

Nearshoring and Farsharing in Europe within the Global Economy

Filippo Bontadini^{1,3}, Valentina Meliciani¹, Maria Savona^{1,3},
Ariel Wirkierman^{2,3}

¹LUISS University ²Goldsmiths, University of London ³SPRU, University of Sussex

WU Economics Seminar
Vienna, 29 March 2023

Acknowledgements and Disclaimer

This paper has been funded by the Unit for Analysis, Planning, Statistics and Historical Documentation, Directorate General for Public and Cultural Diplomacy, Italian Ministry of Foreign Affairs and International Cooperation in line with Art. 23 of the Presidential Decree n.18/1967. Opinions are solely those of the authors and do not reflect those of the Ministry of Foreign Affairs and International Cooperation.

Introduction and motivation

- ▶ Hyper-globalisation (1986-2008) vs. De-globalisation (2008-present) narratives (Antràs, 2020):
Covid-19 pandemic shock and the Ukrainian war: globalisation challenges (Baldwin and Evenett, 2020; Ruta, 2022)
- ▶ Reorganisation of value chains:
shift from global to more regional configurations or *vice-versa* (Baldwin and Lopez-Gonzalez, 2015; Los et al., 2015);
- ▶ Perception of fragility of GVCs to external shocks:
debates on trade-off between efficiency and security shifting to reshoring/nearshoring (Piatanesi and Arauzo-Carod, 2019) and consequences for global supply chain resilience (Miroudot, 2020).

Research question(s)

Our main research questions are:

- ▶ What has been the *geographical reorganisation* of input sourcing and output destinations across the global economy in value-added terms?
- ▶ How is this reorganisation related to employment within Europe?

Methodology

- ▶ Measure *regional* and *global*, i.e. extra-regional, value-added content of trade (Foster-McGregor and Stehrer, 2013);
- ▶ Adopt both *input sourcing* (Los et al., 2015) and *output destination* perspectives;
- ▶ Two units of analysis:
 - (i) GVC j of country of completion c ;
GVC operationalised as an international *subsystem* (Sraffa, 1960)
 - (ii) Industry i of country c .

Dataset characteristics

- ▶ Global input–output tables: OECD Inter-Country Input-Output (ICIO) dataset (Nov-2021 Ed.);
- ▶ 45 industries (ISIC Rev. 4); 66 countries; 1995-2018;
- ▶ Three macro-regions:
 - European Union (EU28)
28 European countries, including Croatia and the UK;
 - Asia-Pacific (AP)
ASEAN Plus Six (i.e. China, Japan, South Korea, India, Australia and New Zealand), Hong Kong and Chinese Taipei;
 - North and Latin America (NLA)
USMCA, Argentina, Brazil, Chile, Colombia, Costa Rica and Peru.

Dataset characteristics (cont'd)

- ▶ Focus on: GVCs for manufacturing final outputs.
Note: a manufacturing GVC requires – directly and/or indirectly – inputs from *all* industries (primary sectors and services included);
- ▶ Focus on: manufacturing industries' contributions to foreign GVCs.
Note: a manufacturing industry contributes to foreign GVCs for all final products (primary sectors and services included).

GVCs in an input-output framework

We start from a standard input-output framework to link final demand to producing countries and sectors

$$X = Z + F = AX + F$$

A is the matrix of technical coefficients (or direct requirements)

$$X = B * F$$

B is the Leontieff inverse includes all rounds of production occurring in a value chain:

$$B = (I - A)^{-1} = I + A + A^2 + A^3 + A^4 * B$$

VAF: Value Added embodied in Final Output

To look at value added, rather than output, we can premultiply the matrices by a diagonalised vector of value added shares:

$$VAF = \hat{v} * B * \hat{f}$$

In a World economy of 3 countries c, p, r and n industries in each, we can depict our global income matrix in matrix form as:

$$VAF = \begin{bmatrix} \hat{v}_c & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \hat{v}_p & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \hat{v}_r \end{bmatrix} \begin{bmatrix} \mathbf{B}_{cc} & \mathbf{B}_{cp} & \mathbf{B}_{cr} \\ \mathbf{B}_{pc} & \mathbf{B}_{pp} & \mathbf{B}_{pr} \\ \mathbf{B}_{rc} & \mathbf{B}_{rp} & \mathbf{B}_{rr} \end{bmatrix} \begin{bmatrix} \hat{f}_c & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \hat{f}_p & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \hat{f}_r \end{bmatrix}$$

$(=\hat{v})$ $(=B)$ $(=\hat{f})$

\mathbf{v} : value added per unit of gross output; \mathbf{B} : total (direct and indirect) input requirements per unit of output; \mathbf{f} : final output.

VAF: Value Added embodied in Final Output

From the global income matrix, we can isolate the foreign sources of value added and the destinations of domestic value added:

$$\text{VAF} = \hat{\mathbf{v}}\mathbf{B}\hat{\mathbf{f}} = \begin{bmatrix} \hat{\mathbf{v}}_c \mathbf{B}_{cc} \hat{\mathbf{f}}_c & \hat{\mathbf{v}}_c \mathbf{B}_{cp} \hat{\mathbf{f}}_p & \hat{\mathbf{v}}_c \mathbf{B}_{cr} \hat{\mathbf{f}}_r \\ \hat{\mathbf{v}}_p \mathbf{B}_{pc} \hat{\mathbf{f}}_c & \hat{\mathbf{v}}_p \mathbf{B}_{pp} \hat{\mathbf{f}}_p & \hat{\mathbf{v}}_p \mathbf{B}_{pr} \hat{\mathbf{f}}_r \\ \hat{\mathbf{v}}_r \mathbf{B}_{rc} \hat{\mathbf{f}}_c & \hat{\mathbf{v}}_r \mathbf{B}_{rp} \hat{\mathbf{f}}_p & \hat{\mathbf{v}}_r \mathbf{B}_{rr} \hat{\mathbf{f}}_r \end{bmatrix}$$

$$\text{FVAS}_c = \frac{\mathbf{1}^T (\hat{\mathbf{v}}_p \mathbf{B}_{pc} \hat{\mathbf{f}}_c + \hat{\mathbf{v}}_r \mathbf{B}_{rc} \hat{\mathbf{f}}_c) \mathbf{1}}{\mathbf{1}^T \hat{\mathbf{f}}_c}, \quad \text{foreign origin of value added}$$

$$\text{FSUBS}_c = \frac{\mathbf{1}^T (\hat{\mathbf{v}}_c \mathbf{B}_{cp} \hat{\mathbf{f}}_p + \hat{\mathbf{v}}_c \mathbf{B}_{cr} \hat{\mathbf{f}}_r) \mathbf{1}}{\mathbf{y}_c^T \mathbf{1}}, \quad \text{foreign destination of value added}$$

Nearshoring and Farsharing

If c and p belong to the **same** region:

Regional (c and p)

$$\text{RFVAS}_c = \frac{\mathbf{1}^T \hat{\mathbf{v}}_p \mathbf{B}_{pc} \hat{\mathbf{f}}_c \mathbf{1}}{\mathbf{1}^T \mathbf{f}_c};$$

$$\text{RFSUBS}_c = \frac{\mathbf{1}^T \hat{\mathbf{v}}_c \mathbf{B}_{cp} \hat{\mathbf{f}}_p \mathbf{1}}{\mathbf{y}_c^T \mathbf{1}};$$

Global (r)

$$\text{GFVAS}_c = \frac{\mathbf{1}^T \hat{\mathbf{v}}_r \mathbf{B}_{rc} \hat{\mathbf{f}}_c \mathbf{1}}{\mathbf{1}^T \mathbf{f}_c}$$

$$\text{GFSUBS}_c = \frac{\mathbf{1}^T \hat{\mathbf{v}}_c \mathbf{B}_{cr} \hat{\mathbf{f}}_r \mathbf{1}}{\mathbf{y}_c^T \mathbf{1}}$$

Hence, if for country c :

$\text{NFVA}_c = \frac{\text{RFVAS}_c}{\text{GFVAS}_c}$ is **increasing**, then the country is *nearshoring*;

$\text{NFSUB}_c = \frac{\text{RFSUBS}_c}{\text{GFSUBS}_c}$ is **decreasing**, then the country is *farsharing*.

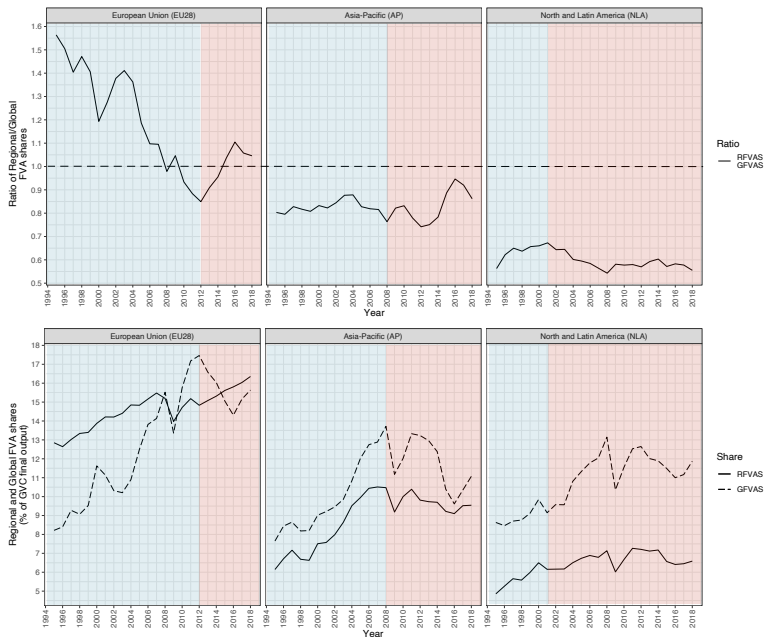


Figure 1: *Upper panel:* Regional-to-Global foreign value added;
Lower panel: Regional and global FVAS of final output.

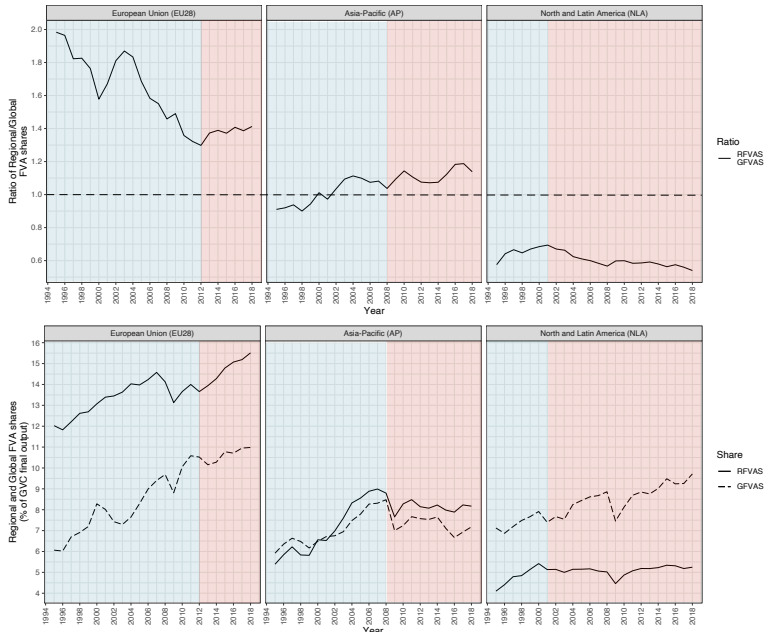


Figure 2: *Upper panel:* Regional-to-Global foreign value added;

Lower panel: Regional and global FVAS of final output.

Note: All value added corresponding to **primary industries** has been excluded from the computations.

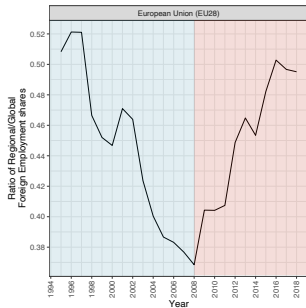


Figure 3: *Upper panel:* Regional-to-Global contribution to foreign GVCs; *Lower panel:* Share of DVA contributed to regional and global GVCs.

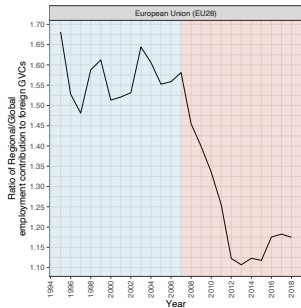
Employment in GVCs

We also look at employment embodied in GVC production and employment in country-industries. This is done by replacing the vector of value added per unit of output with one of employment per unit of output:

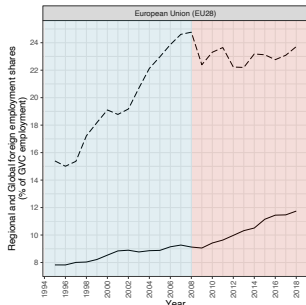
$$EF = \hat{e} * B * F =$$
$$= \begin{bmatrix} \hat{e}_c \mathbf{B}_{cc} \hat{\mathbf{f}}_c & \hat{e}_c \mathbf{B}_{cp} \hat{\mathbf{f}}_p & \hat{e}_c \mathbf{B}_{cr} \hat{\mathbf{f}}_r \\ \hat{e}_p \mathbf{B}_{pc} \hat{\mathbf{f}}_c & \hat{e}_p \mathbf{B}_{pp} \hat{\mathbf{f}}_p & \hat{e}_p \mathbf{B}_{pr} \hat{\mathbf{f}}_r \\ \hat{e}_r \mathbf{B}_{rc} \hat{\mathbf{f}}_c & \hat{e}_r \mathbf{B}_{rp} \hat{\mathbf{f}}_p & \hat{e}_r \mathbf{B}_{rr} \hat{\mathbf{f}}_r \end{bmatrix}$$



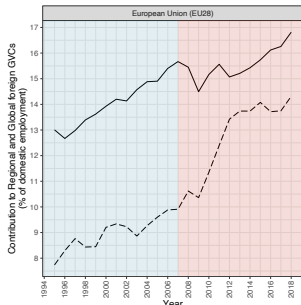
Ratio
— RFEMS
— GFEMS



Ratio
— RFSEMS
— GFSEMS



Share
— RFEMS
-- GFEMS



Share
— RFSEMS
-- GFSEMS

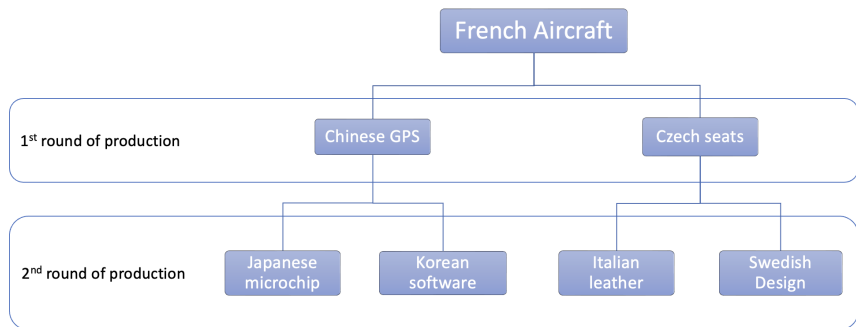
Figure 4: *Upper panel:* Regional-to-Global FEMS and FSEMS; *Lower panel:* Regional and global foreign employment shares (FEMS) and domestic employment contributions to foreign GVCs (FSEMS).

Nearshoring and domestic employment

- ▶ Why should we expect any relationship between GVC nearshoring and employment in the region of completion?
- ▶ GVCs are regional in nature and consist of *bundles* of activities that are carried out together.
- ▶ Relocating an activity from, say, Asia to Europe will impact the location of all upstream activities.
- ▶ This will generate employment in the region through higher-order production linkages.
- ▶ We focus here on nearshoring and employment in the country of completion.

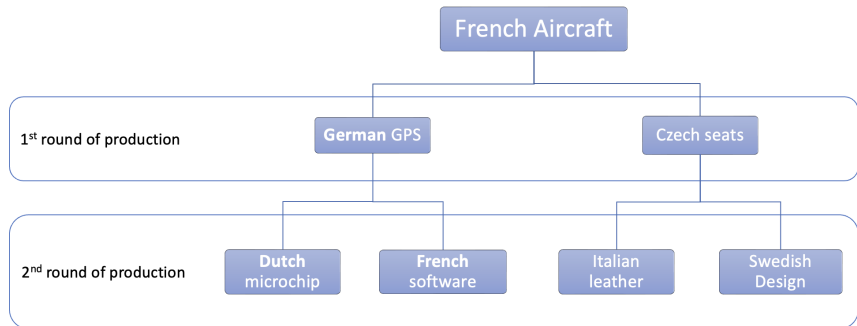
Nearshoring and domestic employment

The GVC leading to the production of Airbus aircrafts in Toulouse will source some inputs from both within and outside the EU



Nearshoring and domestic employment

If sourcing of GPS equipment is shifted from China to Germany, this might shift production of its inputs too, generating more employment within Europe.



Domestic employment share across production rounds

To see this in the data, recall:

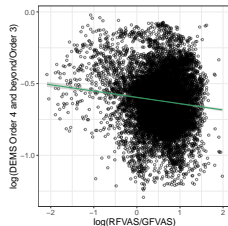
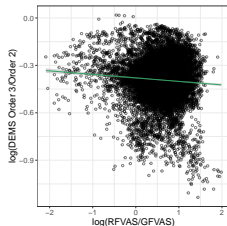
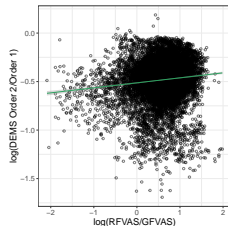
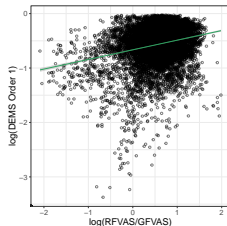
$$B = (I - A)^{-1} = I + A + A^2 + A^3 + A^4 * B$$

We can look at the share of domestic employment at each round of production t and see how this changes the more upstream we move in value chain:

$$\beta_j^{(t),c} = \frac{\sum_i e_i^c a_{ij}^{(t),cc}}{\sum_s \sum_i e_i^s a_{ij}^{(t),sc}}$$

Domestic employment share across production rounds

- ▶ The ratio between betas of successive orders is positively (negatively) correlated with RFVAS/GFVAS, for lower-order (higher-order) inputs
- ▶ This confirms the regional nature of GVCs and the importance of regional input spillovers
- ▶ Regional sourcing is more intensive in employment from the country of completion



Econometric evidence

To empirically test our conjecture around nearshoring and employment we derive measures of domestic employment in GVCs:

- ▶ At the level of *GVC* j of country c :

$$\text{Domestic GVC employment } DEM_j^c = \sum_i e_i^c b_{ij}^{cc} f_j^c;$$

$$\text{Total GVC employment } GVCL_j^c = \sum_s \sum_i e_i^s b_{ij}^{sc} f_j^c;$$

$$\text{Domestic GVC employment share } DEMS_j^c = \frac{DEM_j^c}{GVCL_j^c}$$

- ▶ At the level of *industry* i of country c :

$$\text{Total industry employment } L_i^c = \sum_s \sum_j e_i^c b_{ij}^{cs} f_j^s$$

Econometric approach

At the level of GVC j of country c

$$y_{jct} = \alpha + \beta \cdot \text{nearshoring}_{jct} + \sum_{jct} \gamma^T \mathbf{x}_{jct} + \eta_{ct} + \theta_{jt} + \nu_{jc} + \epsilon_{jct}$$

- ▶ y_{jct} is either domestic GVC employment (DEM_j^c) or its share in total GVC employment (DEMS_j^c) at time t ;
- ▶ We operationalise nearshoring_{jct} as:
Ratio of Regional-to-Global FVA share of final GVC output (NFVA_c);
Regional (RFVAS_c) and global (GFVAS_c) FVA shares of final output.
- ▶ \mathbf{x}_{jct} is a vector of controls:
Final GVC output in current prices;
Capital/Labour ratio and wage rate of industry of completion;
Domestic value added share of final GVC output (only with NFVA_c).

Econometric approach

At the level of industry i of country c

$$y_{ict} = \alpha + \beta \cdot \text{nearsharing}_{ict} + \sum_{ict} \gamma^T \mathbf{x}_{ict} + \eta_{ct} + \theta_{it} + \nu_{ic} + \epsilon_{ict}$$

- ▶ y_{ict} is total industry employment (L_i^c) at time t ;
- ▶ We operationalise nearsharing_{ict} as:
 - Share of domestic GVA contributed to regional-*vis-à-vis*-global foreign GVCs (NFSUB_c);
 - Share of domestic GVA contributed to regional (RFSUBS_c) and global (GFSUBS_c) foreign GVCs;
- ▶ \mathbf{x}_{ict} is a vector of controls:
 - GVA of the industry in current prices;
 - Capital/Labour ratio and wage rate of industry;
 - Share of GVA contributed to domestic GVCs (only with NFSUB_c).

Econometric approach

- ▶ We test a standard OLS, which we saturate with fixed effects at the country-industry (ν_{jc}), country-year (η_{ct}) and industry-year (θ_{jt}) level;
- ▶ Naturally, the relationship between employment and the distribution of value added along a value chain (for nearshoring) and across destinations (for farshoring) is likely to be fraught with endogeneity.
- ▶ We therefore also test a dynamic model including the lag of the outcome variable, using GMM.

Table 1: Nearshoring, Farshoring and Employment in the EU - OLS

	(1)	(2)	(3)
	GVC domestic employment share (ln)	GVC domestic employment (ln)	Industry employment (ln)
Nearshoring Regional-to-Global (ln)	0.232*** (0.018)	0.074*** (0.016)	
Domestic value added share of final GVC output (ln)	0.839*** (0.033)	0.409*** (0.035)	
Nearshoring Regional-to-Global (ln)			-0.002 (0.017)
Share of GVA contributed to domestic GVCs (ln)			0.052 (0.037)
Final GVC output (ln)	-0.058*** (0.007)	0.874*** (0.010)	
Industry Gross Value Added (GVA) (ln)			0.482*** (0.016)
Capital/Labour ratio (ln)	-0.043*** (0.011)	-0.031** (0.014)	-0.237*** (0.022)
Average wage rate (ln)	-0.058* (0.033)	-0.183*** (0.037)	-0.256*** (0.051)
Constant	-0.472*** (0.148)	-4.283*** (0.165)	-1.774*** (0.234)
Observations	4146	4146	4146
R ²	0.981	0.999	0.996
Country-year FE	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes
Country-industry FE	Yes	Yes	Yes

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Nearshoring, Farshoring and Employment in the EU - OLS

	(1)	(2)	(3)
	GVC domestic employment share (ln)	GVC domestic employment (ln)	Industry employment (ln)
Regional value added share of final GVC output (ln)	0.153*** (0.025)	0.183*** (0.025)	
Global value added share of final GVC output (ln)	-0.463*** (0.023)	-0.077*** (0.023)	
Share of GVA contributed to regional foreign GVCs (ln)			-0.042* (0.022)
Share of GVA contributed to global foreign GVCs (ln)			-0.027 (0.020)
Final GVC output (ln)	-0.088*** (0.009)	0.851*** (0.010)	
Industry Gross Value Added (GVA) (ln)			0.476*** (0.017)
Capital/Labour ratio (ln)	-0.044*** (0.015)	-0.039** (0.015)	-0.234*** (0.022)
Average wage rate (ln)	0.004 (0.034)	-0.158*** (0.038)	-0.251*** (0.050)
Constant	-1.096*** (0.158)	-4.013*** (0.177)	-1.854*** (0.229)
Observations	4146	4146	4146
R ²	0.975	0.999	0.996
Country-year FE	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes
Country-industry FE	Yes	Yes	Yes

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Concluding remarks

For the global economy:

- ▶ Three distinct GVC integration patterns:
 - European export-led growth model (nearshoring and farshoring);
 - Asia-Pacific (nearshoring-*cum*-rising domestic final demand);
 - North and Latin America (lowest GVC regionalisation).
- ▶ Dependence on extra-regional input sourcing fluctuates with commodity prices: limited input substitutability capacity as prices increase.

For Europe:

- ▶ Positive nearshoring effect on domestic GVC employment, even when controlling for domestic GVA share in final output (mutual intra-EU input-sourcing);
- ▶ Relationship between farshoring and industry employment not statistically significant.

References

- Antràs, P. (2020). De-Globalisation? Global Value Chains in the Post-COVID-19 Age. Working Paper 28115, National Bureau of Economic Research.
- Baldwin, R. and Lopez-Gonzalez, J. (2015). Supply-chain trade: A portrait of global patterns and several testable hypotheses. *The world economy*, 38(11):1682–1721.
- Baldwin, R. E. and Evenett, S. J. (2020). *COVID-19 and Trade Policy: Why Turning Inward Won't Work*. CEPR Press, London.
- Foster-McGregor, N. and Stehrer, R. (2013). Value added content of trade: A comprehensive approach. *Economics Letters*, 120(2):354–357.
- Los, B., Timmer, M. P., and de Vries, G. J. (2015). How global are global value chains? A new approach to measure international fragmentation. *Journal of Regional Science*, 55(1):66–92.
- Miroudot, S. (2020). Resilience versus robustness in global value chains: Some policy implications. In Baldwin, R. E. and Evenett, S. J., editors, *COVID-19 and Trade Policy: Why Turning Inward Won't Work*, pages 117–130. CEPR Press, London.
- Piatanesi, B. and Arauzo-Carod, J.-M. (2019). Backshoring and nearshoring: An overview. *Growth and Change*, 50(3):806–823.
- Ruta, M. (2022). Long term effects of the war in Ukraine on global value chains. In Ruta, M., editor, *The Impact of the War in Ukraine on Global Trade and Investment*, pages 80–83. World Bank Group, Washington, D.C.
- Sraffa, P. (1960). *Production of Commodities by Means of Commodities*. Cambridge University Press, Cambridge.

Table 3: Nearshoring, Farsharing and Employment in the EU - GMM

	(1)	(2)	(3)
	GVC domestic employment share (ln)	GVC domestic employment (ln)	Industry employment (ln)
GVC domestic employment share (ln t-1)	0.167*** (0.058)		
GVC domestic employment (ln t-1)		0.290*** (0.058)	
Industry employment (ln t-1)			0.178** (0.089)
Nearshoring Regional-to-Global (ln)	0.516*** (0.045)	0.139*** (0.048)	
Domestic value added share of final GVC output (ln)	0.302** (0.125)	0.574*** (0.118)	
Nearsharing Regional-to-Global (ln)			0.043 (0.089)
Share of GVA contributed to domestic GVCs (ln)			0.253** (0.108)
Final GVC output (ln)	0.175*** (0.055)	0.712*** (0.037)	
Industry Gross Value Added (GVA) (ln)			0.293*** (0.062)
Capital/Labour ratio (ln)	-0.178** (0.083)	-0.083 (0.073)	-0.134 (0.162)
Average wage rate (ln)	-0.184** (0.082)	-0.709*** (0.121)	-0.019 (0.123)
Observations	3809	3809	3809
Country-industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Arellano-Bond test AR(1) in FD	0.000	0.000	0.002
Arellano-Bond test AR(2) in FD	0.771	0.056	0.383
Hansen overid. restr. test p-value	0.176	0.116	0.116

GMM dynamic panel model. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Nearshoring, Farsharing and Employment in the EU - GMM

	(1)	(2)	(3)
	GVC domestic employment share (ln)	GVC domestic employment (ln)	Industry employment (ln)
GVC domestic employment share (ln t-1)	0.094 (0.066)		
GVC domestic employment (ln t-1)		0.259*** (0.048)	
Industry employment (ln t-1)			0.145** (0.069)
Regional value added share of final GVC output (ln)	0.480*** (0.092)	0.172** (0.070)	
Global value added share of final GVC output (ln)	-0.608*** (0.076)	-0.187*** (0.052)	
Share of GVA contributed to regional foreign GVCs (ln)			-0.018 (0.094)
Share of GVA contributed to global foreign GVCs (ln)			-0.178 (0.114)
Final GVC output (ln)	0.198*** (0.071)	0.660*** (0.045)	
Industry Gross Value Added (GVA) (ln)			0.376*** (0.067)
Capital/Labour ratio (ln)	-0.016 (0.092)	0.037 (0.064)	-0.121 (0.140)
Average wage rate (ln)	-0.002 (0.139)	-0.456*** (0.106)	0.003 (0.085)
Observations	3809	3809	3809
Country-industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Arellano-Bond test AR(1) in FD	0.001	0.000	0.000
Arellano-Bond test AR(2) in FD	0.648	0.037	0.541
Hansen overid. restr. test p-value	0.270	0.996	0.078

GMM dynamic panel model. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$