

Global value chains in transition economies: integration paths in Central and Eastern Europe

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2018 June 4

Research was carried out in the project “Middle-income trap: global value chains, skills and innovations in CEE countries”, funded by the Lithuanian Research Council (grant No. S-MIP-17-116).

Research problem

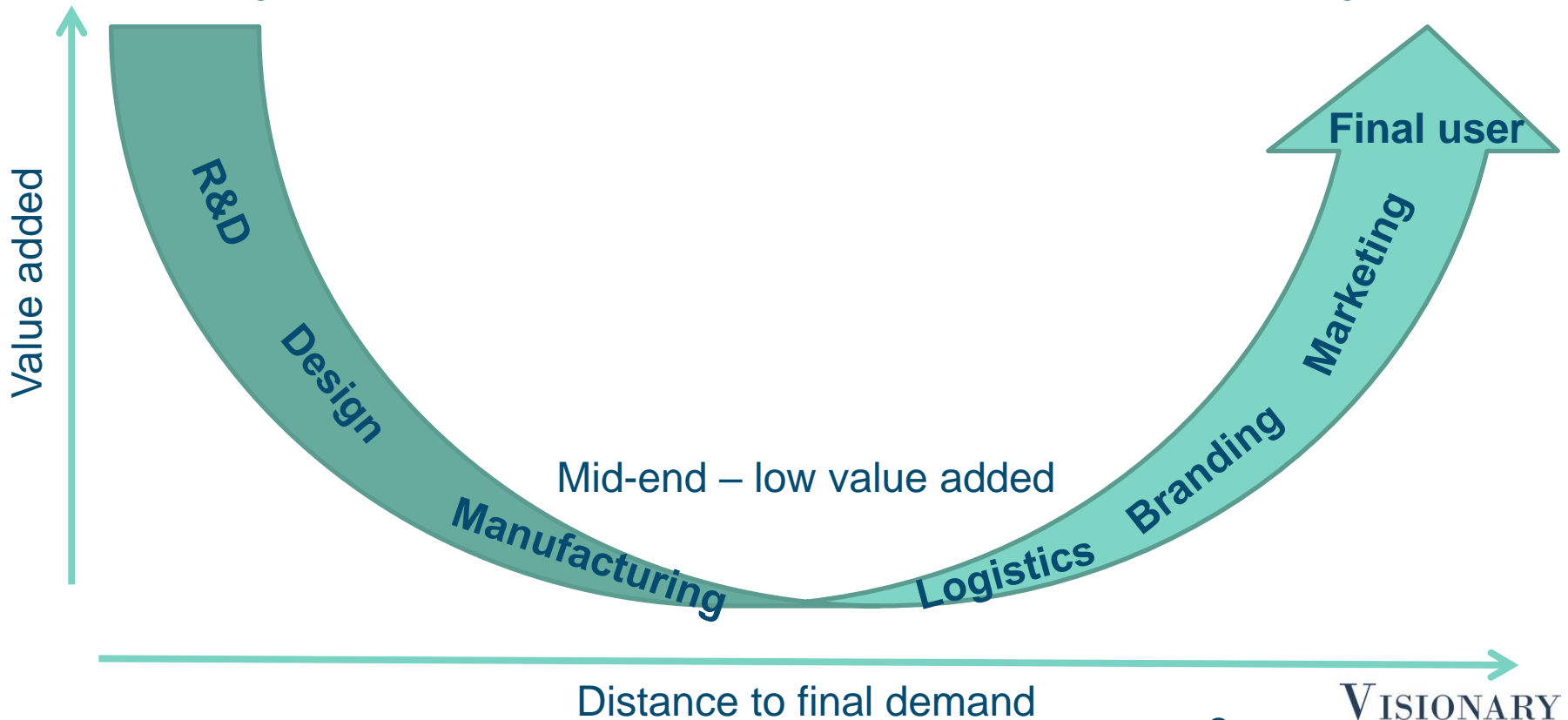
- Participation in global value chains (GVCs) is seen as a means for a country/industry/firm to improve its performance.
- Although literature on GVCs is growing, research on the development of post-communist transition economies remains limited
- Two main knowledge gaps:
 - How successful have post-communist economies in Central and Eastern Europe (CEE) been in integrating into the global market?
 - What are the sectoral tendencies in CEE integration?
- Research problem: the transition from planned to free-market economy meant fundamental changes in their links to the global market, yet knowledge about this process is limited at best.

Integration paths

- What are the benefits of integration and upgrading in global value chains?

Upstream – high value added

Downstream – high value added



Scope of the analysis

The main question:

- **What have been the trajectories of CEE countries' integration into the global economy?**

Scope:

- **Years: 1995 – 2014**
- **Geography: Central and Eastern Europe (11 countries, EU Member States)**
- **The number of sectors: from 35 (1995-2011) to 56 (2000-2014)**

Contribution

- **Comprehensive analysis of integration of CEE economies into global value chains at country-sector level**
- **Reliance on the state of the art methods (decomposition of global input-output data)**
- **Insights on the transition economies' integration into global value chains**
- **Basis for further analysis on the links between involvement in GVCs, skills, and innovations**

Methodological challenges

- **Measuring involvement in global value chains**
 - Which indicators best capture it?
 - How to measure position in a GVC?
 - What is the relative importance of participation (ratio of value added bought from or sold in GVCs) and length (production stages before and after reaching sector X)?
- **Differences between sectors (e.g. manufacturing and services)**
- **The exact shape of the smiley-curve**

Data sources

- **Raw data: cross-country input-output tables and accompanying data provided in the World Input-Output Database (Timmer et al., 2015)**
- **Specific GVC indicators: UIBE GVC Index developed by the Research Institute for Global Value Chains (based on Wang et al., 2013, Wang et al., 2017)**

Structure of global input-output tables

Inputs \ Outputs		Intermediate Use				Final Demand				Total Output
		1	2	...	G	1	2	...	G	
Intermediate Inputs	1	Z^{11}	Z^{12}	...	Z^{1g}	Y^{11}	Y^{12}	...	Y^{1g}	X^1
	2	Z^{21}	Z^{22}	...	Z^{2g}	Y^{21}	Y^{22}	...	Y^{2g}	X^2
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
	G	Z^{g1}	Z^{g2}	...	Z^{gg}	Y^{g1}	Y^{g2}	...	Y^{gg}	X^g
Value-added		Va^1	Va^2	...	Va^g					
Total input		$(X^1)'$	$(X^2)'$...	$(X^g)'$					

Indicators extracted from WIOD

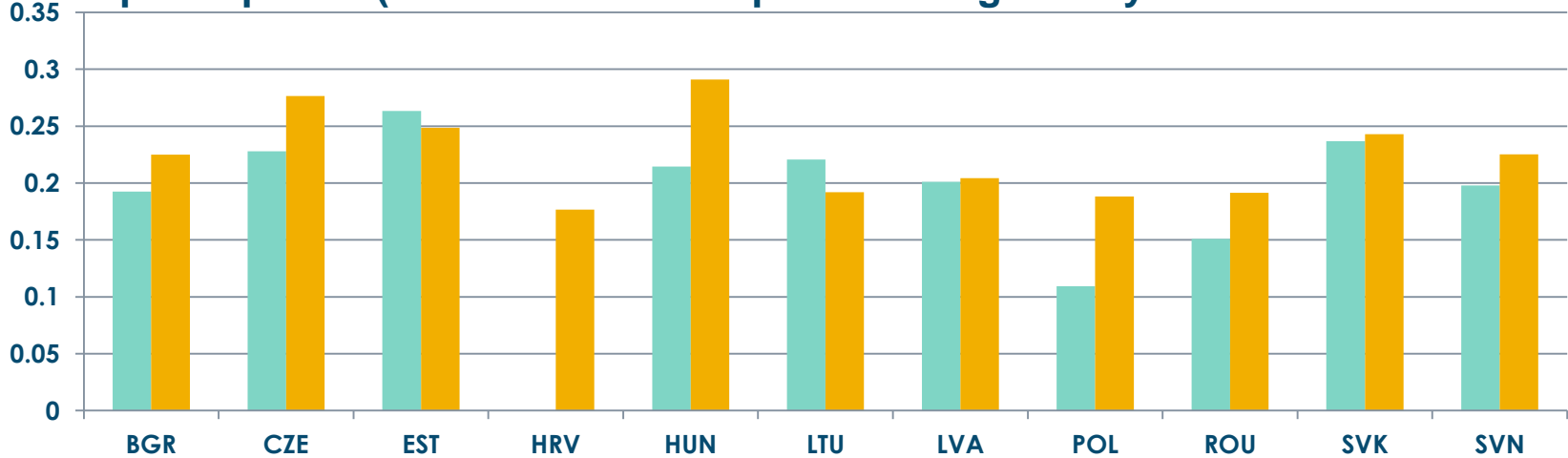
- **Forward linkage:**
 - Value added by country-industry
 - Participation – how much of a country-industry value added is passed to other stages of production
 - Length – how many steps on average the output of a country-industry has to take before reaching the final user
- **Backward linkage:**
 - Output for final demand produced in a country-sector
 - Participation – how much of country-industry output comes from the previous stages of production
 - Length – how many steps on average it takes for other country-industry outputs to become a part of the final output of an industry
- **Value added ratio – share of value added in total sectoral output.**

CEE economies pre-1990

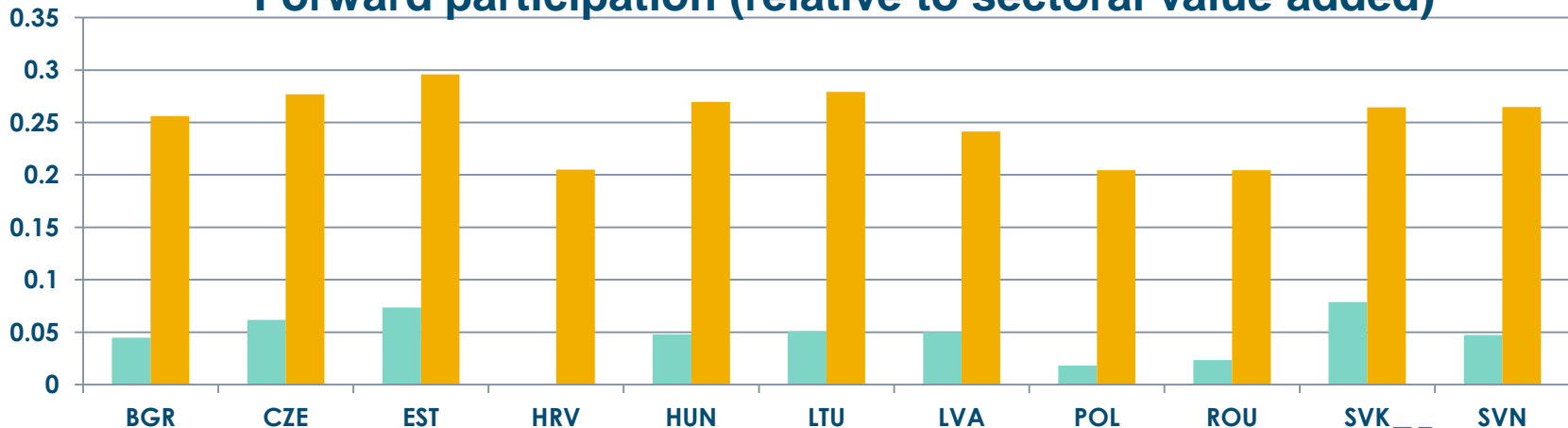
- **Central and Eastern European economies were based on central planning and limited links with non-communist countries pre-1990.**
- **Planning meant strict division of tasks both within and between firms, creating well defined chains.**
- **Restricted private entrepreneurial activities and lack of openness limited local economic sectors to integrate into global value chains.**
- **Collapse of the Soviet Union and deindustrialisation in CEE economies led to disruption in economic ties built within and among them during the Cold War.**
- **CEE countries needed to integrate into the global economy 'from scratch' after 1990.**

Participation in GVCs (I)

Backward participation (relative to final output and weighted by total sectoral value added)



Forward participation (relative to sectoral value added)

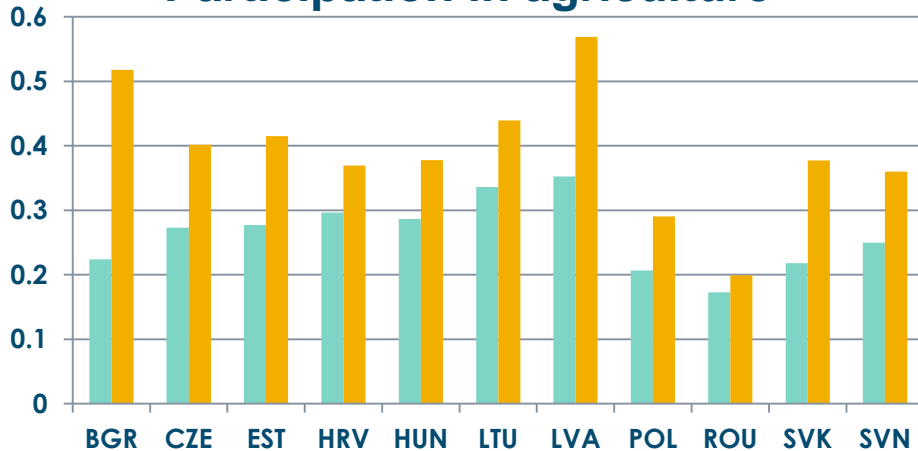


Green – 1995, orange – 2014

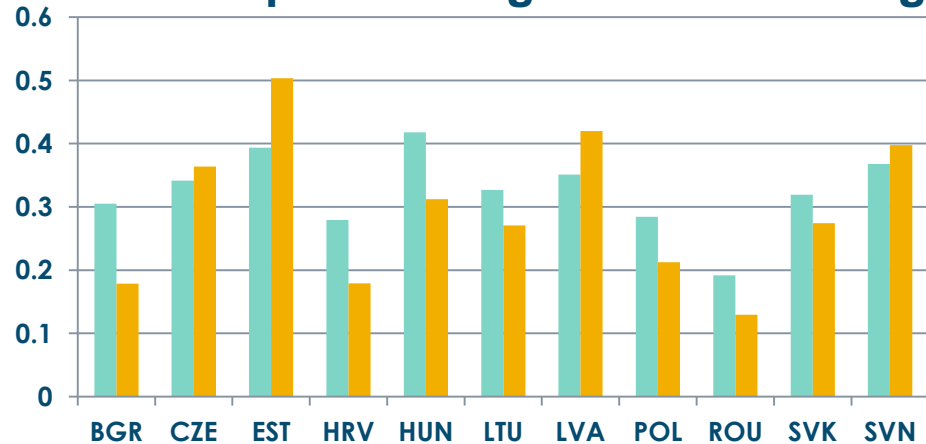
Sources: WIOD WIOT, UIBE GVC index

Participation in GVCs (II)

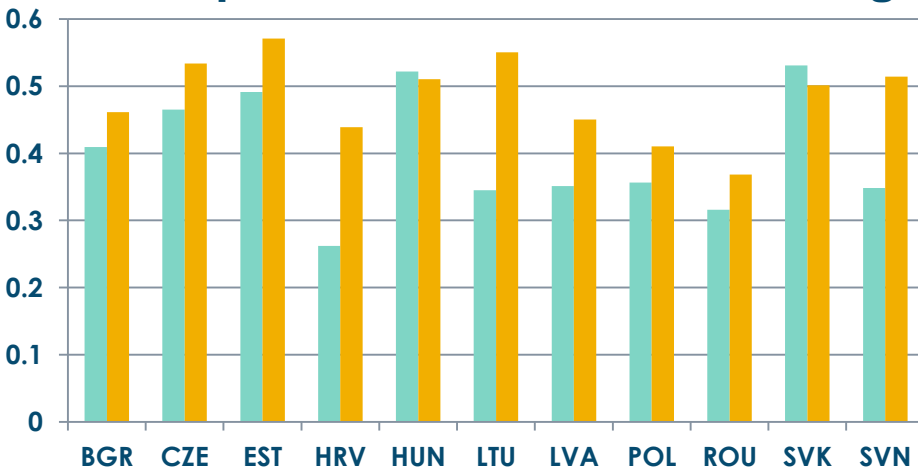
Participation in agriculture



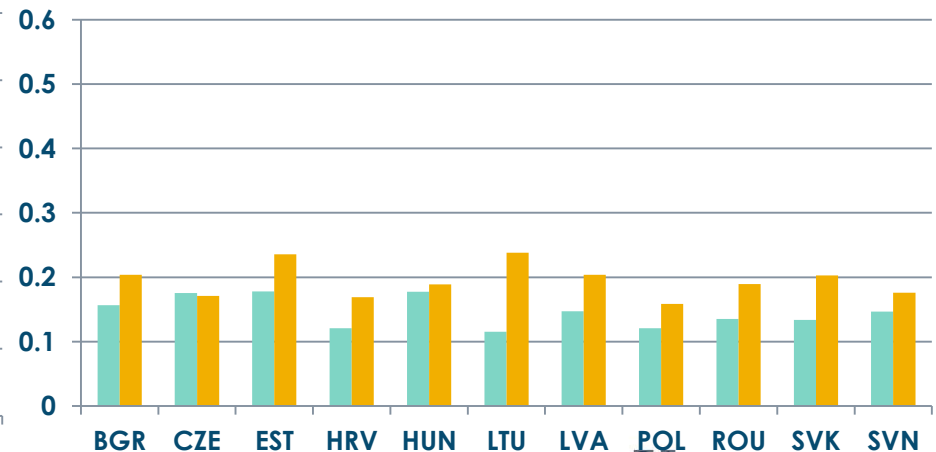
Participation in light manufacturing



Participation in other manufacturing



Participation in services



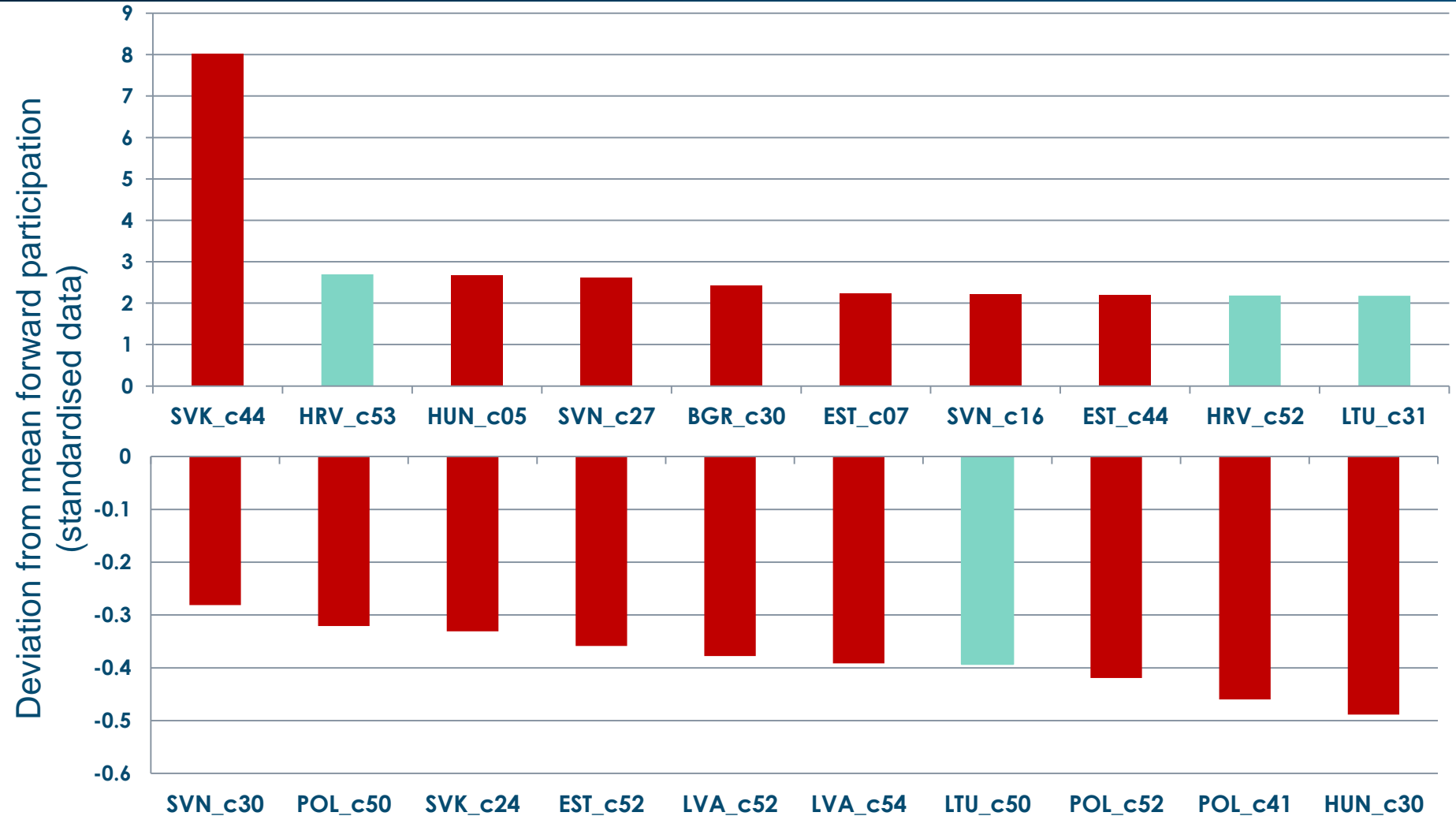
Green – backward, orange – forward, year 2014

Sources: WIOD WIOT, UIBE GVC index

GVCs in CEE – sample reduction

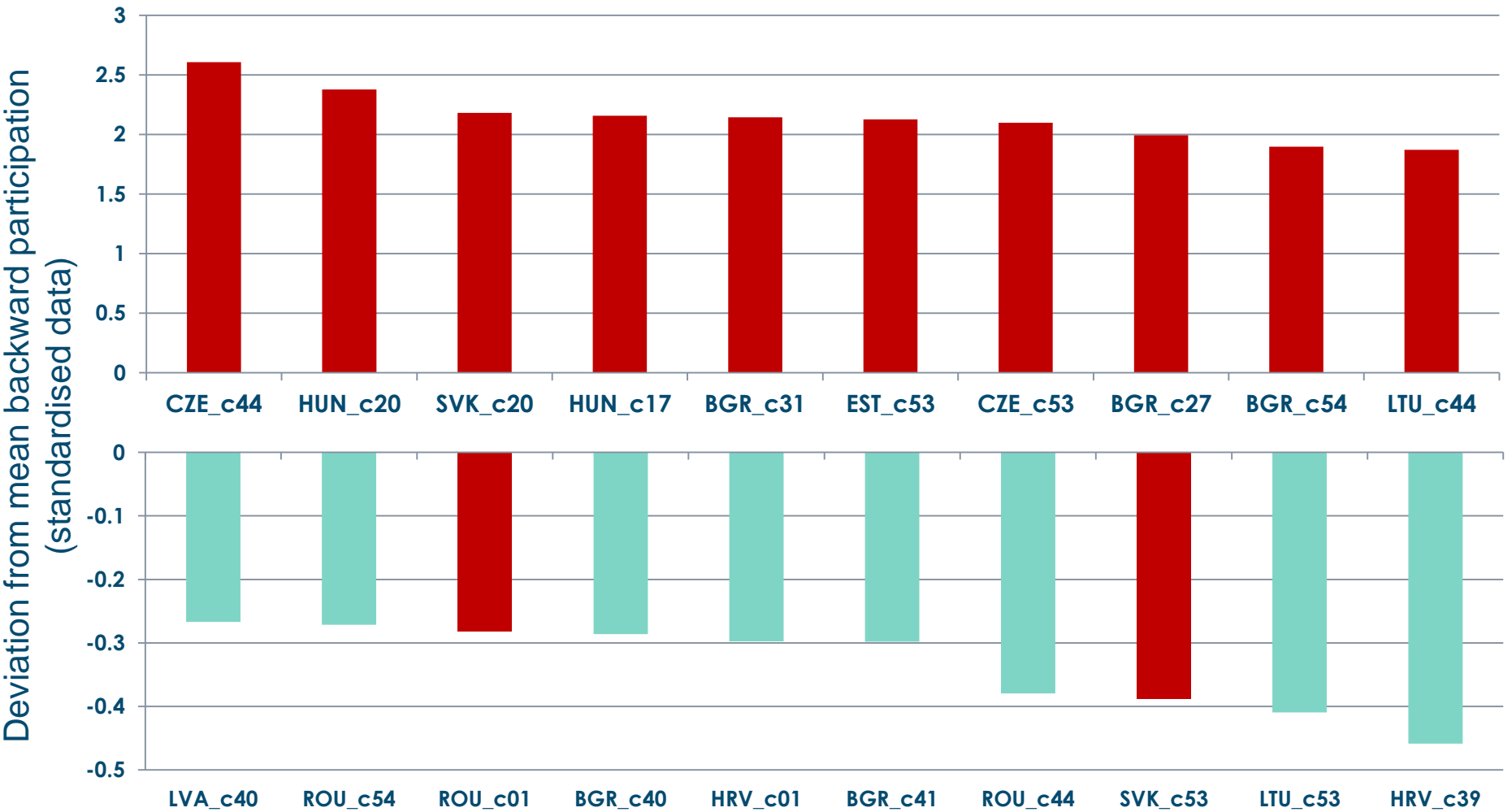
- **The total sample for 2000-2014 covers:**
 - 11 countries
 - 56 sectors
 - 15 years
 - 9240 observations
 - Several time-variant variables
- **Data standardised (mean – 0, standard deviation – 1), to enable cross-sectoral comparisons**
- **Sample reduction:**
 - only sectors accounting for 2% or more of country's GDP in 2014
 - only sectors that are no lower than 0.5 standard deviation below the mean of global sectoral average for 2000-2014 in terms of backward and forward participation in 2014

Winners / losers in CEE? Forward participation (2014)



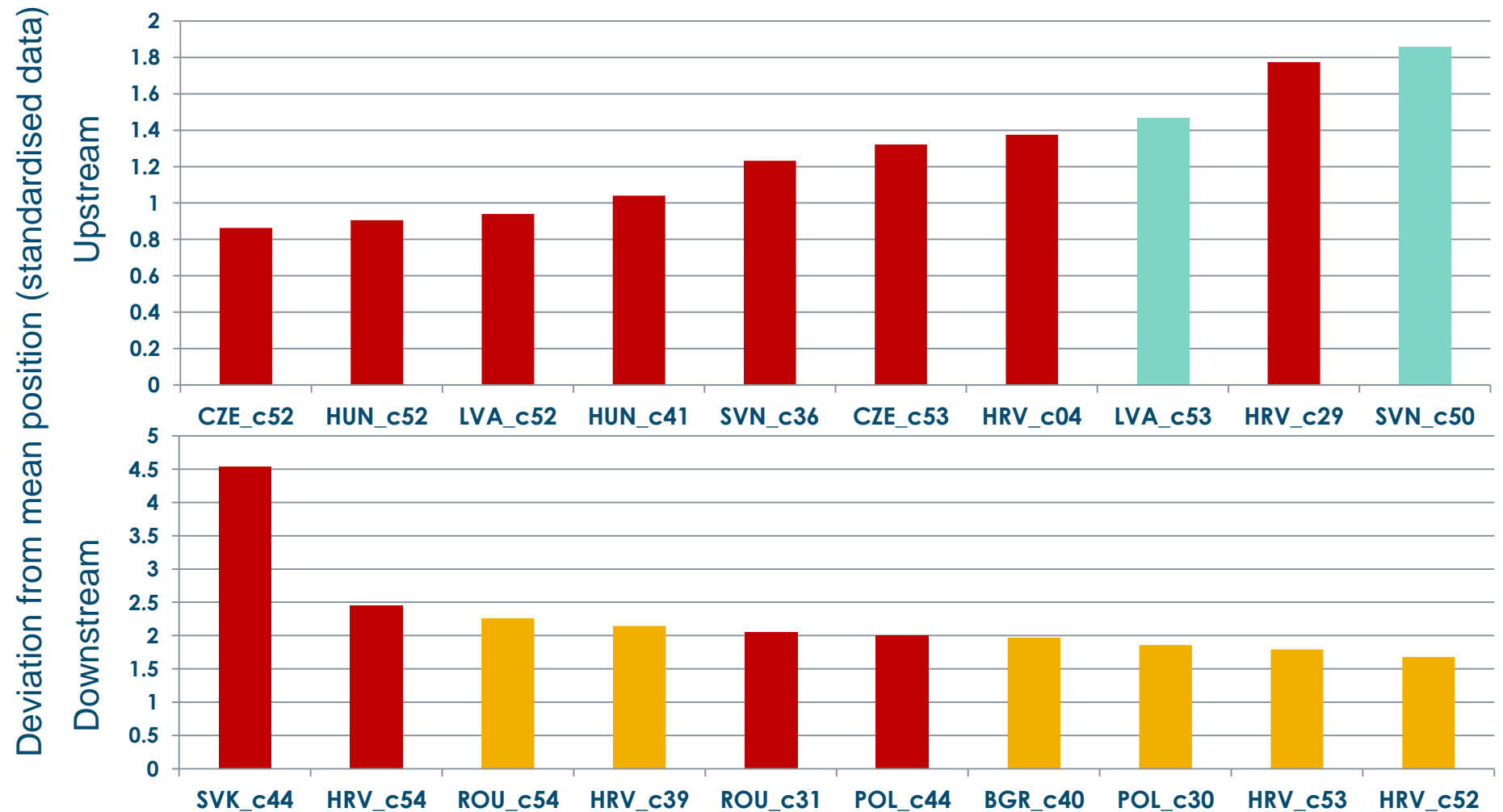
Sources: WIOD WIOT, UIBE GVC index

Winners / losers in CEE? Backward participation (2014)



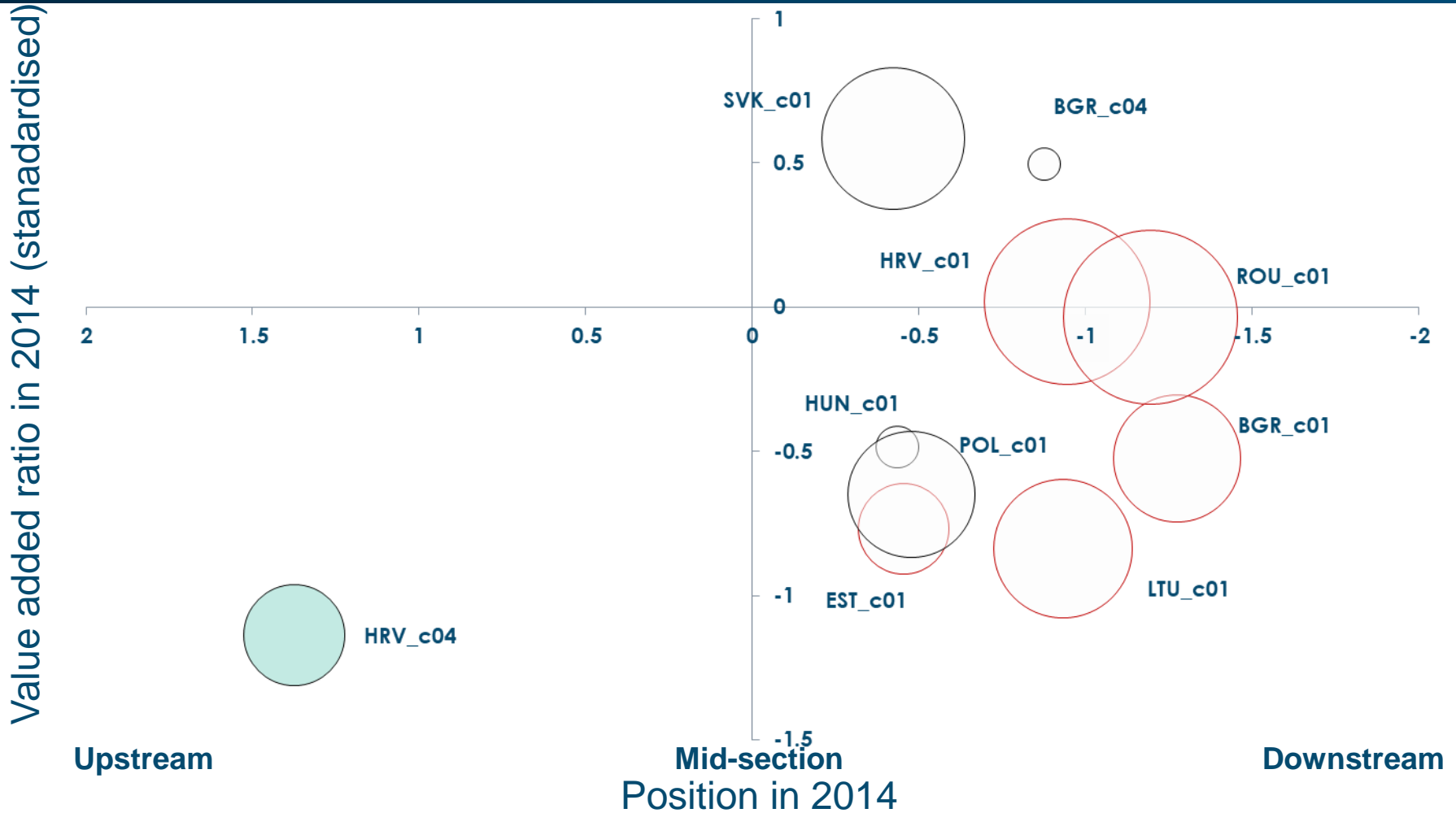
Sources: WIOD WIOT, UIBE GVC index

Most upstream and downstream CEE sectors in 2014



Sources: WIOD WIOT, UIBE GVC index

CEE countries in primary economy 2000-2014

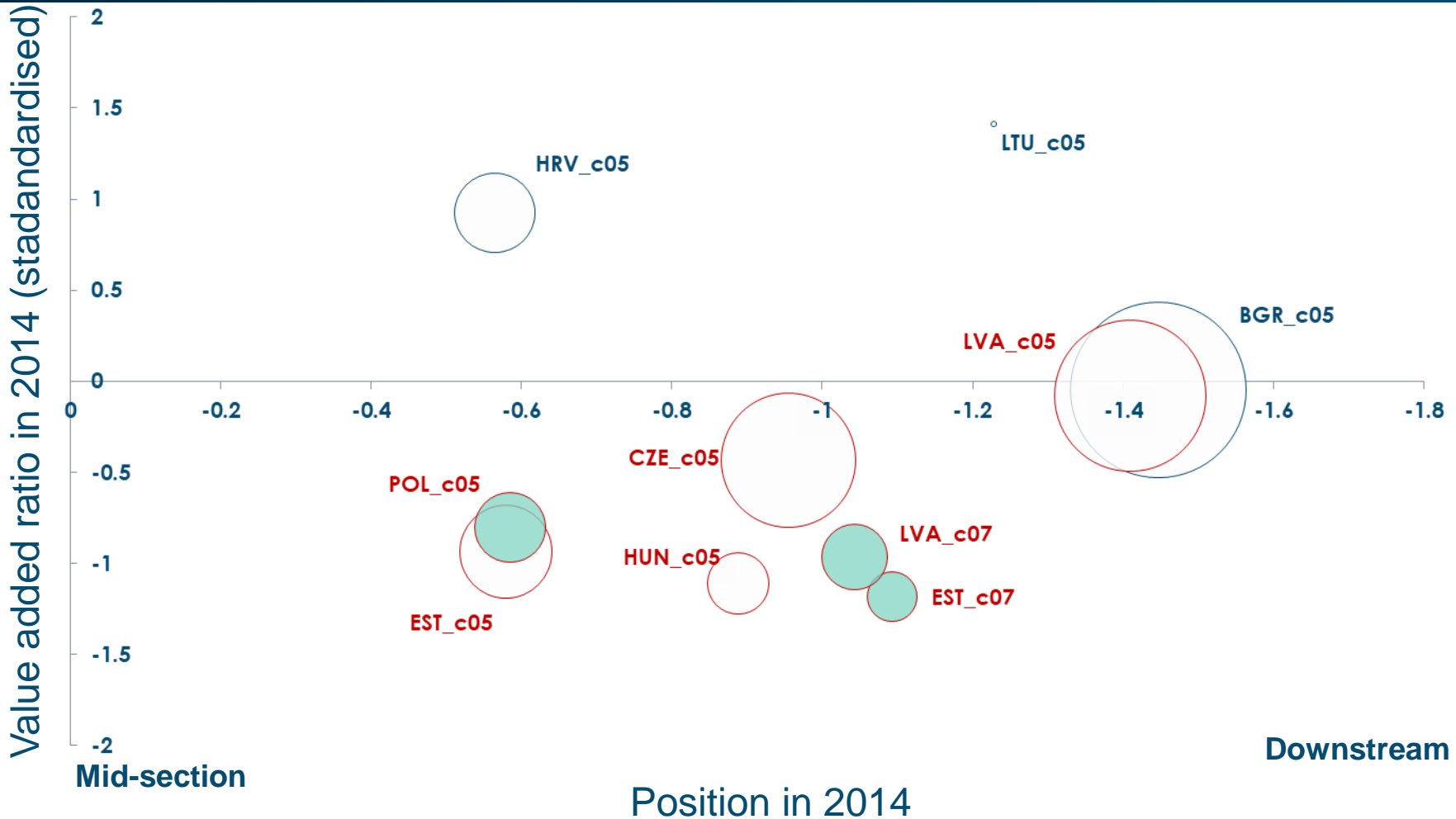


Bubbles: size: change in position; colour: white – move downstream, green – move upstream

Letters: colour: blue – increase in VA ratio, red – decrease in VA ratio

Sources: WIOD WIOT, UIBE GVC index

CEE countries in light manufacturing 2000-2014

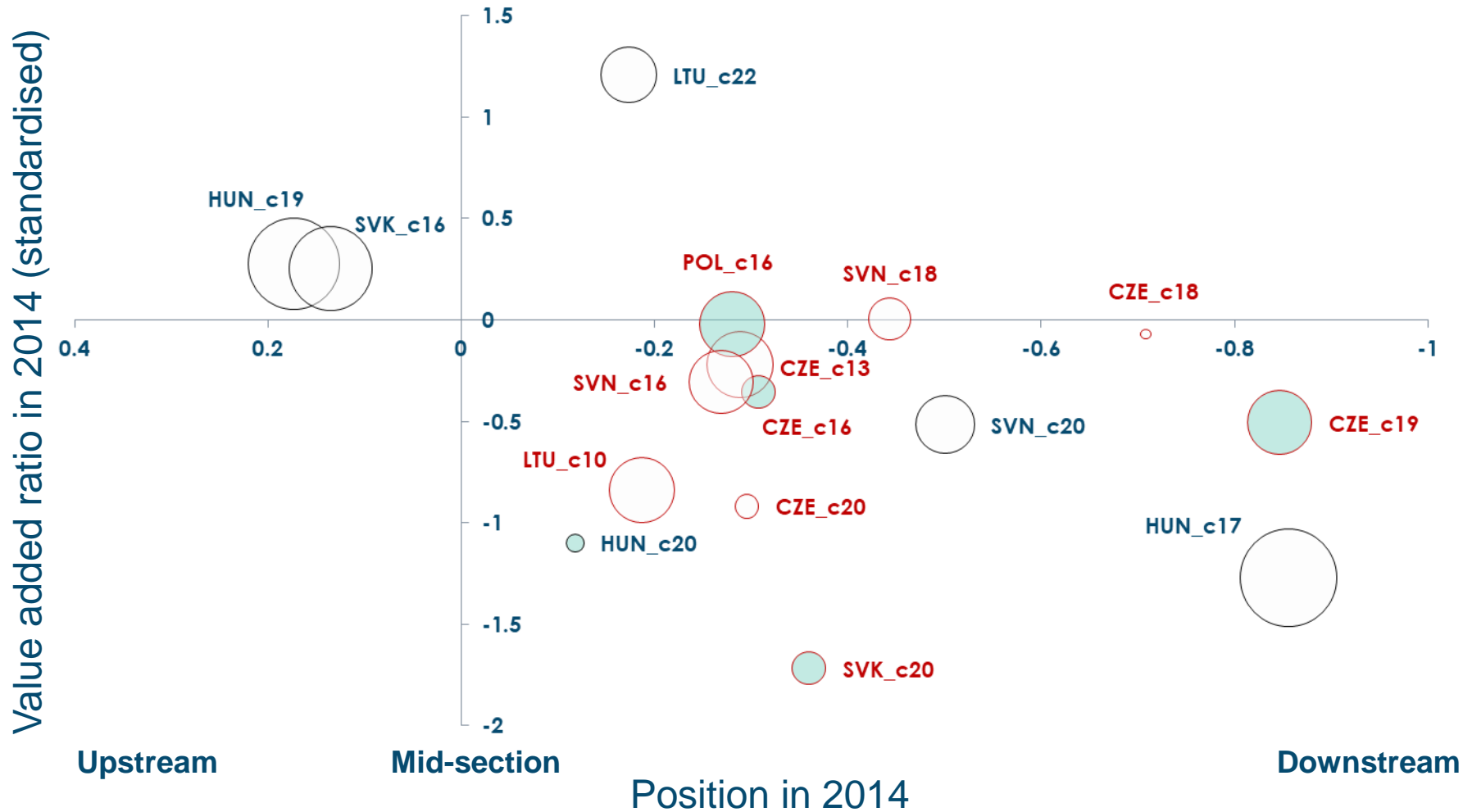


Bubbles: size: change in position; colour: white – move downstream, green – move upstream

Letters: colour: blue – increase in VA ratio, red – decrease in VA ratio

Sources: WIOD WIOT, UIBE GVC index

CEE countries in other manufacturing 2000-2014



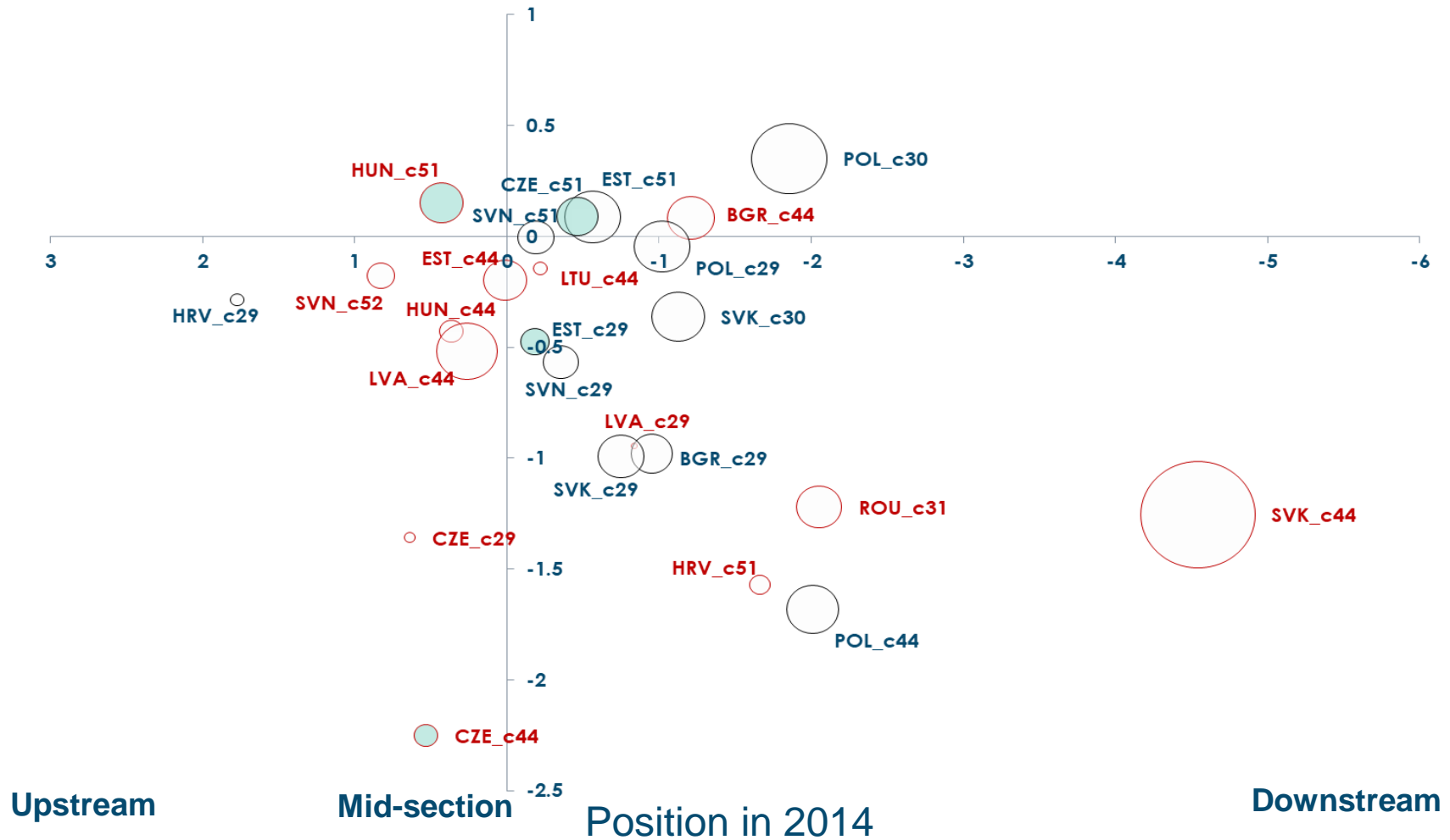
Bubbles: size: change in position; colour: white – move downstream, green – move upstream

Letters: colour: blue – increase in VA ratio, red – decrease in VA ratio

Sources: WIOD WIOT, UIBE GVC index

CEE countries in services 2000-2014

Value added ratio in 2014 (standardised)



Bubbles: size: change in position; colour: white – move downstream, green – move upstream

Letters: colour: blue – increase in VA ratio, red – decrease in VA ratio

Sources: WIOD WIOT, UIBE GVC index

Conclusions (I)

- CEE countries have remained at similar levels of backward participation in 1995-2014, but became significantly more integrated via forward direction.
- The primary sector experienced significant move downstream, mostly being below average in terms of value added ratio by 2014.
- Light manufacturing is on the downstream side in the studied sample. The majority of sectors moved downstream and underwent decline in value added ratio over 2000-2014.
- Other manufacturing is also mostly located in the downstream. Seemingly, there are no dominant sectors across the CEE with countries being stronger in mostly separate sectors.

Conclusions (II)

- The majority of studied services sectors in CEE countries have value added ratios below sector-means. They are also mostly located and moving downstream.
- A significant share of economic sectors in CEE countries are located downstream and have relatively low value added ratios, some even decreasing. How to upgrade their productivity?
- Further research:
 - Relationship between GVC involvement and value added ratio
 - Relationship between GVC involvement and innovation
 - Relationship between GVC involvement and skills

References

- Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R. and de Vries, G. J. (2015). **An Illustrated User Guide to the World Input–Output Database: the Case of Global Automotive Production**, *Review of International Economics.*, 23: 575–605
- Wang, Z., Wei, S.-J. and Zhu, K. (2013). **Quantifying International Production Sharing At The Bilateral And Sector Level**. *NBER Working Paper 19677*.
- Wang, Z., Wei, S.-J., Yu, X. and Zhu, K. (2017). **Characterizing Global Value Chains: Production Length and Upstreamness**. *NBER Working Paper 23261*.

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Thank you!



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