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THE ROLE OF INTANGIBLES IN GLOBAL VALUE CHAINS

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This research is conducted within the context of the GRinGVCs project: Leveraging Global Value Chains for Innovation and Competitiveness: The case of Greece

Scope – Aim

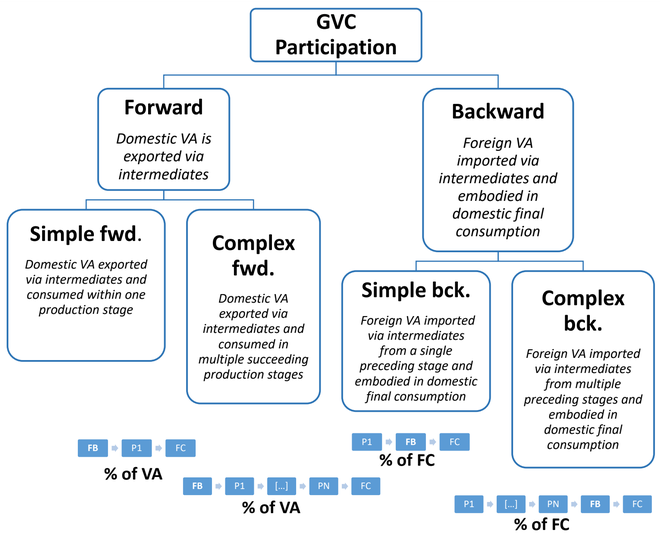
The aim of this paper is to empirically investigate the antecedents of participation in global value chains (GVCs) at the country level for a sample of 28 EU countries during 1995-2020, focusing on technological/knowledge factors that affect GVC activities, namely intangible assets. To this end, we adopt a new perspective on GVC participation measurement through a decomposition framework that enables us to account for GVC participation direction (type) and complexity level (mode).

Theory: GVCs and intangibles

Intangible capital (IC) *(Corrado et al., 2009, Haskel and Westlake, 2018)* is widely **recognized as a significant element in the coordination and the maximization of gains** within the global production network *(Gereffi et al., 2005; Mudambi, 2008)*. Accumulation of IC and GVC participation have some synergistic effects on EU's productivity growth *(Jona-Lasinio & Meliciani, 2019).* Durand and Millberg (2020) argued that **multinational enterprises become "intellectual monopolies" in GVCs** through the accumulation and control of significant intangible assets. **The nature of GVCs is transitioning to become knowledge-intensive: Accumulation of VA shifts from traditional** manufacturing**/**assembly **towards** upstream and downstream **knowledge-intensive, innovative activities** *(conception, R&D, product design (for the upstream part) and marketing and branding (for the downstream part)* *Baldwin and Evenett (2015)*

Methodology

- **3-stage** empirical strategy with elements from IO (Leontief,1936) analysis.
  - Decomposition of value added flows in GVCs from IO Data (A)
  - Estimation of GVC **participation** indicators.
  - **Econometric applications** for each participation type and mode (B)
    - GVC participation direction → **type |** GVC participation "complexity" → **mode**
    - Internal innovation inputs (R&D and capital investments) are also accounted
- **Data source**: OECD's Inter-Country Input-Output Tables (ICIOTs) (OECD 2023), EU-KLEMS intangibles and capital accounts (2024)
- The resulting dataset describes GVC participation and VA flows for **45 NACE rev.2 sectors for 76 countries** (includes all 27 EU members) **from 1995 to 2020.**
- This extensive period **contains rapid shifts** in world trade and the **rapid expansion of GVCs**, (WTO, 2013).
  - It also allows the study of **disruptions of global production activity** due to the 2008 economic crisis and the propagation of adverse shocks through borders, as GVCs can act as channels for transmitting economic downturns (Baldwin, 2009).



- The variables are modelled into an autoregressive panel model: $\mathbf{GVCpt_{i,t}} = \alpha_0 + \boldsymbol{GVCpt_{i,t-1}}\beta_1 + \boldsymbol{K_{i,t-1}}\beta_2 + \boldsymbol{T_{i,t-1}}\beta_3 + \lambda_i + \varepsilon_{i,c,t}$
- $\mathbf{GVCpt_{i,t}}$: vector of GVC participation indicators as dependent variables that differentiate between type (backward vs. forward) and mode (simple vs. complex)

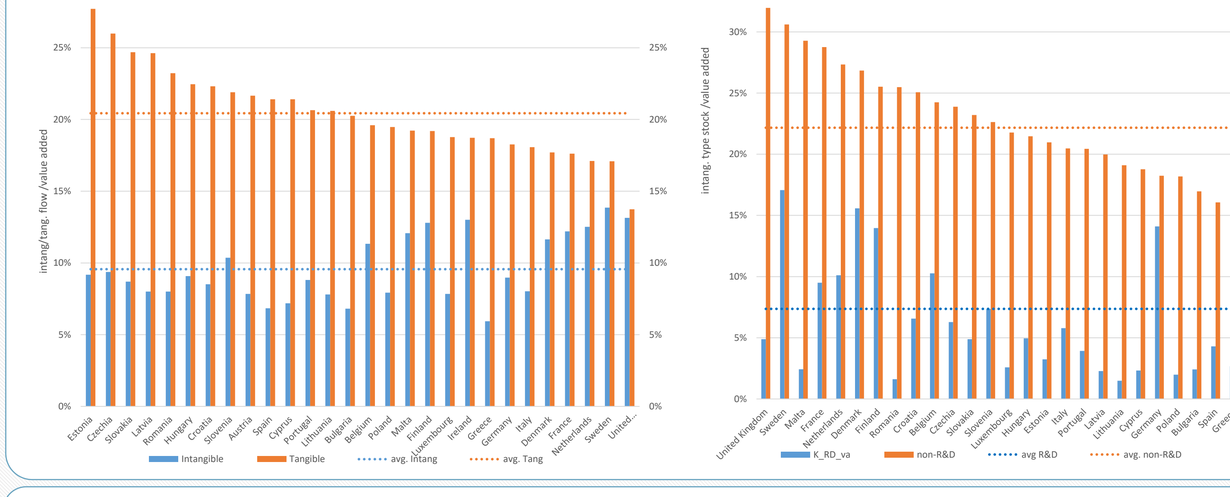
$$\boldsymbol{GVCpt_{i,t}} = (gvc\_b_{i,t}, gvc\_bs_{i,t}, gvc\_bc_{i,t}, gvc\_f_{i,t}, gvc\_fs_{i,t}, gvc\_fc_{i,t},)$$

- $\mathbf{K_{i,t-1}}$: technology/knowledge-related determinants of GVC participation → different categories of intangible and tangible capital stock as shares of VA
- $\boldsymbol{K_{i,t-1}} = (k^{Tang}_{i,t-1}, k^{Intang}_{i,t-1}, k^{NatAcc}_{i,t-1}, k^{NonNatAcc}_{i,t-1}, k^{Innovprop}_{i,t-1}, k^{EconComp}_{i,t-1}, k^{Soft\_DB}_{i,t-1}, k^{RD}_{i,t-1}, k^{OIPP}_{i,t-1}, k^{Brand}_{i,t-1}, k^{Design}_{i,t-1}, k^{OrgCap}_{i,t-1}, k^{Training}_{i,t-1})$
- $\mathbf{T_{i,t-1}}$: traditional trade/factor endowment determinants (controls)

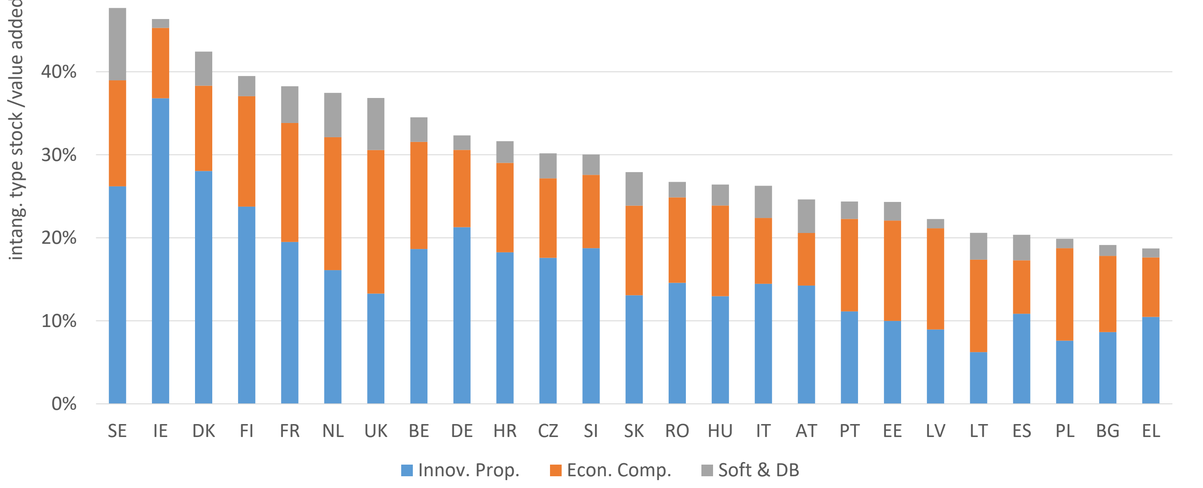
$$\boldsymbol{T_{i,t-1}} = (EMPE_{i,t-1}, LandGDP_{i,t-1}, RegQual_{i,t-1})$$

(B)

Forward (a) and backward (b) GVC participation for the EU



Intangibles intensity by EU country



Nordics and central EU are most intangible intensive. Countries rely alternatingly upon either innovative property or economic competencies → elasticities among intangible capital types?

Non-R&D intangibles have already proliferated (b) – but tangible capital still is the largest components of value added

- large discrepancies between the two capital types among the EU28 members
- Central and eastern economies have the largest tangible capital as a share of their annual VA; all but two (Slovenia, Belgium) of the countries that are above the EU average for intangible capital intensity are simultaneously above the EU average for tangible capital intensity.
- The most intangible-intensive economies are the central-northern EU members (Sweden, Finland, Netherlands), along with Ireland and the UK.
- In terms of capital stocks, the most intangible intensive economies are Sweden, Denmark, Finland, France, and the Netherlands .
  - Belgium, Germany and Austria rank among the top 5 in terms of R&D capital, while the UK leads in terms of non-R&D assets.
  - Greece ranks near the bottom, 9th from last in R&D and 3rd from last in non-R&D assets

gvc_f	(1)	(2)	(3)	(4)
gvc_f_L1	0.861***	0.848***	0.849***	0.823***
	(0.021)	(0.025)	(0.021)	(0.025)
K_Tang_L1	0.086***	0.052**	0.035	0.047
	(0.02)	(0.022)	(0.035)	(0.029)
K_Intang_L1	0.061**			
	(0.023)			
K_NatAcc_L1		0.045***		
		(0.008)		
K_NonNatAcc_L1		0.116***		
		(0.027)		
K_Innovprop_L1			0.045***	
			(0.009)	
K_EconComp_L1			0.153***	
			(0.029)	
K_Soft_DB_L1			0.017	0.005
			(0.017)	(0.014)
K_RD_L1				0.033***
				(0.005)
K_OIPP_L1				-0.005
				(0.008)
K_Brand_L1				0.024
				(0.027)
K_Design_L1				0.000
				(0.016)
K_OrgCap_L1				0.108***
				(0.024)
K_Train_L1				0.054**
				(0.023)
EMPE_L1	-0.233***	-0.196***	-0.197***	-0.205***
	(0.063)	(0.063)	(0.067)	(0.045)
Land_GDP_L1	-0.094***	-0.047	-0.033	-0.043*
	(0.029)	(0.029)	(0.037)	(0.024)
RegQuality_L1	-0.031	-0.032*	-0.094*	-0.016
	(0.018)	(0.0161)	(0.017)	(0.015)
constant	0.271	0.929***	1.368***	1.410***
	(0.324)	(0.308)	(0.371)	(0.350)
Country-sector FE	yes	yes	yes	yes
Observations	590	590	590	584
R2	0.818	0.839	0.835	0.846
No. of groups	25	25	25	25

gvc_b	(1)	(2)	(3)	(4)
gvc_b_L1	0.770***	0.764***	0.768***	0.745***
	(0.025)	(0.026)	(0.027)	(0.026)
K_Tang_L1	0.067**	0.041	0.039	0.031
	(0.027)	(0.025)	(0.035)	(0.028)
K_Intang_L1	0.043*			
	(0.023)			
K_NatAcc_L1		0.034***		
		(0.008)		
K_NonNatAcc_L1		0.080**		
		(0.033)		
K_Innovprop_L1			0.032**	
			(0.012)	
K_EconComp_L1			0.063	
			(0.043)	
K_Soft_DB_L1			0.013	0.003
			(0.012)	(0.010)
K_RD_L1				0.022***
				(0.007)
K_OIPP_L1				-0.001
				(0.005)
K_Brand_L1				-0.029
				(0.022)
K_Design_L1				0.031**
				(0.015)
K_OrgCap_L1				0.058*
				(0.034)
K_Train_L1				0.033**
				(0.016)
EMPE_L1	-0.133**	-0.100*	-0.111*	-0.124**
	(0.052)	(0.053)	(0.054)	(0.046)
Land_GDP_L1	-0.064**	-0.022	-0.025	-0.039
	(0.030)	(0.033)	(0.033)	(0.032)
RegQuality_L1	-0.028*	-0.027*	-0.028*	-0.018
	(0.014)	(0.015)	(0.015)	(0.014)
constant	-0.249	0.302	0.396	0.356
	(0.530)	(0.525)	(0.493)	(0.534)
Country-sector FE	yes	yes	yes	yes
Observations	590	590	590	584
R2	0.888	0.901	0.896	0.886
No. of groups	25	25	25	25

- **Intangible assets are positively and significantly associated to GVC participation** (both forward and backward)
  - Higher magnitude in the case of forward participation → importance of each country's knowledge base for its exporting activities
- Disaggregation based on measurement:
  - Both National Accounts and Non-National Accounts are positively associated to GVC participation
  - For both types of participation, **Non-National Accounts intangibles** present significantly higher correlation to GVC participation
  - → Highlights the importance of a diverse knowledge base comprising different types of knolwedge
- Disaggregation based on knowledge type:
  - **Innovative property** is positively associated to GVC participation in both cases
  - **Economic competences** are statistically important only for forward participation activities → reflects the nature of the underlying assets and their importance for competitiveness
- Disaggregation per intangible asset:
  - 3 assets stand out: **R&D**, **organizational capital** (critical for coordination gains), and **training** (linked to human capital readiness)
  - **Design** appears to be positively associated to backward participation

Key findings

- ✓ Intangible assets are significantly associated to all aggregate GVC participation
- ✓ Accounting for intangibles outside the National Accounts matters → they present a stronger correlation to GVC participation compared to those included in the system
- ✓ Economic Competencies are more important for forward-oriented activities compared to Innovative Property, especially for complex activities
- ✓ Simple backward participation is not related to any type of intangible assets
- ✓ A clear trio of intangibles emerges as the driving factor of the above trends: R&D, organizational capital, and training

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This project is carried out within the framework of the National Recovery and Resilience Plan Greece 2.0, funded by the European Union – NextGenerationEU (Implementation body: Hellenic Foundation for Research & Innovation/HFRI - Project Number: HFRI-016667).