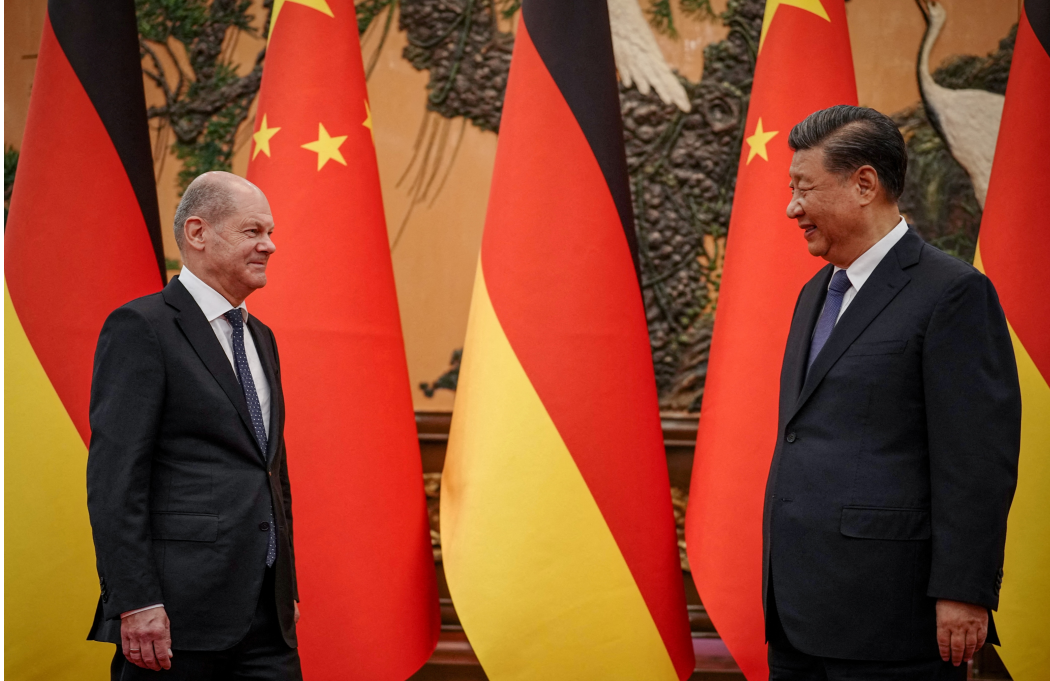
What If? The Effects of a Hard Decoupling from China on the German Economy

SED Barcelona — June 28, 2024

David Baqaee,[1] **Julian Hinz**,[2] Benjamin Moll,[3] Moritz Schularick,[4]
Feodora Teti,[5] Joschka Wanner,[6] and Sihwan Yang.[7]

[1] UCLA, CEPR, & NBER; [2] Bielefeld University & Kiel Institute for the World Economy; [3] London School of Economics; [4] Kiel Institute for the World Economy & Sciences Po; [5] Ifo Institute for Economic Research & University of Munich; [6] University of Würzburg & Kiel Institute for the World Economy; [7] IMF.





Motivation

- China is an important economic partner for Germany.
- “Turning our back” on China in the sense of a strict de-coupling is likely to come at considerable costs (see e.g. Bundesbank Monthly Report Jan 2024).
- Just how costly?
- We try to quantify the costs of a potential trade decoupling.

Motivation

- China is an important economic partner for Germany.
- “Turning our back” on China in the sense of a strict de-coupling is likely to come at considerable costs (see e.g. Bundesbank Monthly Report Jan 2024).
- Just how costly?
- We try to quantify the costs of a potential trade decoupling.

Motivation

- China is an important economic partner for Germany.
- “Turning our back” on China in the sense of a strict de-coupling is likely to come at considerable costs (see e.g. Bundesbank Monthly Report Jan 2024).
- Just how costly?
- We try to quantify the costs of a potential trade decoupling.

Motivation

- China is an important economic partner for Germany.
- “Turning our back” on China in the sense of a strict de-coupling is likely to come at considerable costs (see e.g. Bundesbank Monthly Report Jan 2024).
- Just how costly?
- We try to quantify the costs of a potential trade decoupling.

Economic context

	Sector	Share of China in total sector trade (in %)	Share of total sector trade in GNE (in %)	Share in GNE (in %)
Imports	Animal & Animal Products	2.41	0.62	0.01
	Vegetable Products	1.34	1.21	0.02
	Foodstuffs	1.28	1.13	0.01
	Mineral Products	0.11	2.46	0.00
	Chemicals & Allied Industries	4.91	4.32	0.21
	Plastics / Rubbers	6.10	1.81	0.11
	Raw Hides, Skins, Leather, & Furs	22.14	0.13	0.03
	Wood & Wood Products	3.92	0.86	0.03
	Textiles	15.20	1.45	0.22
	Footwear / Headgear	17.26	0.37	0.06
	Stone / Glass	4.10	1.21	0.05
	Metals	6.13	2.91	0.18
	Machinery / Electrical	16.10	8.57	1.38
	Transportation	3.13	3.61	0.11
	Miscellaneous	15.50	2.33	0.36
	Service	3.31	0.27	0.01
	Total	8.45	33.26	2.81

	Sector	Share of China in total sector trade (in %)	Share of total sector trade in GNE (in %)	Share in GNE (in %)
Exports	Animal & Animal Products	2.62	0.57	0.01
	Vegetable Products	0.64	0.52	0.00
	Foodstuffs	1.44	1.19	0.02
	Mineral Products	0.97	0.82	0.01
	Chemicals & Allied Industries	4.36	5.98	0.26
	Plastics / Rubbers	4.68	2.42	0.11
	Raw Hides, Skins, Leather, & Furs	3.45	0.09	0.00
	Wood & Wood Products	3.09	1.02	0.03
	Textiles	1.56	1.04	0.02
	Footwear / Headgear	0.54	0.26	0.00
	Stone / Glass	3.37	0.99	0.03
	Metals	4.31	3.09	0.13
	Machinery / Electrical	10.37	10.88	1.13
	Transportation	10.70	6.07	0.65
	Miscellaneous	9.61	2.93	0.28
	Service	2.05	0.26	0.01
	Total	7.08	38.13	2.70

Quantitative model

Key Model Features

- Baqaee and Farhi (2024): “Networks, Barriers, and Trade”

  → trade model with international production networks and arbitrary wedge-like distortions like markups, tariffs, or nominal rigidities

- We use the nested CES version of the model.

  → Preferences across origins and across sectors ▸ Preferences

  → Production across different factors and across intermediates from different origins and sectors, as well as across intermediate and factor bundles ▸ Production

- International trade is subject to iceberg trade costs and tariffs; standard gravity pattern for bilateral trade flows. ▸ Gravity

- Perfect competition; goods and factor markets clear. ▸ Equilibrium

Key Model Features

- Baqaee and Farhi (2024): “Networks, Barriers, and Trade”

  → trade model with international production networks and arbitrary wedge-like distortions like markups, tariffs, or nominal rigidities

- We use the nested CES version of the model.

  → Preferences across origins and across sectors ▸ Preferences

  → Production across different factors and across intermediates from different origins and sectors, as well as across intermediate and factor bundles ▸ Production

- International trade is subject to iceberg trade costs and tariffs; standard gravity pattern for bilateral trade flows. ▸ Gravity

- Perfect competition; goods and factor markets clear. ▸ Equilibrium

Key Model Features

- Baqaee and Farhi (2024): “Networks, Barriers, and Trade”

  → trade model with international production networks and arbitrary wedge-like distortions like markups, tariffs, or nominal rigidities

- We use the nested CES version of the model.

  → Preferences across origins and across sectors ▸ Preferences

  → Production across different factors and across intermediates from different origins and sectors, as well as across intermediate and factor bundles ▸ Production

- International trade is subject to iceberg trade costs and tariffs; standard gravity pattern for bilateral trade flows. ▸ Gravity

- Perfect competition; goods and factor markets clear. ▸ Equilibrium

Key Model Features

- Baqaee and Farhi (2024): “Networks, Barriers, and Trade”

  → trade model with international production networks and arbitrary wedge-like distortions like markups, tariffs, or nominal rigidities

- We use the nested CES version of the model.

  → Preferences across origins and across sectors ▸ Preferences

  → Production across different factors and across intermediates from different origins and sectors, as well as across intermediate and factor bundles ▸ Production

- International trade is subject to iceberg trade costs and tariffs; standard gravity pattern for bilateral trade flows. ▸ Gravity

- Perfect competition; goods and factor markets clear. ▸ Equilibrium

Key Model Features

- Baqaee and Farhi (2024): “Networks, Barriers, and Trade”

  → trade model with international production networks and arbitrary wedge-like distortions like markups, tariffs, or nominal rigidities

- We use the nested CES version of the model.

  → Preferences across origins and across sectors ▸ Preferences

  → Production across different factors and across intermediates from different origins and sectors, as well as across intermediate and factor bundles ▸ Production

- International trade is subject to iceberg trade costs and tariffs; standard gravity pattern for bilateral trade flows. ▸ Gravity

- Perfect competition; goods and factor markets clear. ▸ Equilibrium

Key Model Features

- Baqaee and Farhi (2024): “Networks, Barriers, and Trade”

  → trade model with international production networks and arbitrary wedge-like distortions like markups, tariffs, or nominal rigidities

- We use the nested CES version of the model.

  → Preferences across origins and across sectors ▸ Preferences

  → Production across different factors and across intermediates from different origins and sectors, as well as across intermediate and factor bundles ▸ Production

- International trade is subject to iceberg trade costs and tariffs; standard gravity pattern for bilateral trade flows. ▸ Gravity

- Perfect competition; goods and factor markets clear. ▸ Equilibrium

Key Model Features

- Baqaee and Farhi (2024): “Networks, Barriers, and Trade”

  → trade model with international production networks and arbitrary wedge-like distortions like markups, tariffs, or nominal rigidities

- We use the nested CES version of the model.

  → Preferences across origins and across sectors ▸ Preferences

  → Production across different factors and across intermediates from different origins and sectors, as well as across intermediate and factor bundles ▸ Production

- International trade is subject to iceberg trade costs and tariffs; standard gravity pattern for bilateral trade flows. ▸ Gravity

- Perfect competition; goods and factor markets clear. ▸ Equilibrium

Calibration and Parametrization

- Data for calibration: World Input-Output Database for 2014 (43 countries, 56 sectors)
- For the elasticities of substitution between sectors in consumption (σ), between value added and intermediates (θ), between primary factors (γ), and between intermediates from different sectors (η), we follow Baqaee and Farhi (2024) and Atalay (2017) and chose:

$$(\sigma, \theta, \gamma, \eta) = (0.9, 0.5, 1, 0.2).$$

- We also consider an alternative case with extremely low elasticities for robustness:

$$(\sigma, \theta, \gamma, \eta) = (0.01, 0.01, 0.01, 0.01).$$

Calibration and Parametrization

- Data for calibration: World Input-Output Database for 2014 (43 countries, 56 sectors)
- For the elasticities of substitution between sectors in consumption (σ), between value added and intermediates (θ), between primary factors (γ), and between intermediates from different sectors (η), we follow Baqaee and Farhi (2024) and Atalay (2017) and chose:

$$(\sigma, \theta, \gamma, \eta) = (0.9, 0.5, 1, 0.2).$$

- We also consider an alternative case with extremely low elasticities for robustness:

$$(\sigma, \theta, \gamma, \eta) = (0.01, 0.01, 0.01, 0.01).$$

Calibration and Parametrization

- Data for calibration: World Input-Output Database for 2014 (43 countries, 56 sectors)
- For the elasticities of substitution between sectors in consumption (σ), between value added and intermediates (θ), between primary factors (γ), and between intermediates from different sectors (η), we follow Baqaee and Farhi (2024) and Atalay (2017) and chose:

$$(\sigma, \theta, \gamma, \eta) = (0.9, 0.5, 1, 0.2).$$

- We also consider an alternative case with extremely low elasticities for robustness:

$$(\sigma, \theta, \gamma, \eta) = (0.01, 0.01, 0.01, 0.01).$$

Trade elasticity

- One key elasticity for how painful a China decoupling is, is the trade elasticity.

  → Substitutability across origins

- A standard choice in line with Simonovska and Waugh (2014), as well as Head and Mayer (2014) is $\epsilon = 4$.

- In the short run, the elasticity is potentially (much) smaller.

  → We use additional, short-term estimates.

Trade elasticity

- One key elasticity for how painful a China decoupling is, is the trade elasticity.

  $\rightarrow$ Substitutability across origins

- A standard choice in line with Simonovska and Waugh (2014), as well as Head and Mayer (2014) is $\epsilon = 4$.

- In the short run, the elasticity is potentially (much) smaller.

  $\rightarrow$ We use additional, short-term estimates.

Trade elasticity

- One key elasticity for how painful a China decoupling is, is the trade elasticity.

  $\rightarrow$ Substitutability across origins

- A standard choice in line with Simonovska and Waugh (2014), as well as Head and Mayer (2014) is $\epsilon = 4$.

- In the short run, the elasticity is potentially (much) smaller.

  $\rightarrow$ We use additional, short-term estimates.

Trade elasticity

- One key elasticity for how painful a China decoupling is, is the trade elasticity.

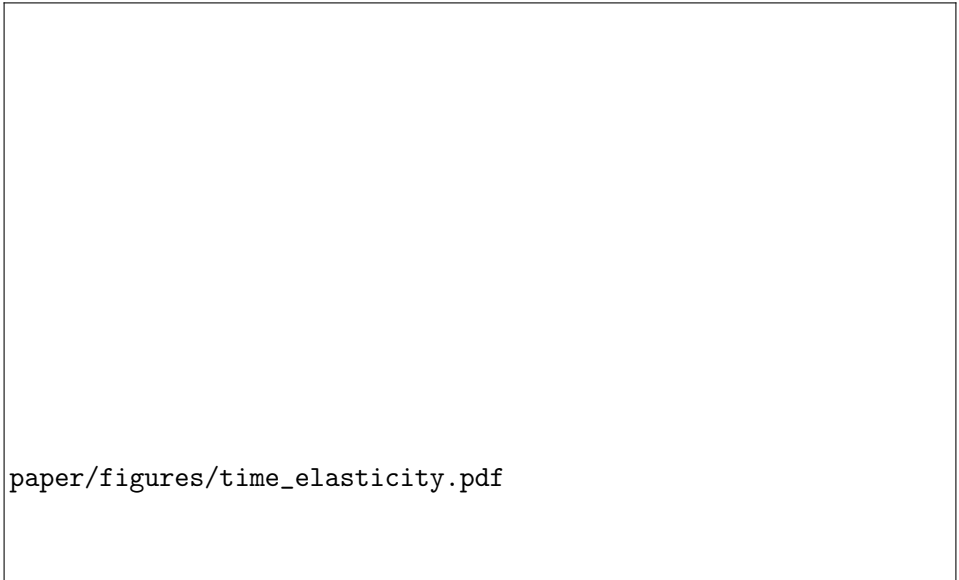
  $\rightarrow$ Substitutability across origins

- A standard choice in line with Simonovska and Waugh (2014), as well as Head and Mayer (2014) is $\epsilon = 4$.

- In the short run, the elasticity is potentially (much) smaller.

  $\rightarrow$ We use additional, short-term estimates.

Time horizons



Model simulations

General setup

- 3 Blocks: “Friends” (EU+G7), “Rivals” (CHN, RUS), “Neutrals” (ROW)
- Shock: Decoupling (complete de-risking) as trade cost rise between “Friends” and “Rivals”

General setup

- 3 Blocks: “Friends” (EU+G7), “Rivals” (CHN, RUS), “Neutrals” (ROW)
- Shock: Decoupling (complete de-risking) as trade cost rise between “Friends” and “Rivals”

Model output to shock

- Trade volume response across 3 blocks
  - “Friends” (EU+G7) : 31 countries, 54% of world GDP
  - “Rivals” (CHN, RUS) : 2 countries, 15% of world GDP
  - “Neutrals” (ROW) : 11 countries, 31% of world GDP

Model output to shock

- Trade volume response across 3 blocks
  - “Friends” (EU+G7) : 31 countries, 54% of world GDP
  - “Rivals” (CHN, RUS) : 2 countries, 15% of world GDP
  - “Neutrals” (ROW) : 11 countries, 31% of world GDP

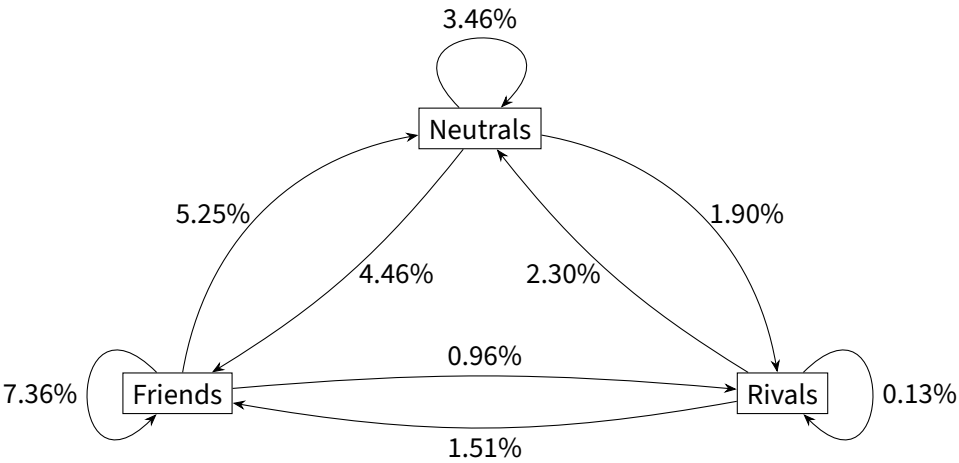
Model output to shock

- Trade volume response across 3 blocks
  - “Friends” (EU+G7) : 31 countries, 54% of world GDP
  - “Rivals” (CHN, RUS) : 2 countries, 15% of world GDP
  - “Neutrals” (ROW) : 11 countries, 31% of world GDP

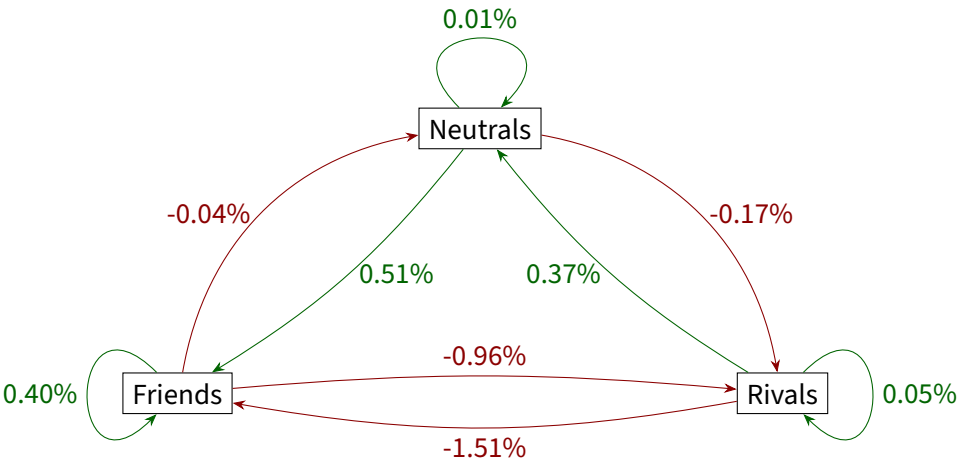
Model output to shock

- Trade volume response across 3 blocks
  - “Friends” (EU+G7) : 31 countries, 54% of world GDP
  - “Rivals” (CHN, RUS) : 2 countries, 15% of world GDP
  - “Neutrals” (ROW) : 11 countries, 31% of world GDP

Global trade flows before derisking



Response of global trade flows

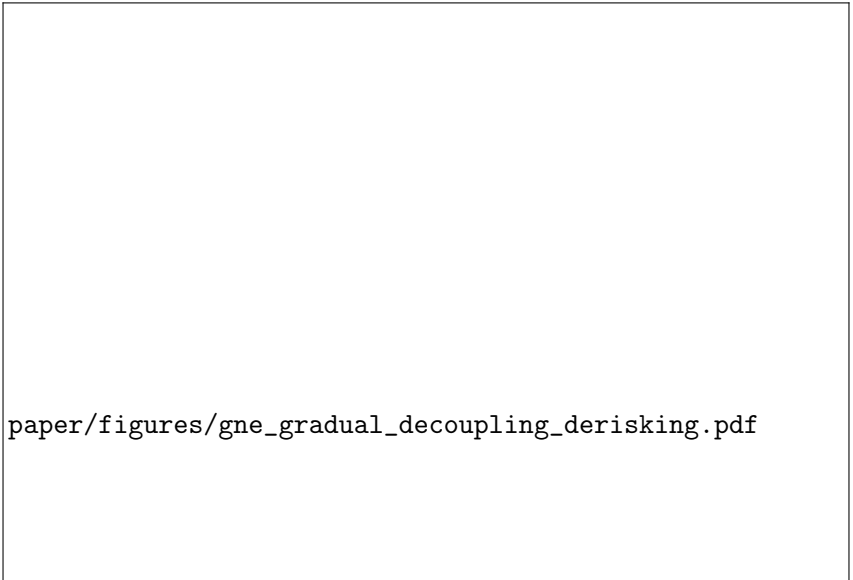


Results: German welfare effects

Trade Elasticity	Benchmark Parameters	Very Low Elasticities
$\varepsilon = 0.5$	-5.00%	-5.83%
$\varepsilon = 1.5$	-2.97%	-3.32%
$\varepsilon = 3$	-1.65%	-1.78%
$\varepsilon = 4$	-1.26%	-1.34%
$\varepsilon = 0.1$	-5.92%	-6.15%
$\varepsilon = 0.25$	-5.62%	-6.38%

paper/figures/gne_cold_turkey.pdf

Results: Cold Turkey vs. Gradual Decoupling



Currently Ongoing Work and Caveats

- Ongoing:
  - New baseline equilibrium, accounting for reduced trade with Russia
  - Estimation of dynamic trade elasticities
  - Incorporation of capital flows following Baqaee and Malmberg (2024)
- Caveats:
  - Strategic raw materials ▸ Raw materials
  - Migration ▸ Migration

Currently Ongoing Work and Caveats

- Ongoing:
  - New baseline equilibrium, accounting for reduced trade with Russia
  - Estimation of dynamic trade elasticities
  - Incorporation of capital flows following Baqaee and Malmberg (2024)
- Caveats:
  - Strategic raw materials ▸ Raw materials
  - Migration ▸ Migration

Currently Ongoing Work and Caveats

- Ongoing:
  - New baseline equilibrium, accounting for reduced trade with Russia
  - Estimation of dynamic trade elasticities
  - Incorporation of capital flows following Baqaee and Malmberg (2024)
- Caveats:
  - Strategic raw materials ▸ Raw materials
  - Migration ▸ Migration

Currently Ongoing Work and Caveats

- Ongoing:
  - New baseline equilibrium, accounting for reduced trade with Russia
  - Estimation of dynamic trade elasticities
  - Incorporation of capital flows following Baqaee and Malmberg (2024)
- Caveats:
  - Strategic raw materials ▸ Raw materials
  - Migration ▸ Migration

Currently Ongoing Work and Caveats

- Ongoing:
  - New baseline equilibrium, accounting for reduced trade with Russia
  - Estimation of dynamic trade elasticities
  - Incorporation of capital flows following Baqaee and Malmberg (2024)
- Caveats:
  - Strategic raw materials → Raw materials
  - Migration → Migration

Currently Ongoing Work and Caveats

- Ongoing:
  - New baseline equilibrium, accounting for reduced trade with Russia
  - Estimation of dynamic trade elasticities
  - Incorporation of capital flows following Baqaee and Malmberg (2024)
- Caveats:
  - Strategic raw materials Raw materials
  - Migration Migration

Currently Ongoing Work and Caveats

- Ongoing:
  - New baseline equilibrium, accounting for reduced trade with Russia
  - Estimation of dynamic trade elasticities
  - Incorporation of capital flows following Baqaee and Malmberg (2024)
- Caveats:
  - Strategic raw materials Raw materials
  - Migration Migration

Conclusions

Preliminary conclusions

- Impact of de-risking likely manageable
- Extreme scenario of decoupling not catastrophic
- Critical dependencies: Invest asap in R&D, new technologies, improve recycling

→ Work-in-progress

Preliminary conclusions

- Impact of de-risking likely manageable
- Extreme scenario of decoupling not catastrophic
- Critical dependencies: Invest asap in R&D, new technologies, improve recycling

  → Work-in-progress

Preliminary conclusions

- Impact of de-risking likely manageable
- Extreme scenario of decoupling not catastrophic
- Critical dependencies: Invest asap in R&D, new technologies, improve recycling

  → Work-in-progress

What If? The Effects of a Hard Decoupling from China on the German Economy

SED Barcelona — June 28, 2024

David Baqaee,[1] **Julian Hinz**,[2] Benjamin Moll,[3] Moritz Schularick,[4]
Feodora Teti,[5] Joschka Wanner,[6] and Sihwan Yang.[7]

[1] UCLA, CEPR, & NBER; [2] Bielefeld University & Kiel Institute for the World Economy; [3] London School of Economics; [4] Kiel Institute for the World Economy & Sciences Po; [5] Ifo Institute for Economic Research & University of Munich; [6] University of Würzburg & Kiel Institute for the World Economy; [7] IMF.

Preferences

- Consumers have nested CES preferences across sectors and origin countries:

$$U^j = \left[\sum_{s \in \mathcal{S}} \beta_s^j \left(C_s^j \right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \tag{1}$$

with

$$C_s^j = \left[\sum_{i \in \mathcal{C}} \beta_s^{ij} \left(c_s^{ij} \right)^{\frac{\epsilon}{\epsilon+1}} \right]^{\frac{\epsilon+1}{\epsilon}}, \tag{2}$$

where c_s^{ij} is the quantity of goods consumed in j produced in i in sector s.

- The lower-tier elasticity of substitution $\epsilon + 1$ is closely linked to the trade elasticity ϵ (known to be a crucial parameter for welfare effects of trade shocks, see e.g. Arkolakis et al., 2012).

→ Armington (1969)-type motivation for international trade. • back

Preferences

- Consumers have nested CES preferences across sectors and origin countries:

$$U^j = \left[\sum_{s \in \mathcal{S}} \beta_s^j \left(C_s^j \right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \tag{1}$$

with

$$C_s^j = \left[\sum_{i \in \mathcal{C}} \beta_s^{ij} \left(c_s^{ij} \right)^{\frac{\epsilon}{\epsilon+1}} \right]^{\frac{\epsilon+1}{\epsilon}}, \tag{2}$$

where c_s^{ij} is the quantity of goods consumed in j produced in i in sector s.

- The lower-tier elasticity of substitution $\epsilon + 1$ is closely linked to the trade elasticity ϵ (known to be a crucial parameter for welfare effects of trade shocks, see e.g. Arkolakis et al., 2012).

→ Armington (1969)-type motivation for international trade. ◂ back

Preferences

- Consumers have nested CES preferences across sectors and origin countries:

$$U^j = \left[\sum_{s \in \mathcal{S}} \beta_s^j \left(C_s^j \right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \tag{1}$$

with

$$C_s^j = \left[\sum_{i \in \mathcal{C}} \beta_s^{ij} \left(c_s^{ij} \right)^{\frac{\epsilon}{\epsilon+1}} \right]^{\frac{\epsilon+1}{\epsilon}}, \tag{2}$$

where c_s^{ij} is the quantity of goods consumed in j produced in i in sector s.

- The lower-tier elasticity of substitution $\epsilon + 1$ is closely linked to the trade elasticity ϵ (known to be a crucial parameter for welfare effects of trade shocks, see e.g. Arkolakis et al., 2012).

  $\rightarrow$ Armington (1969)-type motivation for international trade. back

Production

- In every sector, each country produces a unique variety using a set of primary factors, as well as intermediate products, with a three-tier CES production function:

$$q_s^i = A_s^i \left[\left[\left[\sum_{f \in \mathcal{F}} \alpha_{fs}^i (l_{fs}^i)^{\frac{\gamma-1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1}} \right]^{\frac{\theta-1}{\theta}} + \left[\left[\sum_{s' \in \mathcal{S}} \alpha_{s's}^i (Q_{s's}^i)^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} \right]^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}}, \quad (3)$$

with

$$Q_{s's}^i = \left[\sum_{i \in \mathcal{C}} \alpha_{s's}^{ij} \left(q_{s's}^{ij} \right)^{\frac{\epsilon}{\epsilon+1}} \right]^{\frac{\epsilon+1}{\epsilon}}. \quad (4)$$

→ Firms substitute inputs from different origins with the same elasticity as consumers substitute consumption across origins.

→ International input-output structure similar to Caliendo and Parro (2015). back

Production

- In every sector, each country produces a unique variety using a set of primary factors, as well as intermediate products, with a three-tier CES production function:

$$q_s^i = A_s^i \left[\left[\left[\sum_{f \in \mathcal{F}} \alpha_{fs}^i (l_{fs}^i)^{\frac{\gamma-1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1}} \right]^{\frac{\theta-1}{\theta}} + \left[\left[\sum_{s' \in \mathcal{S}} \alpha_{s's}^i (Q_{s's}^i)^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} \right]^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}}, \quad (3)$$

with

$$Q_{s's}^i = \left[\sum_{i \in \mathcal{C}} \alpha_{s's}^{ij} \left(q_{s's}^{ij} \right)^{\frac{\epsilon}{\epsilon+1}} \right]^{\frac{\epsilon+1}{\epsilon}}. \quad (4)$$

→ Firms substitute inputs from different origins with the same elasticity as consumers substitute consumption across origins.

→ International input-output structure similar to Caliendo and Parro (2015). back

Production

- In every sector, each country produces a unique variety using a set of primary factors, as well as intermediate products, with a three-tier CES production function:

$$q_s^i = A_s^i \left[\left[\left[\sum_{f \in \mathcal{F}} \alpha_{fs}^i (l_{fs}^i)^{\frac{\gamma-1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1}} \right]^{\frac{\theta-1}{\theta}} + \left[\left[\sum_{s' \in \mathcal{S}} \alpha_{s's}^i (Q_{s's}^i)^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} \right]^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}}, \quad (3)$$

with

$$Q_{s's}^i = \left[\sum_{i \in \mathcal{C}} \alpha_{s's}^{ij} \left(q_{s's}^{ij} \right)^{\frac{\epsilon}{\epsilon+1}} \right]^{\frac{\epsilon+1}{\epsilon}}. \quad (4)$$

→ Firms substitute inputs from different origins with the same elasticity as consumers substitute consumption across origins.

→ International input-output structure similar to Caliendo and Parro (2015). back

International Trade

- Whenever consumers or firms source internationally, they face iceberg trade costs $t^{ij}_{s(s')}$ and, potentially, import tariffs $\tau^{ij}_{s(s')}$.
- The model structure implies a standard gravity structure as in Eaton and Kortum (2002), with trade shares π given by:

$$\pi^{ij}_s = \frac{\left(\beta^{ij}_s p^i_s t^{ij}_s \tau^{ij}_s\right)^{-\epsilon}}{\sum_{k \in \mathcal{C}} \left(\beta^{kj}_s p^k_s t^{ij}_s \tau^{kj}_s\right)^{-\epsilon}}, \tag{5}$$

and equivalently for intermediate goods trade.

back

- Whenever consumers or firms source internationally, they face iceberg trade costs $t^{ij}_{s(s')}$ and, potentially, import tariffs $\tau^{ij}_{s(s')}$.
- The model structure implies a standard gravity structure as in Eaton and Kortum (2002), with trade shares π given by:

$$\pi^{ij}_s = \frac{\left(\beta^{ij}_s p^i_s t^{ij}_s \tau^{ij}_s\right)^{-\epsilon}}{\sum_{k\in\mathcal{C}}\left(\beta^{kj}_s p^k_s t^{ij}_s \tau^{kj}_s\right)^{-\epsilon}}, \tag{5}$$

and equivalently for intermediate goods trade.

back

Equilibrium

- Markets are assumed to be perfectly competitive.
- In equilibrium, good and factor markets clear.
- Common practice in new quantitative trade models: solve the model in changes (cf. Dekle et al., 2007, 2008).

  → So-called exact hat algbegra; avoids need for identification of a range of model parameters (such as preference parameters β and iceberg trade costs t).
- Baqaee and Farhi (2024) develop a new alternative algorithm.

  → Differential exact-hat algebra

  → Sequence of infintesimal effects; avoids solving system of non-linear equations

Equilibrium

- Markets are assumed to be perfectly competitive.
- In equilibrium, good and factor markets clear.
- Common practice in new quantitative trade models: solve the model in changes (cf. Dekle et al., 2007, 2008).

  → So-called exact hat algbegra; avoids need for identification of a range of model parameters (such as preference parameters β and iceberg trade costs t).
- Baqaee and Farhi (2024) develop a new alternative algorithm.

  → Differential exact-hat algebra

  → Sequence of infintesimal effects; avoids solving system of non-linear equations

◂ back ▸

Equilibrium

- Markets are assumed to be perfectly competitive.
- In equilibrium, good and factor markets clear.
- Common practice in new quantitative trade models: solve the model in changes (cf. Dekle et al., 2007, 2008).

  → So-called exact hat algbegra; avoids need for identification of a range of model parameters (such as preference parameters β and iceberg trade costs t).

- Baqaee and Farhi (2024) develop a new alternative algorithm.

  → Differential exact-hat algebra

  → Sequence of infintesimal effects; avoids solving system of non-linear equations

Equilibrium

- Markets are assumed to be perfectly competitive.
- In equilibrium, good and factor markets clear.
- Common practice in new quantitative trade models: solve the model in changes (cf. Dekle et al., 2007, 2008).

  $\rightarrow$ So-called exact hat algbegra; avoids need for identification of a range of model parameters (such as preference parameters β and iceberg trade costs t).
- Baqaee and Farhi (2024) develop a new alternative algorithm.

  $\rightarrow$ Differential exact-hat algebra

  $\rightarrow$ Sequence of infintesimal effects; avoids solving system of non-linear equations

back

Equilibrium

- Markets are assumed to be perfectly competitive.
- In equilibrium, good and factor markets clear.
- Common practice in new quantitative trade models: solve the model in changes (cf. Dekle et al., 2007, 2008).

  → So-called exact hat algbegra; avoids need for identification of a range of model parameters (such as preference parameters β and iceberg trade costs t).
- Baqaee and Farhi (2024) develop a new alternative algorithm.

  → Differential exact-hat algebra

  → Sequence of infintesimal effects; avoids solving system of non-linear equations

back

Equilibrium

- Markets are assumed to be perfectly competitive.
- In equilibrium, good and factor markets clear.
- Common practice in new quantitative trade models: solve the model in changes (cf. Dekle et al., 2007, 2008).

  $\rightarrow$ So-called exact hat algbegra; avoids need for identification of a range of model parameters (such as preference parameters β and iceberg trade costs t).
- Baqaee and Farhi (2024) develop a new alternative algorithm.

  $\rightarrow$ Differential exact-hat algebra

  $\rightarrow$ Sequence of infintesimal effects; avoids solving system of non-linear equations

back

Trade volume (share of world GDP) response across blocks under Benchmark

Trade flow			Before shock	After shock	Δ
Friends	→	Friends	10.19%	10.86%	0.67%
Friends	→	Rivals	1.18%	0.00%	-1.18%
Friends	→	Neutrals	17.16%	17.05%	-0.11%
Rivals	→	Friends	1.84%	0.00%	-1.84%
Rivals	→	Rivals	0.13%	0.19%	0.06%
Rivals	→	Neutrals	1.56%	1.98%	0.42%
Neutrals	→	Friends	4.70%	5.24%	0.54%
Neutrals	→	Rivals	1.63%	1.40%	-0.23%
Neutrals	→	Neutrals	2.43%	2.44%	0.01%

→ Global trade Δ -1.65%

Trade volume (share of world GDP) response across blocks under Benchmark

Trade flow			Before shock	After shock	Δ
Friends	→	Friends	10.19%	10.86%	0.67%
Friends	→	Rivals	1.18%	0.00%	-1.18%
Friends	→	Neutrals	17.16%	17.05%	-0.11%
Rivals	→	Friends	1.84%	0.00%	-1.84%
Rivals	→	Rivals	0.13%	0.19%	0.06%
Rivals	→	Neutrals	1.56%	1.98%	0.42%
Neutrals	→	Friends	4.70%	5.24%	0.54%
Neutrals	→	Rivals	1.63%	1.40%	-0.23%
Neutrals	→	Neutrals	2.43%	2.44%	0.01%

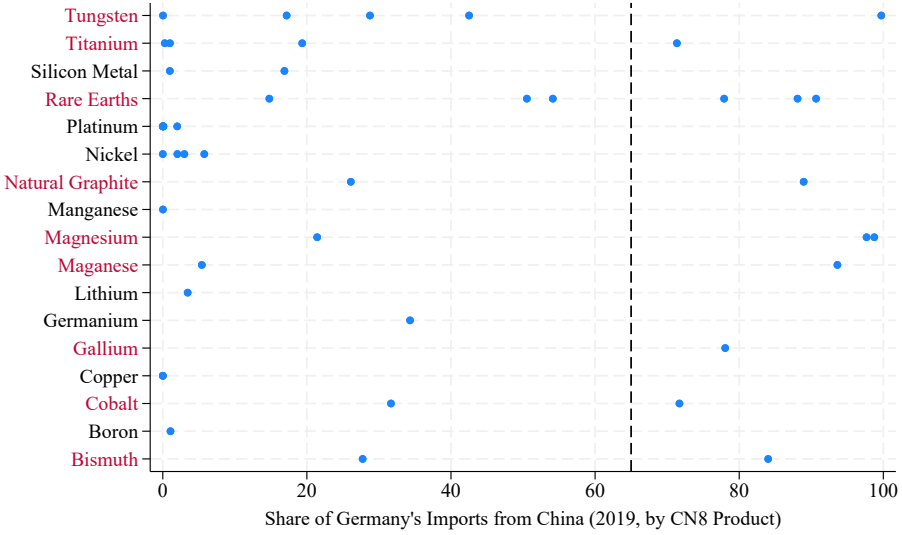
→ Global trade Δ -1.65%

Trade volume (share of world GDP) response across blocks under Benchmark

Trade flow			Before shock	After shock	Δ
Friends	→	Friends	10.19%	10.86%	0.67%
Friends	→	Rivals	1.18%	0.00%	-1.18%
Friends	→	Neutrals	17.16%	17.05%	-0.11%
Rivals	→	Friends	1.84%	0.00%	-1.84%
Rivals	→	Rivals	0.13%	0.19%	0.06%
Rivals	→	Neutrals	1.56%	1.98%	0.42%
Neutrals	→	Friends	4.70%	5.24%	0.54%
Neutrals	→	Rivals	1.63%	1.40%	-0.23%
Neutrals	→	Neutrals	2.43%	2.44%	0.01%

→ Global trade Δ -1.65%

Strategic raw materials



Strategic raw materials — Leontief production?

- For 9 / 17 raw materials highly dependent on China: import share from China $> 65\%$
- 5 / 9 raw materials likely easy to substitute, China's share of world production $< 70\%$
  - $\rightarrow$ Gallium, Magnesium, Rare Earths, and Tungsten
  - $\rightarrow$ Important for automotive and high-tech sector
- Still: Sectoral issue
  - $\rightarrow$ 4.7 % of German GDP, 4% of labor force

back

Strategic raw materials — Leontief production?

- For 9 / 17 raw materials highly dependent on China: import share from China $> 65\%$
- 5 / 9 raw materials likely easy to substitute, China's share of world production $< 70\%$

  $\rightarrow$ Gallium, Magnesium, Rare Earths, and Tungsten

  $\rightarrow$ Important for automotive and high-tech sector
- Still: Sectoral issue

  $\rightarrow$ 4.7 % of German GDP, 4% of labor force

back

Migration

- Chinese in Germany
  - 149,550 / 13,383,910 ≈ 1,1 % of foreign population in Germany
  - 149,550 / 84,482,267 ≈ 0,18 % of total population
- Germans in China
  - 845,697 / 1,411,778,724 ≈ 0,06 % of population are foreigners
  - Germans second largest group of Europeans
  - Net flow -4,159 between 2015 and 2020

back

Migration

- Chinese in Germany
  - 149,550 / 13,383,910 ≈ 1,1 % of foreign population in Germany
  - 149,550 / 84,482,267 ≈ 0,18 % of total population
- Germans in China
  - 845,697 / 1,411,778,724 ≈ 0,06 % of population are foreigners
  - Germans second largest group of Europeans
  - Net flow -4,159 between 2015 and 2020

back