Recent trends in international trade and their consequences on carbon footprints

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Motivation

TWIN SEEDS

Towards a World Integrated and Socio-economically Balanced European Economic Development Scenario

Horizon Europe Framework Programme (PROJECT: 101056793)

The project studies the recent evolution of Global Value Chains (GVC), with the aim of understanding the role played by technological transformations and geopolitical and policy shifts in shaping these changes.

A new trade paradigm?

The New York Times

What Is 'Friendshoring'?

Melanie Lambrick

By Sarah Kessler

Breaking down business jargon.

Published Nov. 18, 2022 Updated Jan. 3, 2023

The New York Times

OPINION

The Era of Offshoring U.S. Jobs Is Over

The pandemic, and Trump's trade policy, are accelerating a trend to bring manufacturing back to America.

May 11, 2020

CBS NEWS

Is "Backshoring" the Next Big Trend?

MONEY WATCH

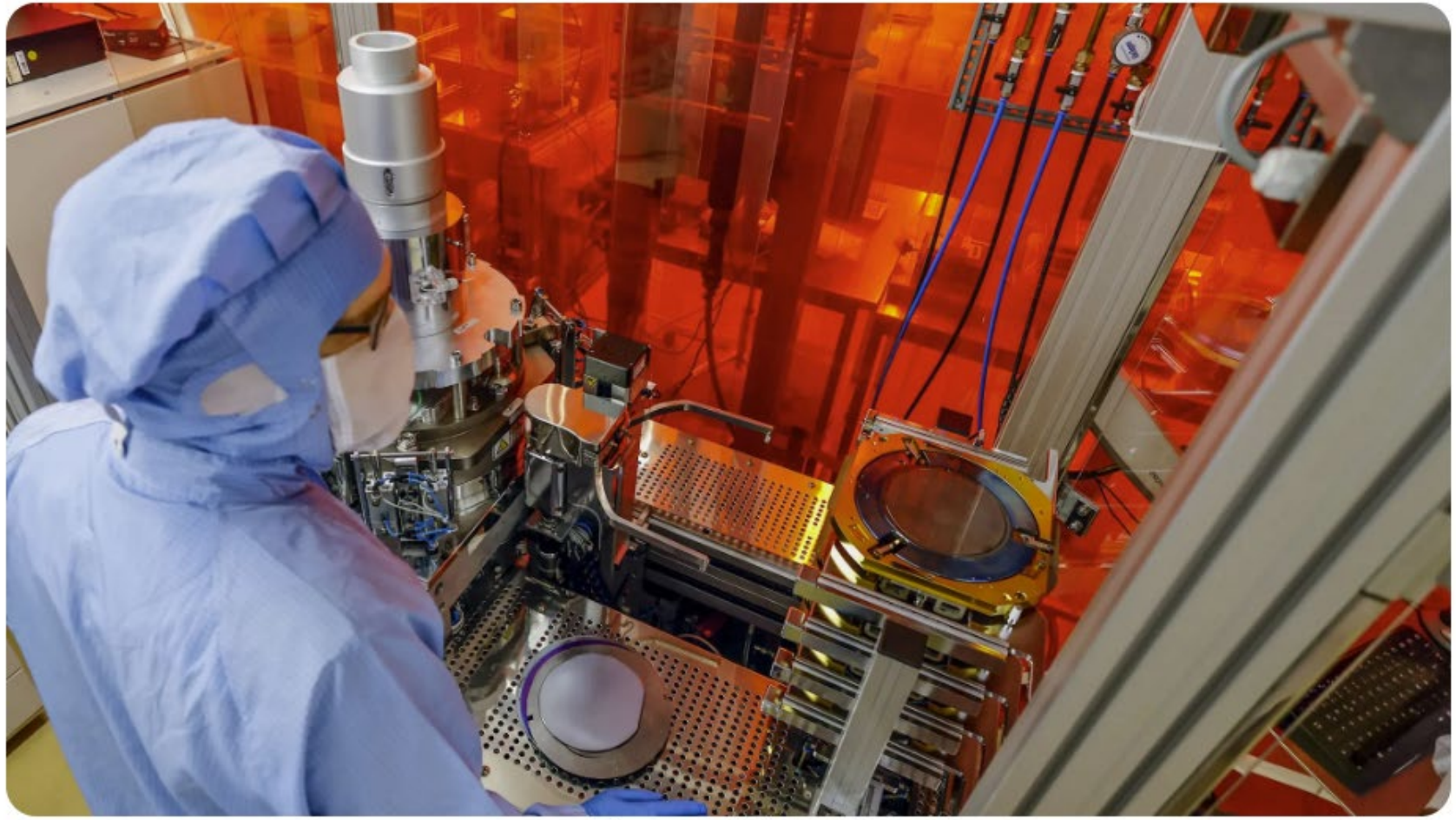
By **Stefan Deeran**

Updated on: June 3, 2009 / 1:14 PM EDT / MoneyWatch

A new trade paradigm?

Open Strategic Autonomy for a competitive and resilient EU

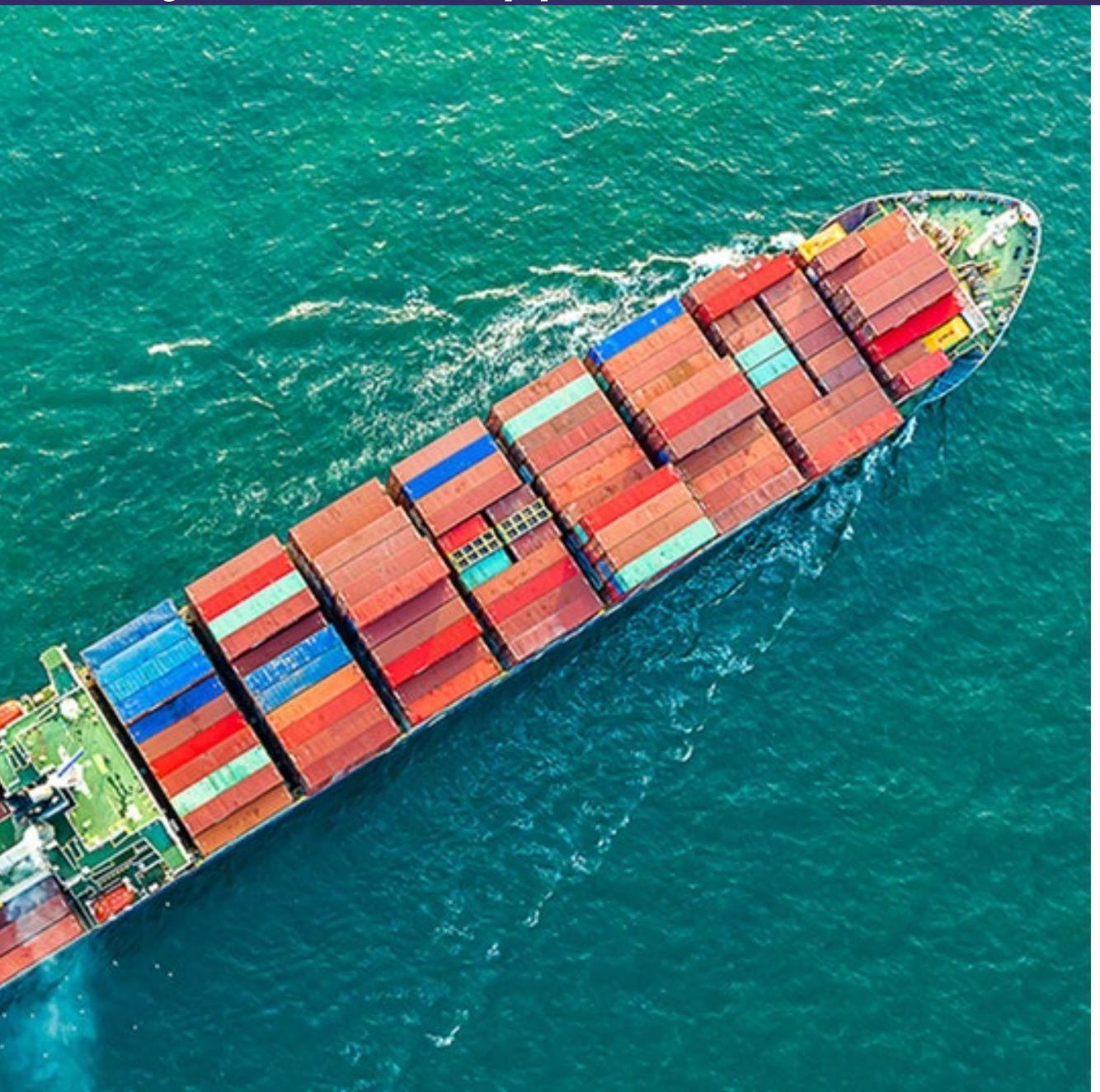
European Parliament



An operator works in a German microchip plant. | © EFE/EPA/Hannibal Hanschke

- Strengthen the EU's internal production
- New comercial expansion
- Respond to the environmental emergency

Objetives and approach

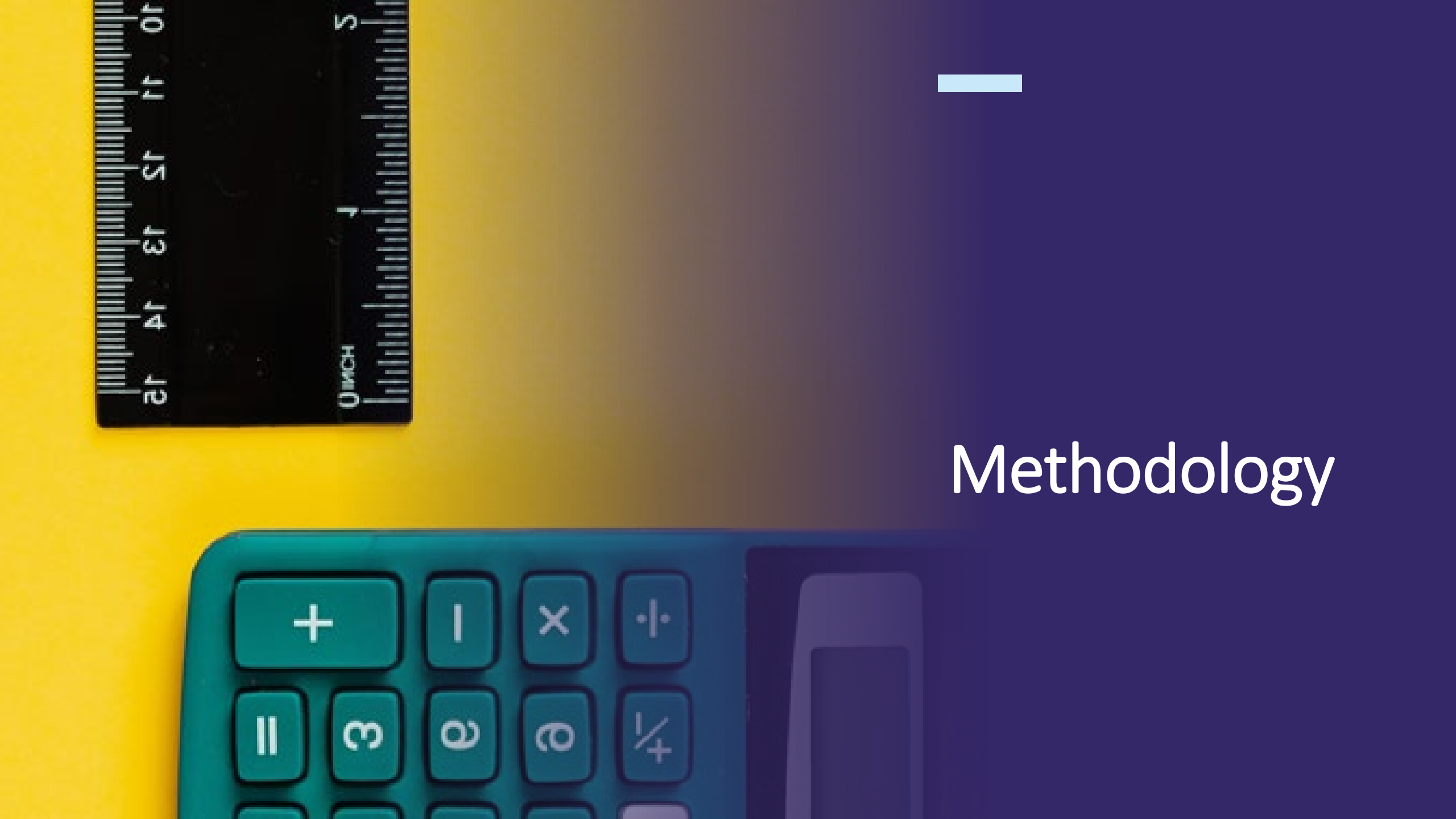


Effects of GVCs' reorganisation on the environment

To analyse the evolution of carbon emissions, with a particular focus on the EU

To assess the drivers of the changes in the EU's carbon footprint

To identify relocation patterns in GVC and its effects on CO2 emissions



Methodology

Methods and data sources

Effects of GVCs' reorganisation on the environment

TIME SPAN

1995-2018

METHODS

Structural decomposition analysis

DATA SOURCE

OECD Inter-Country Input-Output (ICIO) Tables

Relocation measures based on Gao, Hewings & Yang (2022)

Methods: structural decomposition analysis

Full decomposition of the changes in the carbon footprint in a given period

$$\mathbf{F_1 - F_0} = \hat{\mathbf{e}}_1\mathbf{L}_1\hat{\mathbf{y}}_1 - \hat{\mathbf{e}}_0\mathbf{L}_0\hat{\mathbf{y}}_0 = \hat{\mathbf{e}}_1(\mathbf{L}_1 - \mathbf{I})\hat{\mathbf{y}}_1 - \hat{\mathbf{e}}_0(\mathbf{L}_0 - \mathbf{I})\hat{\mathbf{y}}_0 + \hat{\mathbf{e}}_1\hat{\mathbf{y}}_1 - \hat{\mathbf{e}}_0\hat{\mathbf{y}}_0 = \hat{\mathbf{e}}_1\mathbf{M}_1\hat{\mathbf{y}}_1 - \hat{\mathbf{e}}_0\mathbf{M}_1\hat{\mathbf{y}}_0 + \hat{\mathbf{e}}_1\hat{\mathbf{y}}_1 - \hat{\mathbf{e}}_0\hat{\mathbf{y}}_0$$

CHANGES IN INDIRECT EMISSIONS

CHANGES IN DIRECT EMISSIONS

DUE TO CHANGES IN: =

$$\Delta\hat{\mathbf{e}}\,\mathbf{M}_0\,\hat{\mathbf{y}}_0 + \hat{\mathbf{e}}_0\,\Delta\mathbf{M}^{\mathbf{GEO}}\,\hat{\mathbf{y}}_1 + \hat{\mathbf{e}}_0\,\Delta\mathbf{M}^{\mathbf{TEC}}\,\hat{\mathbf{y}}_1 + \hat{\mathbf{e}}_0\,\mathbf{M}_0\Delta\,\hat{\mathbf{y}}^{\mathbf{GEO}} + \hat{\mathbf{e}}_0\,\mathbf{M}_0\Delta\,\hat{\mathbf{y}}^{\mathbf{MIX}} + \Delta\hat{\mathbf{e}}\,\hat{\mathbf{y}}_1 + \hat{\mathbf{e}}_0\,\Delta\,\hat{\mathbf{y}}^{\mathbf{GEO}} + \hat{\mathbf{e}}_0\,\Delta\,\hat{\mathbf{y}}^{\mathbf{MIX}}$$

EMISSION INTENSITIES | INTERMEDIATE INPUTS | FINAL DEMAND | EMISSION INTENSITIES | FINAL DEMAND

Geographical shifts of suppliers | Technological change | Geographical shifts of suppliers | Shifts of the demand's bundle | Geographical shifts of suppliers | Shifts of the demand's bundle

I-EM | I-IC.Geo | I-IC.Tec | I-FD.Geo | I-FD.Mix | D-EM | D-FD.Geo | D-FD.Mix

8 components

Methods: quantification of relocation patterns

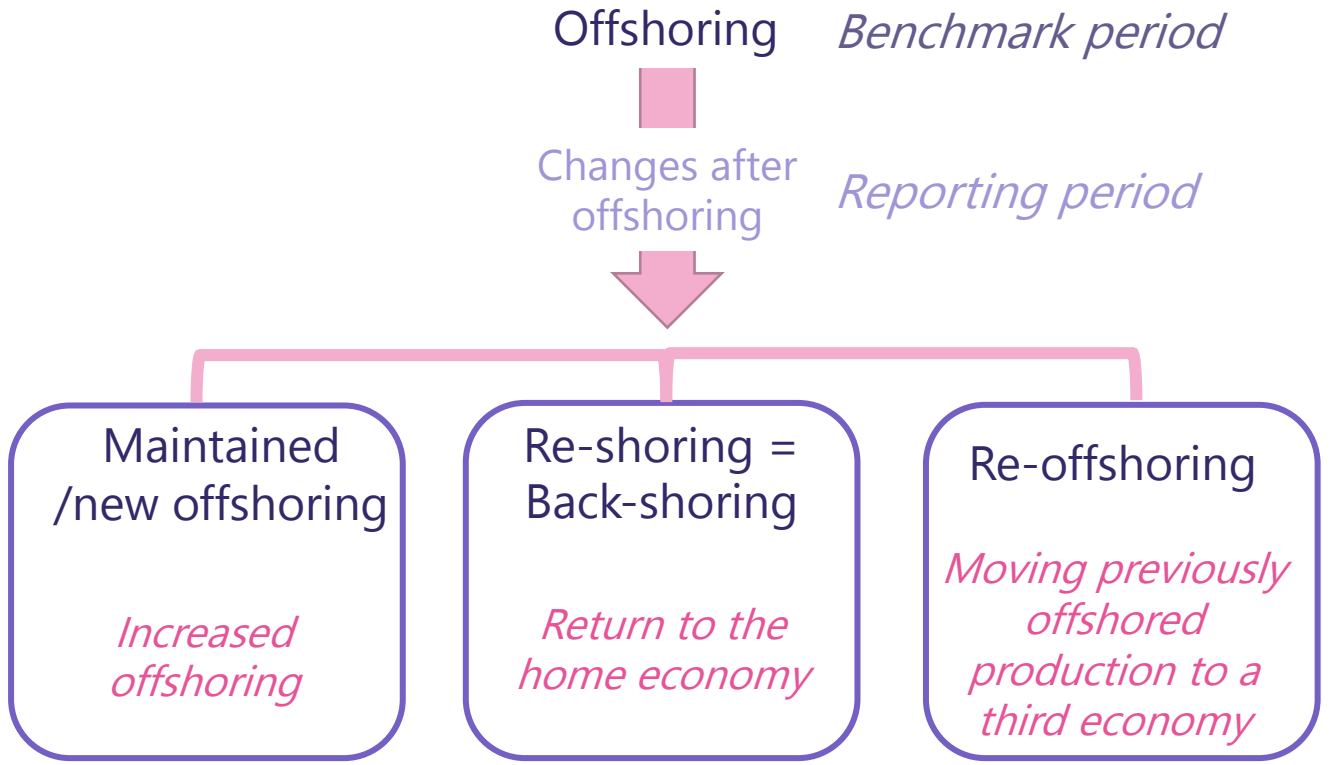
Full decomposition of changes in the carbon footprint in a given period

8 components

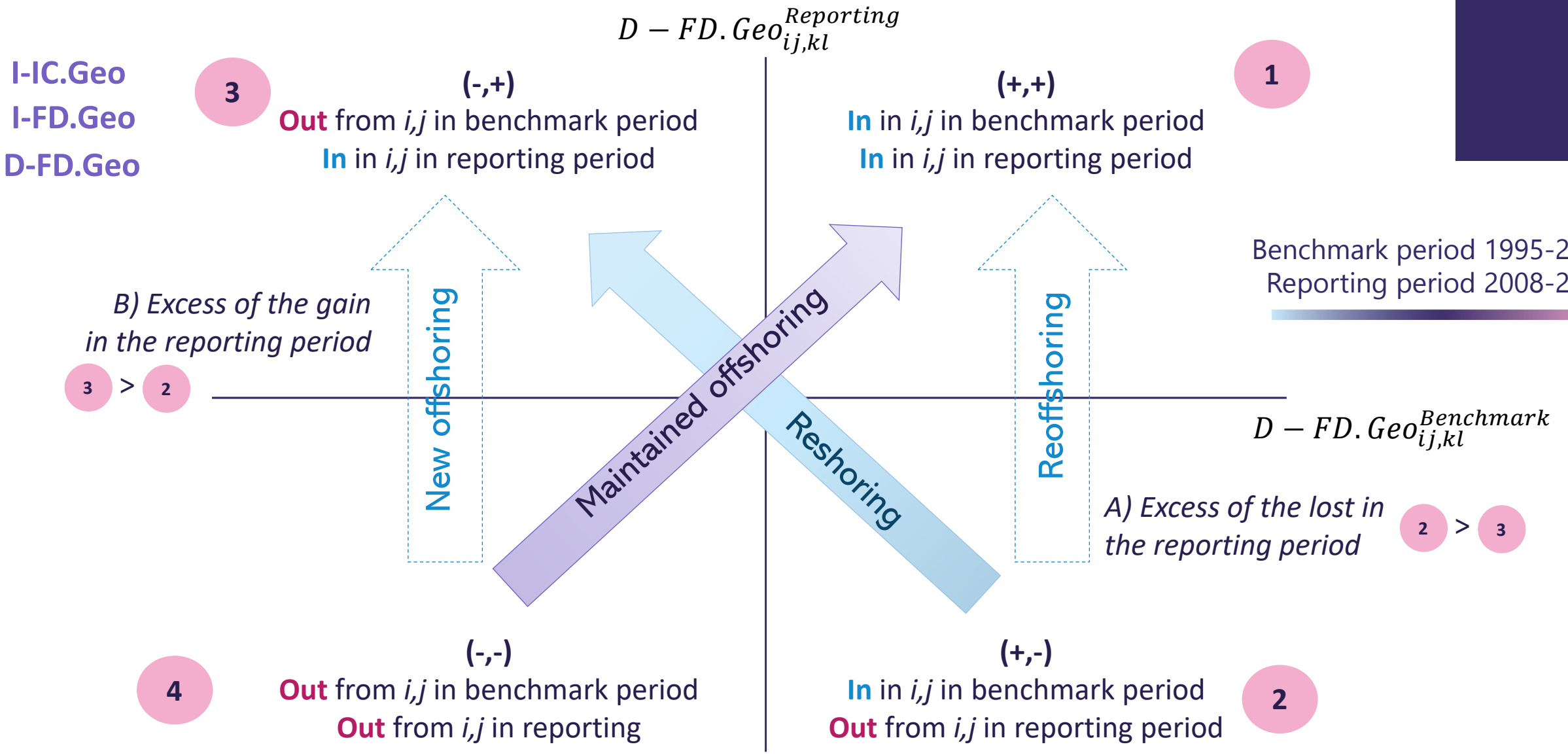
I-EM | I-IC.Geo | I-IC.Tec | I-FD.Geo | I-FD.Mix | D-EM | D-FD.Geo | D-FD.Mix

Focus on the changes in the carbon footprint due to geographical shifts of suppliers

Target: to identify relocation patterns



Methods: quantification of relocation patterns



Gao, X., Hewings, G. J., & Yang, C. (2022).

Specific measures proposed for supplying economy j once fixed supplying industry i and demanding country l and industry k

Results

Results: evolution of the carbon footprint

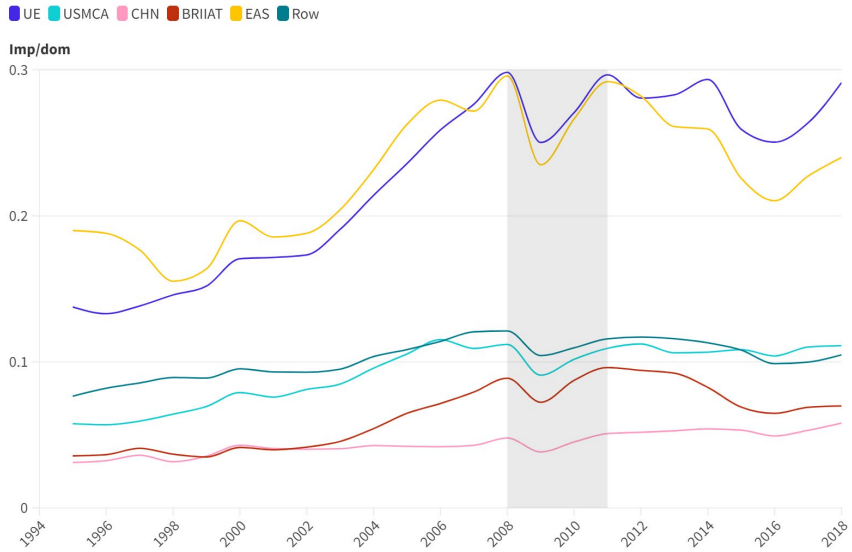
Carbon footprint: growth rates (%)

	1995-2018				1995-2008				2008-2018			
	Domestic part	Imported part	Total footprint	Ratio imported/ domestic	Domestic part	Imported part	Total footprint	Ratio imported/ domestic	Domestic part	Imported part	Total footprint	Ratio imported/ domestic
UE	-23%	29%	-10%	68%	-2%	66%	15%	70%	-21%	-22%	-22%	-1%
NFT	1%	96%	13%	94%	15%	104%	26%	78%	-12%	-4%	-10%	9%
CHN	236%	377%	246%	42%	104%	135%	106%	15%	65%	103%	68%	23%
BRIIAT	97%	211%	111%	58%	47%	190%	63%	98%	35%	7%	29%	-20%
EAS	23%	25%	24%	1%	8%	32%	15%	22%	14%	-6%	7%	-17%
Row	53%	101%	63%	32%	32%	97%	46%	49%	15%	2%	11%	-12%
Total	**59%**	**92%**	**65%**	**21%**	**33%**	**88%**	**43%**	**41%**	**20%**	**2%**	**16%**	**-14%**

CO_2 emissions multiplier: growth rate 1995-2018 (%)

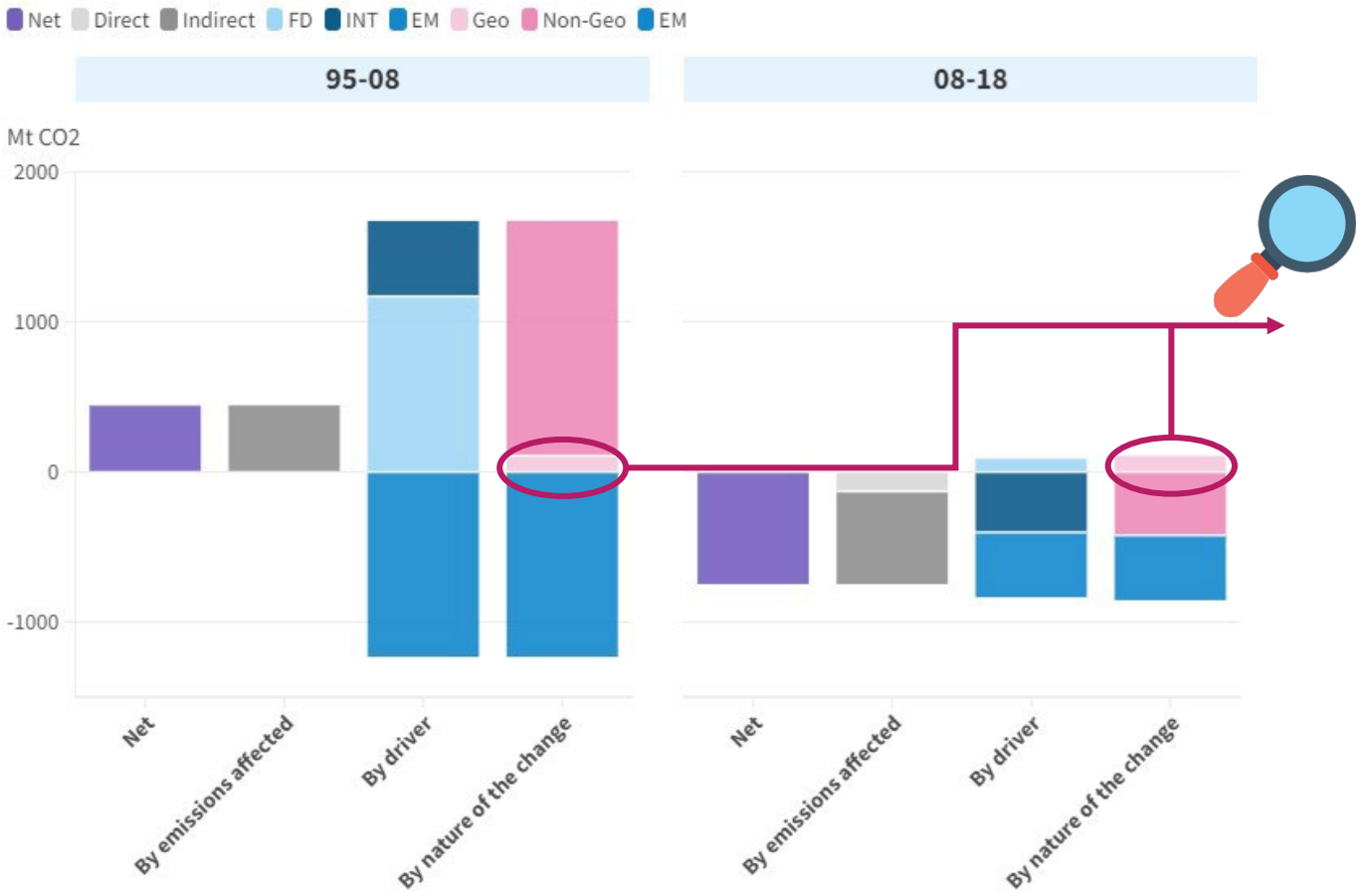
	Growth rate 1995-2018 (%)		
	Domestic	*Imported*	*Total*
UE	-44.28%	13.06%	-37.03%
USMCA	-42.82%	3.72%	-40.13%
CHN	-30.05%	14.99%	-28.54%
BRIIAT	-29.55%	22.87%	-27.56%
EAS	19.41%	47.28%	23.91%
Row	53.41%	97.34%	56.72%

Ratio Imported part/domestic part of the CO2 multiplier

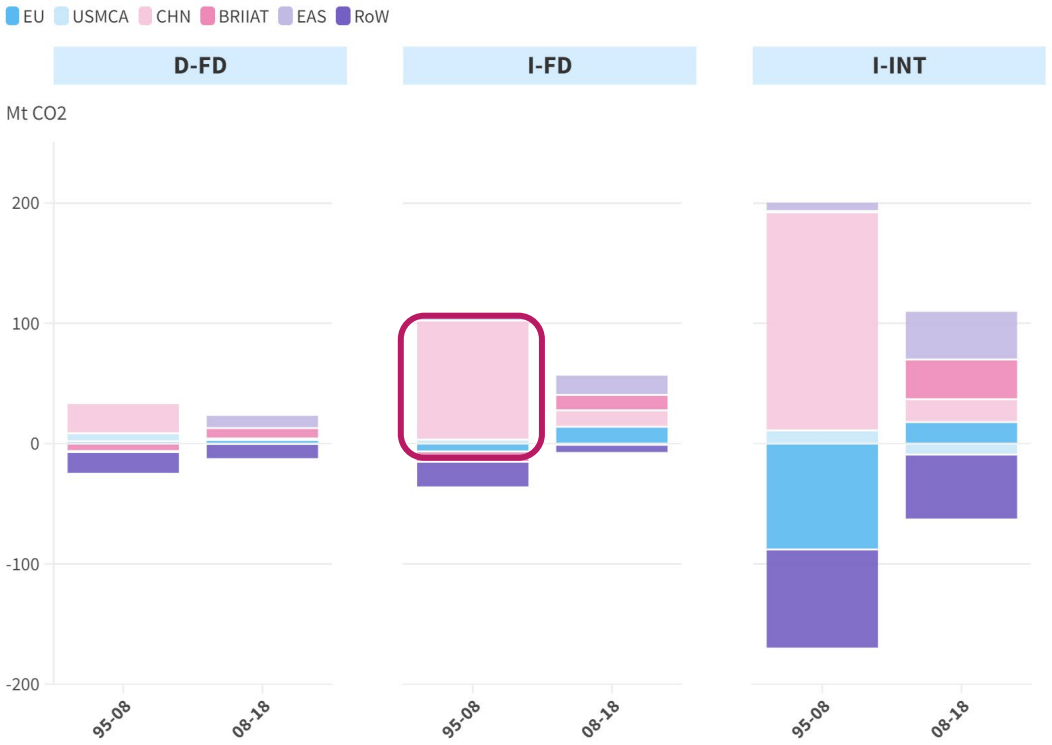


Results: decomposition of the changes in the carbon footprint

Decomposition of changes in EU's CF. 1995-2008 and 2008-2018, $MtCO_2$

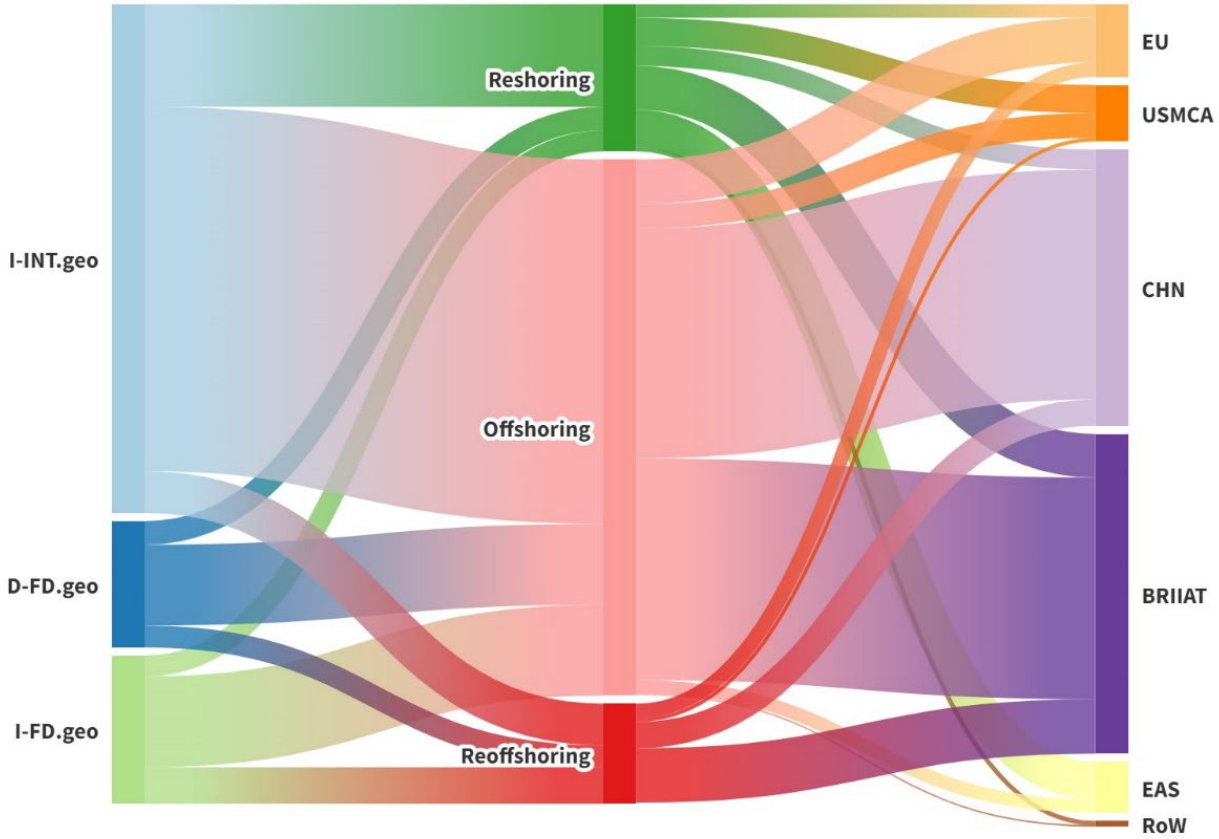


Focus on changes in EU's CF due to geographical shifts of suppliers. 1995-2008 and 2008-2018, $MtCO_2$

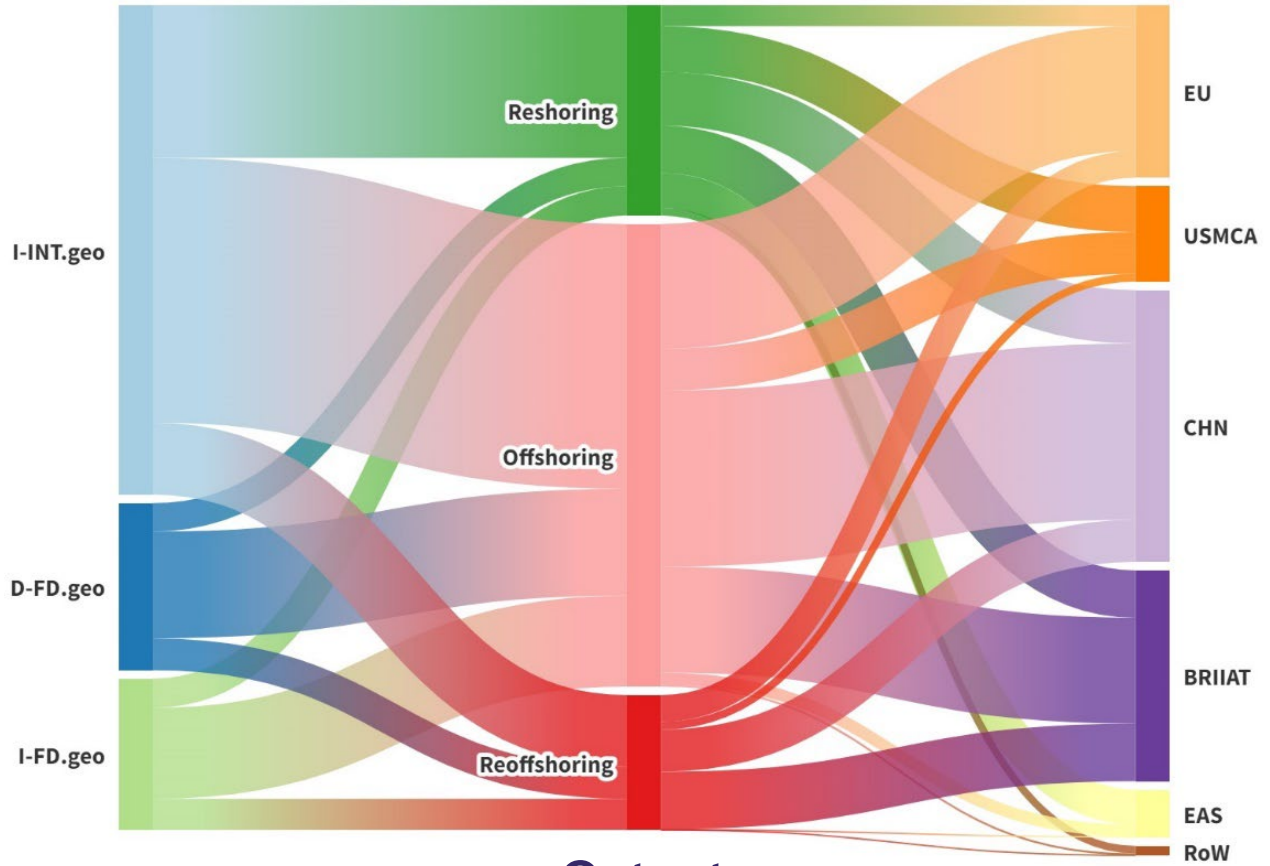


Results: trade-restructuration patterns

Relocation patterns of emissions vs. output by shifts of suppliers, 2008-2018 (taking 1995-2008 as benchmark), $MtCO_2$



Emissions



Output

Discussion

Discussion

Carbon FP evolution

Global carbon emissions ↑ 1995 to 2018

- Rise in imported emissions
- Mainly due to the trends in the subperiod 1995-2008

Focus on the EU

↓ EU's CO_2 footprint

Domestic emissions ↓

Imported emissions ↑

Decomposition of the reduction in the EU's FP

↓

- Indirect emissions
- CO_2 intensities

⚠ Relocation trends increased the footprint in all the periods

Identification of trade trends

- Offshoring as the predominant one
  - More intensive in CO_2 than the backshored production

Thank you for your attention

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