EUROPEAN CENTRAL BANK

EUROSYSTEM

The Economic Costs of Supply Chain Decoupling

ASSA conference

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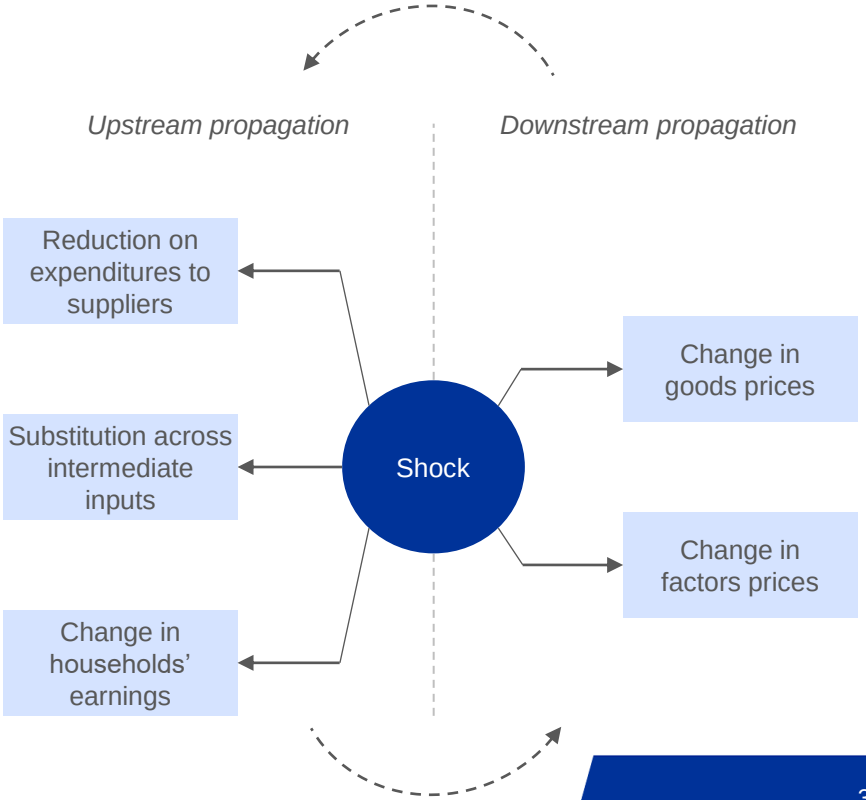
Motivation and key findings

- Increasing role of **geopolitical considerations** in global trade relations

- Growing literature on the impact of **a reversal of GVC integration**

- We quantify a range of **fragmentation scenarios** using Baqaee and Farhi (2023)
  - → Accounting for rigidities
  - → Impact beyond welfare (prices, trade, wages)

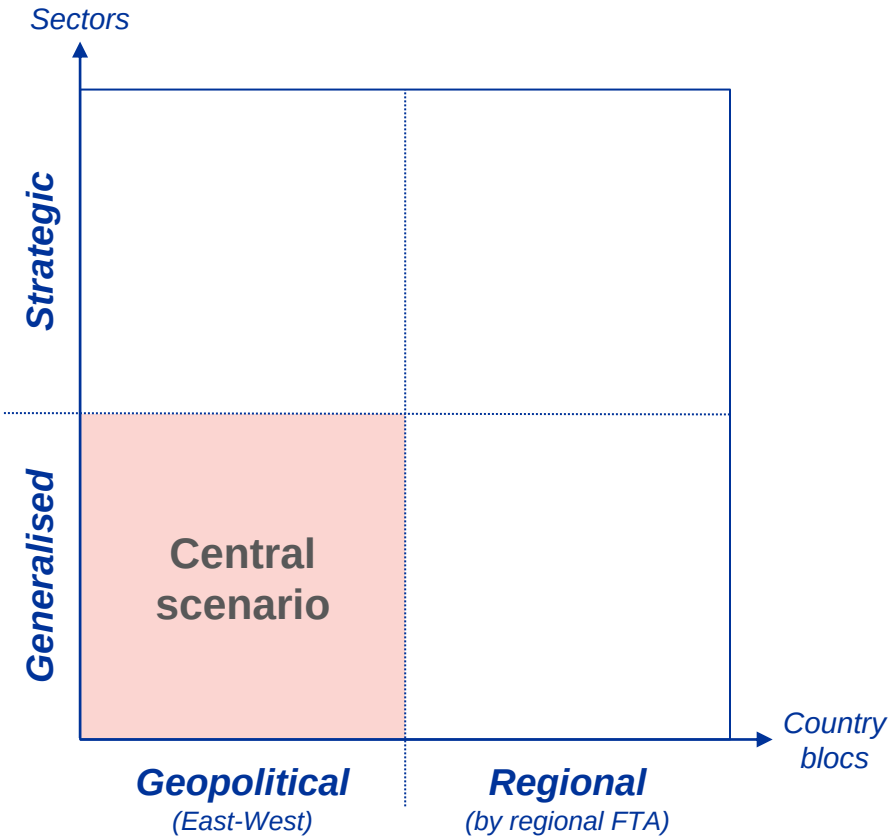
Baqaee-Farhi model



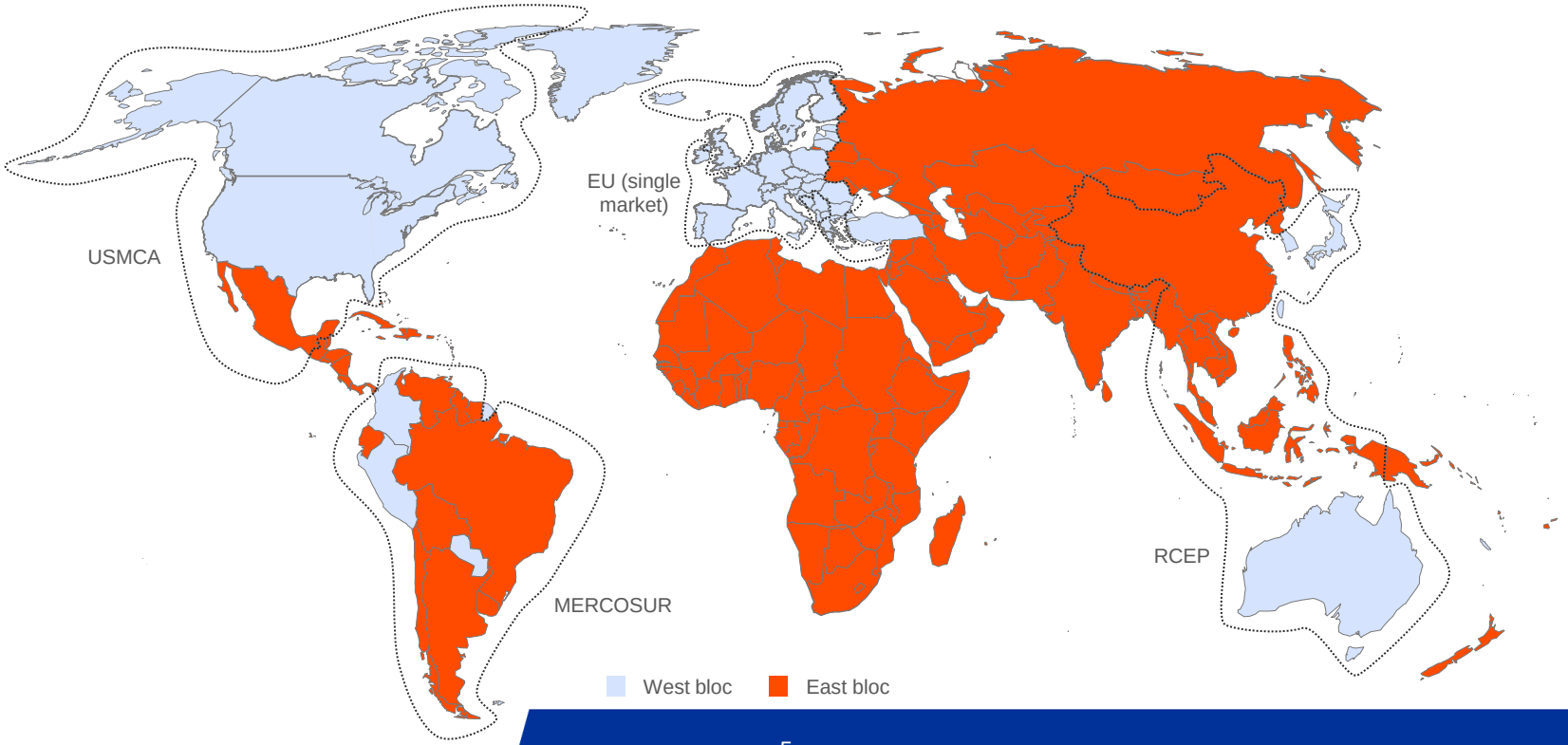
- **41 countries / 30 sectors** model accounting for global sectoral interlinkages
- Accounts for **non-linearities** while other workhorse trade models rely on linear production functions
- Propagation both to **downstream consumers** (prices) and to **upstream suppliers** (revenues)
- Impact dependent on the **direct and indirect linkages** given by the input-output structure

Uncertain decoupling

- Increase in **iceberg trade costs** (non-tariffs barriers)
- Shock on trade in **intermediates** but not in final products – reflecting recent friend-shoring policies
- **150 p.p.** increase as a stylised exercise to shut down GVC – in line with literature (Bachmann et al, 2022; Goes and Bekker, 2022)



Heterogenous country blocs



Notes: Mechanical allocation based on UN voting. Africa, Middle East, Ukraine, New Zealand, Israel, and Moldova belong to the “Rest of the World” aggregate in ADB IO table and are allocated collectively

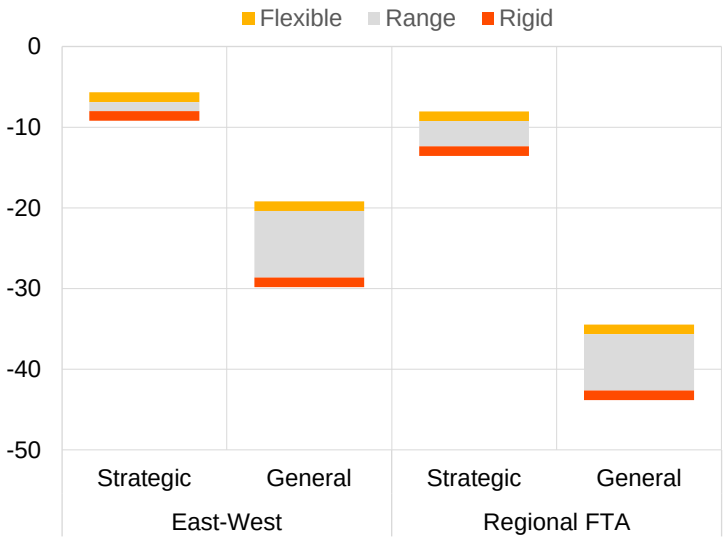
Accounting for rigidities

	Flexible	Rigid
Wage flexibility	• **Flexible** with exogenous (**constant**) supply of labour	• Sticky: **constant** with endogenous (**flexible**) supply of labour
Substitution elasticities	• 90% **upper** confidence band from Atalay (2017) across inputs • **Unitary elasticity** (Cobb-Douglas) across factors	• **Lower** estimates from Atalay (2017) across inputs • **Severe** elasticity of Bachmann et al. (2022) across factors

Trade effects

Real imports

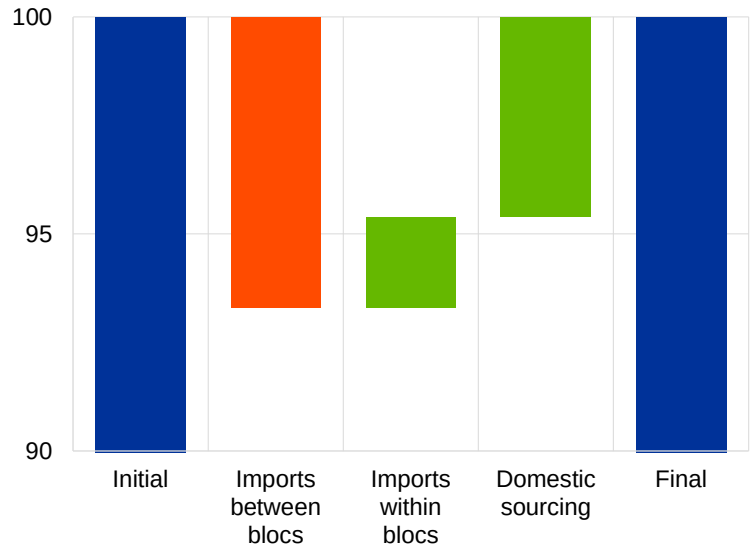
(World, percentage deviation from steady state)



Sources: Baqaee and Farhi (2023), FPS, ADB MRIO, and ECB staff calculations.
Note: Non-linear impact simulated through 25 iterations of the log-linearized model.

Sourcing of intermediate inputs

(World, percentage points, market share)

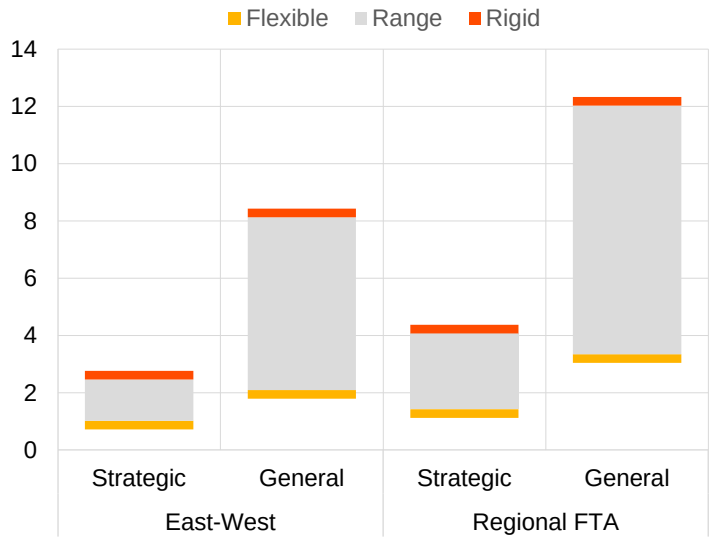


Sources: Baqaee and Farhi (2023), FPS, ADB MRIO, and ECB staff calculations.
Note: Non-linear impact simulated through 25 iterations of the log-linearized model.
The chart refers to the *central* scenario (East-West decoupling generalized across sectors) under the *flexible* setup.

Prices and wages impact

Consumer prices

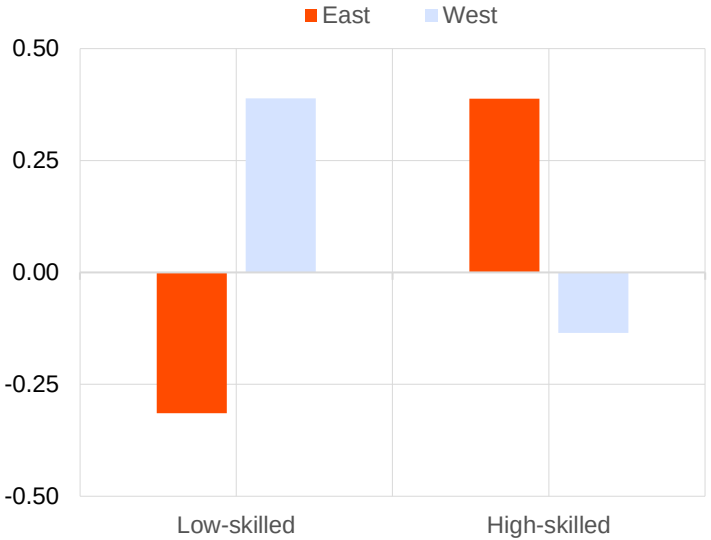
(World, percentage deviation from steady state)



Sources: Baqaee and Farhi (2023), FPS, ADB MRIO, and ECB staff calculations.
Note: Non-linear impact simulated through 25 iterations of the log-linearized model.

Wages (*central* scenario, *flexible* setup)

(percentage deviation from steady state, relative to medium-skilled)

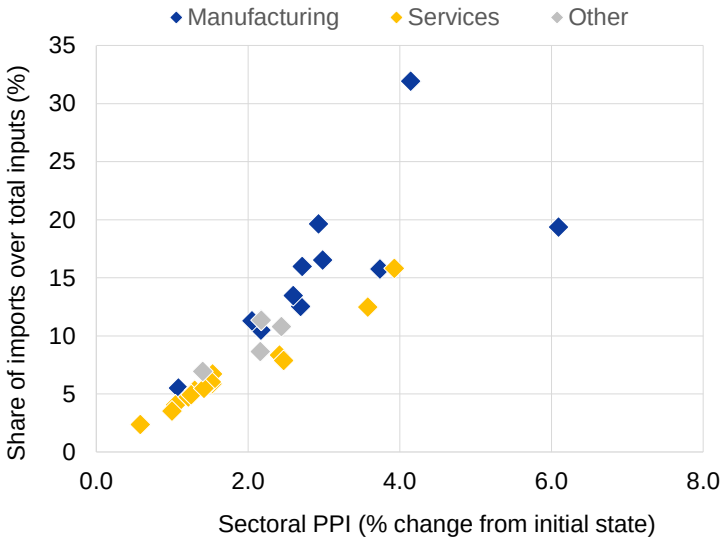


Sources: Baqaee and Farhi (2023), Foreign Policy Similarity database, ECB staff calculations
Notes: Non-linear impact simulated through 25 iterations of the log-linearized model

Sector and country heterogeneities

Sectoral prices (*central* scenario, *flexible* setup)

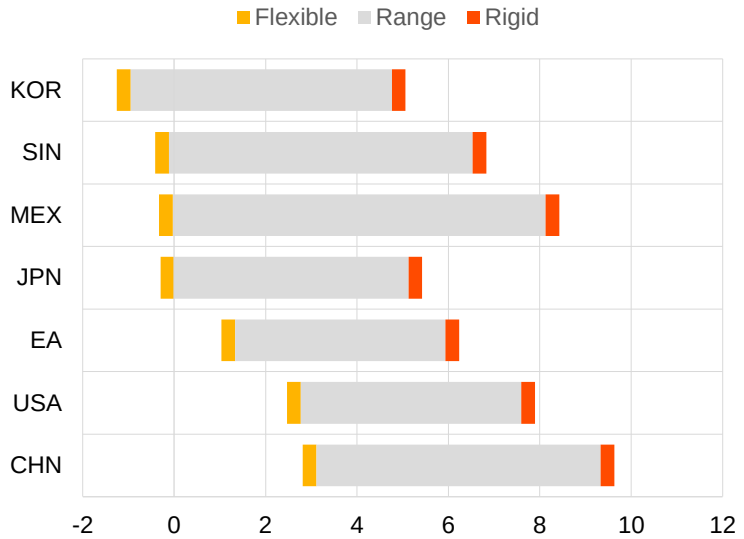
(World, percentage deviation from steady state)



Sources: Baqaee and Farhi (2023), FPS, ADB MRIO, and ECB staff calculations.
Note: Non-linear impact simulated through 25 iterations of the log-linearized model.

Country consumer prices (*central* scenario)

(percentage deviation from steady state)

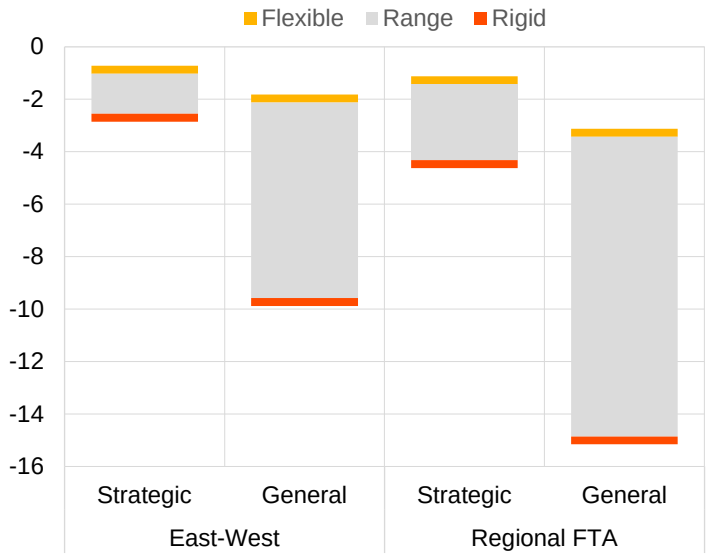


Sources: Baqaee and Farhi (2023), FPS, ADB MRIO, and ECB staff calculations.
Note: Non-linear impact simulated through 25 iterations of the log-linearized model.

Welfare effects

Real GNE

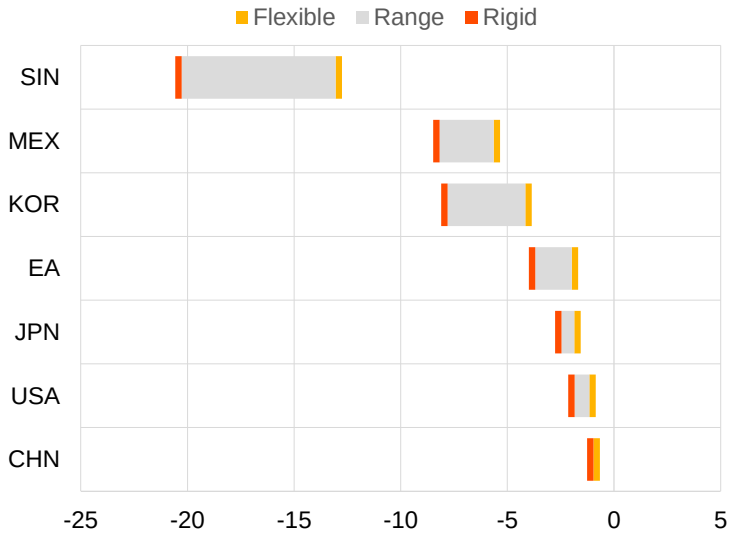
(World, percentage deviation from steady state)



Sources: Baqaee and Farhi (2023), FPS, ADB MRIO, and ECB staff calculations.
Notes: Non-linear impact simulated through 25 iterations of the log-linearized model.
"GNE" = Gross National Expenditures.

Country real GNE (*central* scenario)

(percentage deviation from steady state)



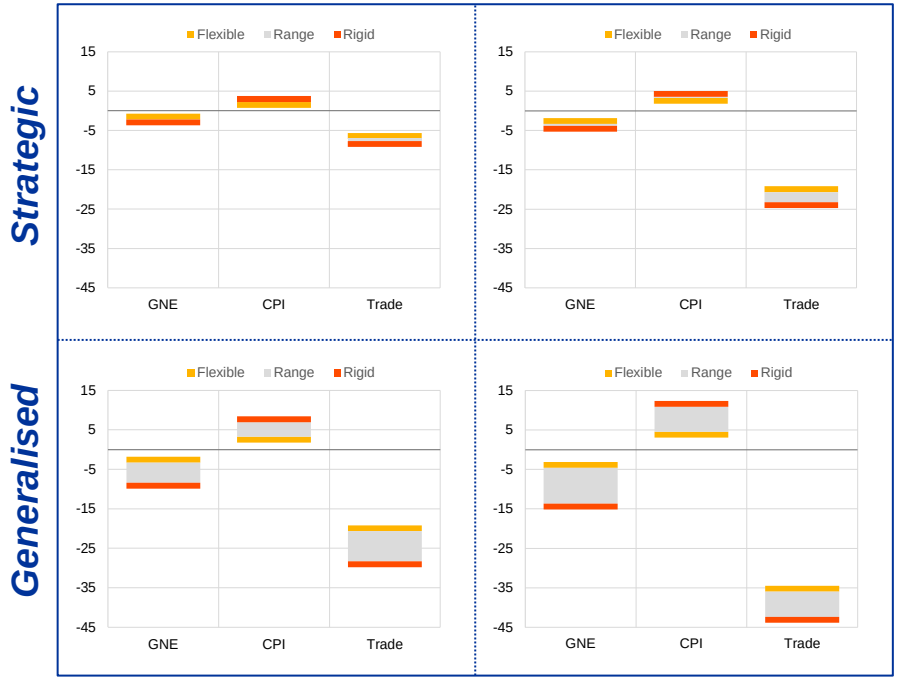
Sources: Baqaee and Farhi (2023), FPS, ADB MRIO, and ECB staff calculations.
Notes: Non-linear impact simulated through 25 iterations of the log-linearized model.
"GNE" = Gross National Expenditures.

Conclusion

- Welfare losses in line with literature for the *flexible* setup but magnified when **accounting for rigidities**
- **Lose-lose situation** with all countries losing welfare across all scenarios – along with global trade losses
- Fragmentation also having an **upward effect on price levels**

Summary of GNE, CPI, and trade effects

(percentage deviation from steady state)

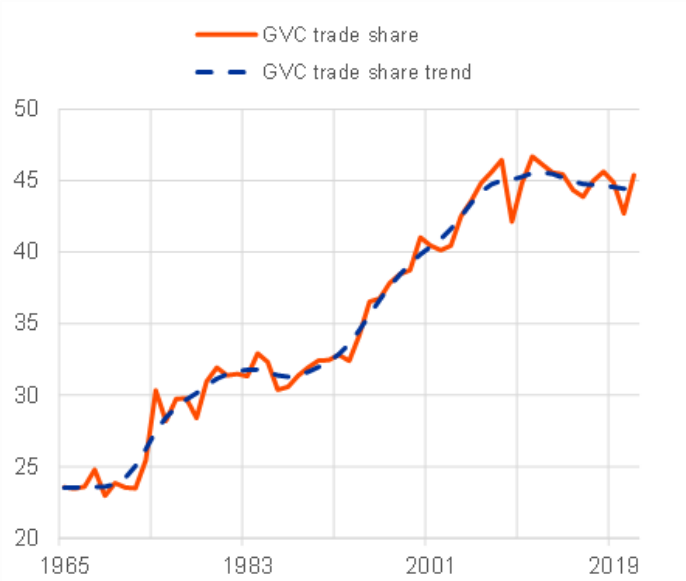


THANK YOU

- ECB Bulletin: https://www.ecb.europa.eu/pub/economic-bulletin/focus/2023/html/ecb.ebbox202302_03~d4063f8791.en.html
- Working paper: https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2839~aaf35001a3.en.pdf
- Quantification of IRA: https://cepr.org/voxeu/columns/unfriendly-friends-trade-and-relocation-effects-us-inflation-reduction-act

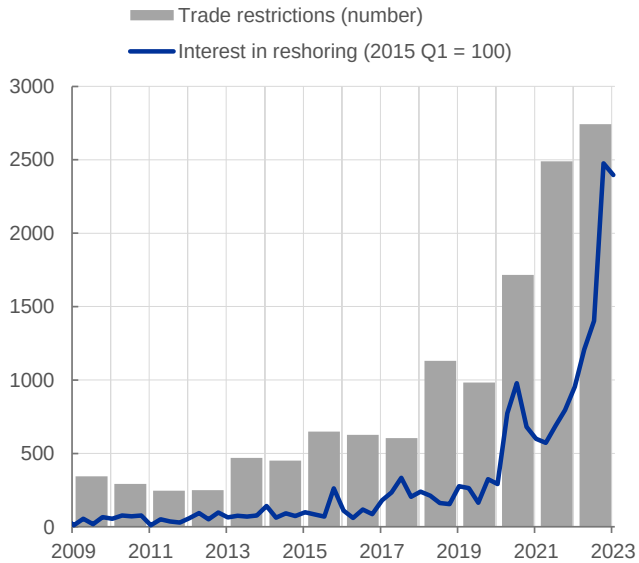
Slow-balisation

GVC related trade
(share of total trade)



Sources: ECB staff, WIOD, OECD TiVA, Trade Data Monitor
Notes: Trade flows are considered related to GVC if they cross at least two borders before reaching the final consumer – as per the definition in Hummels et al. (2001)

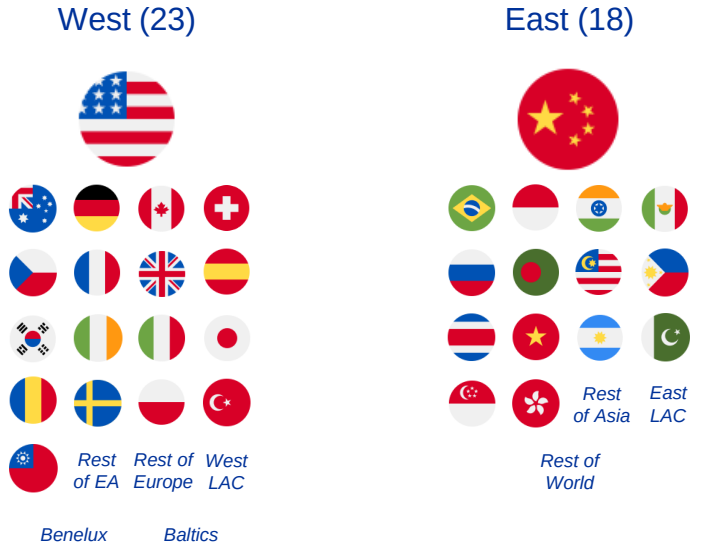
Trade restrictions and friend-shoring
(number and index)



Sources: NL Analytics, Global Trade Alert, and ECB staff calculations.
Notes: Frequency of the terms "reshoring", "nearshoring" and “friend-shoring” occurrence in firms' earnings calls. Index 2015 Q1=100. Trade restrictions refer to number of harmful interventions

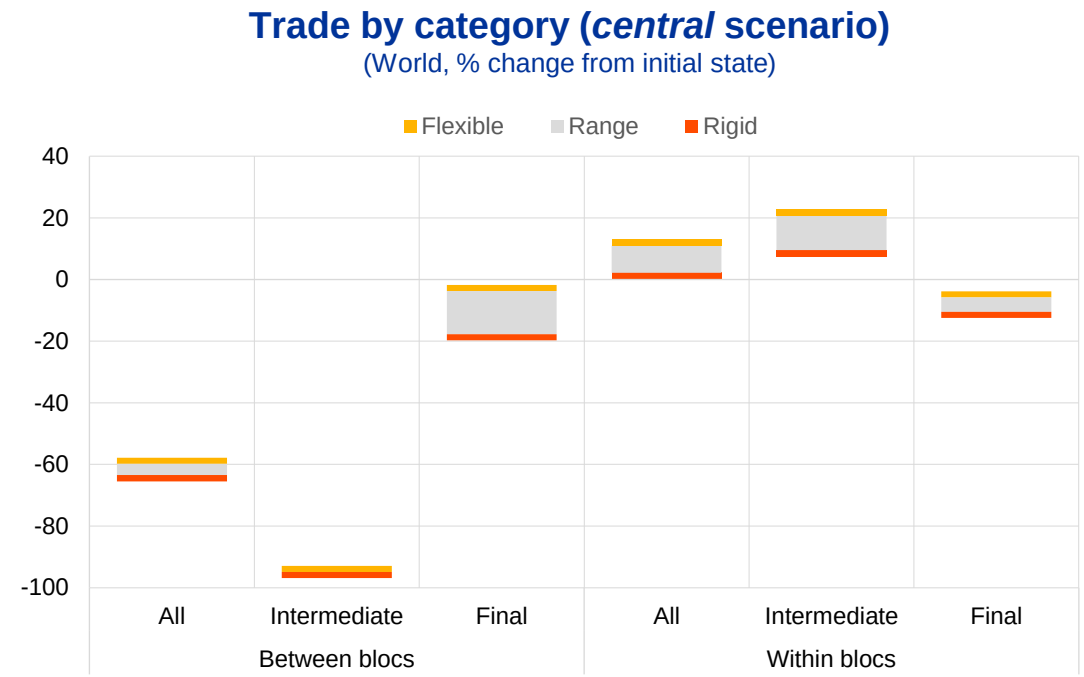
Geopolitical lines

- Based on the **Foreign Policy Similarity** database (Hage, 2017) measuring similarity of voting at the UN between country pairs
- Countries **mechanically allocated** to blocs depending on pairwise similarity with US and China
- Approach closely related to the **literature** (Goes and Bekker, 2022; Campos et al., 2023)



Notes: Benelux = Belgium, Netherlands, Luxembourg;
Rest of Europe = Bulgaria, Denmark, Hungary, Norway;
Rest of EA = Austria, Cyprus, Croatia, Finland, Greece, Malta, Portugal, Slovakia, Slovenia;
Baltics = Estonia, Latvia, Lithuania;
Rest of Asia = Kazakhstan, Mongolia, Fiji, Laos, Brunei, Bhutan, Kyrgyz Republic, Cambodia, Maldives, Nepal, Sri Lanka;
West LAC (Latin America) = Colombia, Paraguay, Peru
East LAC (Latin America) = Bolivia, Chile, Ecuador, Uruguay, Venezuela

Trade by category

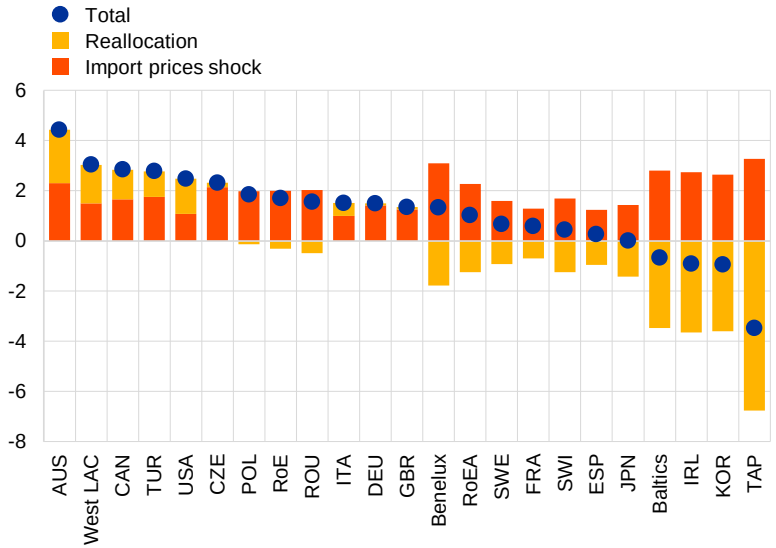


Sources: Baqaee and Fahri (2023), Foreign Policy Similarity database, ECB staff calculations
Notes: Non-linear impact simulated through 25 iterations of the log-linearized model

CPI decomposition

CPI decomposition (central, flexible)

(West, p.p., % change from initial state)



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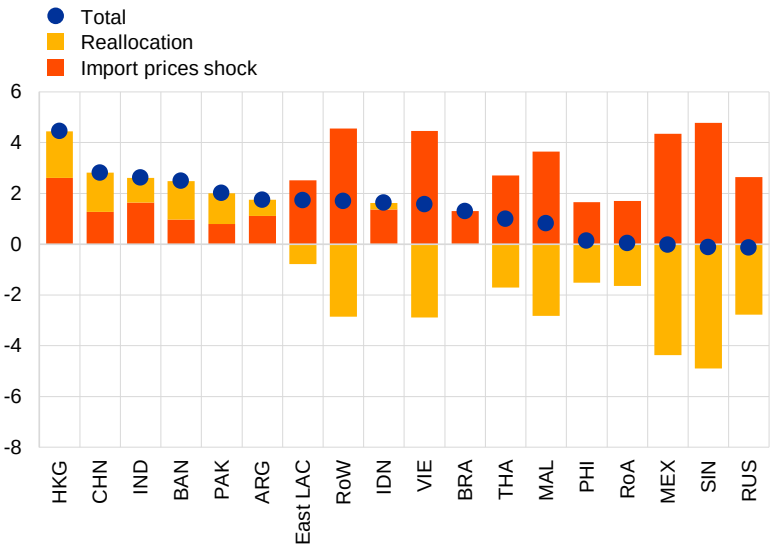
CPI decomposition (central, flexible)

(East, p.p., % change from initial state)



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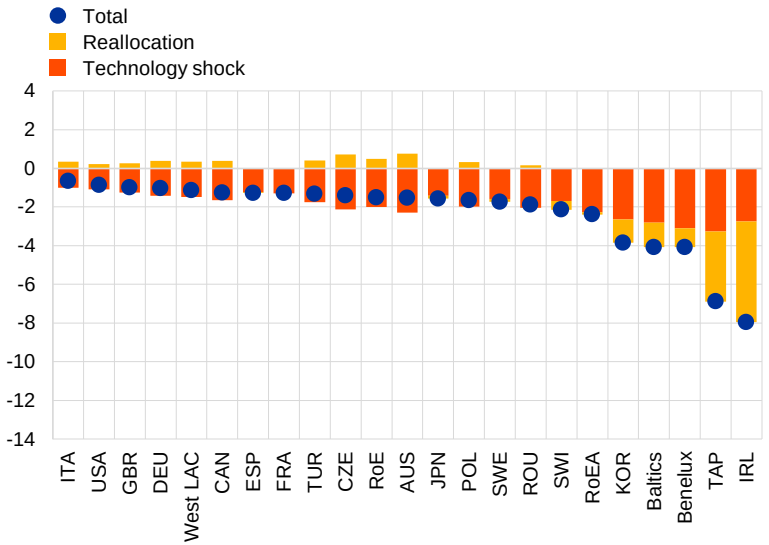
GNE decomposition

GNE decomposition (central, flexible)

(West, p.p., % change from initial state)



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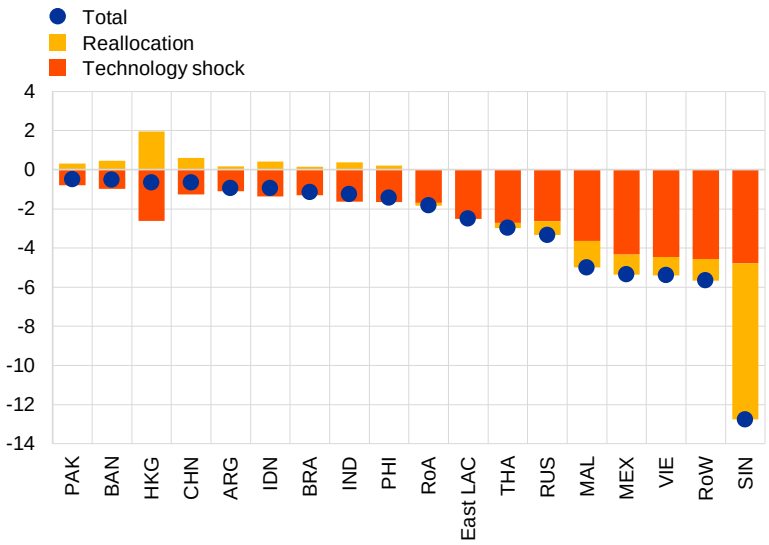
GNE decomposition (central, flexible)

(East, p.p., % change from initial state)

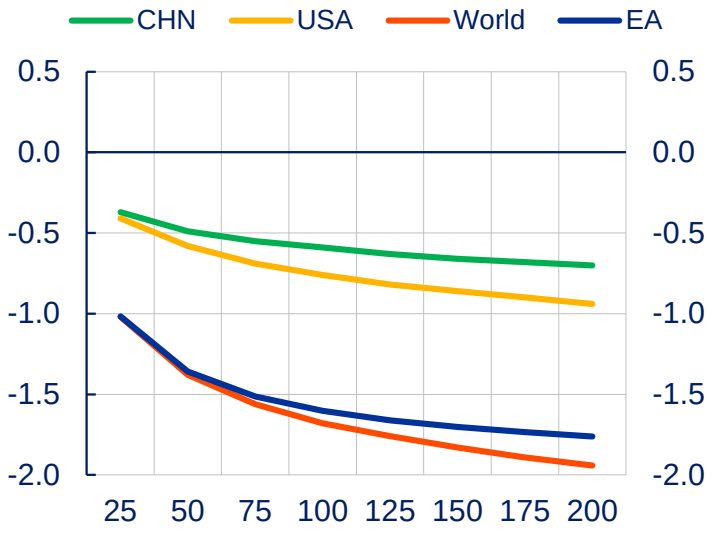


Sources: Baqaee and Fahri (2023), Foreign Policy Similarity database, ECB staff calculations
Notes: Non-linear impact simulated through 25 iterations of the log-linearized model

Robustness

Real GNE impact

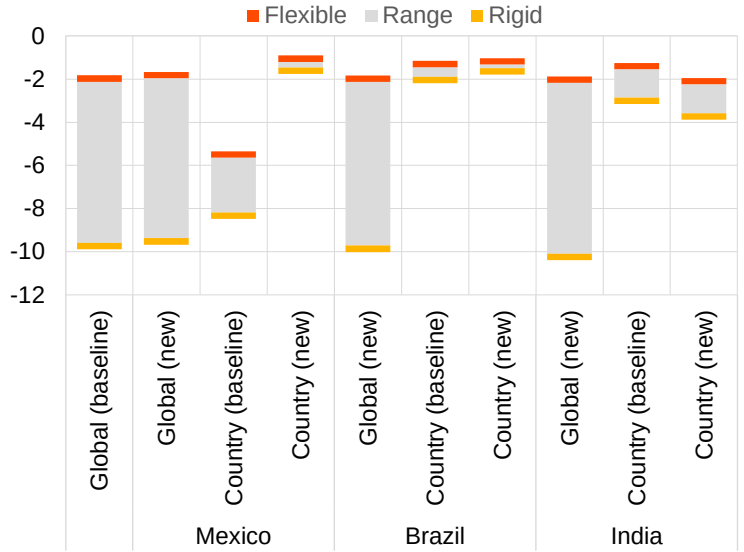
(% change from initial state, by magnitude of iceberg trade costs)



Sources: Baqaee and Fahri (2023), Foreign Policy Similarity database, ECB staff calculations
Notes: Non-linear impact simulated through 25 iterations of the log-linearized model

Real GNE losses under alternative blocs

(% change from initial state)



Sources: Baqaee and Fahri (2023), Foreign Policy Similarity database, ECB staff calculations
Notes: Non-linear impact simulated through 25 iterations of the log-linearized model

Overview of Baqaee and Fahri (2023)

General framework

- Multi-country multi-sector model accounting for **global production networks**
- Two types of **trade barriers**: iceberg trade costs (akin to transportation costs) and tariffs
- **EXT extension** of model:
  - Exploration of rigidities to model **transition effects**
  - Estimation of **various variables** (GNE, trade flows, prices, wages)
  - Calibration with up-to-date Input Output data covering 75 countries and 30 sectors

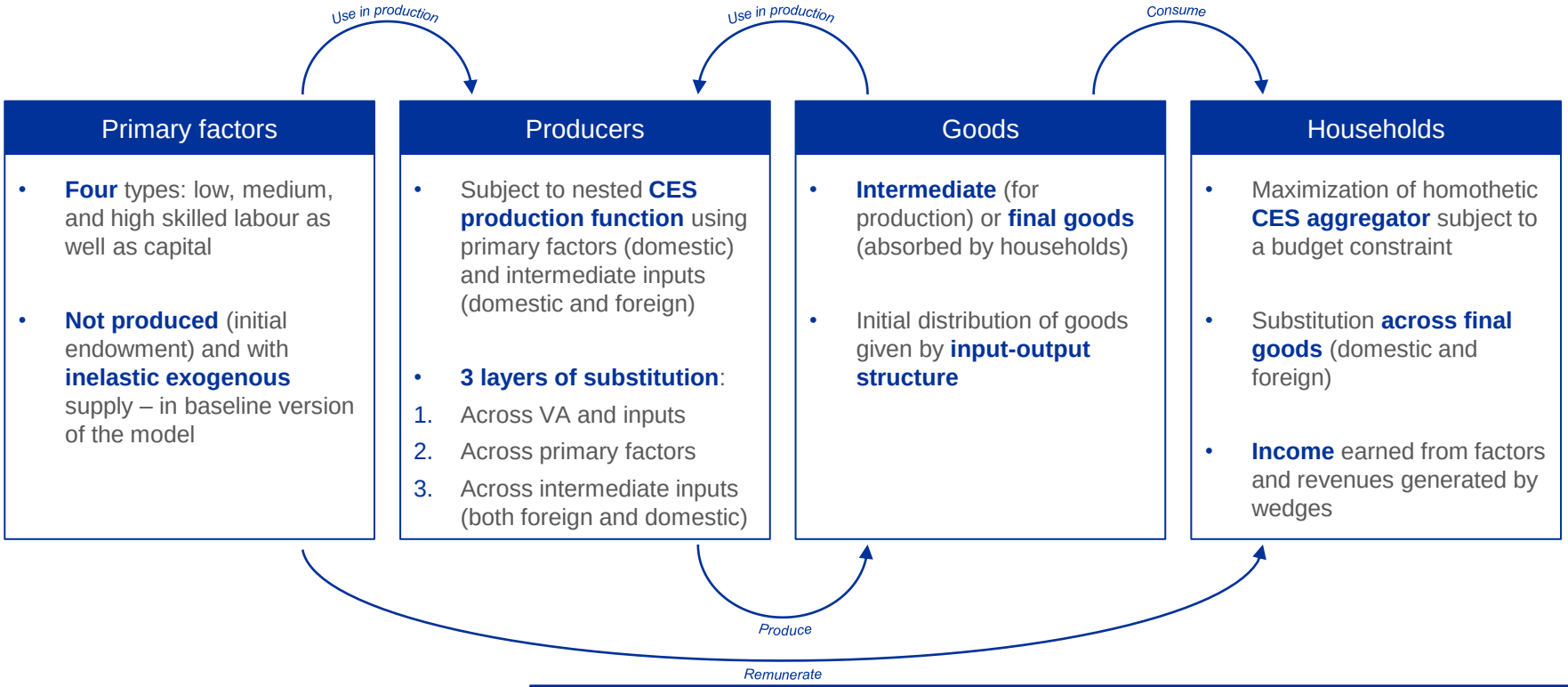
Comparative advantages

- Design of **tailored scenarios:**
  - Different trade barriers, types of goods (intermediate or final), and bilateral country-sector pairs
  - Multiple extensions for rigidities (e.g. sticky wages)
- **Non-linear** production functions – can be viewed as generalization of usual models such as Caliendo and Parro (2015) using Cobb-Douglas functions

Limitations

- **Steady-state** model (no dynamics)
- No endogenous response of **productivity**
- No business cycle or financial **amplification effects**
- Uncertainty around calibration of elasticities of **substitution**

Baqaee-Fahri – main structure



New Input-Output structure

	Baqaee and Fahri (2023)	Updated
Source	• WIOD • 2008	• **ADB**: “extended” WIOD with similar structure but more extensive coverage • **2017** – rather than 2021 due to lower country coverage and Covid distortions

Countries	• 41
	• Low coverage of emerging
	• Uneven split between East (7) and West (34)
		• 73 in initial ADB – aggregated into **41** due to computation issues
		  • Grouping of **smallest** countries
		  • Grouping **within** same bloc and with **broadly similar exposure** to other bloc
		  • Keeping initial ADB **East-West split** (55% West bloc)

Factors	• 4 factors (capital, low-, medium-, high-skilled labour) • No source of labour split in Baqaee and Fahri (2023)	• For WIOD countries, **country-sector- specific** split between capital and low- / medium- / high-skilled labour based on Baqaee and Fahri (2023) • For non-WIOD countries, **averages per sector** split between capital and low- / medium- / high-skilled labour, across WIOD countries

Geopolitical blocs

WIOD 2008

West (34)

East (7)

ADB 2017

West (23)

East (18)

Notes: Benelux = Belgium, Netherlands, Luxembourg;
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Rest of EA = Austria, Cyprus, Croatia, Finland, Greece, Malta, Portugal, Slovakia, Slovenia;
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Rest of Asia = Kazakhstan, Mongolia, Fiji, Laos, Brunei, Bhutan, Kyrgyz Republic, Cambodia, Maldives, Nepal, Sri Lanka;
West LAC (Latin America) = Colombia, Paraguay, Peru
East LAC (Latin America) = Bolivia, Chile, Ecuador, Uruguay, Venezuela

Summary of literature

Modelling framework

- **Eaton-Kortum** class of multi-country multi-sector models (Caliendo and Parro, 2015; Antras and Chor, 2018) sometimes with **add-ons** on labour mobility and knowledge diffusion
- **Large macroeconomic models** (OECD, WB)
- **Other** methods (HEM, gravity model, GTAP)

Calibration of scenario

Variables shocked

- **Iceberg trade costs** and/or **tariffs** increased by various degrees (10% to infinity)
- Iceberg trade costs shocks to **intermediate goods** with some extensions to all trade (incl. final goods) – tariffs in general applied to all imports (intermediate and final)
- Some adding national **subsidies** (1% GDP) and lowered import **elasticities** (by 50%)

Geography

- **Global** in most cases
- Breakdown by **geopolitical blocs** for some (West vs. East; high-income vs. rest of the world; US vs. China; EU vs. rest of the world) with the presence of a neutral bloc in some papers

Results

- **Welfare losses** at global level (1-5% in general)
- Losses in all individual economies with **small open economies** more reliant on GVCs more affected (up to 40% in some cases)
- Renationalization of GVCs translating into **lower resilience** to shocks

Closely related papers

	Modelling framework	Calibration of scenario	Results
Eppinger et al. (2021)	• Antras and Chor (2018) with **imperfect intersectoral mobility of labour**	• **Iceberg trade costs** for global trade in intermediate goods set to infinity (GVC shutdown)	• **Welfare losses** between 2.5% (US) and 38% (LU) • Stronger effect when shocking **intermediate** than final goods
Felbermayr et al. (2022)	• Caliendo and Parro (2015)	• **Doubling of non-tariff barriers on imports** across all sectors between US allies and BRIC	• **Almost zero** bilateral trade • Welfare losses **-3.8% in BRIC** and -1.2% in West bloc
Goes and Bekker (2022)	• Caliendo and Parro (2015) with **endogenous knowledge diffusion**	• Increase in iceberg trade costs (+160 p.p.) or in tariffs (+32 p.p.) between **West and East blocs**	• Global welfare losses of **5%** • Losses **largely higher** with knowledge diffusion
Campos et al. (2022)	• **Gravity** trade model	• Increase in trade restrictions (MATR) between **West and East, but with neutral bloc**	• Trade reduced by **20% to 50%** • Losses **larger in East bloc**