

How do multinationals and domestic firms build GVC business functions

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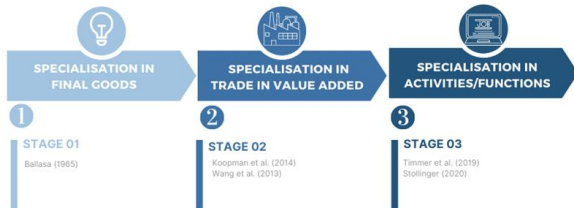
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Project

The background

- “Gains from GVC participation are not automatic. Benefits of GVCs can also vary considerably depending on whether a country operates at the high or at the low end of the value chain.” (OECD-WTO-World Bank Group report, 2014) - the smile curve concept (Shih 1996)
- The development of GVCs changes a way of measuring countries' specialisation (Balassa 1965, Koopman et al. 2014, Wang et al. 2013, 2017)
- Difficulty in separating pure production from service activities (servicification of manufacturing); differences in functions and industries classifications (the rise of factoryless goods producer).
- Fontagné and Harrison (2017) - statistical classification of industries cannot be relied on. Bernard et al. 2017 - firms that design goods and coordinate production networks are often registered as manufacturers, but they are not de facto engaged in fabrication activity (Bernard et al. 2017).

The background



- Alternative approach to specialisation measurement which combines both - a) measuring specialisation in GVC, and b) measuring specialiation at different stages of GVCs / for different activities along GVCs
- Functional specialisation concept at the country-industry level: FDI approach (Stöllinger 2020), and occupation-trade approach (Timmer at al. 2019)
- Different tasks (e.g., production, R&D, management, headquarter activities, marketing) yield different value added by employee
- “It does not matter which products you export, it matters which tasks you perform for those exports”, see also Kruse et al. (2023)

Domestically vs. foreign owned firms

- Large heterogeneity within an industry of a country for domestically and foreign owned enterprises (foreign multinationals)
- Production networks of transnational corporations account for about 80 percent of worldwide gross exports (UNCTAD 2013)
- Large foreign presence in CEE countries, especially in manufacturing industry
- Domestically owned enterprises can export indirectly by supplying goods and services to foreign multinationals in the home economy (Fortanier et al. 2020)

EU15 vs. CEE countries

- We pay a special attention to CEE countries – Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia
- Compare them to the 15 “older members” of the European Union (EU15)
- Long-standing industrial tradition and a large share of manufacturing in GDP
- Structural relationship between Germany and CEE countries called the “German-Central European Supply Chain Cluster” (IMF, 2013) or the “Central European Manufacturing Core” (Stehrer and Stöllinger, 2015);
- CEE countries play the role of factory economies in regional GVCs (Kordalska and Olczyk, 2019)
- Still in a transitional phase or “trapped” in fabrication?

Questions we ask

- Does firms' heterogeneity in terms of their ownership affect functional specialisation?
- Channels (direct/indirect) - which of them are important and support particular business functions
- What is the difference between EU15 and CEE countries - which channels are important and support particular business functions

Functional specialisation - measurement

- fDi Markets cross-border investment monitor database for the period 2003-2018
- Expected employment at the firm (job creation effect) resulting from FDI greenfield projects
- Job creation effect by five business functions: (i) headquarter services, (ii) R&D, (iii) fabrication, (iv) sales and distribution services, and (v) technical support services and training
- Four-dimensional data - country i , manufacturing industry j , business function f , and time t

Relative functional specialisation (adoption of Balassa index) for number of jobs J :

$$RFS_{ij}^f = \frac{J_{ij}^f / \sum_f J_{ij}^f}{\sum_j J_{ij}^f / \sum_j \sum_f J_{ij}^f} \quad (1)$$

Normalised relative functional specialisation:

$$normRFS_{ij}^f = \frac{RFS_{ij}^f - 1}{RFS_{ij}^f + 1} \quad (2)$$

Export intensity by firms' ownership

- OECD Activity of Multinational Enterprises (AMNE) database for the period 2003-2018
- Four-dimensional data - country i , manufacturing industry j , firm's ownership o , and time t

$$\text{direct export intensity}_{ij_o} = \frac{EXGRDVA_{ij_o}^{\text{direct}}}{VA} \quad (3)$$

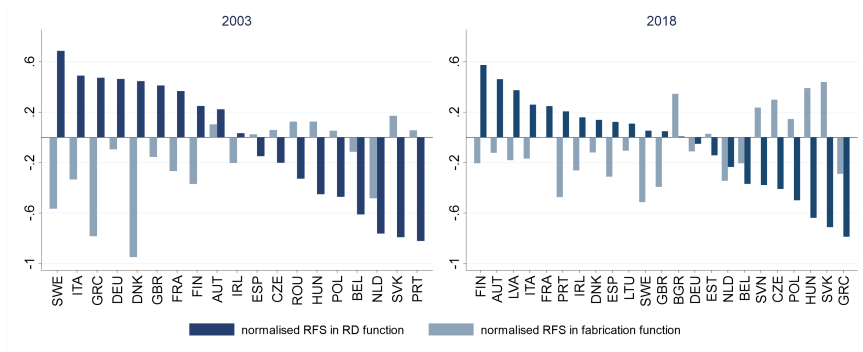
$$\text{indirect export intensity}_{ij_o} = \frac{EXGRDVA_{ij_o}^{\text{indirect}}}{VA} \quad (4)$$

where $EXGRDVA_{ij_o}^{\text{direct}} = \text{diag}\left(\frac{VA}{GO}\right) \cdot I \cdot X$ and $EXGRDVA_{ij_o}^{\text{indirect}} = \text{diag}\left(\frac{VA}{GO}\right) \cdot (L - I) \cdot X$ and express domestic value added embodied in the direct/indirect exports of a type of firm o (domestically/foreign owned)

Our dataset

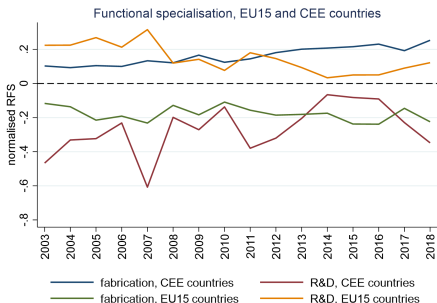
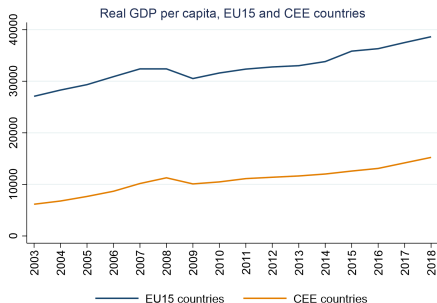
- Countries in dataset: 25 EU countries that were members of the European Union in 2018 (we exclude Cyprus, Luxembourg and Malta)
- Industries in dataset: 10 manufacturing sectors - food-beverages-tobacco (10-12), textiles-apparel (13-15), chemicals (20), pharmaceuticals (21), metals and metal products (24-25), electronics (26), electrical equipment (27), machinery (28), vehicles (29), other transport equipment (30)
- Period of this analysis: 2003-2018

Functional specialisation in 2003 and 2018, by country.

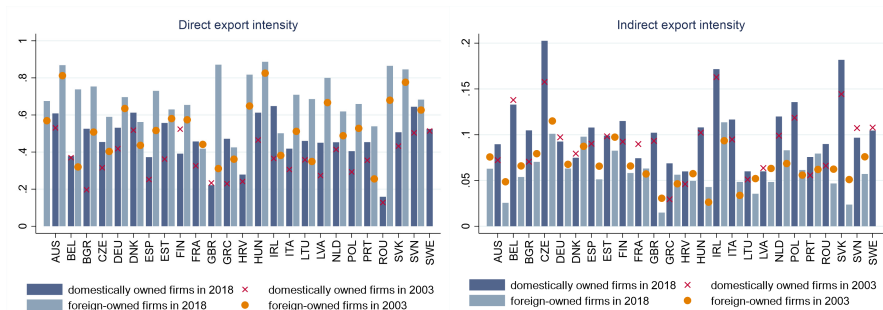


Note: some data points are not presented; sometimes there are no FDI project with production and/or R&D for a given year-country combination.

Functional specialisation vs. GDP per capita, EU15 vs. CEEs



Export intensity of domestically and foreign-owned firms



- *direct export intensity* is larger for foreign-owned firms than for domestically owned firms, it grows for both types of firms
- *indirect export intensity* is far lower than the direct export intensity, With the exception of Germany, indirect export intensity of domestically owned firms was larger than those of foreign-owned firm

Our model

We consider a model in a form of 3-equation recursive system (GSEM - generalised structural equation model):

$$Dom_{ijt} = \gamma_0^1 + \beta_1^1 \ln(K_{it}) + \beta_2^1 \ln(Dist_{it}) + \beta_3^1 \ln(Emp_{ijt}) + \beta_4^1 FDIratio_{ijt} + \lambda_{ij}^1 + \varepsilon_{ijt}^1 \quad (5)$$

$$For_{ijt} = \gamma_0^2 + \beta_1^2 \ln(K_{it}) + \beta_2^2 \ln(Dist_{it}) + \beta_3^2 \ln(Emp_{ijt}) + \beta_4^2 FDIratio_{ijt} + \lambda_{ij}^2 + \varepsilon_{ijt}^2 \quad (6)$$

$$\begin{aligned} normRFS_{ijt}^f = \gamma_0^3 + \alpha_1^{3f} Dom_{ijt} + \alpha_1^{3f} For_{ijt} + \beta_1^{3f} \ln(RGDPcap_{it}) + \beta_2^{3f} LMEmp_{ijt} + \beta_3^{3f} HC_{ijt} \\ + \beta_4^{3f} BWpart_{ijt} + \beta_5^{3f} FWpart_{ijt} + \lambda_{ij}^3 + \varepsilon_{ijt}^3 \end{aligned} \quad (7)$$

where:

Dom and *For* - export intensity measures of domestically and foreign-owned firms. *K* - capital income, *Dist* - geographical distance to DEU, *Emp* - employment, *FDIratio* - inward FDI to outward FDI ratio.

normRFS - normalised relative functional specialisation, *RGDPcap* - real GDP per capita, *LMEmp* - share of hours worked by low and medium-skilled workers in total number of hours worked, *HC* is the human capital, *BWpart* and *FWpart* - GVC backward and forward participation. λ - common unobserved firm heterogeneity components

Two value chain functions vs. different channels of export intensity

$$\begin{aligned} normRFS_{ijt}^f = & \gamma_0^3 + \alpha_1^{3f} Dom_{ijt} + \alpha_1^{3f} For_{ijt} + \beta_1^{3f} \ln(RGDPCap_{it}) + \beta_2^{3f} LMEmp_{ijt} + \beta_3^{3f} HC_{ijt} \\ & + \beta_4^{3f} BWpart_{ijt} + \beta_5^{3f} FWpart_{ijt} + \lambda_{ij}^3 + \varepsilon_{ijt}^3 \end{aligned} \quad (8)$$

In the empirical section, we consider:

- functional specialisation in two value chain functions - fabrication ($normRFS_{ijt}^{fabrication}$) and R&D ($normRFS_{ijt}^{RD}$)
- export intensity of domestically and foreign-owned firms measured - totally ($DomTot_{ijt}$ and $ForTot_{ijt}$), as direct flows ($DomDir_{ijt}$ and $ForDir_{ijt}$), and as indirect flows ($DomIndir_{ijt}$ and $ForIndir_{ijt}$)

Results for fabrication function

	dependent variable: normalized RFS in fabrication function											
	total export intensity				direct export intensity				indirect export intensity			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Dom</i>	0.309***	0.314***	0.315***	0.271***								
	(0.045)	(0.045)	(0.045)	(0.047)								
<i>For</i>	-0.038	-0.034	-0.034	-0.039								
	(0.042)	(0.042)	(0.042)	(0.042)								
<i>Dom-Dir</i>					0.162***	0.166***	0.167***	0.135***				
					(0.036)	(0.036)	(0.036)	(0.037)				
<i>For-Dir</i>					0.033	0.036	0.037	0.028				
					(0.034)	(0.034)	(0.034)	(0.035)				
<i>Dom-Indir</i>									0.350***	0.349***	0.345***	0.350***
									(0.088)	(0.088)	(0.088)	(0.088)
<i>For-Indir</i>									-0.356**	-0.361**	-0.369**	-0.352**
									(0.142)	(0.141)	(0.143)	(0.149)
Observations	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995
log pseudo-likelihood	4,385.6	4,387.9	4,389.5	4,400.0	3,112.4	3,114.4	3,116.1	3,129.5	11,968	11,971	11,973	11,986

Note: Models (2), (6), (10) with log of *RGDPcap* (-), models (3), (7), (11) with log of *RGDPcap*(-), *LMEmp* and *HC*, models (4), (8), (12) with log of *RGDPcap* (-), *LMEmp*, *HC* and *GVC* linkages (+). All specifications contain constant, country, industry, and time fixed effects.

- Both *direct* and *indirect* export channels of *domestic* firms support fabrication function
- Indirect channel for domestic firms affects twice strongly fabrication function

Results for R&D function

	dependent variable: normalized RFS in RD function											
	total export intensity				direct export intensity				indirect export intensity			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Dom</i>	-0.099	-0.116	-0.132	-0.088								
	(0.114)	(0.114)	(0.114)	(0.119)								
<i>For</i>	0.463***	0.444***	0.427***	0.447***								
	(0.109)	(0.108)	(0.109)	(0.108)								
<i>Dom-Dir</i>					-0.086	-0.102	-0.114	-0.071				
					(0.090)	(0.090)	(0.090)	(0.093)				
<i>For-Dir</i>					0.294***	0.276***	0.263***	0.283***				
					(0.086)	(0.086)	(0.086)	(0.087)				
<i>Dom-Indir</i>									0.635***	0.646***	0.640***	0.614***
									(0.239)	(0.240)	(0.235)	(0.236)
<i>For-indir</i>									0.513	0.557	0.563	0.537
									(0.353)	(0.356)	(0.353)	(0.351)
Observations	3,988	3,988	3,988	3,988	3,988	3,988	3,988	3,988	3,988	3,988	3,988	3,988
log pseudo-likelihood	2695.995	2710.779	2241.463	2247.713	1983.955	2000.409	1690.131	1696.040	7250.494	7272.040	5377.679	5385.729

Note: Models (2), (6), (10) with log of *RGDPcap* (+), models (3), (7), (11) with log of *RGDPcap* (+), *LMEmp* and *HC* (+), models (4), (8), (12) with log of *RGDPcap* (+), *LMEmp*, *HC* (+) and *GVC* linkages. All specifications contain constant, country, industry, and time fixed effects.

- Direct export intensity of foreign-owned firms makes FS in R&D grow
- The only way domestically owned firms can support specialisation in R&D activities is their indirect exporting channel (via other domestic firms, via foreign firms)

Results EU15 vs. CEE countries

	dependent variable: normalised RFS in fabrication function				dependent variable: normalised RFS in RD function			
	EU15 countries		CEE countries		EU15 countries		CEE countries	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Dom-Dir</i>	0.185***		0.194***		-0.097		-0.134	
	(0.044)		(0.057)		(0.109)		(0.158)	
<i>For-Dir</i>	-0.026		-0.115**		0.459***		0.162	
	(0.047)		(0.047)		(0.104)		(0.142)	
<i>Dom-Indir</i>		-0.193		-0.104		0.523		0.840***
		(0.131)		(0.105)		(0.333)		(0.301)
<i>For-Indir</i>		-0.543***		0.347*		0.400		-0.648
		(0.181)		(0.192)		(0.424)		(0.592)
<i>RGDP_{pc} (log)</i>	0.013	-0.032	-0.276**	-0.258*	-0.164	-0.096	0.013	0.041
	(0.186)	(0.191)	(0.133)	(0.132)	(0.361)	(0.366)	(0.428)	(0.418)
<i>LowMed-Emp</i>	0.724*	0.810**	-0.119	-0.116	-0.985	-1.257	-3.482*	-3.457*
	(0.397)	(0.391)	(0.605)	(0.611)	(0.896)	(0.907)	(2.031)	(2.038)
<i>HC</i>	0.160	0.210	-0.221	-0.237	-0.380	-0.390	2.813***	2.870***
	(0.287)	(0.285)	(0.180)	(0.181)	(0.733)	(0.733)	(0.583)	(0.583)
<i>BW-Part</i>	0.706***	0.828***	0.080	0.149	1.864***	1.834***	-1.489***	-1.578***
	(0.177)	(0.169)	(0.158)	(0.156)	(0.354)	(0.343)	(0.420)	(0.405)
<i>FW-Part</i>	1.018***	1.073***	-0.365*	-0.444**	4.529***	3.841***	-1.072	-1.245
	(0.295)	(0.294)	(0.199)	(0.220)	(0.766)	(0.752)	(0.801)	(0.808)
<i>Observations</i>	2,236	2,236	1,759	1,759	2,236	2,236	1,752	1,752

- Domestic direct channel of both EU15 and CEEs is important for fabrication.
- Foreign direct channel of decreases fabrication in CEEs and increases R&D function in EU15
- R&D function in CEEs is supported by domestic indirect export intensity.

Conclusions

- firm heterogeneity in terms of ownership affects functional specialisation patterns - different roles of MNEs and domestic firms in supporting specific activities along the smile curve
- direct exports of domestic firms supports fabrication function, direct exports of MNEs make R&D function stronger
- specialisation in both functions is supported by indirect exports of domestic firms
- EU15 and CEE countries exhibit significant differences in terms of their functional specialisation patterns
- Upgrading along value chains (fabrication \rightarrow R&D) for CEE countries can be made by indirect channels only

Limitation of current research

- How do domestically owned firms and MNEs form their own business functions? - nonrealistic assumption
- Different occupational pattern for these firms - jobs/tasks/business functions in domestically-owned firms in eg. the metal industry and those in foreign-owned firms in the same industry
- Separate determinants of export intensity for domestically and foreign-owned firms

Thank you for your attention

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