

Transport Disruptions and their Impacts on Supply Chains

Model & Application to Tanzania



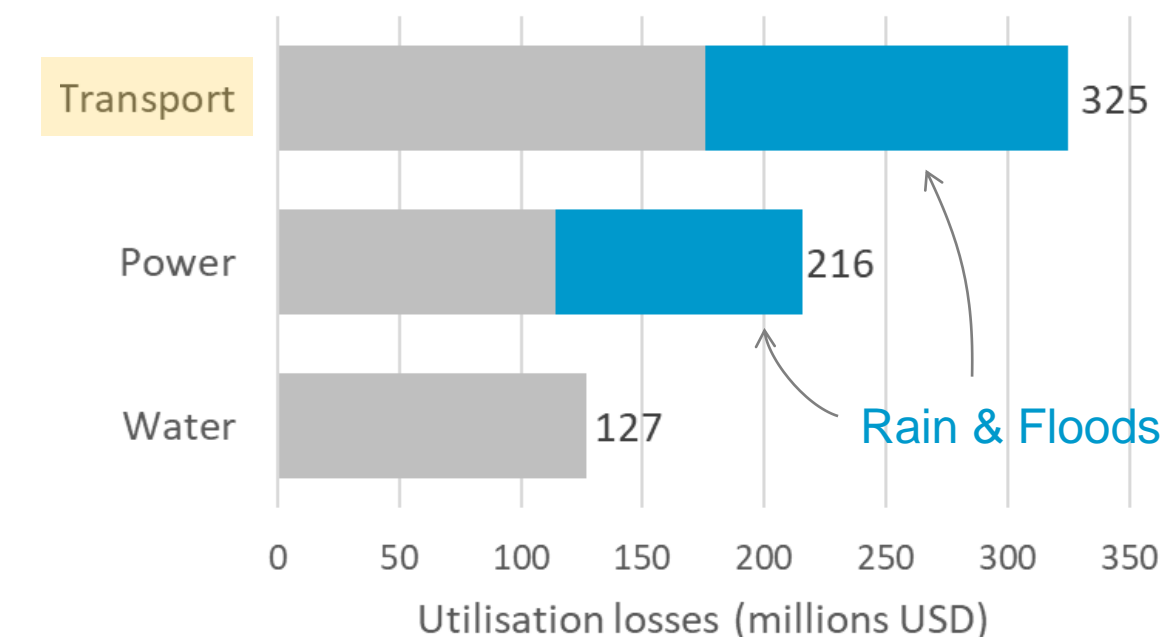
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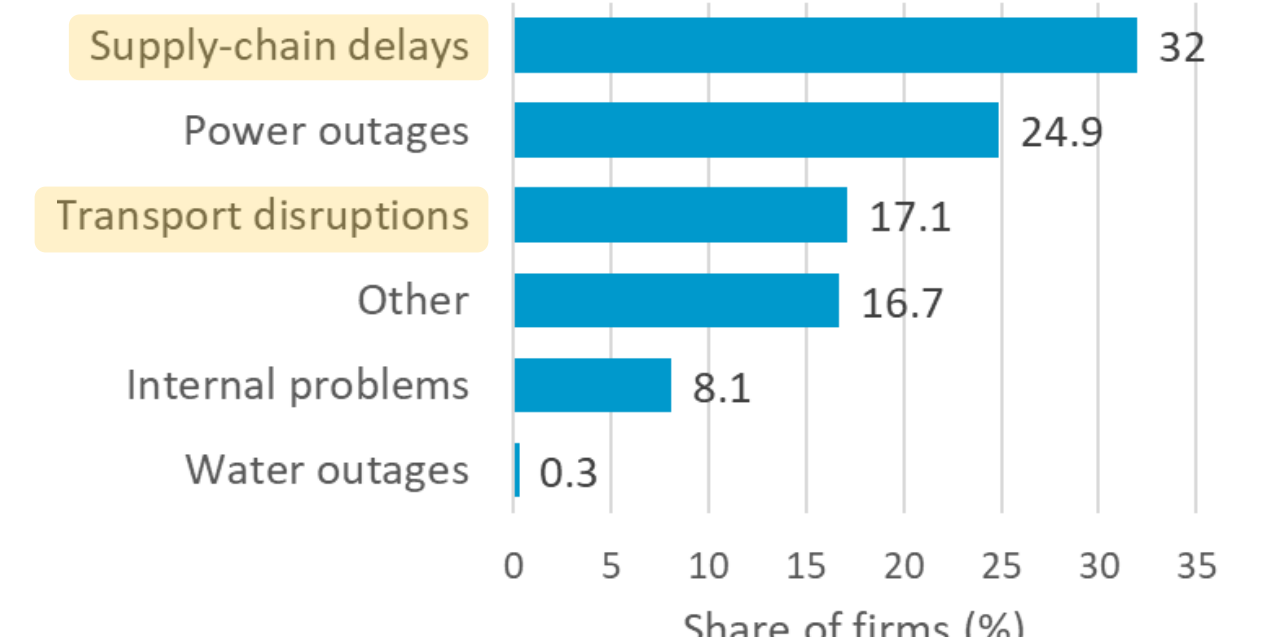
Disaster ► Disrupts transport ► Perturbs supply chains ► Economic losses

- Transport is often the first infrastructure to get disrupted when a disaster hits (e.g., flood, landslide, earthquake).
- Transport is crucial for supply chains.
- Disruption at one point of the supply chain can propagate across sectors and regions.

Losses from infrastructure disruptions in Tanzania



Main causes of delivery delays in Tanzania

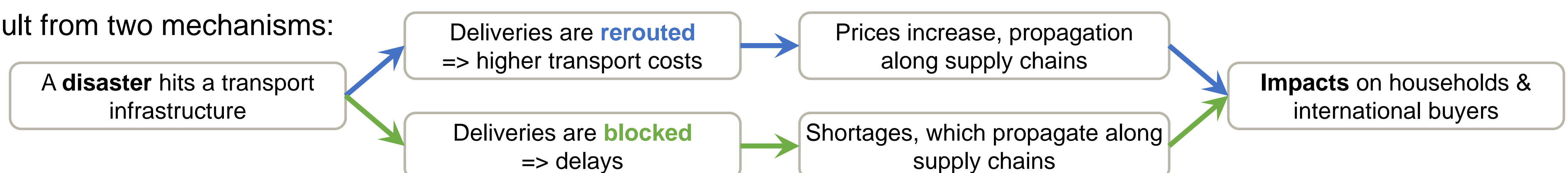


The model brings together transport modeling & input–output macroeconomic analysis

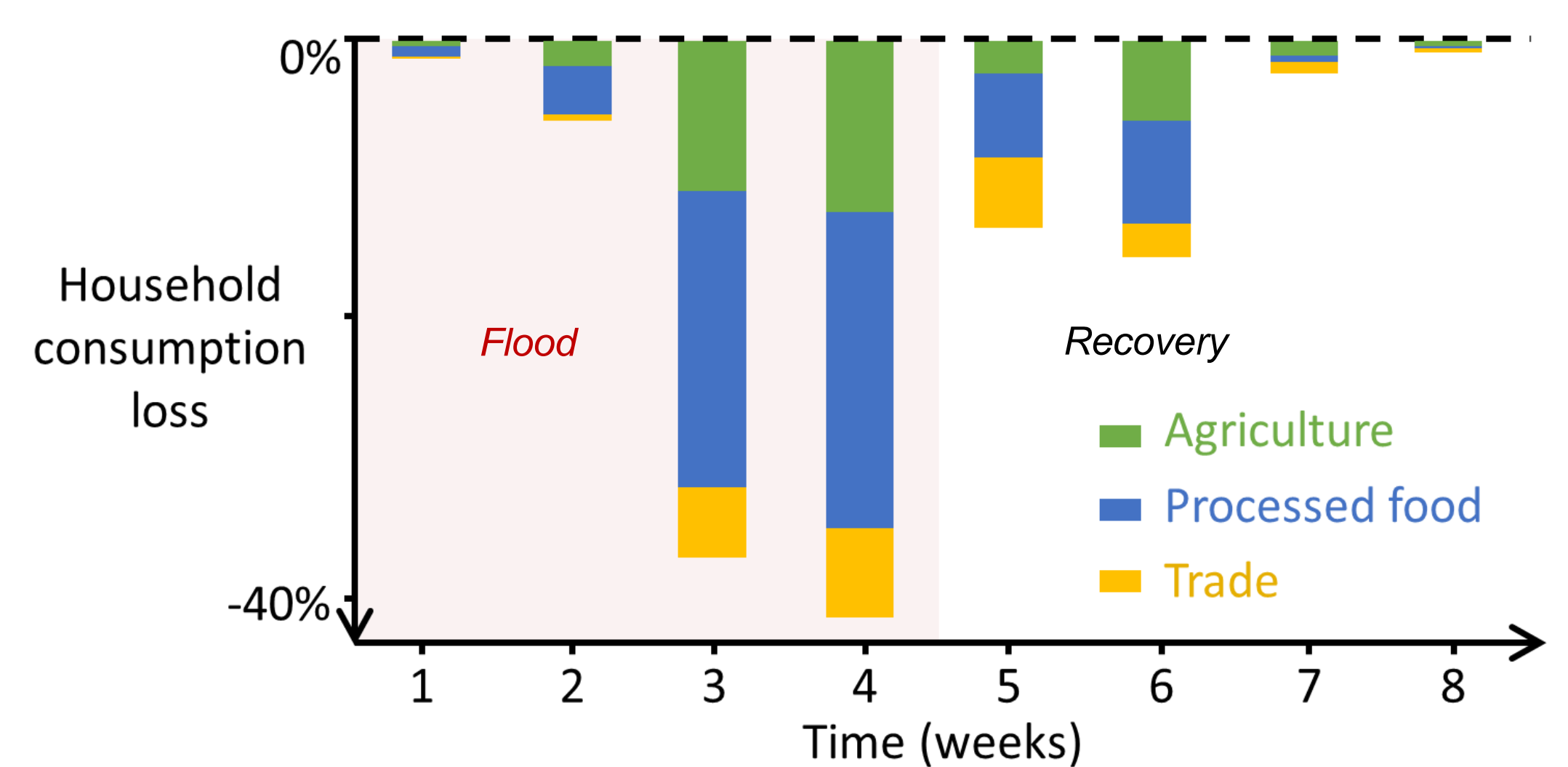
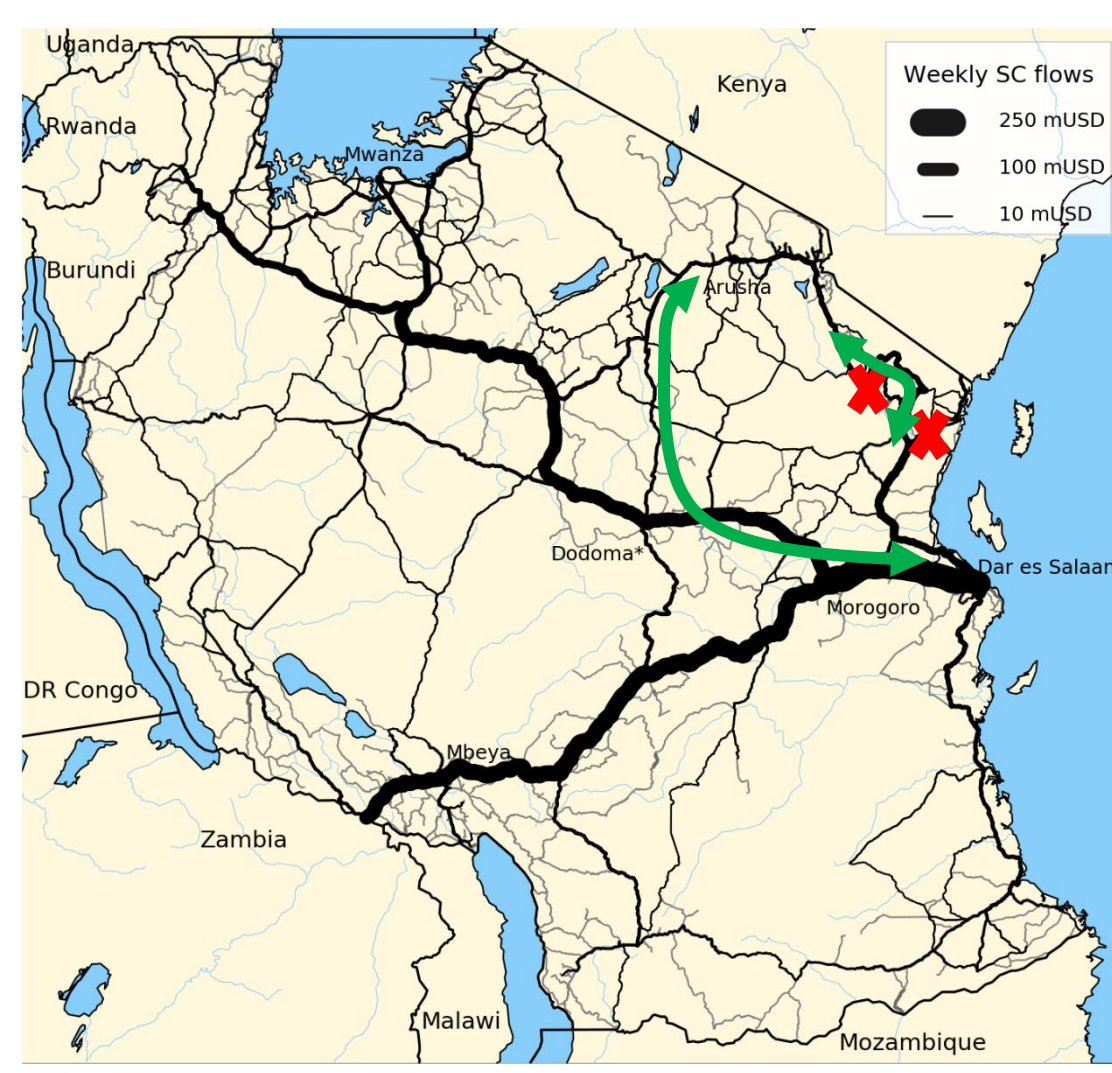
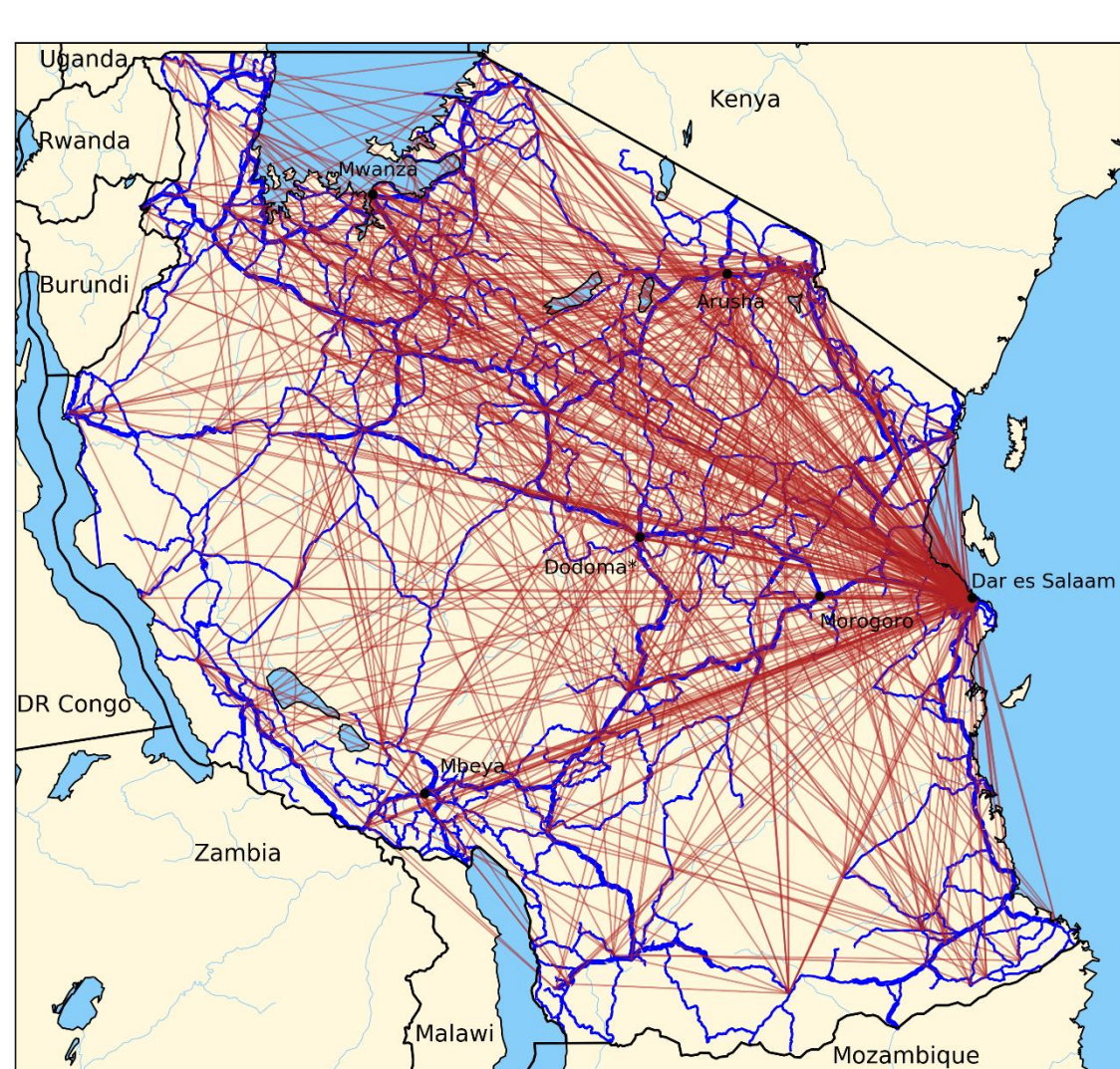
We build a **dynamic, agent-based, and spatially-explicit supply-chain model** which is fully embedded in the transport network

- A set of firms — namely one per sector — is modeled on each node of the transport network.
- Firms buy inputs from and sell outputs to (i) other firms located in other nodes, (ii) firms abroad, (iii) households. They use inventories.
- Products are delivered using the lowest-cost path on the transport network.

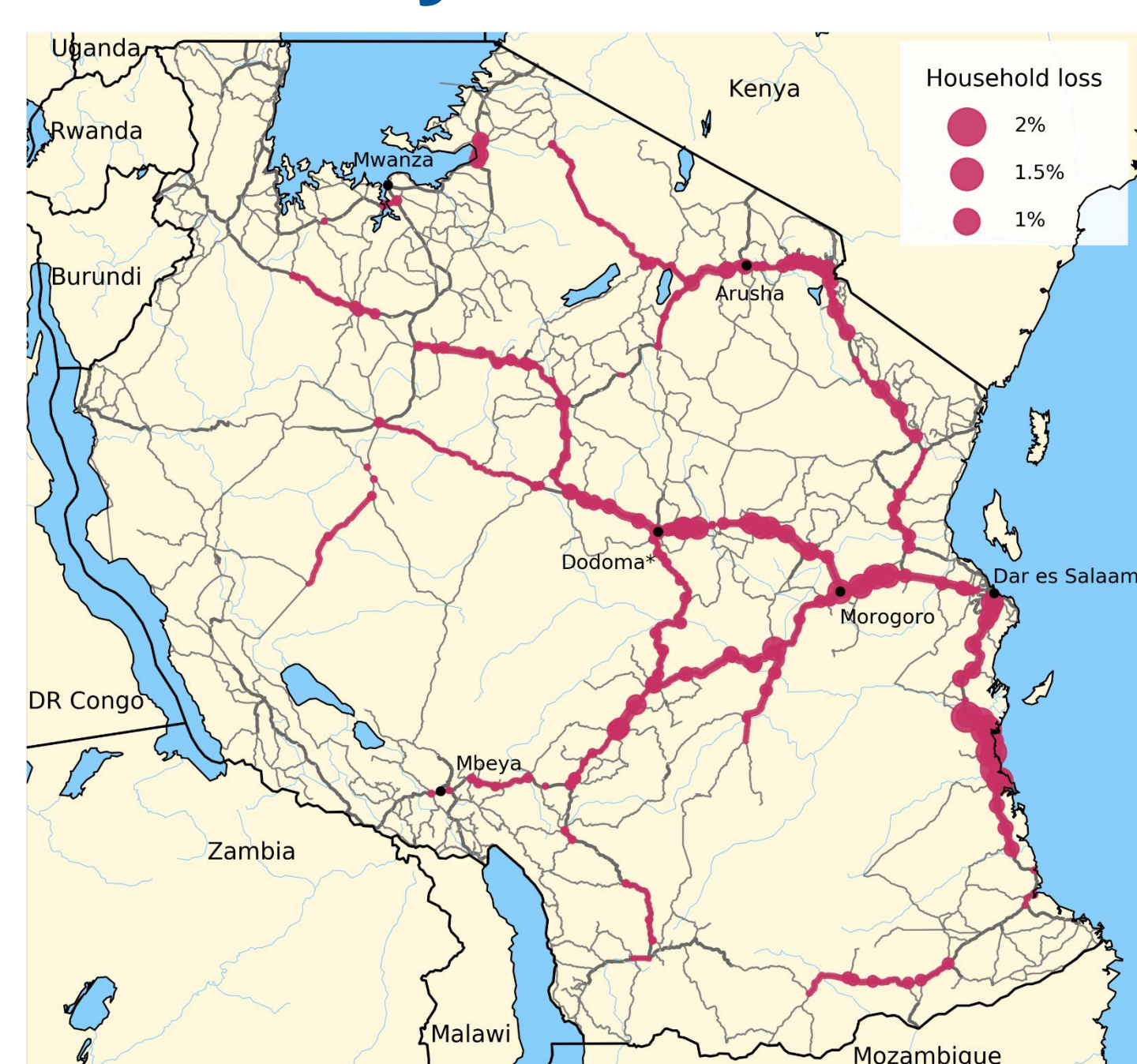
Losses result from two mechanisms:



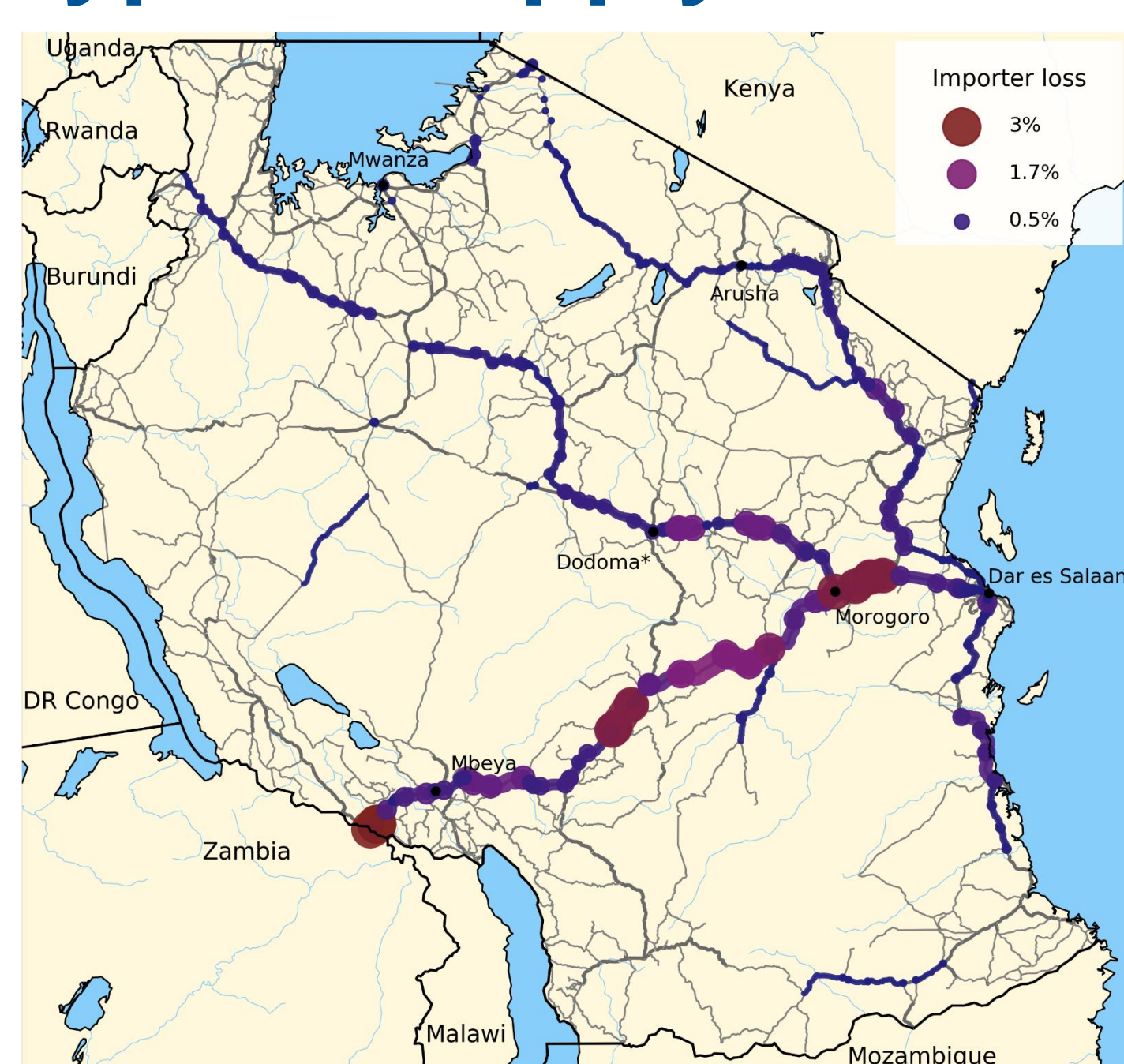
Calibration data: transport (OSM, OIA), input–output table (GTAP), spatial distributions of population, GDP, and land use (CIESIN, RCMRD), listing of firms (Tanzanian authorities), dedicated survey to 800 Tanzanian firms (World Bank)



Criticality varies with the type of supply chains

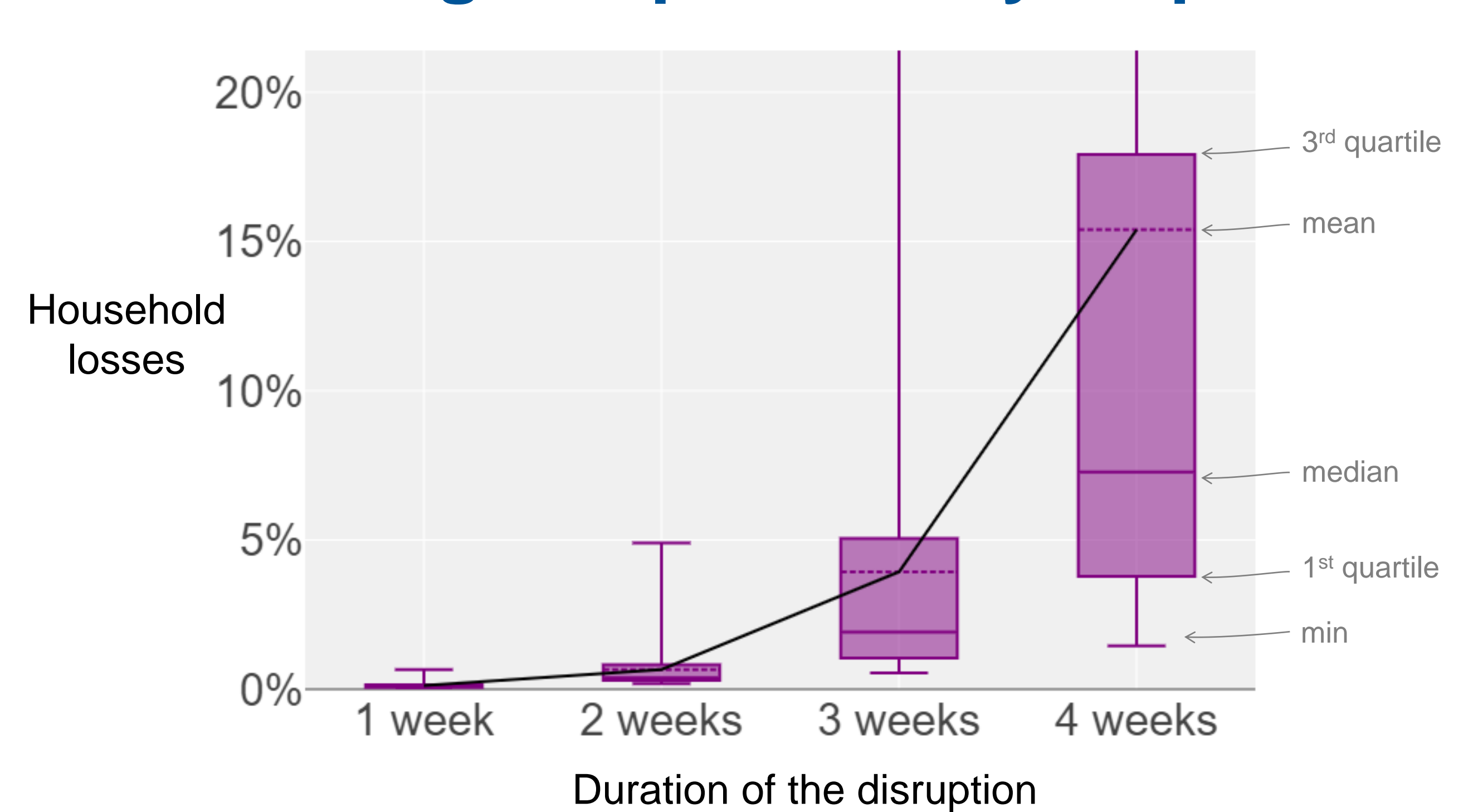


Loss of food products for households

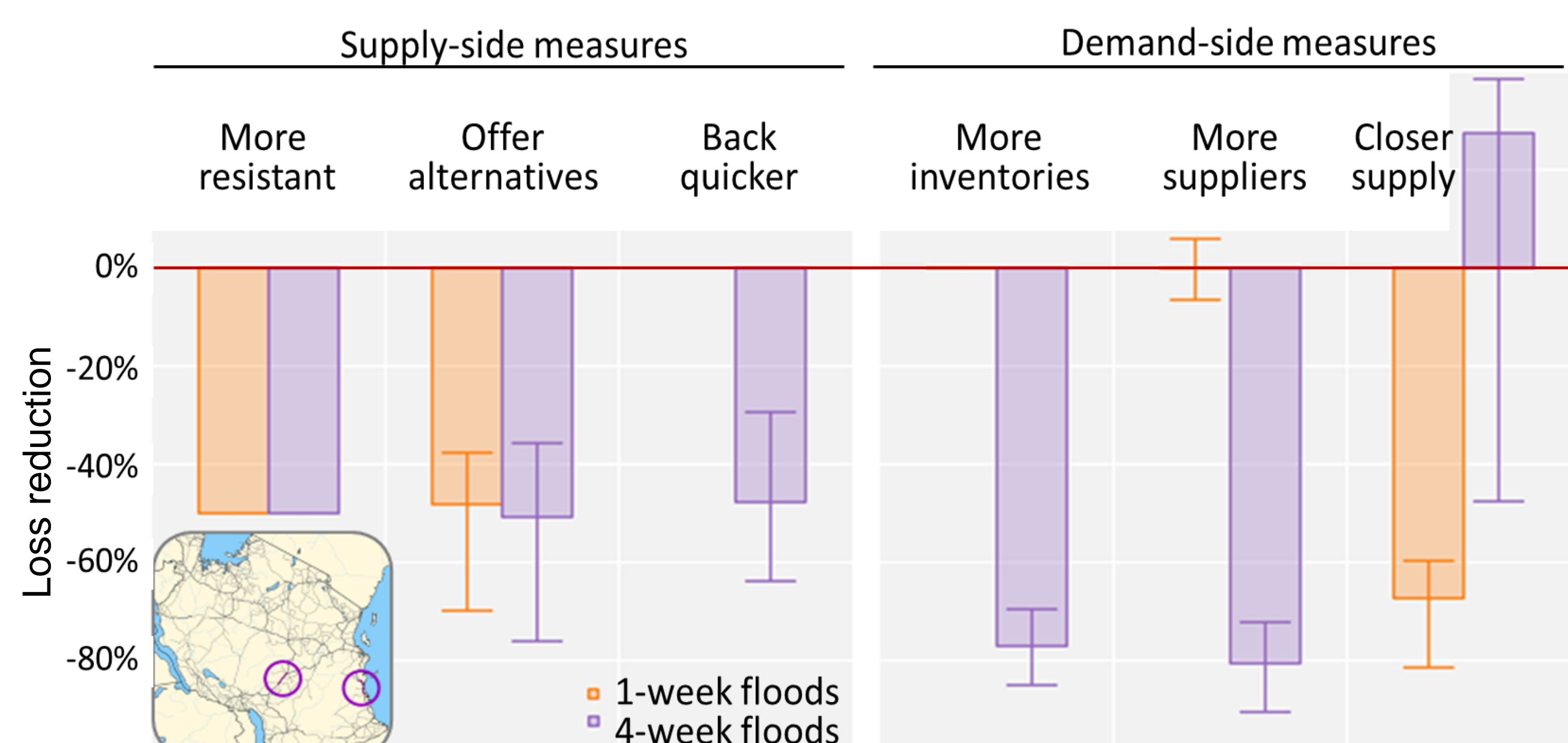


Losses for international buyers

Shocks get exponentially amplified



Resilience can be improved through supply and demand-side measures



Supply-side = offer better transport in critical corridors

- Strengthen the quality of roads
- Build alternative pathways
- Improve preparedness to repair quicker

Demand-side = manage how firms use transport

- Larger inventories
- More suppliers for the same inputs
- Shorter supply chains

The model can test both types of measures and helps widen the spectrum of resilience policies.