Box on Reassessing EU Comparative Advantage: The Role of Technology

Marco Matani[1]

[1]IHEID

TSI Concluding Conference
European House, Berlin
March 17, 2025

Roadmap

Roadmap

Motivation

- The topic of **economic competitiveness** has experienced a renewed interest in Europe

Motivation

- The topic of **economic competitiveness** has experienced a renewed interest in Europe
- Strengthening the competitive position of the EU is critical in an increasingly **fragmented and security threatened global economy**

Motivation

- The topic of **economic competitiveness** has experienced a renewed interest in Europe
- Strengthening the competitive position of the EU is critical in an increasingly **fragmented and security threatened global economy**
- *The future of European competitiveness* (Draghi, 2024)
  - EU's **loss of technological prowess** with respect to the United States, and increasingly China
  - **Active industrial policy** to reverse the trend

Motivation

- The topic of **economic competitiveness** has experienced a renewed interest in Europe
- Strengthening the competitive position of the EU is critical in an increasingly **fragmented and security threatened global economy**
- *The future of European competitiveness* (Draghi, 2024)
  - EU's **loss of technological prowess** with respect to the United States, and increasingly China
  - **Active industrial policy** to reverse the trend
- First necessary block: **how to map the EU's relative state of technology** vis-à-vis the rest of the world?

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**
- Two aspects can be distinguished
  - **Internal** competitiveness: innovation, efficiency, and productivity within a country or region ("*competition with yourself*")

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**
- Two aspects can be distinguished
  - **Internal** competitiveness: innovation, efficiency, and productivity within a country or region ("*competition with yourself*")
    - GDP growth and high living standards

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**
- Two aspects can be distinguished
  - **Internal** competitiveness: innovation, efficiency, and productivity within a country or region ("*competition with yourself*")
    - GDP growth and high living standards
    - Wealth creation

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**
- Two aspects can be distinguished
  - **Internal** competitiveness: innovation, efficiency, and productivity within a country or region ("*competition with yourself*")
    - GDP growth and high living standards
    - Wealth creation
    - Cost efficiency

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**
- Two aspects can be distinguished
  - **Internal** competitiveness: innovation, efficiency, and productivity within a country or region ("*competition with yourself*")
    - GDP growth and high living standards
    - Wealth creation
    - Cost efficiency
  - **External** competitiveness: converting productivity gains into foreign market shares ("*competition with others*")

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**
- Two aspects can be distinguished
  - **Internal** competitiveness: innovation, efficiency, and productivity within a country or region ("*competition with yourself*")
    - GDP growth and high living standards
    - Wealth creation
    - Cost efficiency
  - **External** competitiveness: converting productivity gains into foreign market shares ("*competition with others*")
    - Offering desirable goods and services

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**
- Two aspects can be distinguished
  - **Internal** competitiveness: innovation, efficiency, and productivity within a country or region ("*competition with yourself*")
    - GDP growth and high living standards
    - Wealth creation
    - Cost efficiency
  - **External** competitiveness: converting productivity gains into foreign market shares ("*competition with others*")
    - Offering desirable goods and services
    - Retaining a dominant industry role at home and abroad

CompNet

The Current Debate

- In contrast to earlier discussions about the vague concept of a "win-lose" competition for global markets, the current debate focuses on **concrete topics of European industrial organisation**
  - Preventing **deindustrialisation**
  - Restoring European **tech dominance**
  - Preserving European **economic security**
- Two aspects can be distinguished
  - **Internal** competitiveness: innovation, efficiency, and productivity within a country or region ("*competition with yourself*")
    - GDP growth and high living standards
    - Wealth creation
    - Cost efficiency
  - **External** competitiveness: converting productivity gains into foreign market shares ("*competition with others*")
    - Offering desirable goods and services
    - Retaining a dominant industry role at home and abroad
    - Local production of strategic technology

CompNet

The Notion of Comparative Advantage

- The objectives of fostering *internal* and *external* competitiveness are **not necessarily aligned**

The Notion of Comparative Advantage

- The objectives of fostering *internal* and *external* competitiveness are **not necessarily aligned**
- Policies prioritizing external over internal competitiveness can **backfire** in terms of promoting citizens' living standards

The Notion of Comparative Advantage

- The objectives of fostering *internal* and *external* competitiveness are **not necessarily aligned**
- Policies prioritizing external over internal competitiveness can **backfire** in terms of promoting citizens' living standards
  - Specific pre-conditions: terms-of-trade effects, scale economies, social benefits differing from individual ones, threshold and lock-in effects...
- Key channel mapping internal competitiveness (*productivity*) into external competitiveness (*foreign market shares*):

"comparative advantage" (CA)

The Notion of Comparative Advantage

For countries $i, i' \in I$, sectors $s, s' \in S$, output price p, unit input requirement c, and exports exp

Comparative Advantage

i has a comparative advantage w.r.t. i' in s iff **in autarky**

$$\frac{p_{i,s}}{p_{i,s'}} < \frac{p_{i',s}}{p_{i',s'}}$$

The Notion of Comparative Advantage

For countries $i, i' \in I$, sectors $s, s' \in S$, output price p, unit input requirement c, and exports exp

Comparative Advantage

i has a comparative advantage w.r.t. i' in s iff **in autarky**

$$\frac{p_{i,s}}{p_{i,s'}} < \frac{p_{i',s}}{p_{i',s'}}$$

Ricardian Comparative Advantage

i has a *Ricardian* comparative advantage w.r.t. i' in s iff **in autarky**

$$\frac{c_{i,s}}{c_{i,s'}} < \frac{c_{i',s}}{c_{i',s'}}$$

The Notion of Comparative Advantage

For countries $i, i' \in I$, sectors $s, s' \in S$, output price p, unit input requirement c, and exports exp

Comparative Advantage

i has a comparative advantage w.r.t. i' in s iff **in autarky**

$$\frac{p_{i,s}}{p_{i,s'}} < \frac{p_{i',s}}{p_{i',s'}}$$

Ricardian Comparative Advantage

i has a *Ricardian* comparative advantage w.r.t. i' in s iff **in autarky**

$$\frac{c_{i,s}}{c_{i,s'}} < \frac{c_{i',s}}{c_{i',s'}}$$

Balassa "Revealed" Comparative Advantage

i has a *Revealed* comparative advantage in s iff **in the open economy**

$$BRCA_{i,s} = \frac{exp_{i,s}}{\sum_s exp_{i,s}} \Big/ \frac{\sum_{i'} exp_{i',s}}{\sum_{i'} \sum_s exp_{i',s}} > 1$$

CompNet

The Notion of Comparative Advantage

▸ Nuances of comparative advantage

The Notion of Comparative Advantage

- "Revealed" comparative advantage are polluted by other concomitant drivers of external competitiveness beyond technology

▸ Nuances of comparative advantage

The Notion of Comparative Advantage

- "Revealed" comparative advantage are polluted by other concomitant drivers of external competitiveness beyond technology
  - Input prices (Heckscher-Ohlin)

▸ Nuances of comparative advantage

The Notion of Comparative Advantage

- "Revealed" comparative advantage are polluted by other concomitant drivers of external competitiveness beyond technology
  - Input prices (Heckscher-Ohlin)
  - Scale economies and market power (Krugman)

▸ Nuances of comparative advantage

The Notion of Comparative Advantage

- "Revealed" comparative advantage are polluted by other concomitant drivers of external competitiveness beyond technology
  - Input prices (Heckscher-Ohlin)
  - Scale economies and market power (Krugman)
  - Firm selection (Melitz)

▸ Nuances of comparative advantage

The Notion of Comparative Advantage

- "Revealed" comparative advantage are polluted by other concomitant drivers of external competitiveness beyond technology
  - Input prices (Heckscher-Ohlin)
  - Scale economies and market power (Krugman)
  - Firm selection (Melitz)
  - Government intervention (institutions)

▸ Nuances of comparative advantage

The Notion of Comparative Advantage

- "Revealed" comparative advantage are polluted by other concomitant drivers of external competitiveness beyond technology
  - Input prices (Heckscher-Ohlin)
  - Scale economies and market power (Krugman)
  - Firm selection (Melitz)
  - Government intervention (institutions)
- How to obtain technology-based **Ricardian Comparative Advantages** by purging trade information from other concomitant drivers?

▸ Nuances of comparative advantage

The Notion of Comparative Advantage

- "Revealed" comparative advantage are polluted by other concomitant drivers of external competitiveness beyond technology
  - Input prices (Heckscher-Ohlin)
  - Scale economies and market power (Krugman)
  - Firm selection (Melitz)
  - Government intervention (institutions)
- How to obtain technology-based **Ricardian Comparative Advantages** by purging trade information from other concomitant drivers?
  - i.e., how to back out **productivity** (internal competitiveness) from **foreign market shares** (external competitiveness)?

▸ Nuances of comparative advantage

Roadmap

Huang and Ottaviano (2024)

Huang and Ottaviano (2024)

- Encompassing model with cross-country differences in **factor prices**, **technologies**, and **market sizes** as well as pro-competitive effects of **firm selection** and **market power** from imperfect competition

Huang and Ottaviano (2024)

- Encompassing model with cross-country differences in **factor prices**, **technologies**, and **market sizes** as well as pro-competitive effects of **firm selection** and **market power** from imperfect competition
- Model-based methodology with minimal data, estimation and computation requirements

Huang and Ottaviano (2024)

- Encompassing model with cross-country differences in **factor prices**, **technologies**, and **market sizes** as well as pro-competitive effects of **firm selection** and **market power** from imperfect competition
- Model-based methodology with minimal data, estimation and computation requirements

Huang and Ottaviano (2024)

- Encompassing model with cross-country differences in **factor prices**, **technologies**, and **market sizes** as well as pro-competitive effects of **firm selection** and **market power** from imperfect competition
- Model-based methodology with minimal data, estimation and computation requirements
  - Much more parsimonious than full-fledged econometric or calibrated approaches

Huang and Ottaviano (2024)

- Encompassing model with cross-country differences in **factor prices**, **technologies**, and **market sizes** as well as pro-competitive effects of **firm selection** and **market power** from imperfect competition
- Model-based methodology with minimal data, estimation and computation requirements
  - Much more parsimonious than full-fledged econometric or calibrated approaches
- **Sufficient statistics** approach

Huang and Ottaviano (2024)

- Encompassing model with cross-country differences in **factor prices**, **technologies**, and **market sizes** as well as pro-competitive effects of **firm selection** and **market power** from imperfect competition
- Model-based methodology with minimal data, estimation and computation requirements
  - Much more parsimonious than full-fledged econometric or calibrated approaches
- **Sufficient statistics** approach
- Retrieves measures of **Ricardian Comparative Advantage from trade data**

Huang and Ottaviano (2024)

- Encompassing model with cross-country differences in **factor prices**, **technologies**, and **market sizes** as well as pro-competitive effects of **firm selection** and **market power** from imperfect competition
- Model-based methodology with minimal data, estimation and computation requirements
  - Much more parsimonious than full-fledged econometric or calibrated approaches
- **Sufficient statistics** approach
- Retrieves measures of **Ricardian Comparative Advantage from trade data**
- First applied to Chinese data (Annual Survey of Industrial Firms and Chinese Customs Trade Statistics)

Huang and Ottaviano (2024)

Huang and Ottaviano (2024)

Modeling assumptions reflecting state-of-the-art theory:

Huang and Ottaviano (2024)

Modeling assumptions reflecting state-of-the-art theory:

- **Two factors**: labor and capital

Huang and Ottaviano (2024)

Modeling assumptions reflecting state-of-the-art theory:

- **Two factors**: labor and capital
- **Two countries**: Home and Foreign (Rest of the World) different in terms of technology, factor endowments, market size

Huang and Ottaviano (2024)

Modeling assumptions reflecting state-of-the-art theory:

- **Two factors**: labor and capital
- **Two countries**: Home and Foreign (Rest of the World) different in terms of technology, factor endowments, market size
- **Many sectors**: different in terms of relative factor intensity; indexed z in increasing order of Home's export propensity

Huang and Ottaviano (2024)

Modeling assumptions reflecting state-of-the-art theory:

- **Two factors**: labor and capital
- **Two countries**: Home and Foreign (Rest of the World) different in terms of technology, factor endowments, market size
- **Many sectors**: different in terms of relative factor intensity; indexed z in increasing order of Home's export propensity
- **Market structure**: monopolistic competition with demand exhibiting elasticity of substitution either variable (VES) of constant (CES: $\sigma(z)$)

Huang and Ottaviano (2024)

Modeling assumptions reflecting state-of-the-art theory:

- **Two factors**: labor and capital
- **Two countries**: Home and Foreign (Rest of the World) different in terms of technology, factor endowments, market size
- **Many sectors**: different in terms of relative factor intensity; indexed z in increasing order of Home's export propensity
- **Market structure**: monopolistic competition with demand exhibiting elasticity of substitution either variable (VES) of constant (CES: $\sigma(z)$)
  - CES obscures the role of *endogenous market power* (anti- and pro-competitive effects)

Huang and Ottaviano (2024)

Modeling assumptions reflecting state-of-the-art theory:

- **Two factors**: labor and capital
- **Two countries**: Home and Foreign (Rest of the World) different in terms of technology, factor endowments, market size
- **Many sectors**: different in terms of relative factor intensity; indexed z in increasing order of Home's export propensity
- **Market structure**: monopolistic competition with demand exhibiting elasticity of substitution either variable (VES) of constant (CES: $\sigma(z)$)
  - CES obscures the role of *endogenous market power* (anti- and pro-competitive effects)
- **Scale economies**, **firm heterogeneity**, **multi-product firms**, and **endogenous selection**

CompNet

▶ The Model in motion

Huang and Ottaviano (2024)

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$
- **Export Intensity (share of export)**: $\theta(z)$ and $\theta^*(z)$

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$
- **Export Intensity (share of export)**: $\theta(z)$ and $\theta^*(z)$
- **Income**: I and I^*

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$
- **Export Intensity (share of export)**: $\theta(z)$ and $\theta^*(z)$
- **Income**: I and I^*
- **Population**: L and L^*

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$
- **Export Intensity (share of export)**: $\theta(z)$ and $\theta^*(z)$
- **Income**: I and I^*
- **Population**: L and L^*
- **Trade Freeness**: $\rho(z)$

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$
- **Export Intensity (share of export)**: $\theta(z)$ and $\theta^*(z)$
- **Income**: I and I^*
- **Population**: L and L^*
- **Trade Freeness**: $\rho(z)$
- **Technology Skewness**: $k(z)$

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$
- **Export Intensity (share of export)**: $\theta(z)$ and $\theta^*(z)$
- **Income**: I and I^*
- **Population**: L and L^*
- **Trade Freeness**: $\rho(z)$
- **Technology Skewness**: $k(z)$
- **Unit Input Price**: $\omega(z)$ and $\omega^*(z)$

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$
- **Export Intensity (share of export)**: $\theta(z)$ and $\theta^*(z)$
- **Income**: I and I^*
- **Population**: L and L^*
- **Trade Freeness**: $\rho(z)$
- **Technology Skewness**: $k(z)$
- **Unit Input Price**: $\omega(z)$ and $\omega^*(z)$
- **State of Technology**: $C_M(z)$ and $C_M^*(z)$

Huang and Ottaviano (2024)

Variables definition (* indicates variables for the foreign country)

- **Export Propensity (share of exporters)**: $\chi(z)$ and $\chi^*(z)$
  - Ordering sectors: $\frac{\partial \chi(z)}{\partial z} > 0$
- **Export Intensity (share of export)**: $\theta(z)$ and $\theta^*(z)$
- **Income**: I and I^*
- **Population**: L and L^*
- **Trade Freeness**: $\rho(z)$
- **Technology Skewness**: $k(z)$
- **Unit Input Price**: $\omega(z)$ and $\omega^*(z)$
- **State of Technology**: $C_M(z)$ and $C_M^*(z)$
- **Pre-trade TFP**: $\Phi^A(z)$ and $\Phi^{A*}(z)$

Huang and Ottaviano (2024)

Proposition 7 (Sufficient Statistics for Ricardian Comparative Advantage)

(a) The Pareto shape k, trade freeness ρ, export propensity $\chi(z)$ and intensity $\theta(z)$ are sufficient statistics for the ex-post amplifying component ($XPA(z)$) and dampening component ($XPD(z)$) of industry z's relative TFPQ; (b) The sufficient statistics for the ex-ante component further include $\frac{\omega(z)}{\omega^*(z)}$, the relative unit input prices, as this component can be rewritten as:

$$\frac{\Phi^A(z)}{\Phi^{A*}(z)} = \left(\frac{C_M^*(z)}{C_M(z)}\right)^{\frac{k}{k+1}} \left(\frac{1-\theta(z)}{\theta(z)}\right)^{\frac{1}{k+1}} \chi(z)^{\frac{1}{k}} \rho^{-\frac{1}{k(k+1)}}$$

with the relative state of technology given by

$$\frac{C_M^*(z)}{C_M(z)} = \left(\frac{\omega(z)}{\omega^*(z)}\right)^{\frac{k+1}{k}} [\rho(1-\theta(z)) + \rho^{-1}\theta(z)]^{\frac{1}{k}}$$

▸ Ex-post $XP(z)$

▸ Relative Exports

Roadmap

di Mauro et al. (2024)

di Mauro et al. (2024)

Application to **CompNet** for retrieving measures of **European** Ricardian Comparative Advantage

di Mauro et al. (2024)

Application to **CompNet** for retrieving measures of **European** Ricardian Comparative Advantage

- **Countries**: Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden

di Mauro et al. (2024)

Application to **CompNet** for retrieving measures of **European** Ricardian Comparative Advantage

- **Countries**: Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden
- **Years**: Balanced sample 2010-2018

di Mauro et al. (2024)

Application to **CompNet** for retrieving measures of **European** Ricardian Comparative Advantage

- **Countries**: Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden
- **Years**: Balanced sample 2010-2018
- **Micro data ($\chi(z), \theta(z)$, C-D shares in $\frac{\omega(z)}{\omega^*(z)}, k(z)$)**: CompNet 9^{th} Vintage

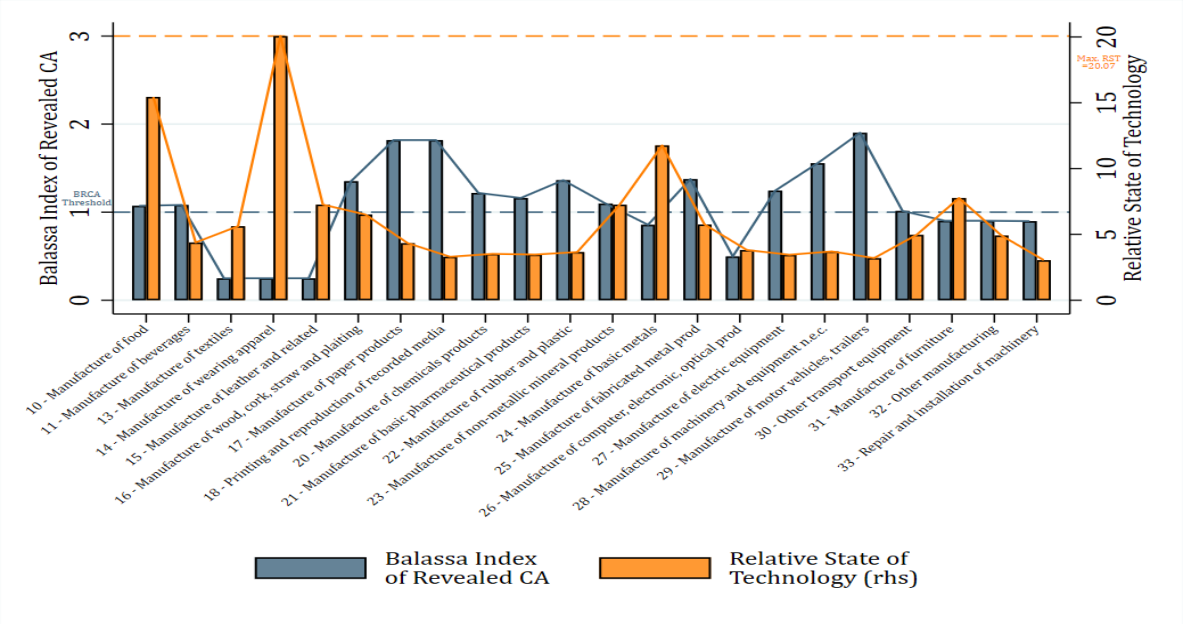
di Mauro et al. (2024)

Application to **CompNet** for retrieving measures of **European** Ricardian Comparative Advantage

- **Countries**: Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden
- **Years**: Balanced sample 2010-2018
- **Micro data ($\chi(z), \theta(z)$, C-D shares in $\frac{\omega(z)}{\omega^*(z)}, k(z)$)**: CompNet 9^{th} Vintage
- **Macro data ($I, L, \frac{\omega(z)}{\omega^*(z)}, \rho(z)$)**: OECD Inter Country Input Output tables 2020, Penn World Tables 10.01

di Mauro et al. (2024)

Balassa Revealed Comparative Advantage and Relative State of Technology in the EU

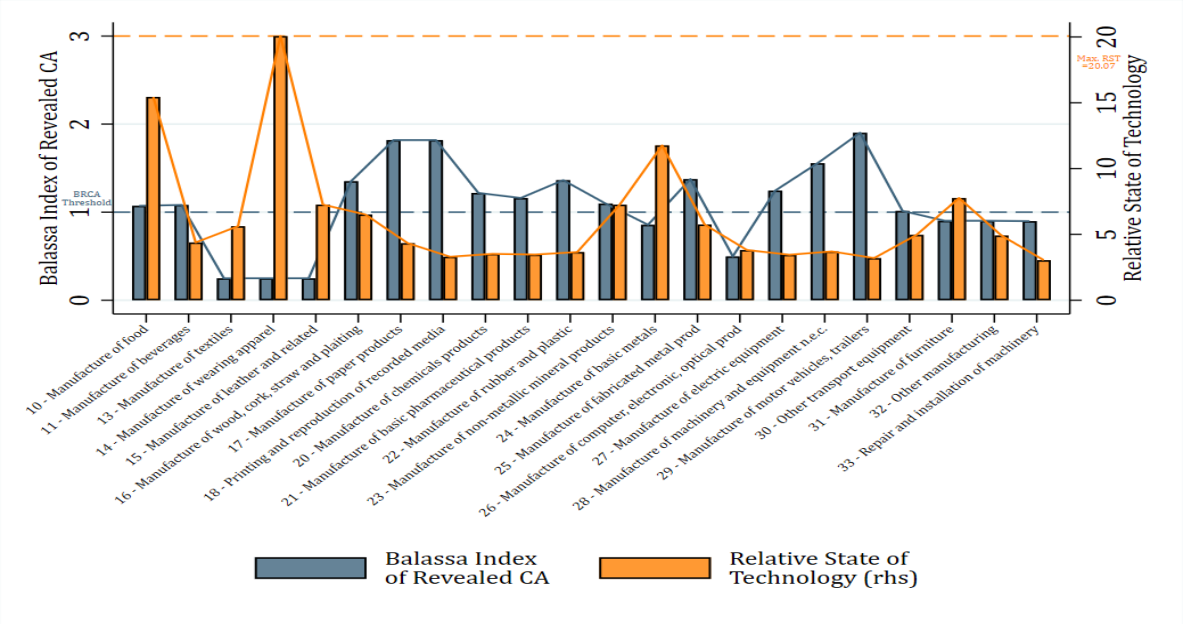


- BRCA RST FR
- BRCA RST DE
- RCA TFPQ EU
- RCA TFPQ FR
- RCA TFPQ DE
- CESEE
- BRCA EU CHN
- Comparative Stat
- XPA XPD EU
- XPA XPD FR
- XPA XPD DE

CompNet

di Mauro et al. (2024)

Balassa Revealed Comparative Advantage and Relative State of Technology in the EU



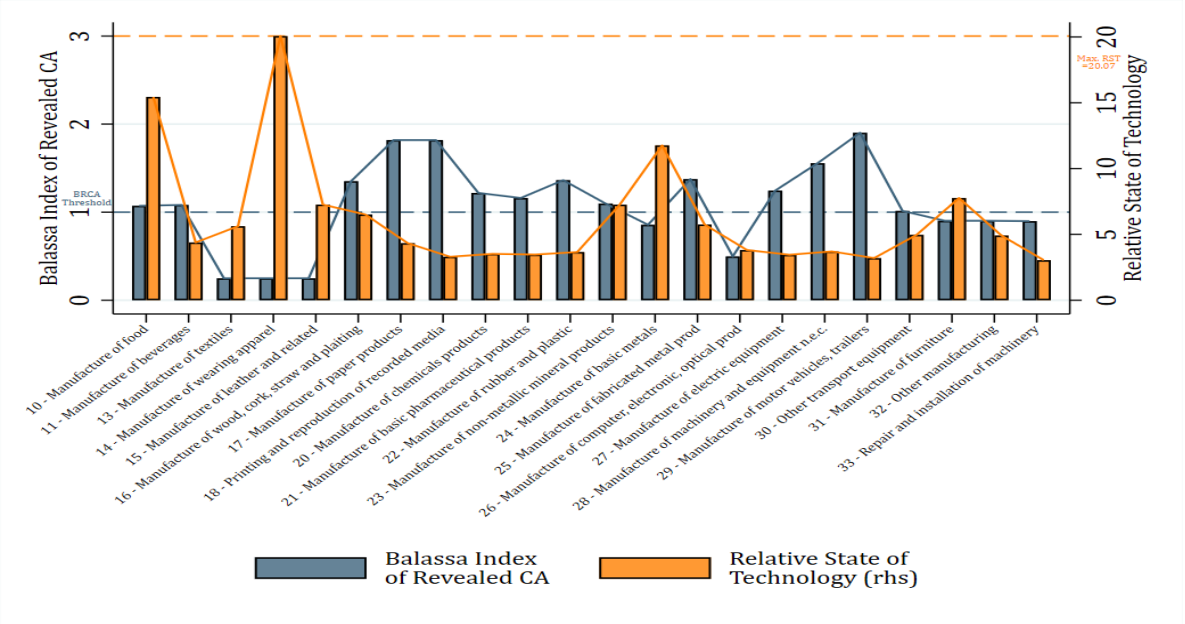
- BRCA RST FR
- BRCA RST DE
- RCA TFPQ EU
- RCA TFPQ FR
- RCA TFPQ DE
- CESEE
- BRCA EU CHN
- Comparative Stat
- XPA XPD EU
- XPA XPD FR
- XPA XPD DE

- Europe has better state of technology than the rest of the world (RST>1) in all manufacturing sectors

CompNet

di Mauro et al. (2024)

Balassa Revealed Comparative Advantage and Relative State of Technology in the EU



- BRCA RST FR
- BRCA RST DE
- RCA TFPQ EU
- RCA TFPQ FR
- RCA TFPQ DE
- CESEE

- BRCA EU CHN
- Comparative Stat
- XPA XPD EU
- XPA XPD FR
- XPA XPD DE

- Europe has better state of technology than the rest of the world (RST>1) in all manufacturing sectors
- Disalignment between RST and BRCA in Europe

CompNet

Conclusions

- CompNet offers tools for **analyzing European competitiveness** and for contributing to the policy debate
- Urgent actions are needed to substantiate export specialization with **heightened technological standing**
- Necessary if Europe aims to maintain its **global competitive edge** in key industries

di Mauro, F., M. Matani, and G. I. Ottaviano, "Reassessing EU Comparative Advantage: The Role of Technology," *IWH Discussion Papers*, 2024, *26.*

Draghi, M., "The future of European competitiveness," Technical Report, European Commission 2024.

Heckscher, E. and B. Ohlin, *Interregional and International Trade*, Cambridge, MA: Harvard University Press, 1933.

Huang, H. and G. I. Ottaviano, "Revealing Ricardian comparative advantage with micro and macro data," *CEPR*, 2024, *Discussion Paper* (18935).

Krugman, P., "Scale Economies, Product Differentiation, and the Pattern of Trade," *American Economic Review*, 1980, *70* (5), 950–959.

Ricardo, D., *The Principles of Political Economy and Taxation*, London: Everyman's Library, 1817. Reprinted edition.

Roadmap

Comparative Advantage in the 21^{st} Century

- **Heckscher and Ohlin (1933)**: useful when technologies and market sizes converge across countries so that international competitiveness is driven by factor price differences
- **Krugman (1980)**: useful when technologies and factor prices converge across countries so that international competitiveness is driven by market size differences
- **Ricardo (1817)**: useful when factor prices and market sizes converge across countries so that international competitiveness is driven by technological differences

Comparative Advantage in the 21st Century

- **Heckscher and Ohlin (1933)**: useful when technologies and market sizes converge across countries so that international competitiveness is driven by factor price differences
- **Krugman (1980)**: useful when technologies and factor prices converge across countries so that international competitiveness is driven by market size differences
- **Ricardo (1817)**: useful when factor prices and market sizes converge across countries so that international competitiveness is driven by technological differences
- **Arguably**, in today's policy debate Ricardo matters the most, as the EU and the US are losing the market size advantage and China is losing its global labor advantage

Huang and Ottaviano (2024)

Proposition 5 (Relative TFPQ Decomposition)

In the open economy, Home industry z's relative TFPQ can be decomposed as the product of an ex-ante component before trade and two ex-post components after trade:

$$\frac{\Phi(z)}{\Phi^*(z)} = \underbrace{\frac{\Phi^A(z)}{\Phi^{A*}(z)}}_{ex-ante} \underbrace{\left(\frac{\frac{L}{L^*}\rho + \left(\frac{\chi(z)}{\rho}\right)^{\frac{k+1}{k}}}{\frac{L^*}{L}\rho + \left(\frac{\chi(z)}{\rho}\right)^{-\frac{k+1}{k}}} \right)^{\frac{k}{k+1}}}_{ex-post\ amplifying\ XPA(z)} \underbrace{\frac{\rho\chi(z)^{-1} + \frac{L^*}{L}\rho}{\rho^{-1}\chi(z) + \frac{L}{L^*}\rho}}_{ex-post\ dampening\ XPD(z)}$$

Huang and Ottaviano (2024)

Proposition 8 (Balassa Index and Comparative Advantage)

(a) Home industry z's relative exports can be decomposed as:

$$\frac{Exp(z)}{Exp^*(z)} = \frac{\frac{I}{I^*}\left(\frac{\chi(z)}{\rho}\right)^{\frac{k+1}{k}} - \rho}{1 - \frac{I}{I^*}\rho\left(\frac{\chi(z)}{\rho}\right)^{\frac{k+1}{k}}} \frac{\rho^{-1} + \frac{L^*}{L}\left(\frac{\chi(z)}{\rho}\right)^{\frac{k+1}{k}}}{\left(\frac{\chi(z)}{\rho}\right)^{\frac{k+1}{k}} + \frac{L}{L^*}\rho} \frac{\theta(z)}{1-\theta(z)} \left(\frac{\omega^*(z)}{\omega(z)}\right)^{k+1} \left(\frac{\Phi^A(z)}{\Phi^{A*}(z)}\right)^{k+1}$$

(b) The Pareto shape parameter k, trade freeness ρ, export propensity $\chi(z)$, export intensity $\theta(z)$ and relative income $\frac{I}{I^*}$ are sufficient statistics for $Exp(z)/Exp^*(z)$ and its components.

(c) The sufficient statistics for the BRCA index $RCAB(z)$ further include Home exports $Exp(z)$.

Huang and Ottaviano (2024)

- **Free entry**: Firms enter by sinking a fixed input requirement and draw unit input requirement c (inverse of TFP) from a country-sector (inverse) Pareto distribution with country-sector support $[0, C_M(z)$ *or* $C_M^*(z)]$ and sector concentration $k(z)$ – call $C_M(z)$ Home's "relative state of technology"

Huang and Ottaviano (2024)

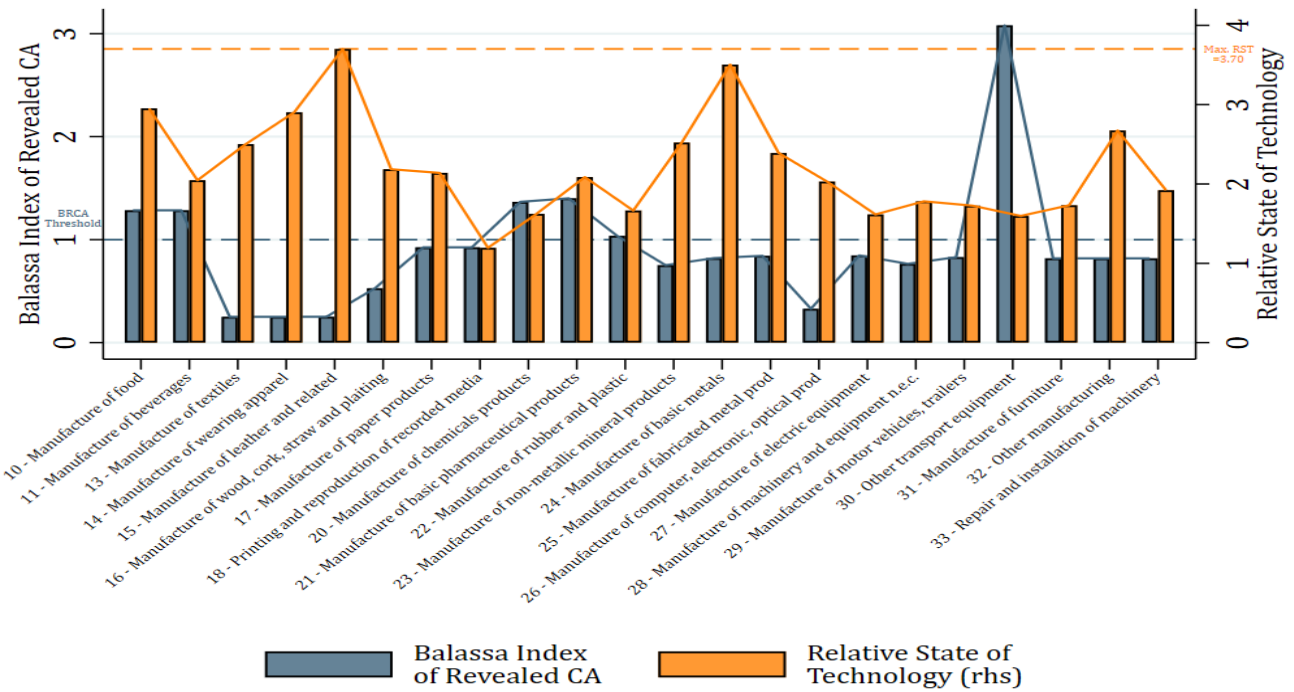
- **Free entry**: Firms enter by sinking a fixed input requirement and draw unit input requirement c (inverse of TFP) from a country-sector (inverse) Pareto distribution with country-sector support $[0, C_M(z)$ *or* $C_M^*(z)]$ and sector concentration $k(z)$ – call $C_M(z)$ Home's "relative state of technology"
- If their c falls above **country-sector survival cutoff**, they exit without producing; if c falls below that cutoff, they produce for the domestic market; if it falls also below bilateral **country-sector export cutoff**, they also export ("double selection")

Huang and Ottaviano (2024)

- **Free entry**: Firms enter by sinking a fixed input requirement and draw unit input requirement c (inverse of TFP) from a country-sector (inverse) Pareto distribution with country-sector support $[0, C_M(z)$ *or* $C_M^*(z)]$ and sector concentration $k(z)$ – call $C_M(z)$ Home's "relative state of technology"
- If their c falls above **country-sector survival cutoff**, they exit without producing; if c falls below that cutoff, they produce for the domestic market; if it falls also below bilateral **country-sector export cutoff**, they also export ("double selection")
- Selection implies that more firms enter country-sectors with better technology, lower input prices and larger domestic market; they are less likely to survive but more likely to export if they survive

di Mauro et al. (2024)

Balassa Revealed Comparative Advantage and Relative State of Technology in France

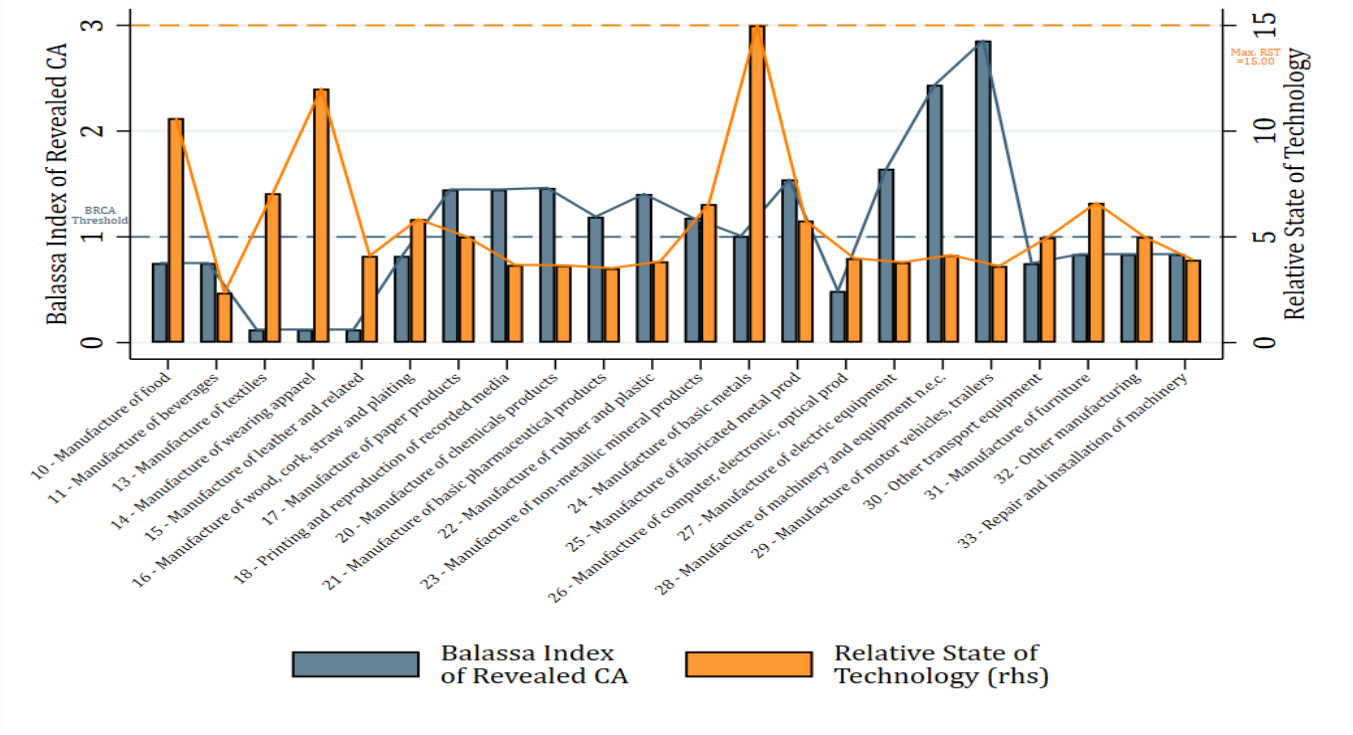


CompNet

Back

di Mauro et al. (2024)

Balassa Revealed Comparative Advantage and Relative State of Technology in Germany

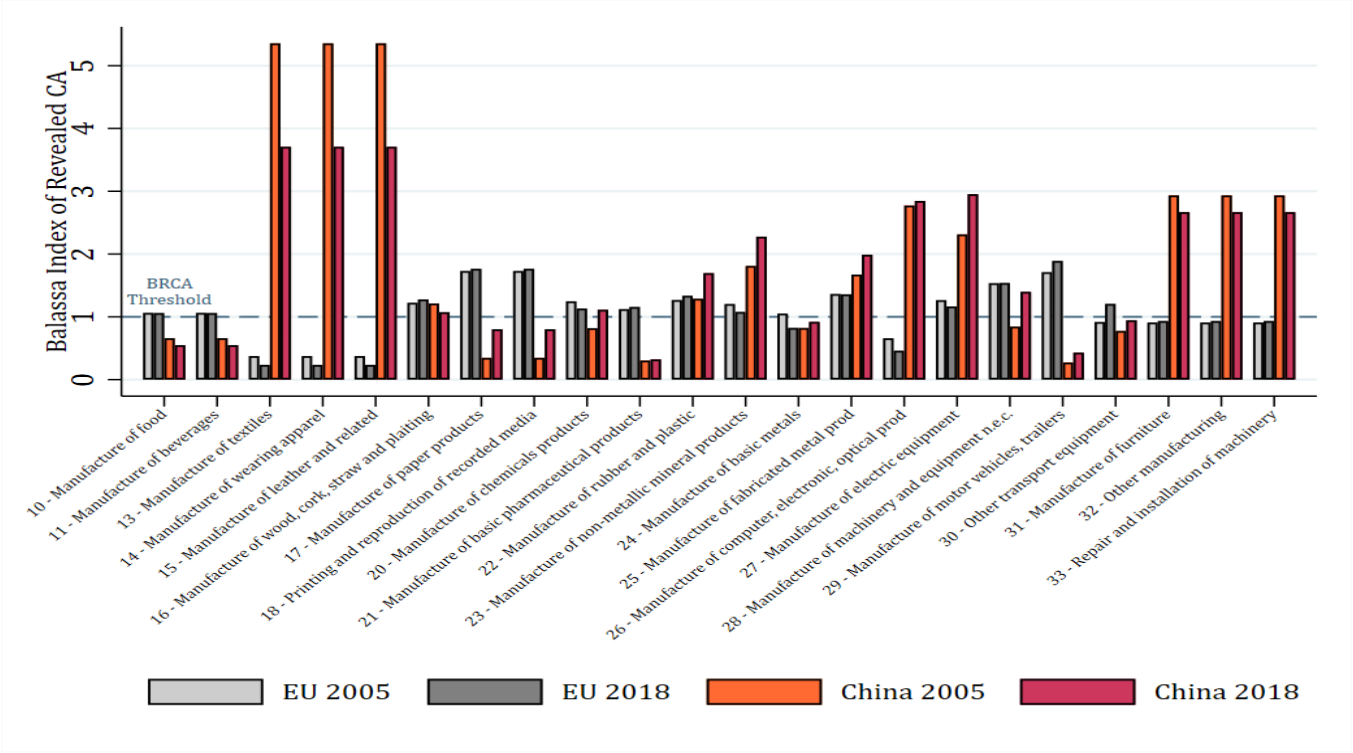


CompNet

Back

di Mauro et al. (2024)

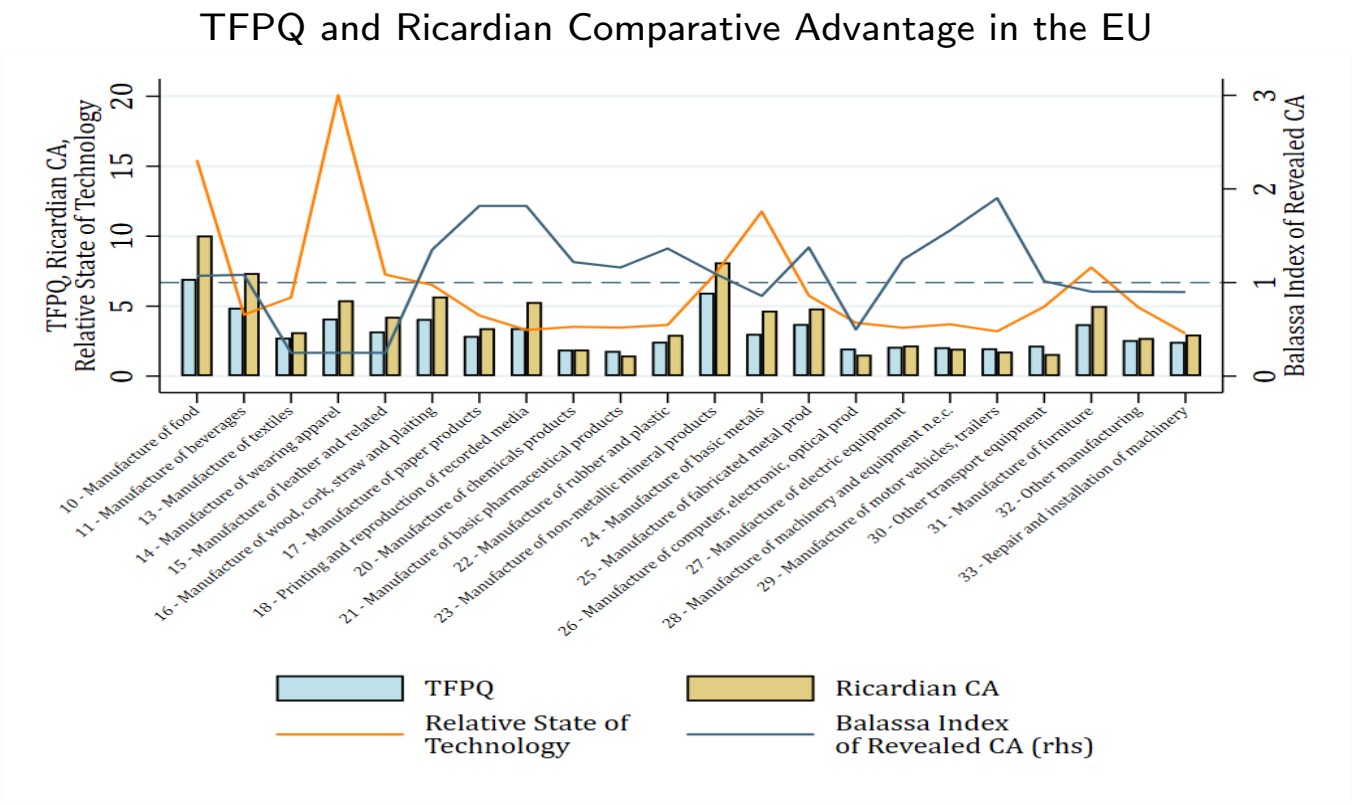
Balassa Revealed Comparative Advantage in the EU and China, Time Evolution



CompNet

Back

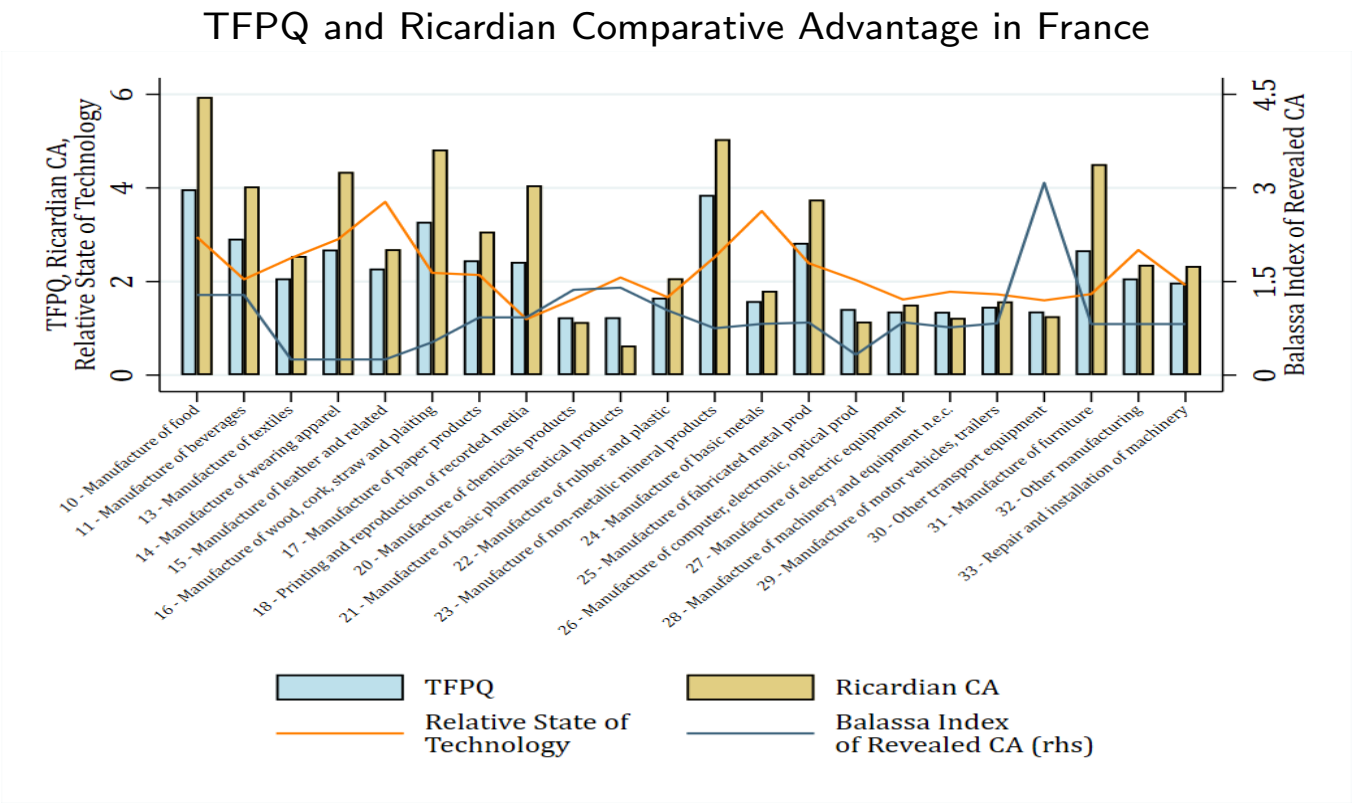
di Mauro et al. (2024)



CompNet

Back

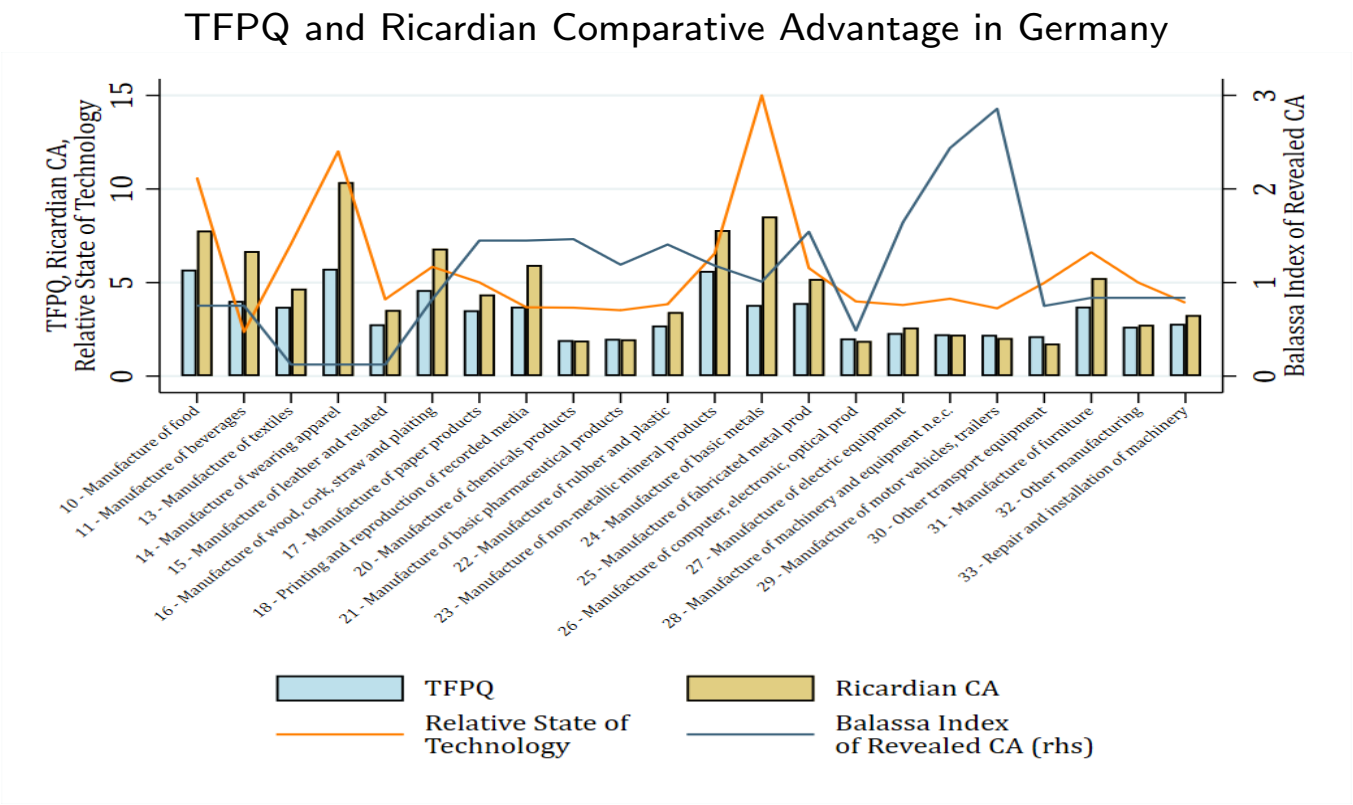
di Mauro et al. (2024)



CompNet

Back

di Mauro et al. (2024)



CompNet

Back

di Mauro et al. (2024)

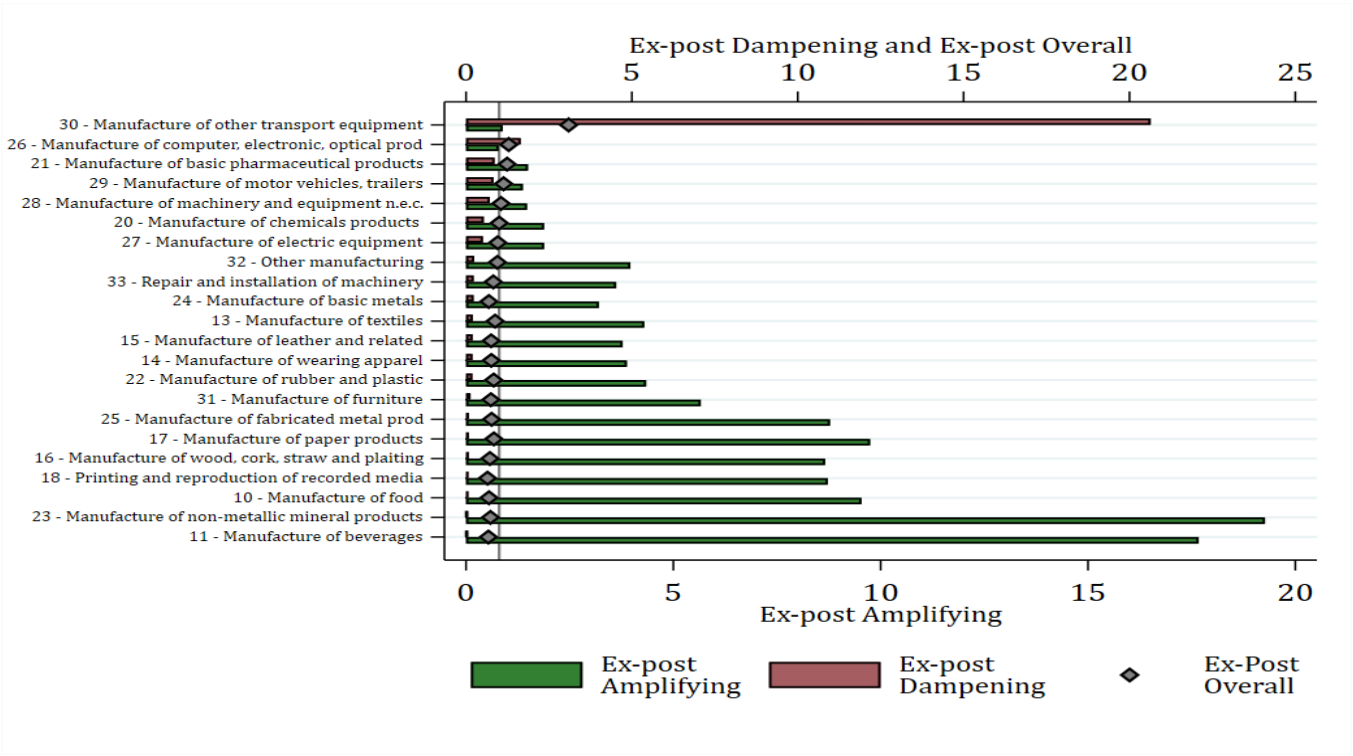
Relative State of Technology, Ricardian Comparative Advantage, and TFPQ in the CESEE countries

CompNet

Back

di Mauro et al. (2024)

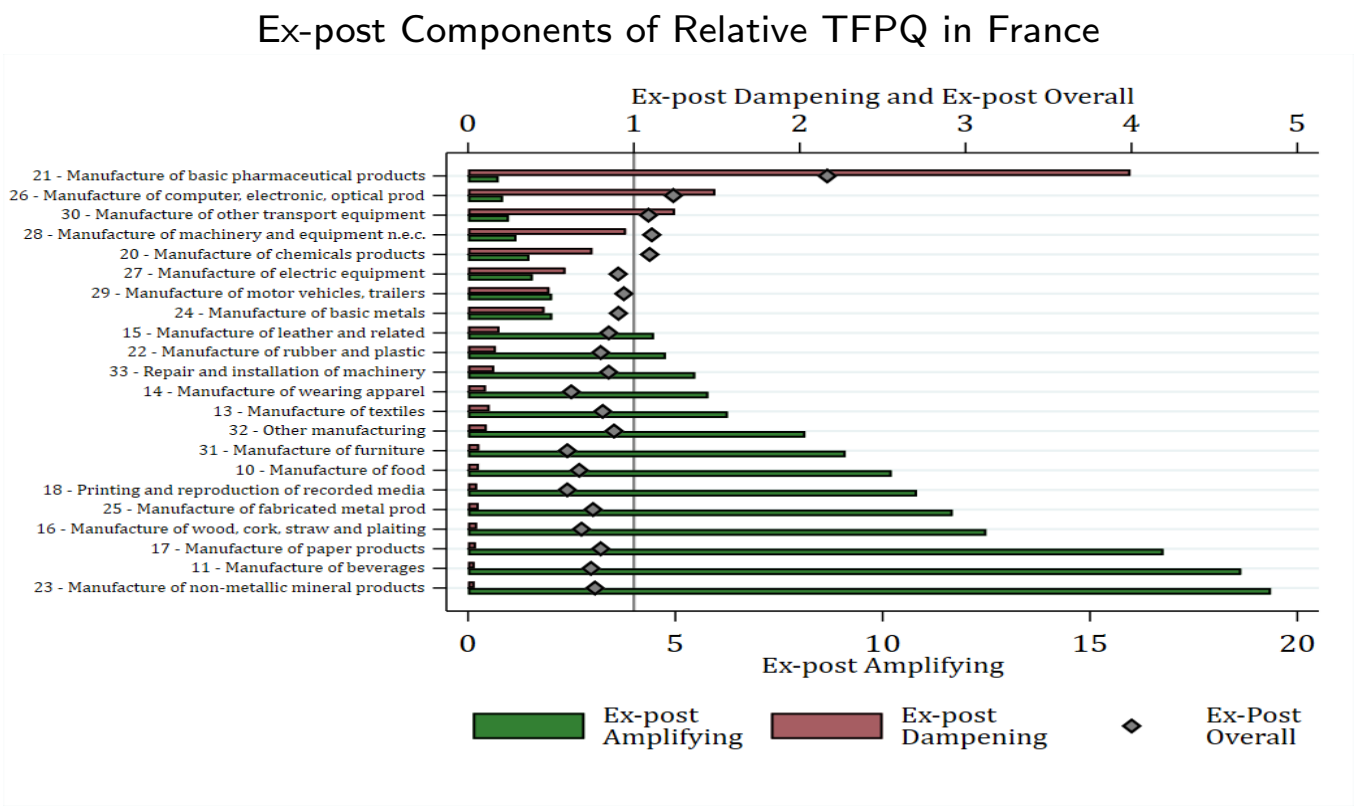
Ex-post Components of Relative TFPQ in the EU



CompNet

Back

di Mauro et al. (2024)

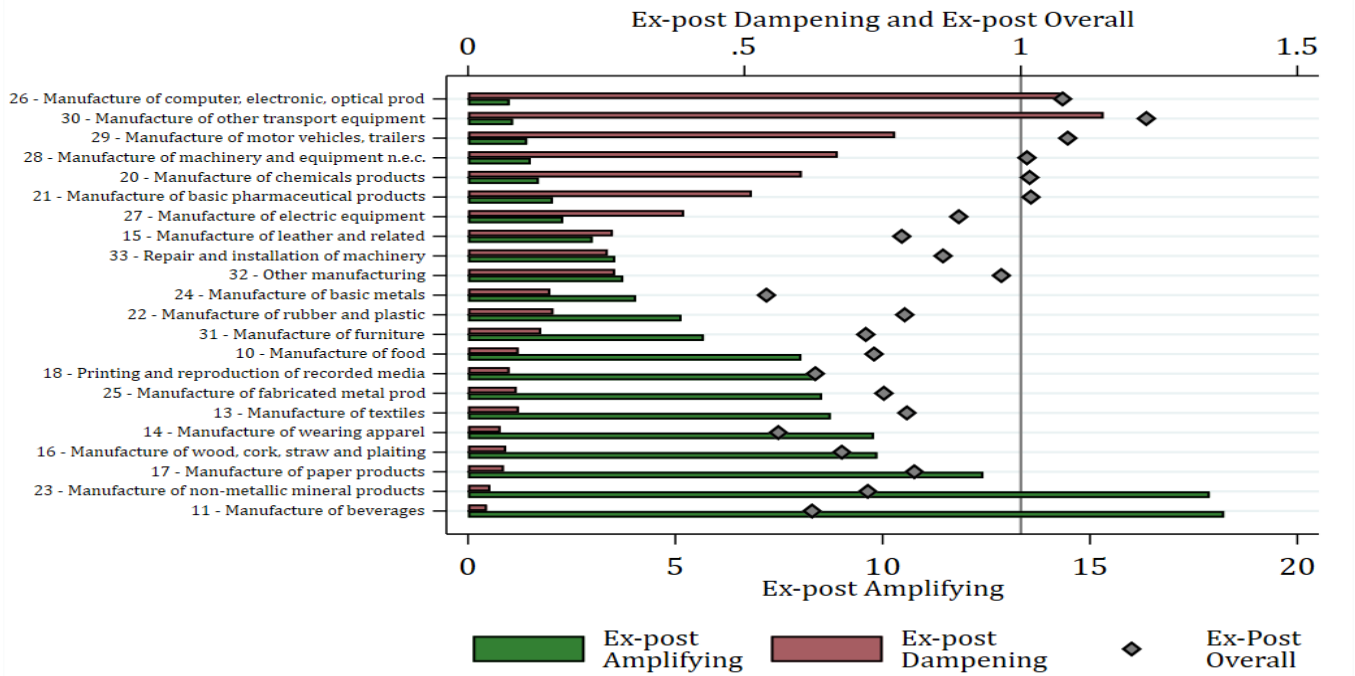


CompNet

Back

di Mauro et al. (2024)

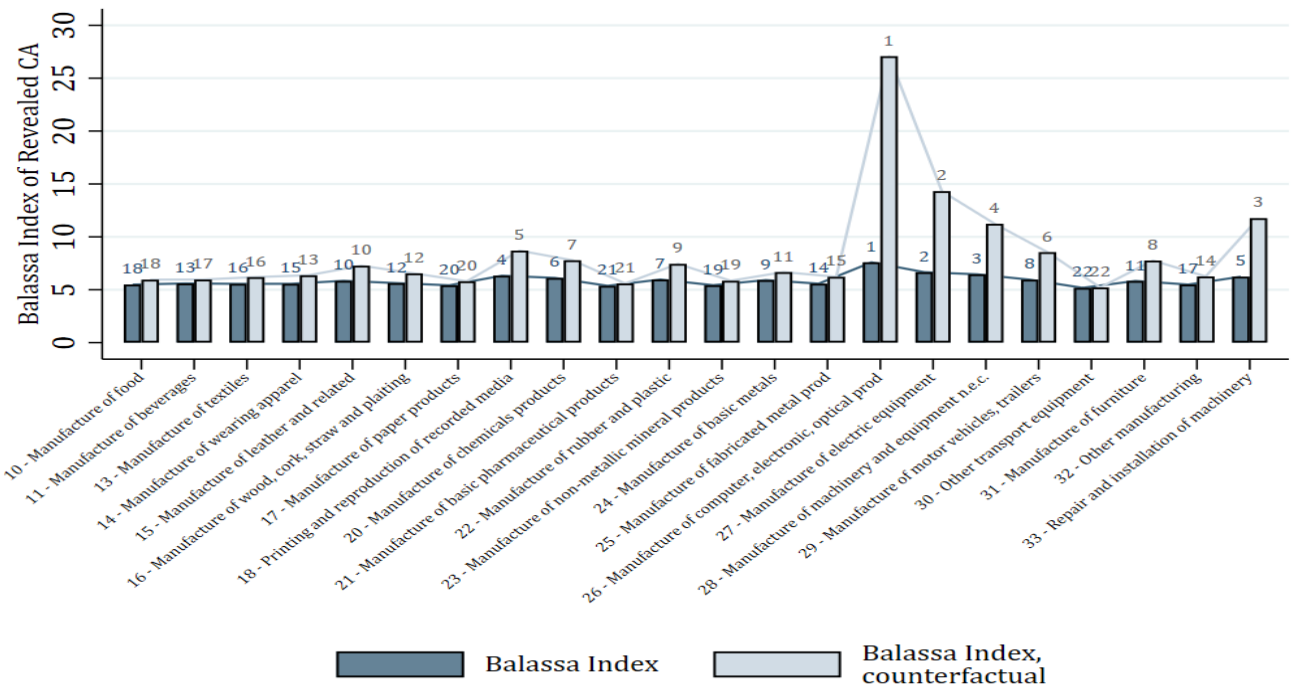
Ex-post Components of Relative TFPQ in Germany



Back

di Mauro et al. (2024)

Balassa Revealed Comparative Advantage in the EU, Comparative Statics



CompNet

Back