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Global Value Chains and Capabilities

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Outline and questions

Background:

are GVCs **still growing?**

GVCs influence firms' productivity, **together with** Innovation Systems

Questions:

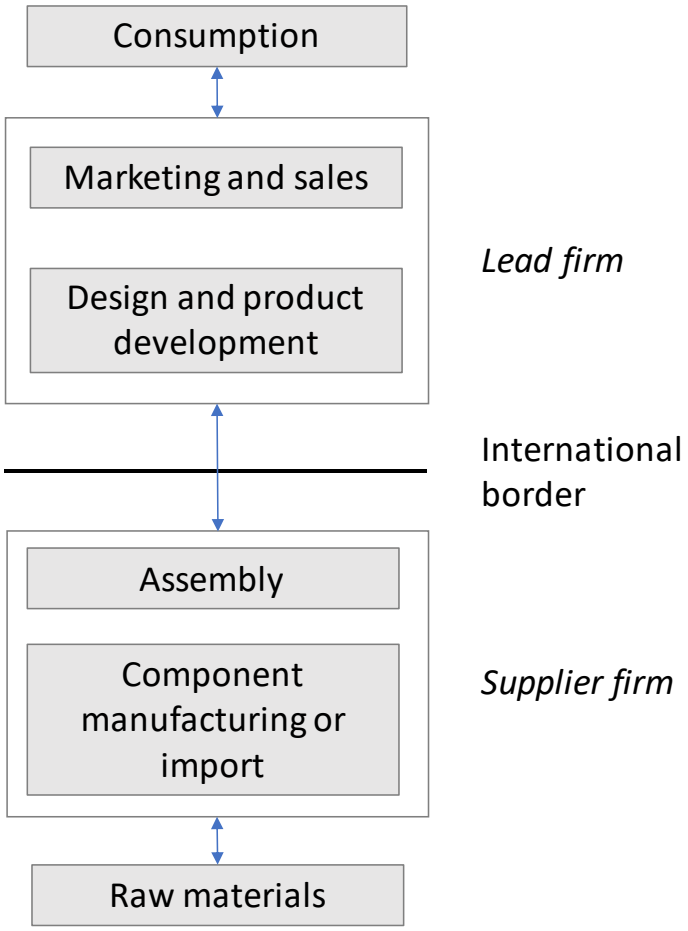
- Any evidence of **trajectories** of GVCs and IS development?
- Do they **coevolve**?
- What is their **impact** on innovation capabilities?

The Global Value Chain Approach

- **Focus:** The role of **leading firms** and **inter-firm networks** in supplier firm upgrading.
- **Key point:** Opportunities for building production and innovation capabilities in domestic enterprises are structured by **governance patterns** in GVCs.
- **Main limitations:**
  - Little attention to the micro-dynamics involved in the **upgrading process**. How is **knowledge accessed?** How can firms in GVCs **learn and innovate?**
  - Little attention to the **institutional framework,** that structures the opportunities for upgrading

Functional integration with Geographical fragmentation

Simplified Global Value Chain Model



One step back:

Are GVCs slowing down?

Are we still living in a “GVC world”?

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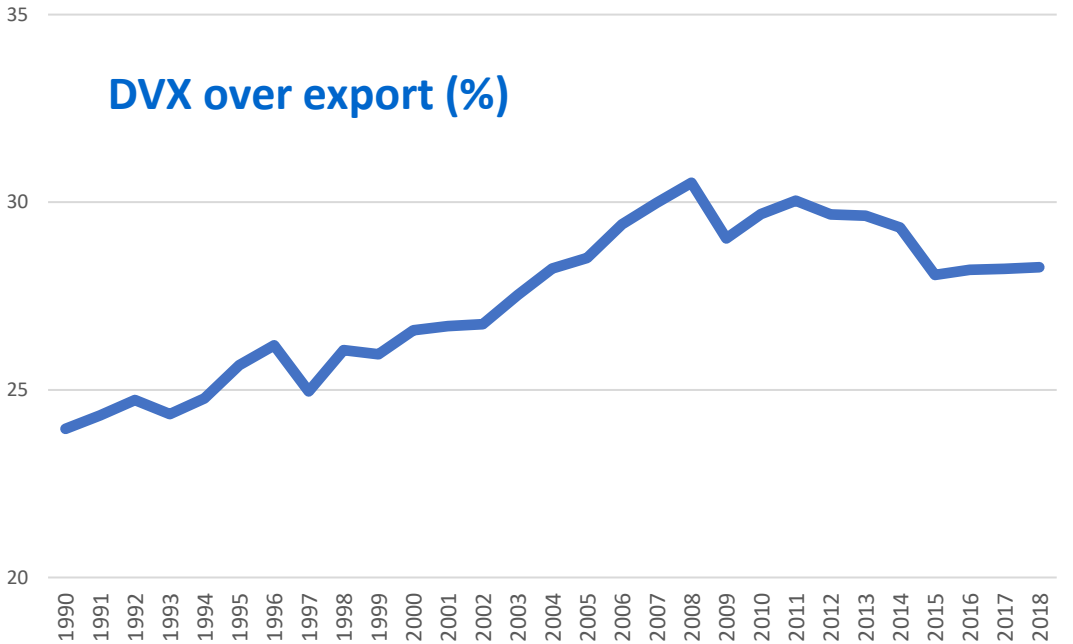
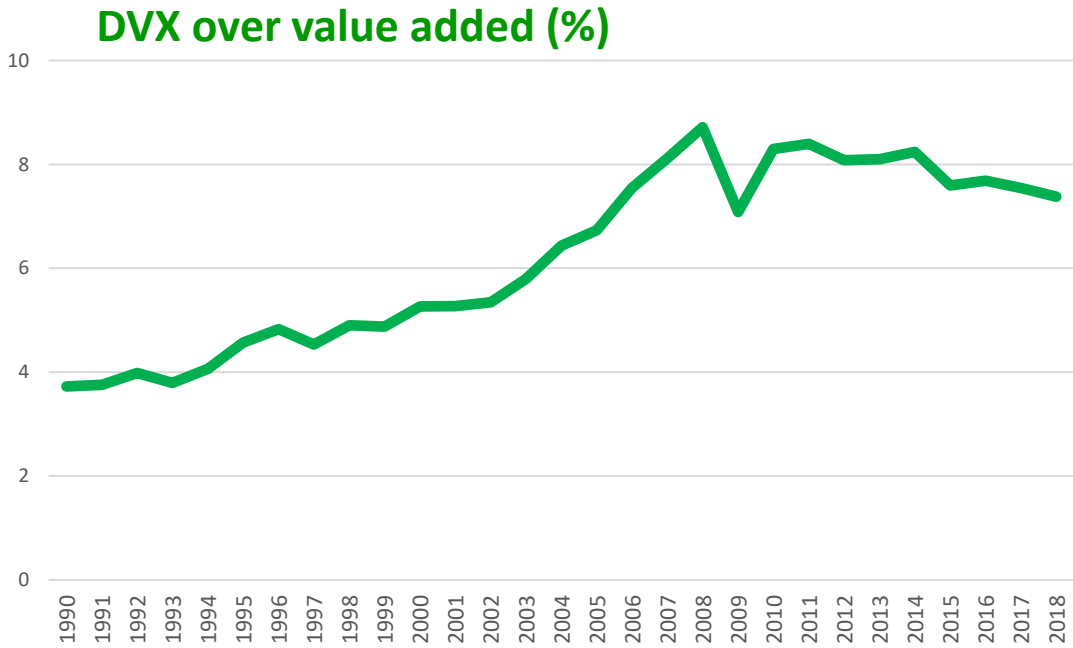
Trends in GVCs confirm their relevance

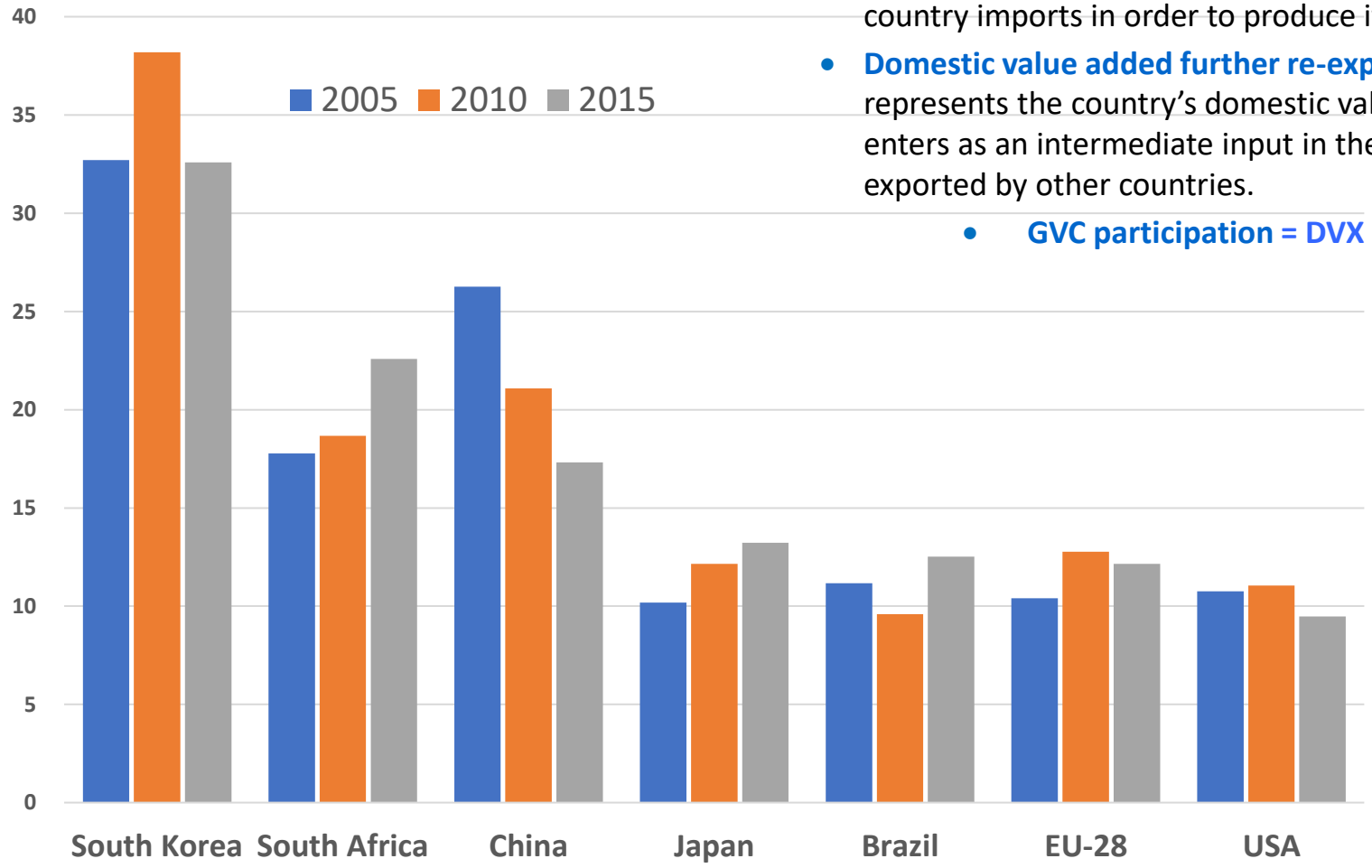
Before the financial crisis (2008-9), trade of intermediate goods and the domestic VA that is further re-exported (DVX) have grown more than overall trade.





Great diversity across countries

FVA share of gross exports (2005, 2010 and 2015)

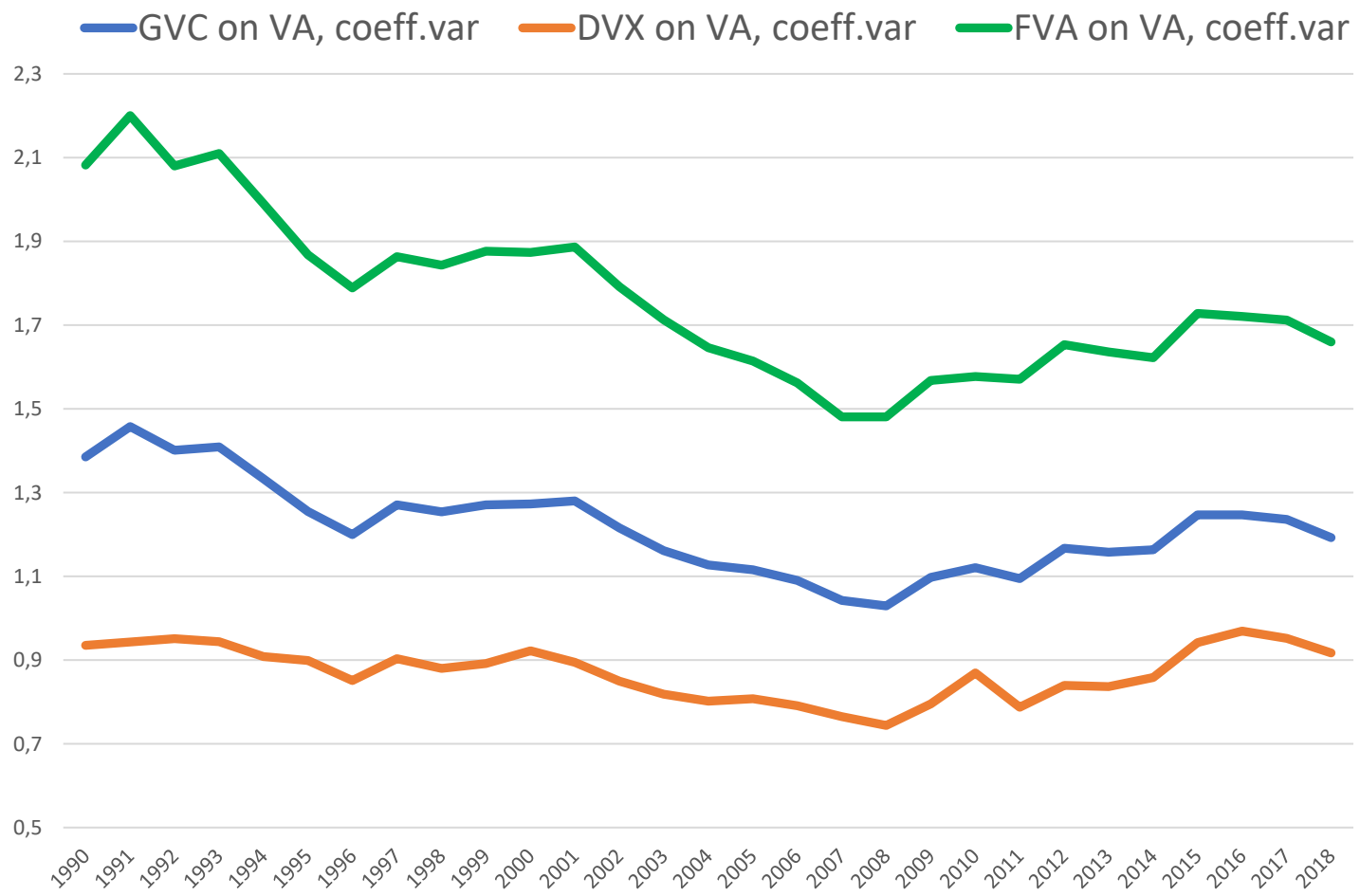


- **Foreign Value Added** (**FVA**) content of exports of a country, represents the share of value added that a country imports in order to produce its exports.
- **Domestic value added further re-exported** (**DVX**), represents the country's domestic value added that enters as an intermediate input in the value added exported by other countries.
  - **GVC participation = DVX + FVA**

Source: Pietrobelli and Vezzani, from OECD data.

GVC Integration across countries:

countries converged and then diverged in their GVC participation over time

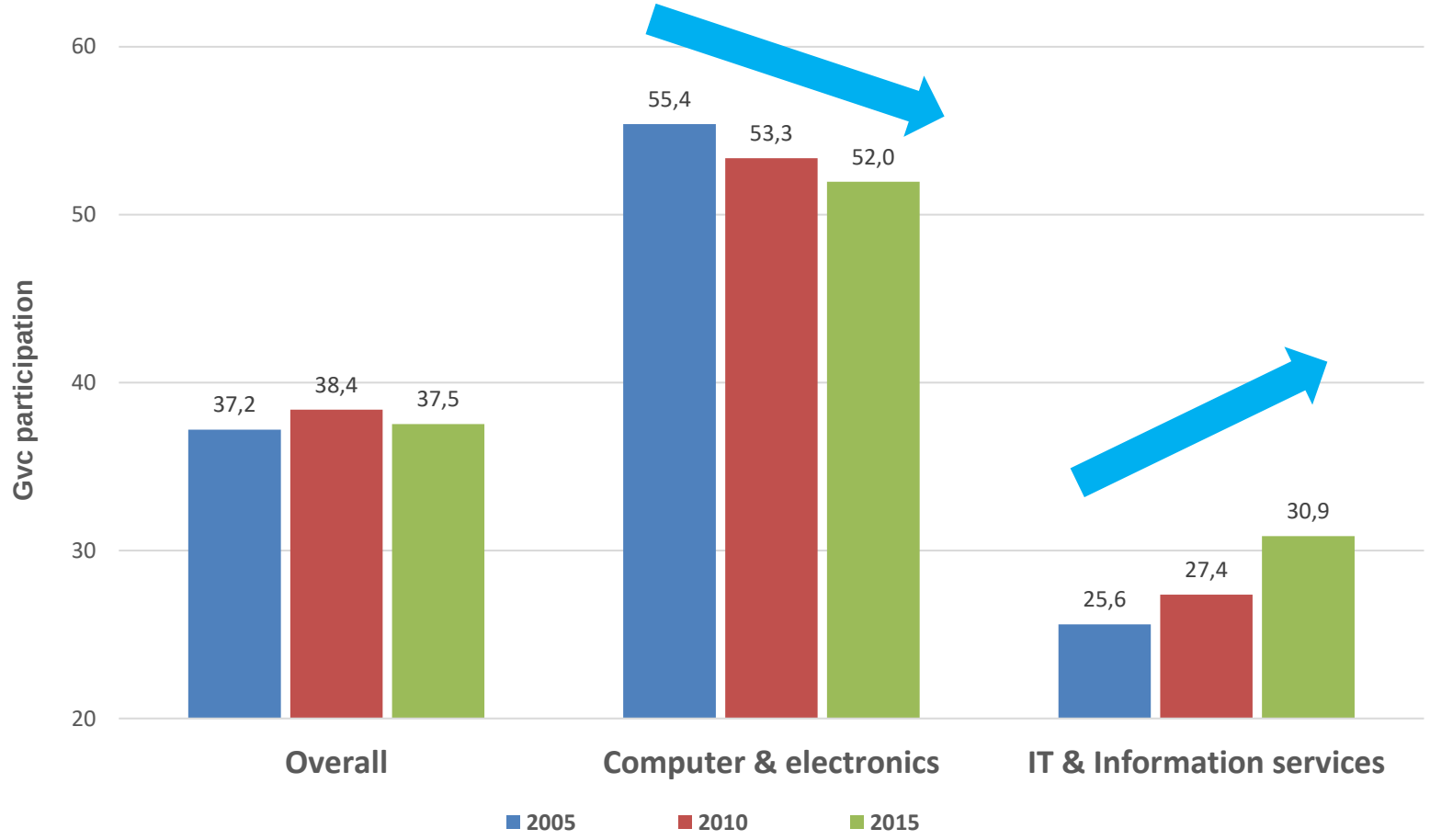


Source: Pietrobelli and Vezzani, from UNCTAD data

Huge diversity across sectors
In some sectors GVCs continue to grow

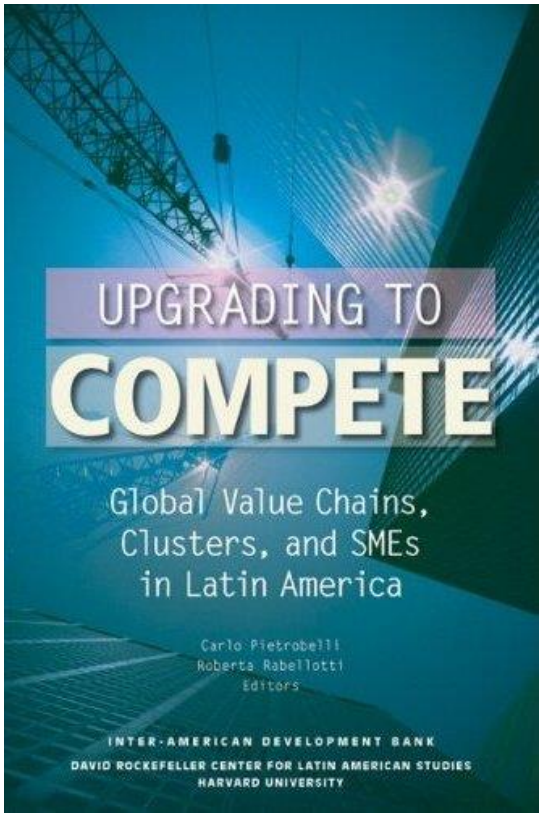
From work with Lema, Rabellotti, Vezzani, forthcoming

GVC participation. Computer & Electronics vs. IT & Information Services, 2005-15

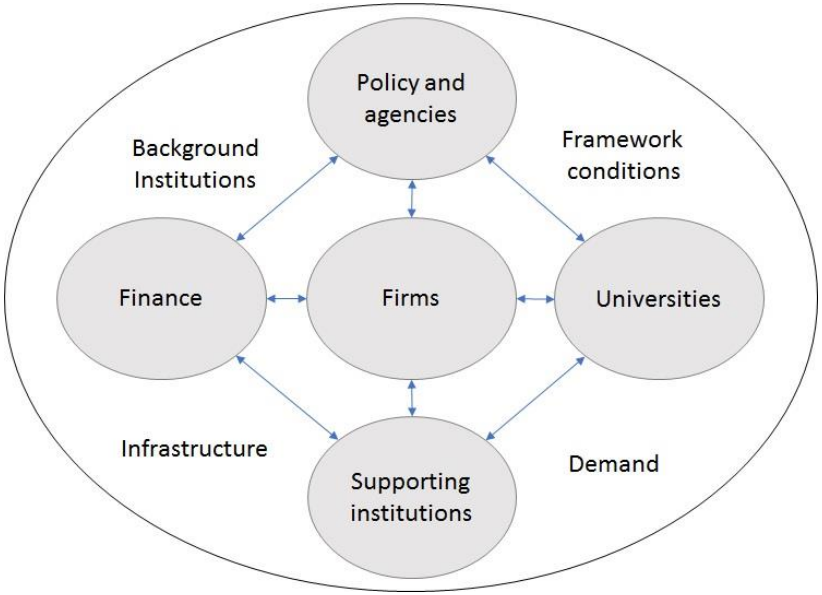


Note: authors' elaboration from OECD TIVA data. 64 countries, GVC participation represents the value of production crossing more than one border divided by total exports (**backward + forward linkages divided by total exports**).

Innovation Systems and GVCs: do they coevolve?



Innovation Systems



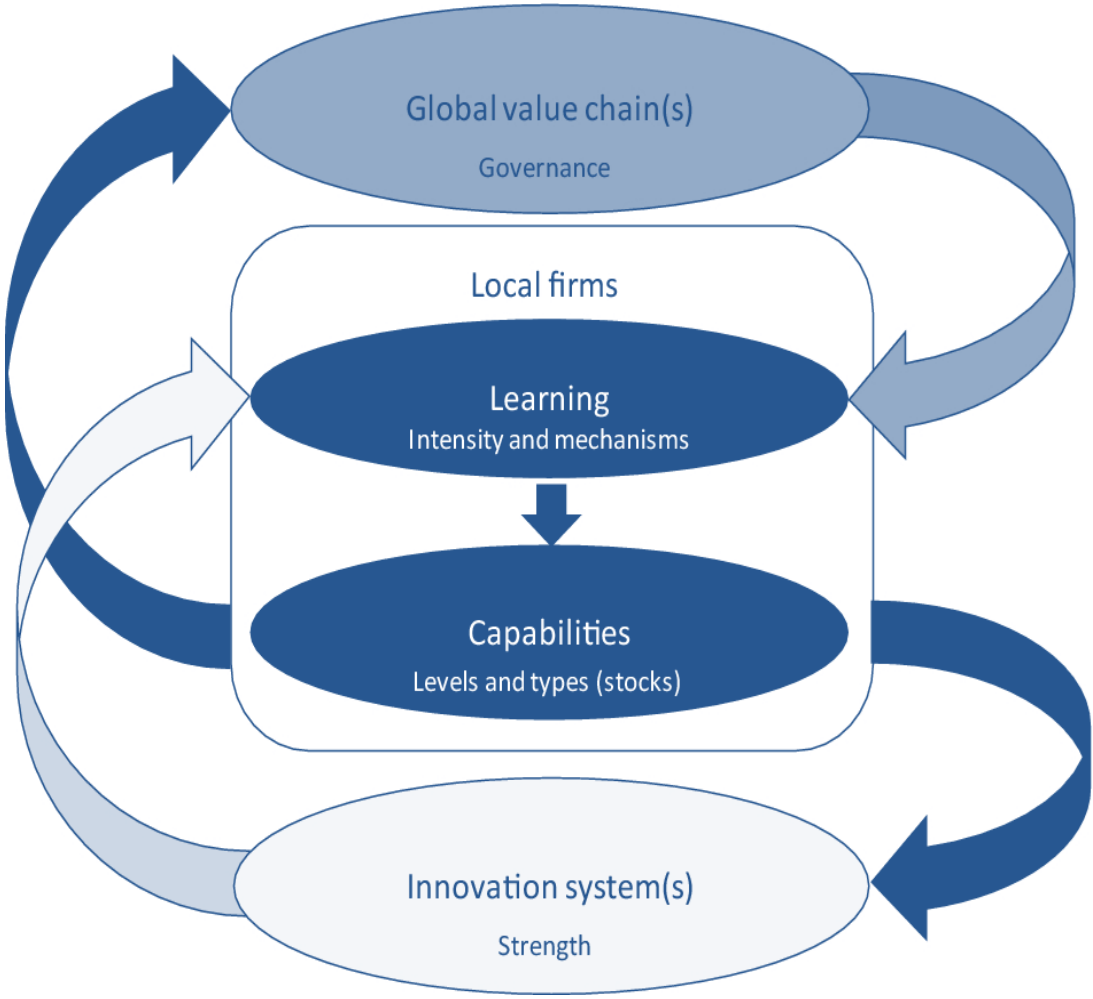
- **Focus:** How **interactions** among enterprises, institutions, research bodies and policy making agencies contribute to learning and innovation within firms
- **Key point:** **Innovation capability** at the firm level depends on the **density and quality of the relationships** among enterprises and between enterprises and supporting institutions.
- **Main limitations:**
  - Still less understanding of **systems building and dynamism**.
  - Less attention to **external linkages** in the creation, generation and diffusion of knowledge and innovation in local systems.

The coevolution of GVCs and the Innovation System and **Capabilities' Development**

- **'Forward feeding flows': Both IS and GVC contribute to local firms' learning processes and their stock of innovation capabilities**
- **'Feedback flows' – in dark -:**

  GVCs: Changes in firms' capabilities can influence GVC governance patterns *(which then influences capabilities)*

  ISs: Changing stocks of capabilities may have spillover effects on the IS, and create demand for different types of knowledge and resources in the IS.



Lema, Pietrobelli and Rabellotti, 2019, in *Handbook of Global Value Chains*, E.Elgar.

How are **GVCs** and **IS** related in their influence on **innovation capabilities**?

Typology of possible trajectories

	Strengthening relative innovation capability	**Weakening relative innovation capability**
Deepening GVCs participation	1 Deepening and strengthening	3 Deepening and weakening
Withdrawal from GVC participation (delinking)	2 Delinking and strengthening	4 Delinking and weakening

How are GVCs and IS related in their influence on capabilities and innovation?

We combine measures of GVC participation with measures of the strength of the Sectoral Innovation Systems and see their evolution from 2005 to 2015 (Lema, Pietrobelli, Rabellotti, Vezzani, forth.)

Integration in global IT value chains does not necessarily improve innovation capacity

https://www.sustainablesupplychains.org/integration-in-global-it-value-chains-does-not-necessarily-improve-innovation-capacity/

The pattern of coevolution varies by sector

Data and indicators

- **45 countries**;
- ***Information and Communications Technology* (ICT) industry** exploring the potential difference between hardware manufacturing – namely *Computer, electronic and optical products* – and software services - *IT and other information services;*

- ***GVC participation*** (Borin and Mancini (2015) (OECD-TiVA)

$$\mathrm{GVC}_{\mathrm{sct}} = \frac{\mathrm{backward}_{\mathrm{sct}} + \mathrm{forward}_{\mathrm{sct}}}{\mathrm{export}_{\mathrm{sct}}} \qquad \mathrm{GVChange}_{\mathrm{sc}} = \mathrm{GVC}_{\mathrm{sct=2015}} - \mathrm{GVC}_{\mathrm{sct=2005}}$$

- ***(Relative) SIS strength*** *(Patstat – USPTO)*

$$SIS_{\mathrm{sct}} = \frac{\mathrm{uspto\_patents}_{\mathrm{sct}}}{\mathrm{population}_{\mathrm{ct}}} - \frac{1}{n}\sum_{c=1}^{N} \frac{\mathrm{uspto\_patents}_{\mathrm{sct}}}{\mathrm{population}_{\mathrm{ct}}} \qquad \mathrm{SISchange}_{\mathrm{sc}} = \mathrm{SIS}_{\mathrm{sct=2015}} - SIS_{\mathrm{sct=2005}}$$

The pattern of coevolution varies by sector

- Countries with high GVC participation decrease it over time (Hardware)
- Increasing GVC participation together with impoverishing SIS (hardware); the opposite for software
- In software SIS improves over time, and high SIS associated with high GVC participation

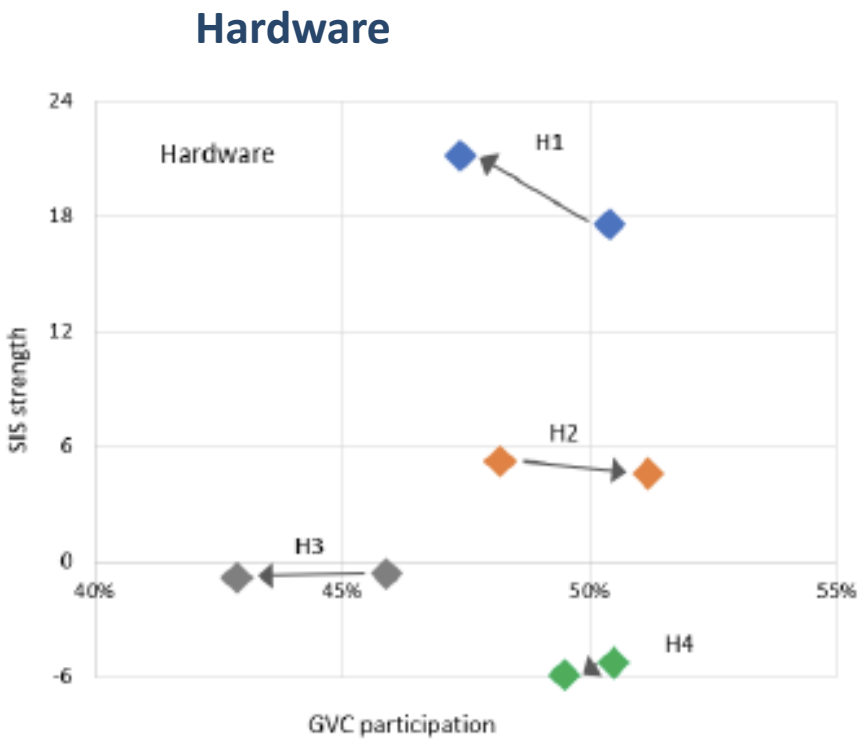
	Hardware			Software		
	GVC	GVChange	SIS	GVC	GVChange	SIS
GVC	1			1		
GVChange	-0.47*	1		0.22	1.00	
SIS	0.03	-0.03	1	-0.08	0.22	1.00
SISchange	-0.09	-0.31*	0.26*	0.30*	0.36*	0.63*

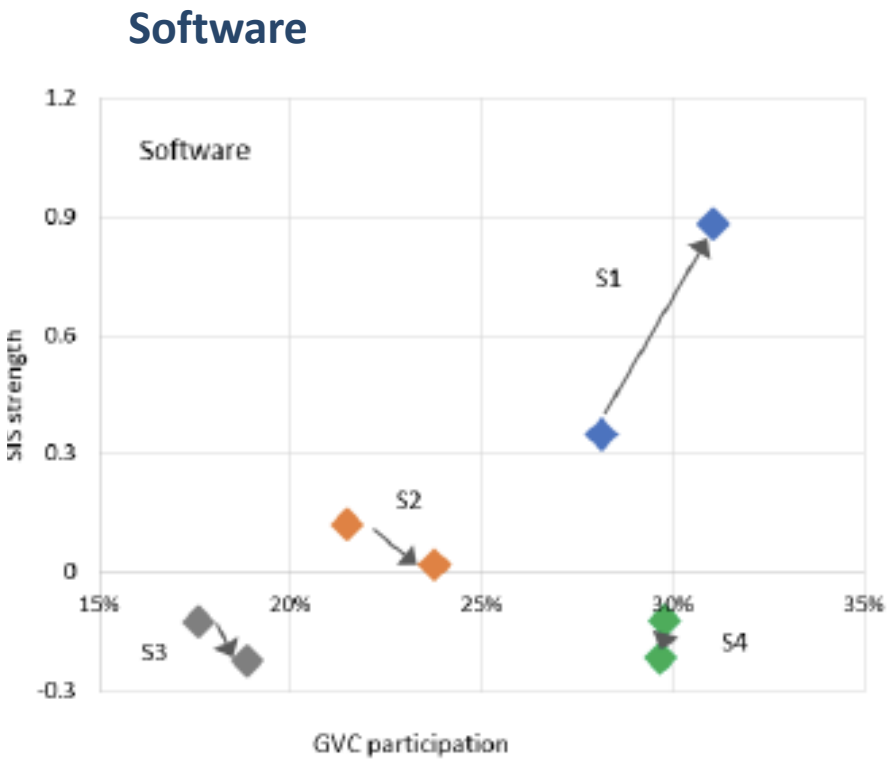
Clusters of countries with similar trajectories

Country groups in the *software* sector

Cluster	Trajectory	Countries	GVC (GVChange)	SIS (change)
Cluster 3	• **Highest GVC participation and strongest increase** • **Strongest IS strength, reinforcing**	**IRL, ISR, USA**	0.370 (+0.06)	0.401 (+0.93)
Cluster 2	• **Relatively high participation, moderately increasing** • **Good IS strength, strengthening**	**CAN, FIN, KOR, SGP**	0.269 (+0.02)	0.139 (+0.29)
Cluster 5	• **Lowest GVC participation, increasing** • **Relatively weak IS, weakening**	**ARG, BRA, CHL, ESP, FRA, IND, MEX, NOR, RUS, TUR**	0.176 (+0.01)	-0.125 (-0.10)

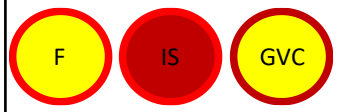
GVC and SIS trajectories (2005-2015): Software and Hardware





- **Cumulativeness of innovation in IT**. Initial better innovation capacity is associated with faster patenting
- In the **hardware** sector, an increased innovation capacity is associated with a decreased GVC participation.
- In the **software** sector, the opposite (user-producer interactions).
- Some countries leverage synergies between hardware and software

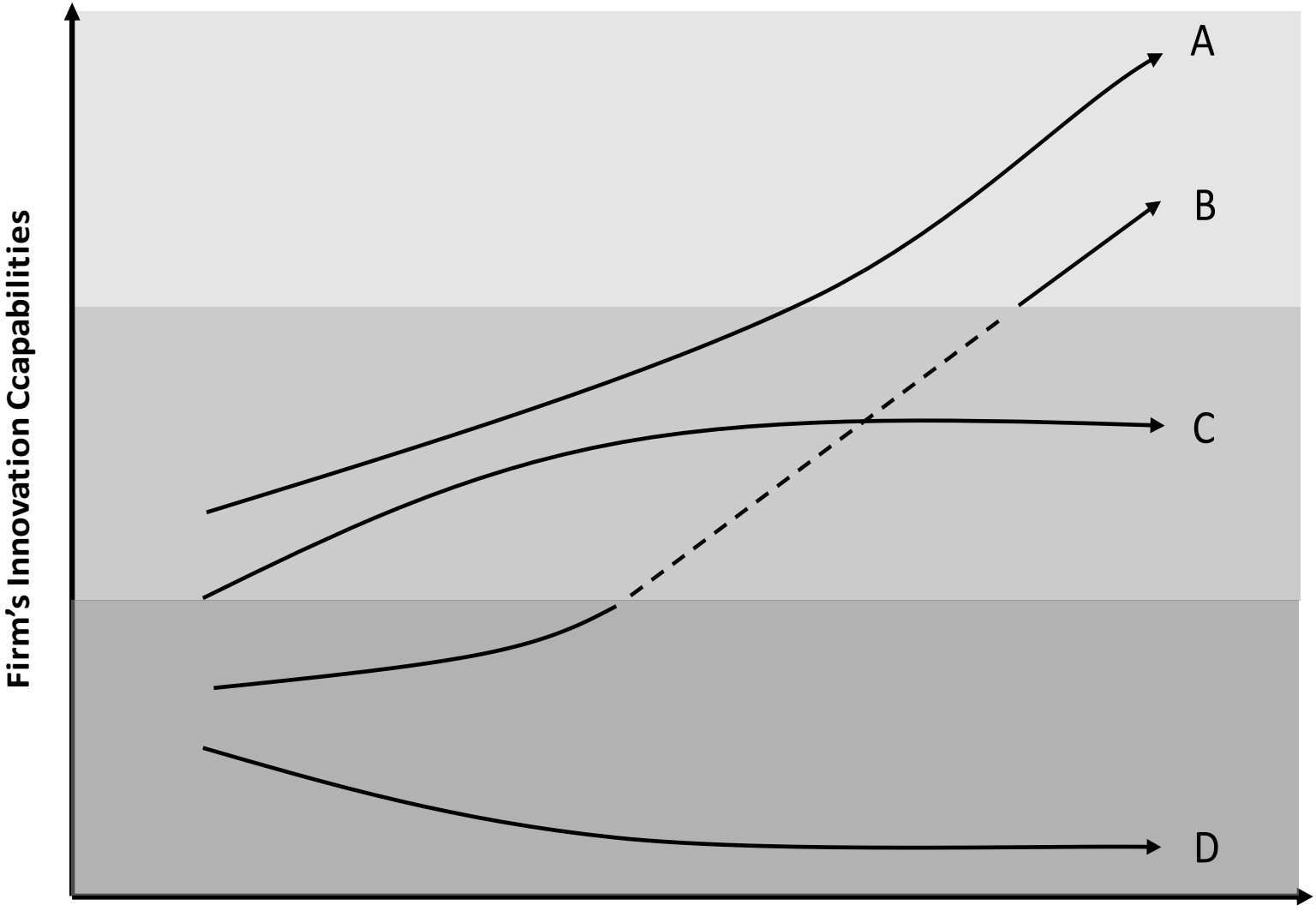
Illustrative Trajectories of Innovation Capabilities Development – as a result of the interactions between GVCs and IS

Gradual: Electronics, auto, space in India and China, salmon in Chile		▪ Firm capabilities gradually and cumulatively strengthened ▪ IS sufficiently strong and strengthened by GVC ▪ GVC strengthened with more rewarding and learning-intensive roles
In-out-In: South Korea and Brazil examples Bangalore, India (*strong time-bound bias towards <u>one</u> source of learning*)		▪ Firm capabilities strengthened in jumps; GVC & IS as alternate sources of knowledge and capabilities ▪ IS sufficiently strong to support GVC development ▪ GVC fail to provide learning opportunities; ▪ Interrupted value chain development; sequencing of local and global value chains (re-entering from a stronger position)
Aborted: Aquaculture chains in Bangladesh		▪ Firm capabilities unchanged/developed marginally (stuck) ▪ IS fragmented and unable to support GVC; ▪ Limited absorptive capacity ▪ GVC participation stagnant; limited learning
Retrograding: Cassava in Thailand, timber in Gabon		▪ Firms' capabilities weakened. ▪ Very weak IS unable to support GVC development ▪ Negative influence of lead firms in GVCs ▪ Influence of China's entry, product downgrading

GVCs and Innovation Systems coevolve

(from Lema, Rabellotti, Pietrobelli, 2019)

Possible Trajectories of firms' innovation capabilities



Main Takeaways – and research avenues

1. **GVCs – and their evolution - differ across countries and sectors**. They may be decreasing, but they are still a dominant feature of the international economy.
2. **Traces of coevolution between GVCs and ISs**
3. Evidence differs for **different sectors**
4. **Policies** need to be reconsidered in light of GVCs

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Thank you!

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