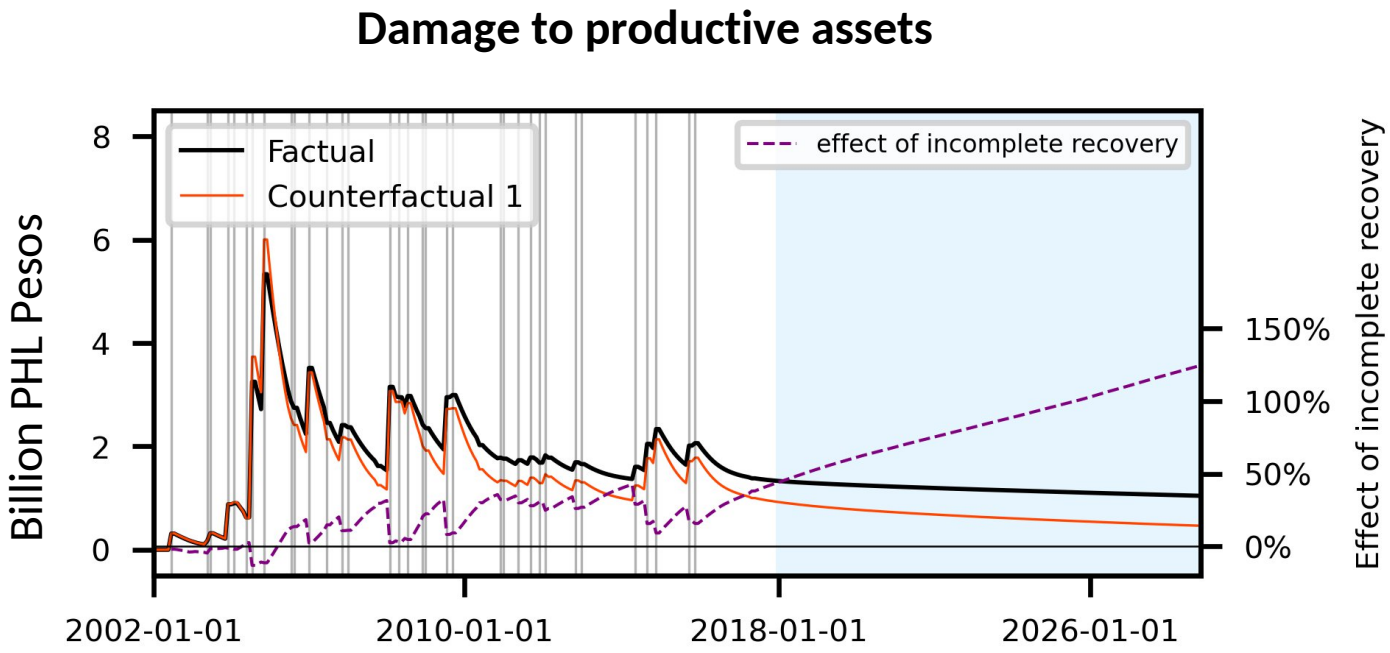


Results - Case study Philippines

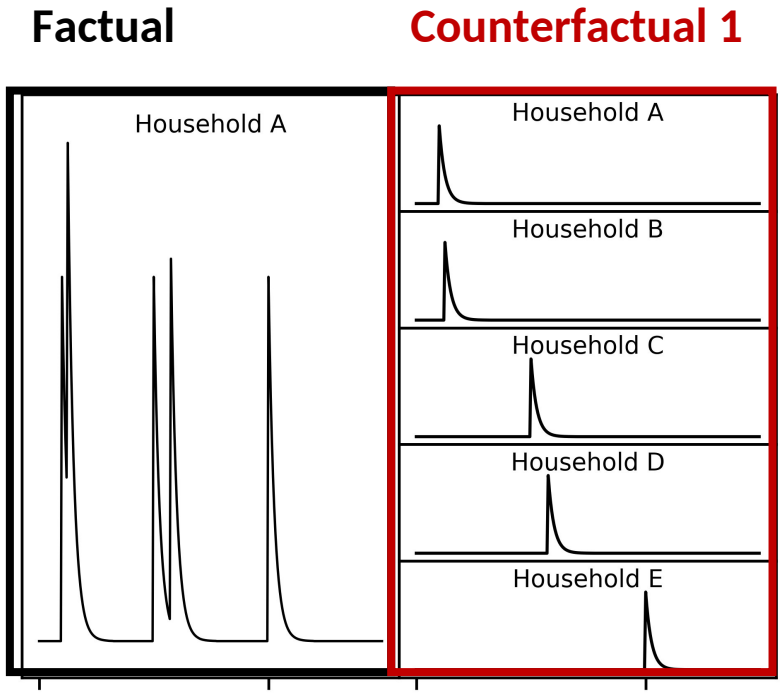


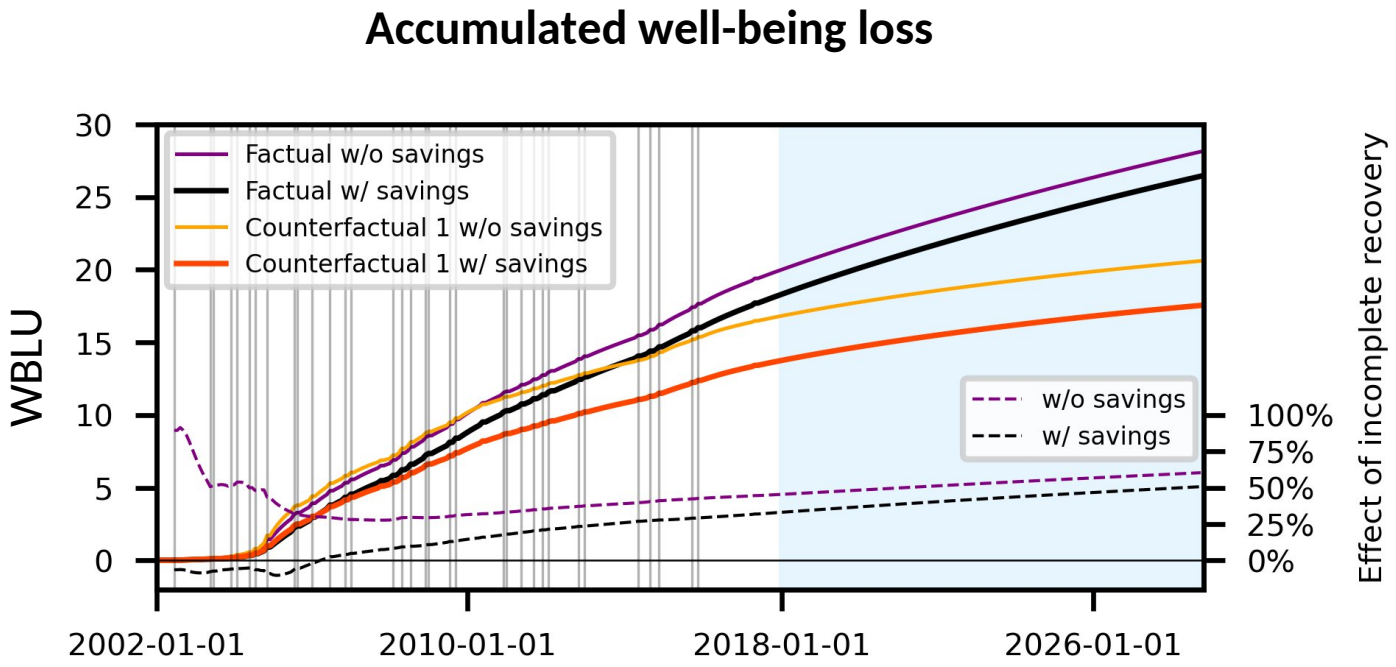
Results - Case study Philippines





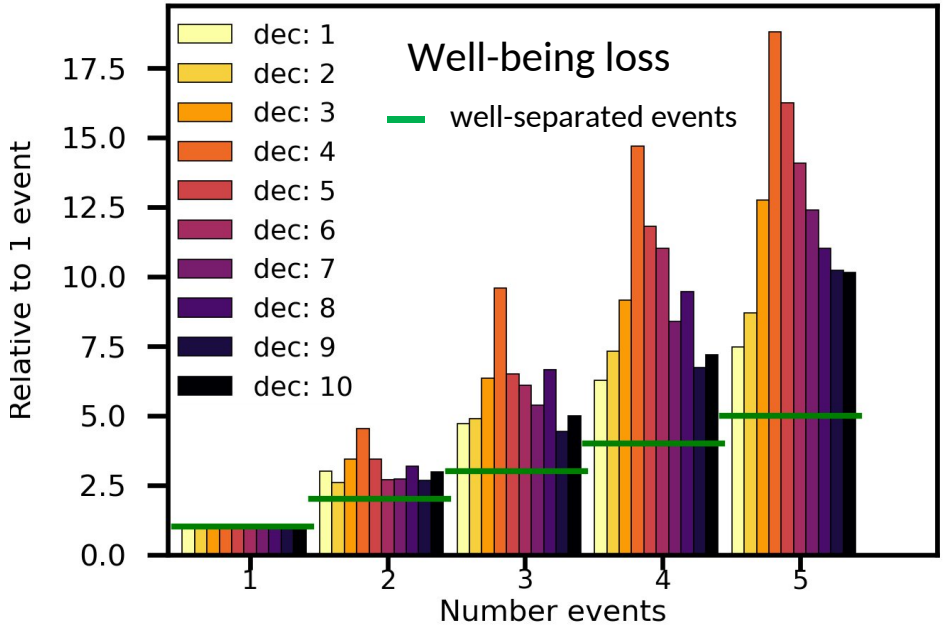
Results - Case study Philippines





Conclusions

- Impacts of consecutive disasters are **not additive**
- The effects change depending on the **impact metric**
- **Incomplete recoveries** cause an **increase long-term impact**
- direct impacts are likely to be reduced
- The **relative increase in long-term losses** caused by incomplete recoveries is **largest for middle-income** households



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