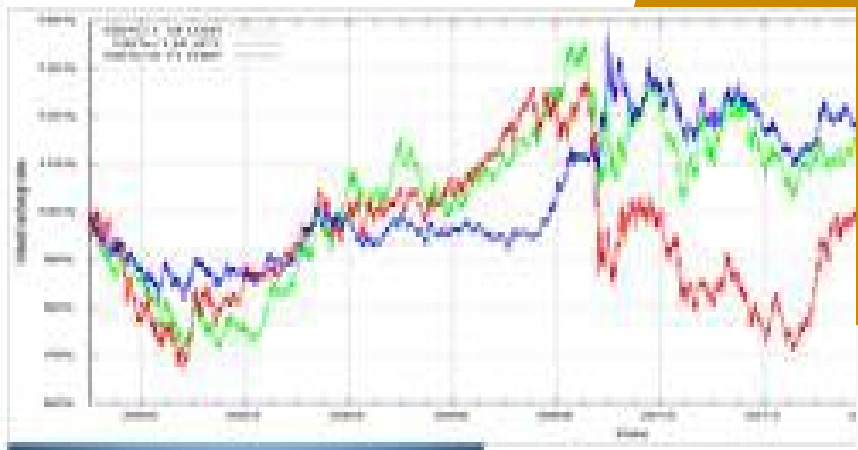
cascades

Cascading climate risks:
Towards adaptive and
resilient European Societies



Cascading socio-economic and financial impacts of geopolitical shocks:

Evidence from the Russian war on Ukraine

(Auer, C., Bosello, F., Bressan, G., Delpiazzo, E., Monasterolo, I., Parrado, R.)

CASCADES & RECEIPT conference
16.10.2023

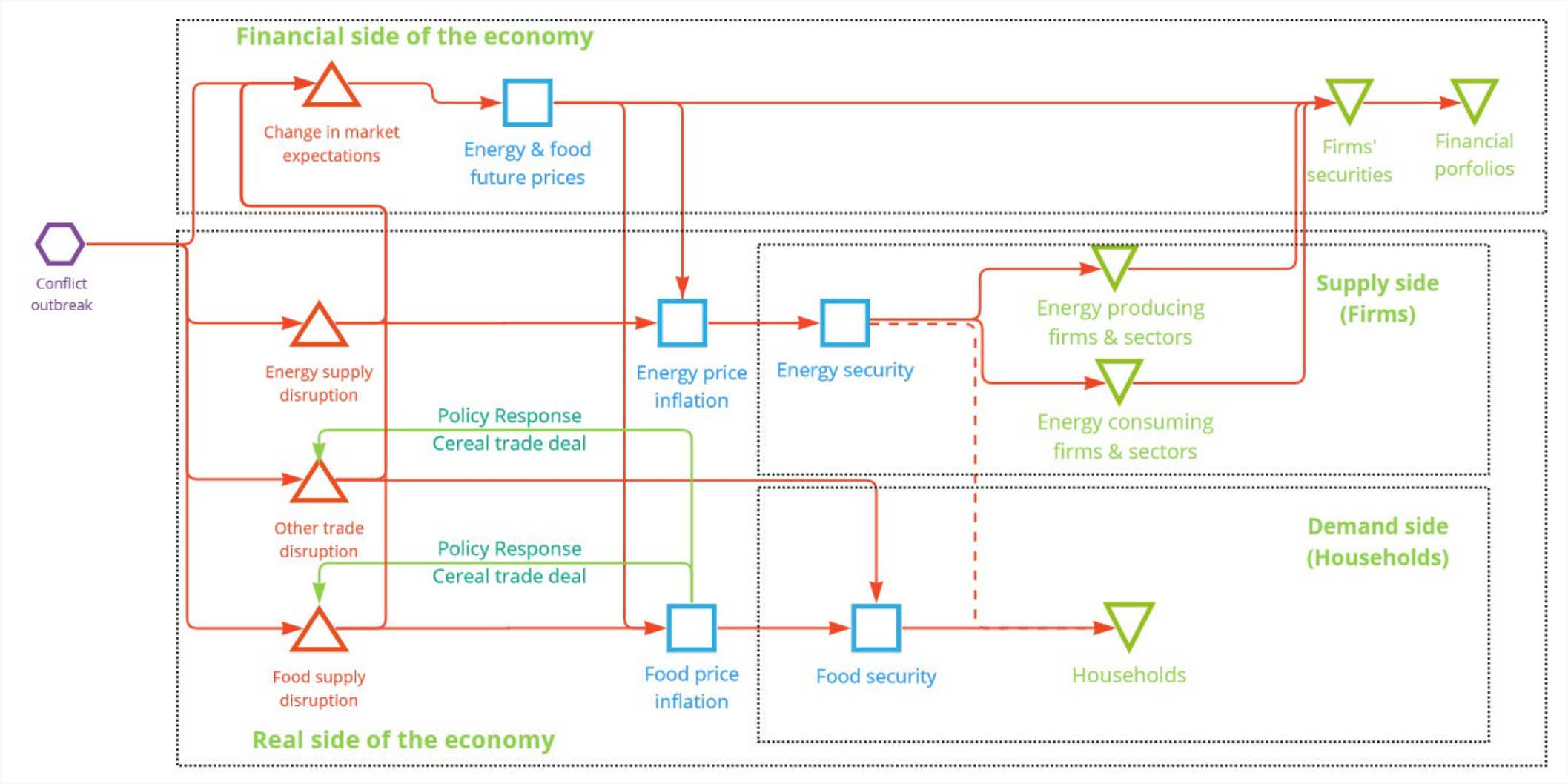
Aim

- Develop & test the potential of an innovative integrated assessment framework connecting the real-side and the financial-side of the economic system to study cascading effects triggered by «shocks»

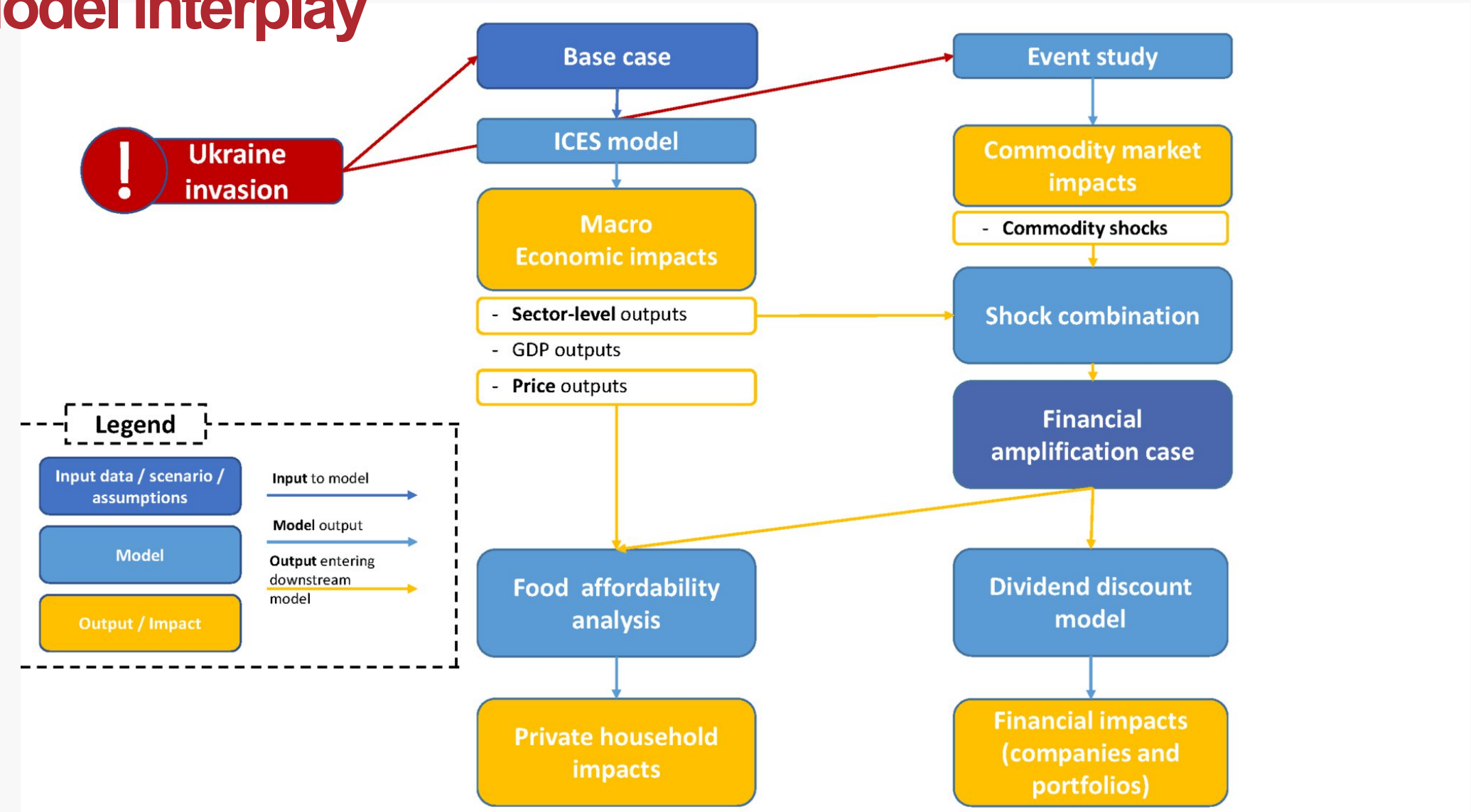
- We are applying this framework to an «armed conflict context» that replicates many (not all) features of the Russian-Ukrainian war

- **Quantify**
  - Macroeconomic losses by CGE model
  - Amplification effects on financial markets on prices
  - Effects on investors & portfolios
  - Impacts of macro and finance on food security

Conceptualizing cascading effects



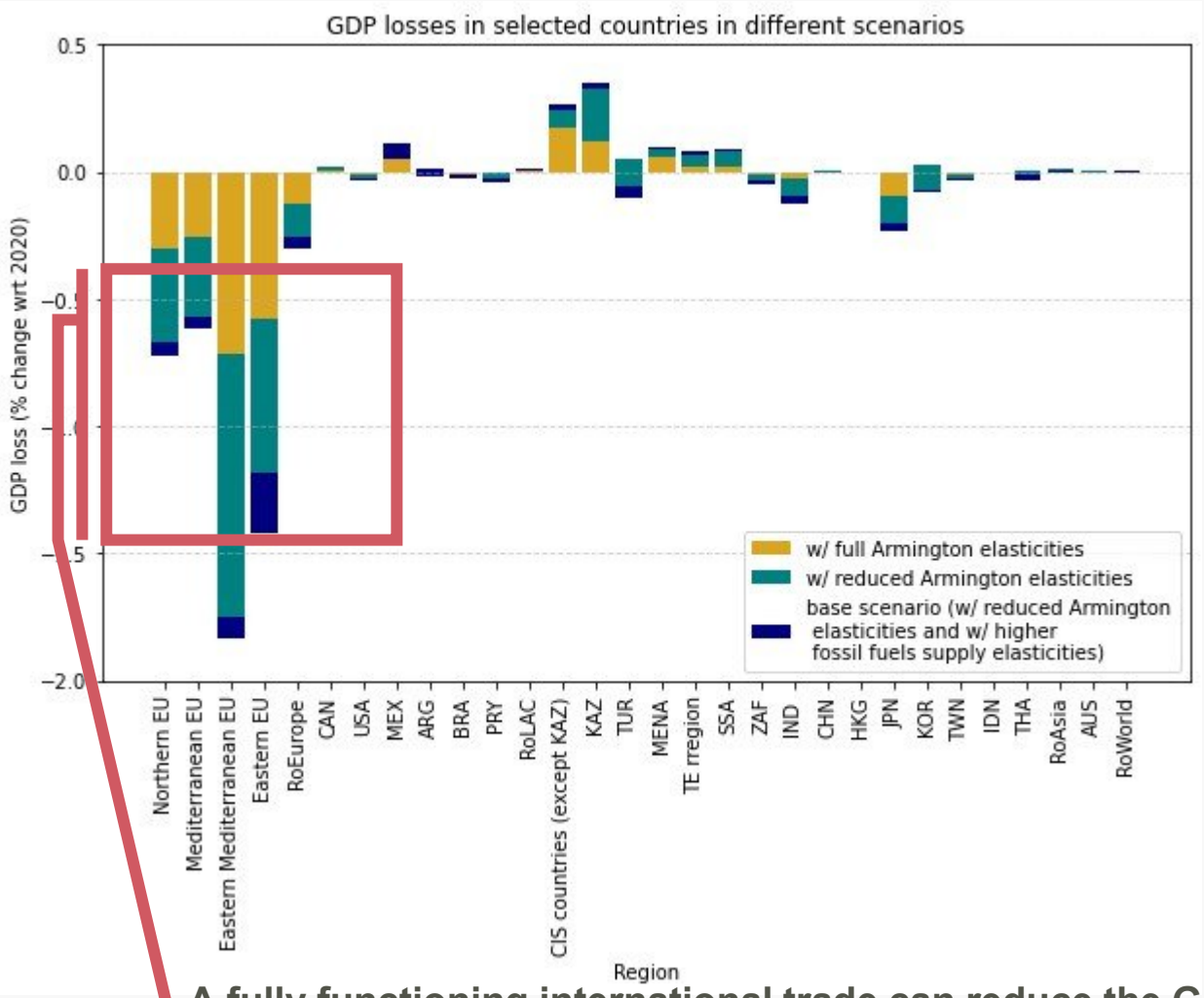
Model interplay

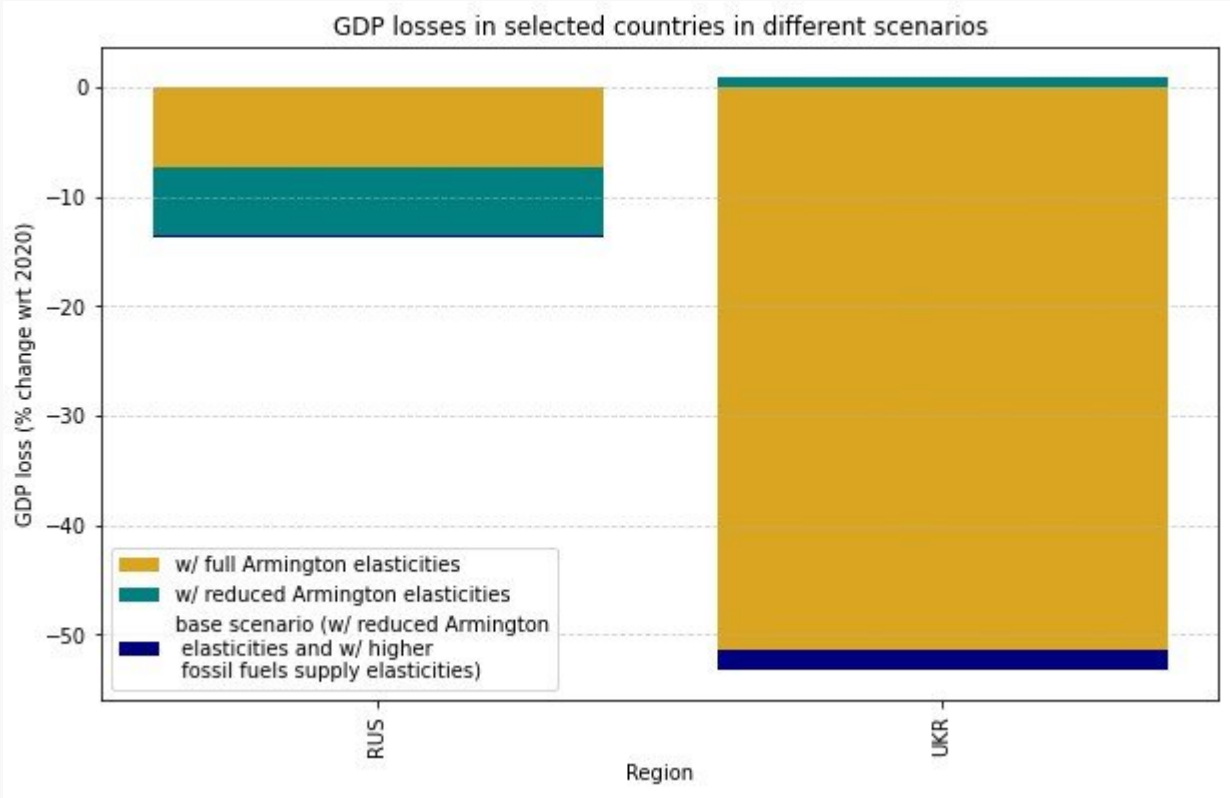


Scenario

Base Scenario (Worst Scenario)	- 100% Russian ban on fossil fuels export to EU, USA, JPN, CAN, AUS, UKR - 100% Russian ban on fertilizers exports to BC and 50% to RoW. - 100% Russian ban on oil seeds export globally. - 100% Russian ban on forestry and fishery exports to EU, USA, JPN, CAN, AUS, UKR - 0.6% labour and capital loss in Russia - 30% reduction in all factors of production in Ukraine to simulate production capacity disruption - 90% Ukraine exports reduction - inelastic international fossil fuel market using modified elasticities of supply for coal, oil, and gas
Sensitivity scenario 1	With reduced Armington elasticities
Sensitivity scenario 2	With full Armington elasticities

Macroeconomic results – GDP (i)

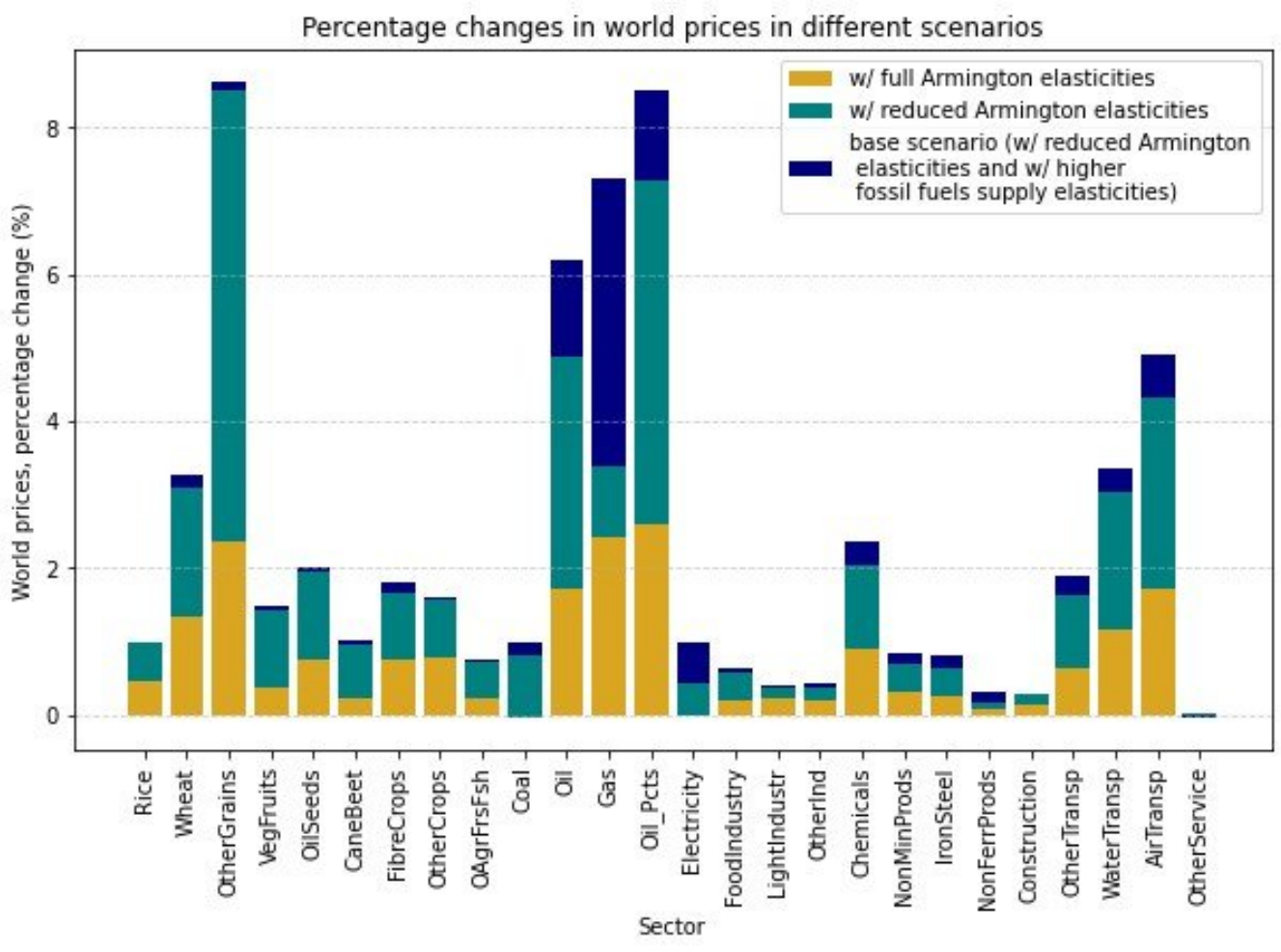




GDP losses are higher for Russia and Ukarine while in other countries losses depend on how much countries are dependent on imports from the belligerant countries.

A fully functioning international trade can reduce the GDP losses cushioning the negative effect of the conflict

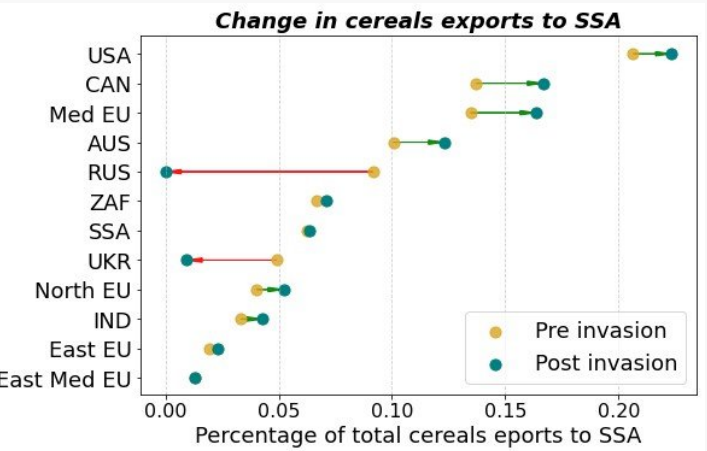
Macroeconomic results – world prices (ii)



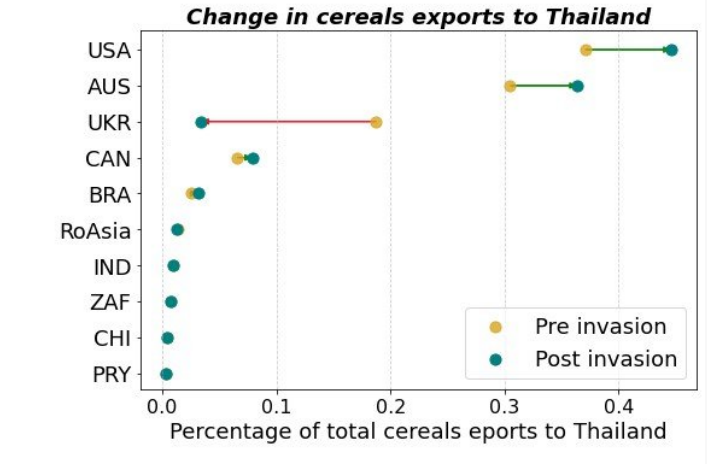
Because of (i) the reduction in World supply for sanctioned Russian commodities and (ii) the reduction in production for the capacity disruption induced by the conflict in Ukraine, World prices for all commodities increase especially if international trade has frictions.

Macroeconomic results – price increases (iii)

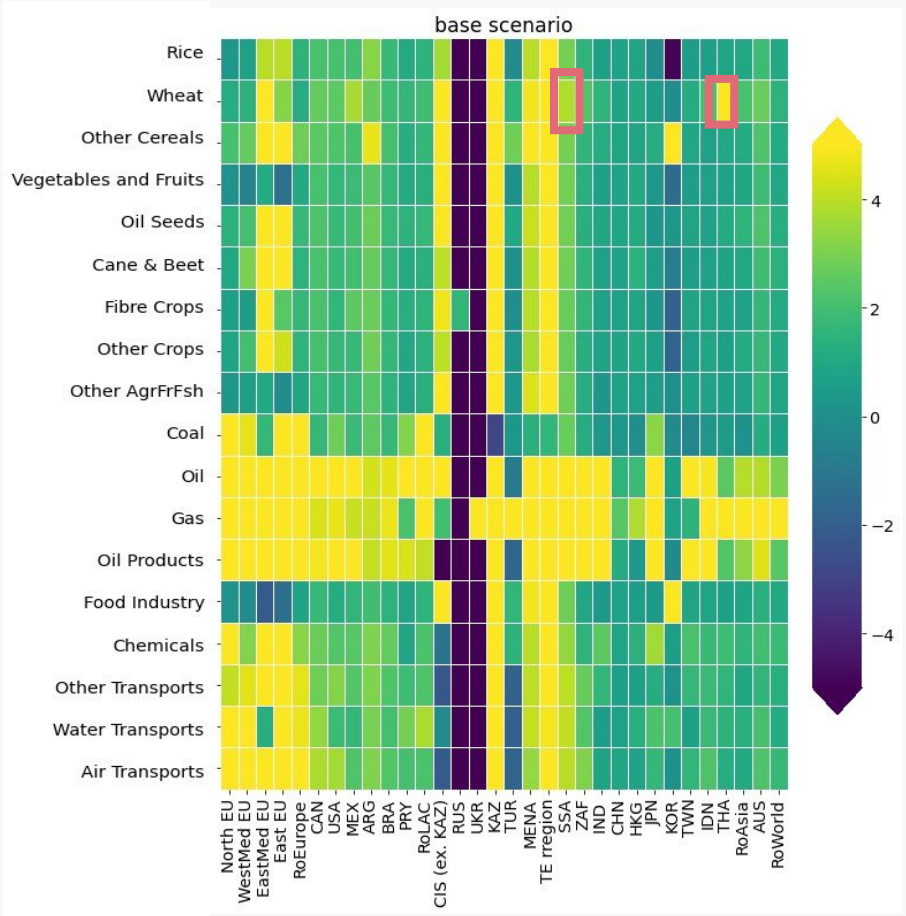
To avoid increasing costs of production and consumers' price increases, countries should diversify their import sources to gain from importers with relatively lower prices.



Thus, SSA faces a +2.8% in internal cereals'price increase…

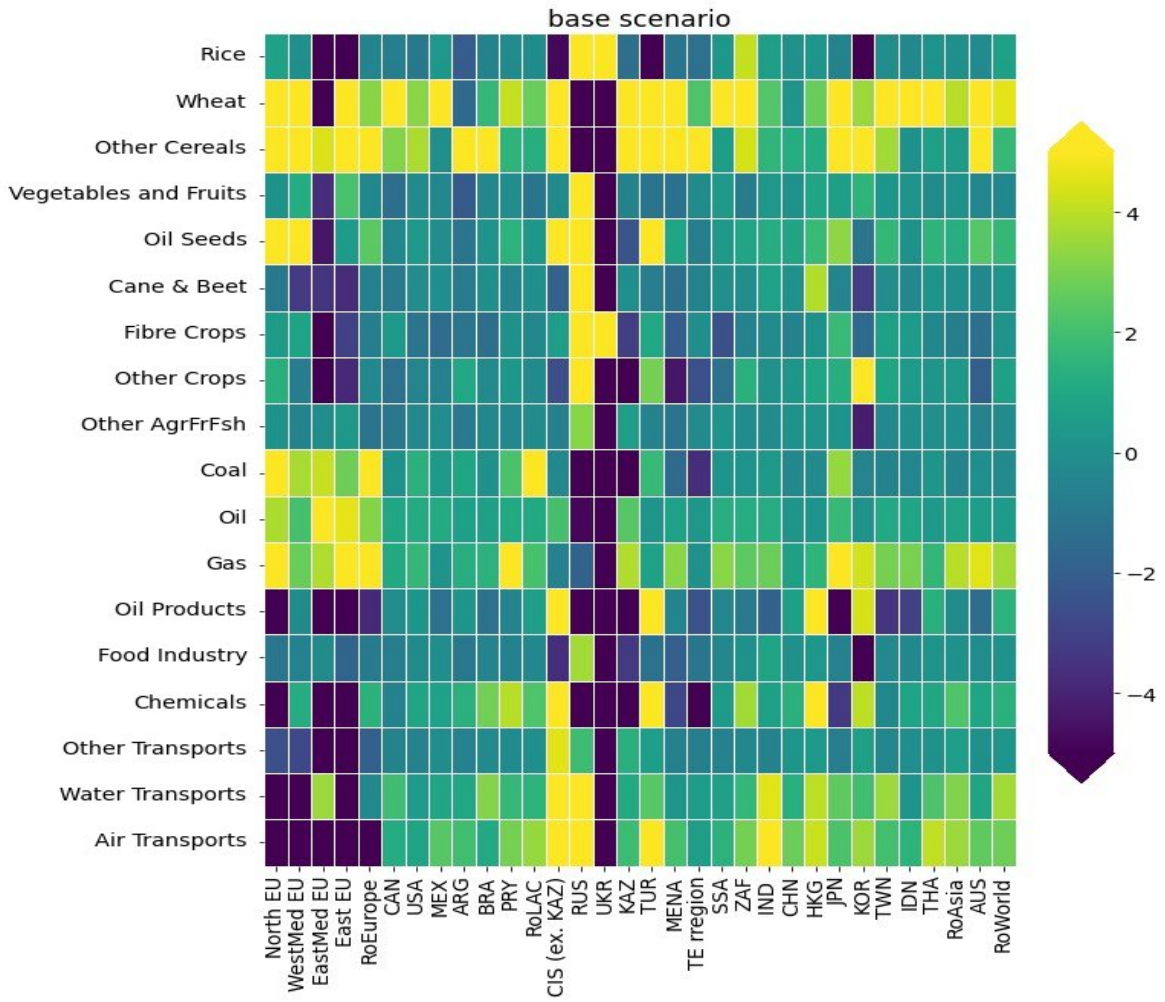


…While in Thailand cereals' prices go up by nearly 6%



Changes in regional prices for selected sectors

Macroeconomic results – production (iv)



Percentage changes in regional production for selected commodities

Production in some countries declines because of their high dependency on Russian/Ukrainian imports.
Examples are the oil products, chemicals, and transports sectors in EU, that depend heavily on Russian fossil fuels.

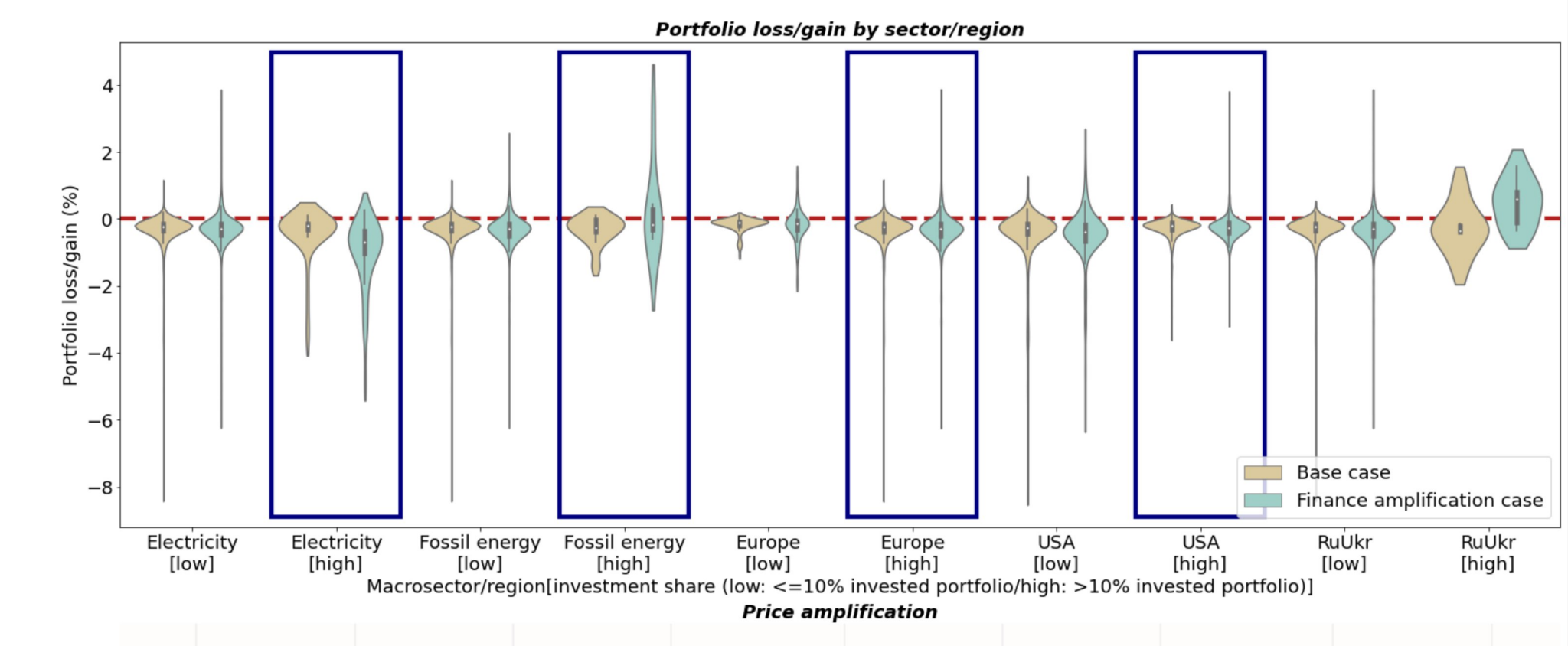
On the contrary, the reduction in international supply (mainy for cereals) induced new trade flows and thus some countries (especially Latin American and Asian countries) increase their production.

Finance results – price amplification

Finance results

Overreaction combined with macroeconomic shocks

- **revaluation of** companies' **stock price**



Portfolio benefit or loses from revaluation of stocks depend on sectoral and geographical composition

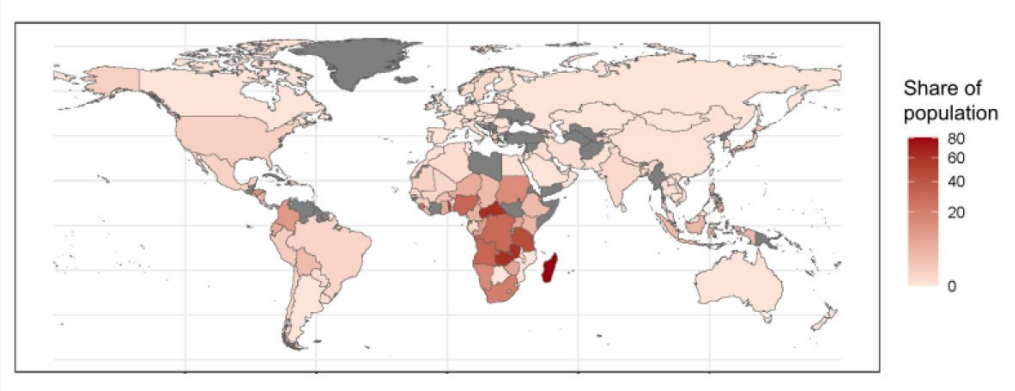
Firms and portfolios in **Europe** emerge as main losers.

The **fossil energy** sector firms and portfolios (excluding oil products) emerge as the main winner

Food security – calorie sufficient & healthy diet

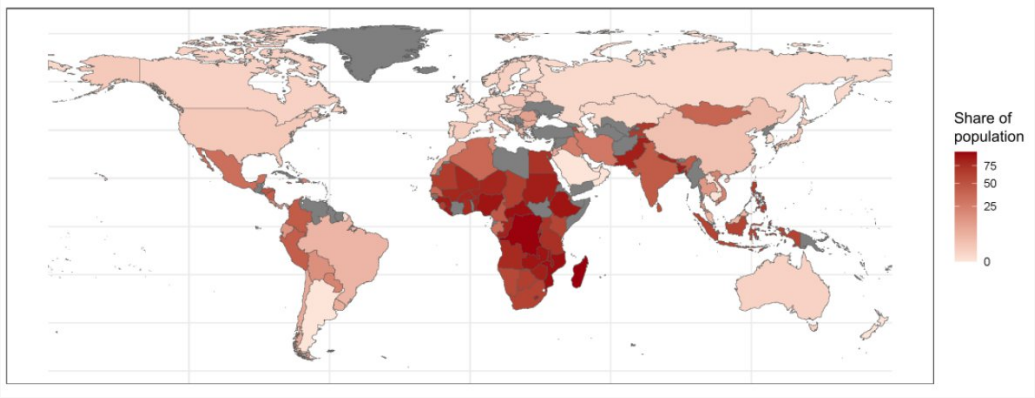
Pre-war price levels:

- calorie sufficient diet unaffordable for 140 - 360 mio people



Share of population that could not afford a calorie sufficient diet before the war

- healthy diet unaffordable for 1.9 - 3.2 bil. people



Share of population that could not afford a healthy diet before the war

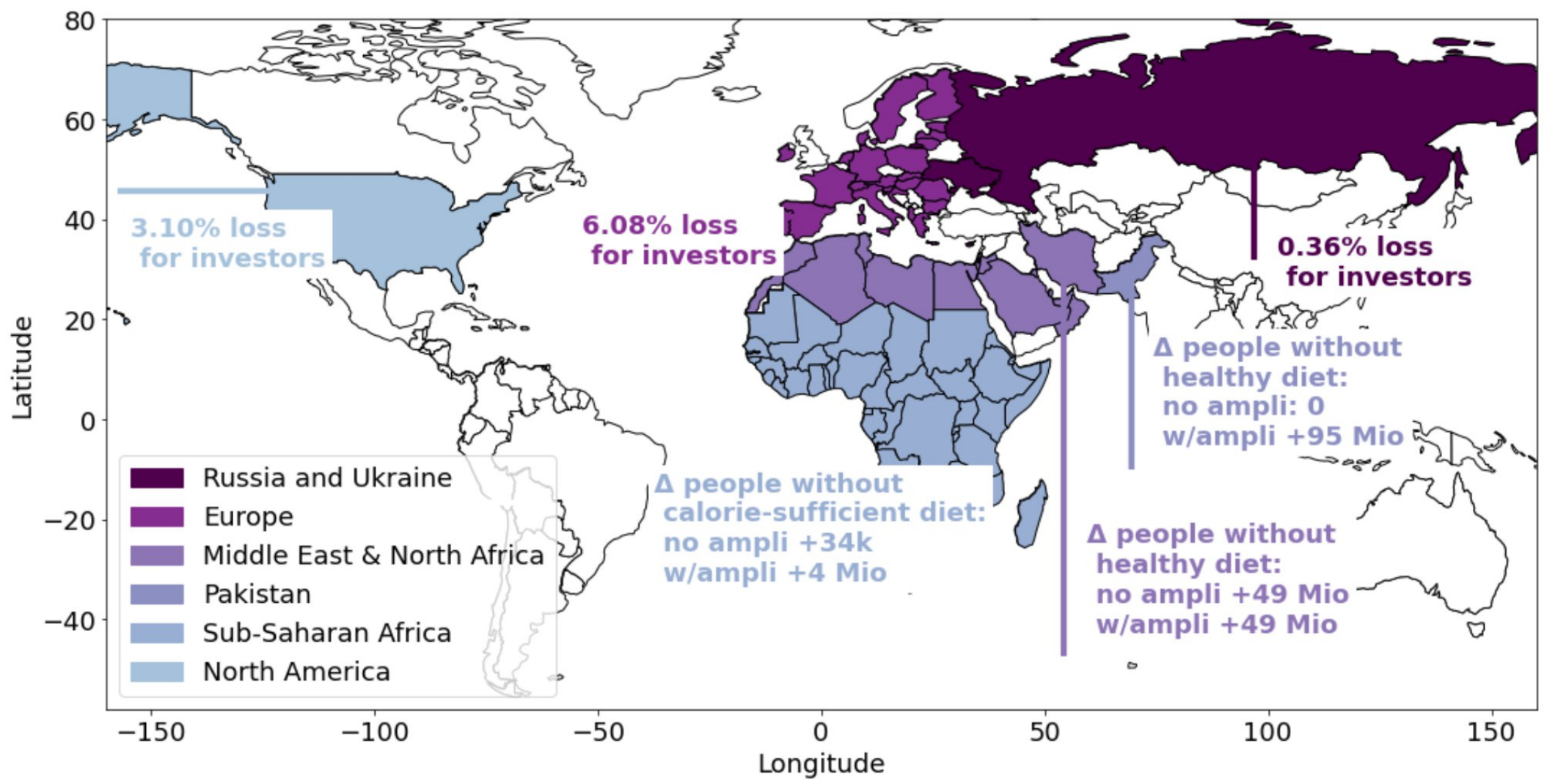
Food security – calorie sufficient & healthy diet

Additional people through price shocks

- Calorie sufficient: 0.16 ☾ 10.4 mio
  Amplification of **65x**
  Most affected: extremely poor people(living from < 2.15$ / day)

- Healthy diet: 62 ☾ 158 mio
  Amplification of **2.5x**
  Most affected: near poor people(living from < 6.85$ / day)

Food security – calorie sufficient & healthy diet



Conclusion

- Avoiding concentrated dependencies on individual trading partners and diversifying supply -> key measure
- Reduced dependency reduces volatility & commodity shocks on financial markets
  - also relevant for food security
- Domestic production in some strategic sectors may also help cushion immediate shocks and provide time to redirect imports

Future work

- Integration of feedback loops financial & macroeconomic model
  - include price shocks induced through financial actors' expectations in the ICES model
- Extensions of the amplification analysis:
  persistency of the shocks &
  interaction of fiscal and financial policies
- Broadening of the market coverage in the financial analysis
- Extension of the food affordability analysis
  energy prices, national food yields, access to local markets etc

Thanks!

Integrating methods