

Global value chains and middle income trap in Central and Eastern Europe

Pijus Krūminas, Egidijus Rybakovas, Agnė Paliokaitė
Visionary Analytics, Lithuania

VISIONARY
ANALYTICS

The project is funded by Research Council of Lithuania (grant No. S-MIP-17-116)

Research problem

- Potential income trap in Central and Eastern Europe (EBRD, 2017)
- Low-costs vs. productivity based growth
- Regional innovation paradox (Oughton et al, 2002; Muscio et al. 2015)
- Can greater involvement in GVCs help to improve innovativeness of CEE economies and provide an escape from the potential trap? (cf. Vivarelli, 2014)

Why Central and Eastern Europe?

- Unique historical experience
- Recent integration into global trade networks
- GVCs data available for the major part of CEE countries's history as free economies

Theoretical framework (I)

- Structure of global value chains
- Low vs. high value added depending on sector/firm position
- Greater involvement can lead to (Taglioni and Winkler, 2016):
 - Domestic and foreign pressure for increased innovation activities
 - New standards, processes – specific skills

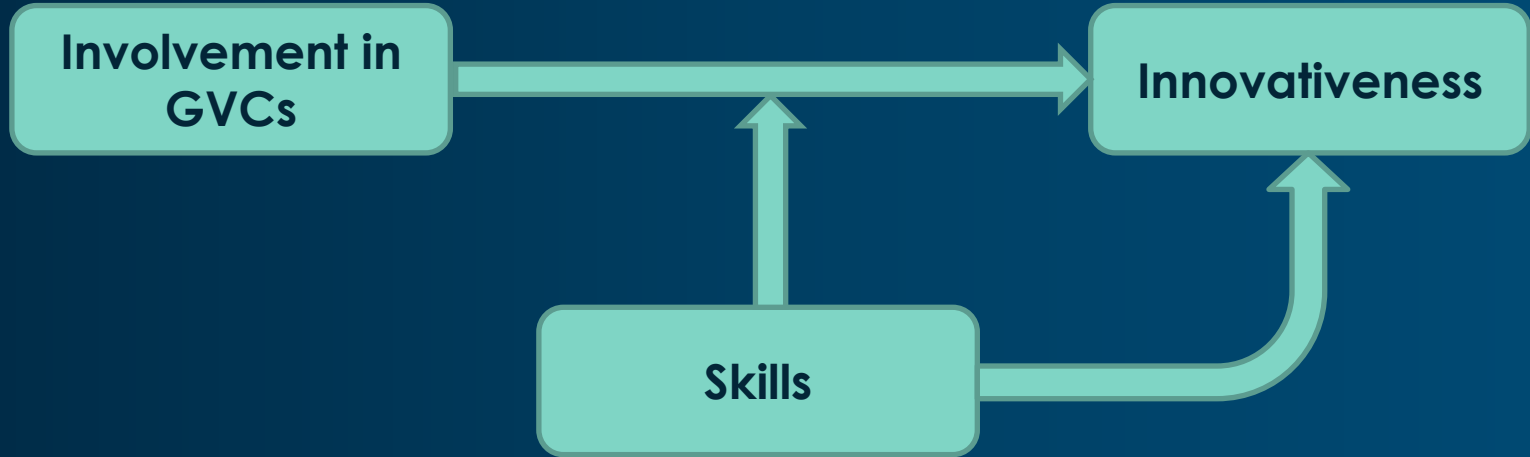
Theoretical framework (II)

- Skills, innovation, GVCs – endogeneity problem
- Type of relationship:
 - **Moderation?**
 - Mediation?
 - Independent?

Working hypotheses

- H1. Higher involvement in GVCs is associated with higher innovativeness at the sector level.
- H2. Higher skills are associated with higher innovativeness at the sector level.
- H3. Higher involvement in GVCs has a stronger positive relationship with innovativeness at the sector level, when skills are higher.

Working hypotheses



Methodology: Data sources and unit of analysis

- Unit: country-sector
- WIOD database (Timmer et al., 2015) / UIBE GVC index (cf. Wang et al., 2017)
- Eurostat Community Innovation Survey
- Eurostat Structural Business Statistics

Methodology: GVC and skills indicators

- **Participation:**
 - the ratio between domestic VA in intermediary products and total domestic VA for a country-sector
- **Revealed comparative advantage (RCA):**
 - country-sector's revealed comparative advantage in terms of domestic value added in intermediate products' export
- **Personnel costs:**
 - Average personnel costs per employer

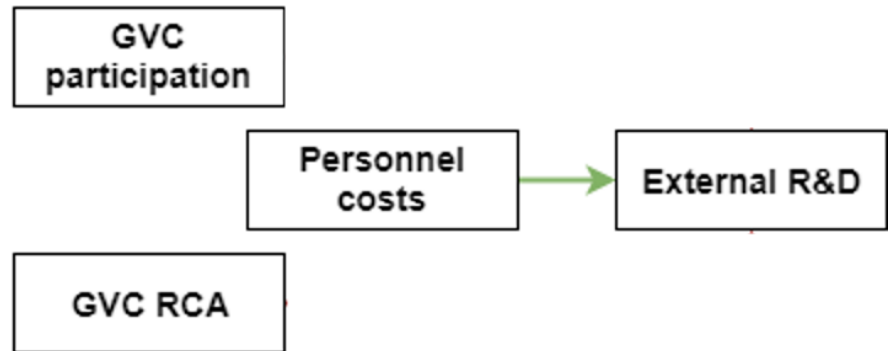
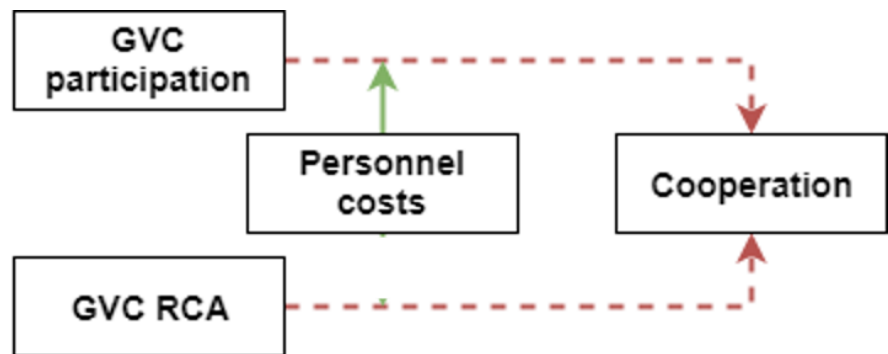
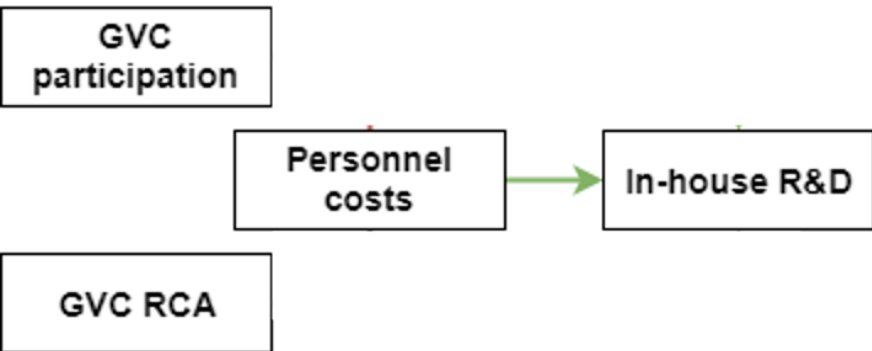
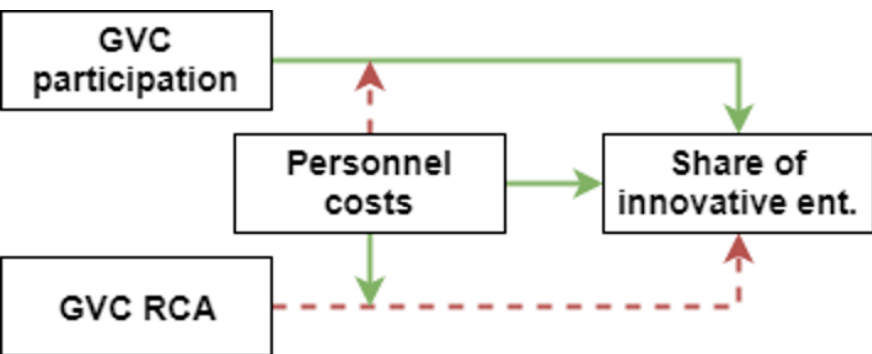
Methodology: Innovation indicators

- **Innovative enterprises:**
 - share of innovative enterprises
- **In-house R&D:**
 - in-house R&D as share in total turnover
- **External R&D:**
 - external R&D as share in total turnover of a country-sector
- **Cooperation:**
 - % of enterprises in any type of innovation co-operation with a partner in EU, EFTA or EU candidates (including national partners) out of product process innovative enterprises

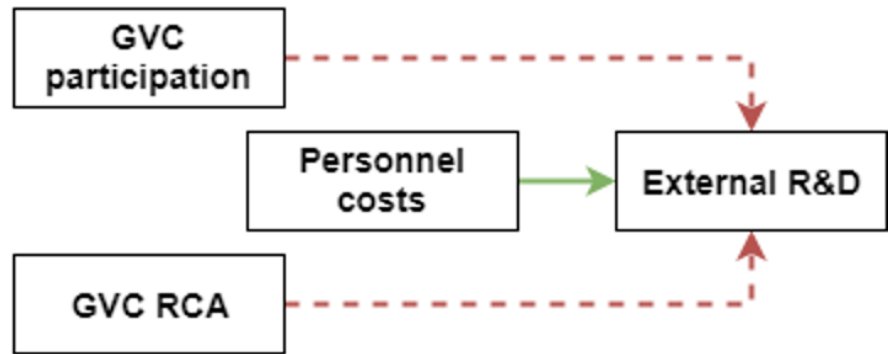
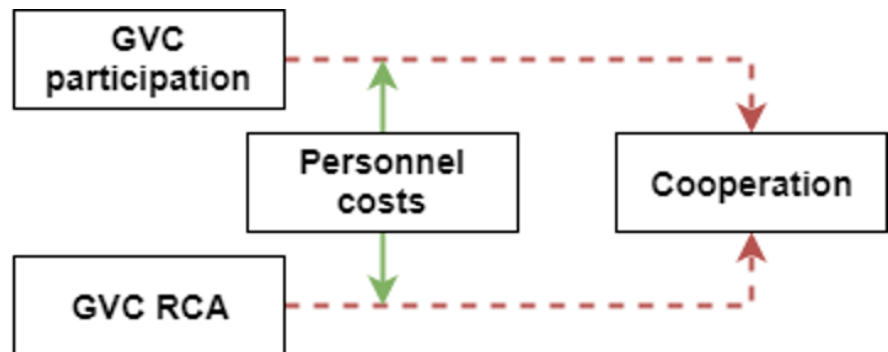
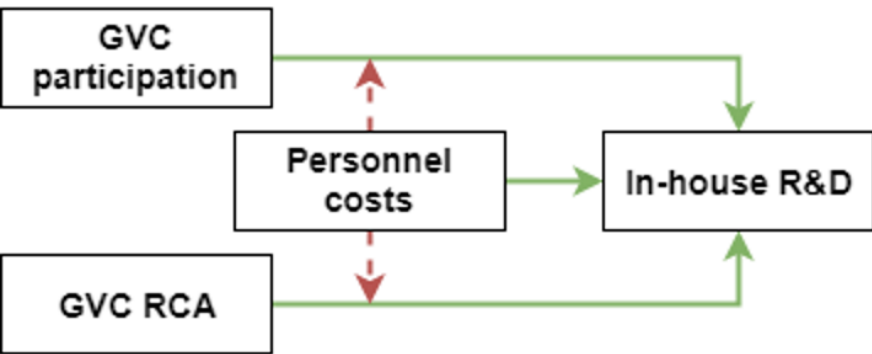
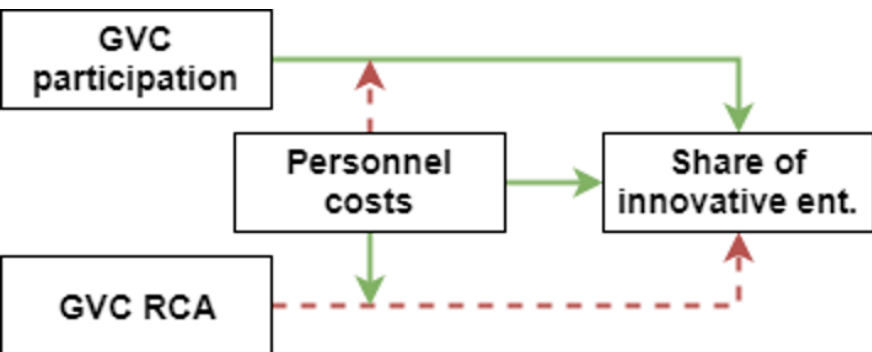
Challenges: Data coverage

- **GVC:**
 - Full time-series 2000-2014
- **Innovation:**
 - 2008-2014 (bi-annual)
- **Skills:**
 - 2008-2014

Results: Relationships (OLS)



Results: Relationships (WLS)



Implications

- The **main implications** from the CEE analysis are:
 - Participation in GVCs is positively associated with the share of innovative companies. However, at the higher skill level, the relationship can become negative. The relationship is opposite for RCA.
 - Participation in GVCs also seems to have a negative effect on innovation cooperation, but the effect can become positive with a higher level of skills.
 - Higher skills are associated with higher innovativeness.
 - The findings suggest that there are more nuances in the relationship between GVCs, skills, and innovation, and that variables used to measure innovation can have different 'working logic'.

Thank you!

Pijus Krūminas: pijus@visionary.lt

Dr Egidijus Rybakovas: egidijus.rybakovas@ktu.lt

Dr Agnė Paliokaitė: agne@visionary.lt

VISIONARY
ANALYTICS

Annex I: Share of innovative enterprises (WLS)

Independent variable	Coefficient	Standard error	t-ratio	p-value
CONSTANT	0.253536	0.0156903	16.16	<0.0001
SURP	0.000611116	0.00049862	1.226	0.2207
COST	0.00955517	0.0010784	8.861	<0.0001
APPAR	0.00039572	0.00021557	1.836	0.0667
RCA	-0.0515661	0.00662857	-7.779	<0.0001
PART	0.24875	0.0363611	6.841	<0.0001
RCA*COST	0.00292966	0.00048704	6.015	<0.0001
PART*COST	-0.0166547	0.00248928	-6.691	<0.0001
Adjusted R ²	0.492352			
P-value(F)	<0.0001			
Number of observations	917			
Number of cross-sectional units	255			
Time-series length	1-4			

Annex II: Cooperation (WLS)

Independent variable	Coefficient	Standard error	t-ratio	p-value
CONSTANT	38.8318	1.96412	19.7706	<0.0001
SURP	0.0871226	0.0486848	1.7895	0.0742
COST	0.180253	0.176637	1.0205	0.308
APPAR	0.005484	0.0365736	0.1499	0.8809
RCA	-3.37915	0.678732	-4.9786	<0.0001
PART	-33.3924	3.96122	-8.4298	<0.0001
RCA*COST	0.168818	0.0483543	3.4913	0.0005
PART*COST	2.1534	0.308174	6.9876	<0.0001
Adjusted R ²	0.592135			
P-value(F)	<0.0001			
Number of observations	465			
Number of cross-sectional units	249			
Time-series length	1-2			

Annex III: In-house R&D (WLS)

Independent variable	Coefficient	Standard error	t-ratio	p-value
CONSTANT	-2.09614	0.230464	-9.095	<0.0001
SURP	0.0139633	0.00348971	4.001	<0.0001
COST	0.324036	0.0177083	18.30	<0.0001
APPAR	-0.0180404	0.00227712	-7.922	<0.0001
RCA	0.146674	0.0329839	4.447	<0.0001
PART	3.04048	0.429791	7.074	<0.0001
RCA*COST	-0.0256685	0.00263385	-9.746	<0.0001
PART*COST	-0.404534	0.0319171	-12.67	<0.0001
Adjusted R ²	0.450447			
P-value(F)	<0.0001			
Number of observations	863			
Number of cross-sectional units	280			
Time-series length	1-2			

Annex IV: External R&D (WLS)

Independent variable	Coefficient	Standard error	t-ratio	p-value
CONSTANT	0.216288	0.0244429	8.849	<0.0001
SURP	-0.00167128	0.00059746	-2.797	0.0053
COST	0.00689761	0.00236978	2.911	0.0037
APPAR	-0.00115958	0.00026799	-4.327	<0.0001
RCA	-0.0146779	0.00506312	-2.899	0.0038
PART	-0.274396	0.0421779	-6.506	<0.0001
RCA*COST	0.000598505	0.00046764	1.28	0.201
PART*COST	-0.00516580	0.00402777	-1.283	0.2
Adjusted R ²	0.492352			
P-value(F)	<0.0001			
Number of observations	822			
Number of cross-sectional units	286			
Time-series length	1-4			

Annex V: Share of innovative enterprises (OLS)

Independent variable	Coefficient	Standard error	t-ratio	p-value
CONSTANT	0.263791	0.0490658	5.376	<0.0001
SURP	0.00104779	0.00139121	0.7532	0.4521
COST	0.00937449	0.00416971	2.248	0.0254
APPAR	0.000304619	0.0005608	0.5432	0.5875
RCA	-0.0405335	0.0172948	-2.344	0.0199
PART	0.195241	0.0953533	2.048	0.0416
RCA*COST	0.00221408	0.00126537	1.75	0.0814
PART*COST	-0.0137965	0.0078961	-1.747	0.0818
Adjusted R ²	0.11492			
P-value(F)	3.41E-07			
Number of observations	917			
Number of cross-sectional units	255			
Time-series length	1-4			

Annex VI: Cooperation (OLS)

Independent variable	Coefficient	Standard error	t-ratio	p-value
CONSTANT	37.1025	8.08247	4.5905	<0.0001
SURP	0.161997	0.190624	0.8498	0.3959
COST	0.254423	0.479575	0.5305	0.596
APPAR	-0.00466476	0.0881695	-0.0529	0.9578
RCA	-3.42818	1.71295	-2.0013	0.0459
PART	-29.8187	16.6662	-1.7892	0.0742
RCA*COST	0.17409	0.147302	1.1819	0.2379
PART*COST	1.93123	1.09288	1.7671	0.0779
Adjusted R ²	0.145921			
P-value(F)	5.41E-13			
Number of observations	465			
Number of cross-sectional units	249			
Time-series length	1-2			

Annex VII: In-house R&D (OLS)

Independent variable	Coefficient	Standard error	t-ratio	p-value
CONSTANT	-2.09614	0.230464	-9.095	<0.0001
SURP	0.0139633	0.00348971	4.001	<0.0001
COST	0.324036	0.0177083	18.30	<0.0001
APPAR	-0.0180404	0.00227712	-7.922	<0.0001
RCA	0.146674	0.0329839	4.447	<0.0001
PART	3.04048	0.429791	7.074	<0.0001
RCA*COST	-0.0256685	0.00263385	-9.746	<0.0001
PART*COST	-0.404534	0.0319171	-12.67	<0.0001
Adjusted R ²	0.450447			
P-value(F)	<0.0001			
Number of observations	863			
Number of cross-sectional units	280			
Time-series length	1-2			

Annex VIII: External R&D (OLS)

Independent variable	Coefficient	Standard error	t-ratio	p-value
CONSTANT	0.0983548	0.286613	0.3432	0.7317
SURP	-0.00438972	0.00473984	-0.9261	0.3552
COST	0.0404619	0.0218522	1.852	0.0651
APPAR	-0.00226379	0.00154842	-1.462	0.1448
RCA	-0.00739299	0.031108	-0.2377	0.8123
PART	-0.00516255	0.601182	-0.008587	0.9932
RCA*COST	0.000274472	0.00350632	0.07828	0.9377
PART*COST	-0.0605090	0.0400734	-1.510	0.1322
Adjusted R ²	0.06144			
P-value(F)	0.010262			
Number of observations	822			
Number of cross-sectional units	0.0983548	0.286613	0.3432	0.7317
Time-series length	-0.00438972	0.00473984	-0.9261	0.3552