

Input-output approaches to analyzing trade linkages of Latin America: Links to public policy

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Objectives and outline

- **International linkages:** Preview the current analytical work on multiregional input-output tables to quantify international production sharing
 - [1] Show preliminary results replicated for Asia & the Pacific's trading patterns in global production networks
 - [2] Decompose Brazil's value-added trading patterns with East Asia & the Pacific to gain insights on the evolving trading relations
- **Internal linkages:** Show results from the input-output analysis of seven (7) Latin American economies using 2010 and 2015 tables.
 - [3] Identify key trends and patterns from the **multiplier** analysis using different policy variables
 - [4] Quantify important **linkages** of sectors to map out the roles they play in each economy
 - [5] Analyze **structural changes** in LAC economies between 2010 and 2015 to understand underlying factors driving economic growth

Part I. Introduction to the GVC analytical database

Trade is increasingly flowing through global value chains, creating measurement challenges due to globalization and technological advances. Accounting for global value chains therefore becomes important for capturing the gains and managing risks.

What's out there at the moment?

International / Intercountry Input-Output Tables

Database	Number of countries	Number of products and industries	Years
AIOT (IDE-JETRO)	10 (8 for 1975 table)	75 products (56 for 1975 table, 77 for 1985 table)	1975, 195, 1990, 1995, 2000, 2005
EORA MRIO	187 countries	Varying across countries; simplified version with 26 industries	1990-2013
EXIOBASE Versions 2 and 3 are more enhanced	43 countries; 5 world regions	220 products; 163 industries	2000, 2007
FIGARO	28 EU countries; USA; Rest of the World	64 industries; 64 products	2010; 2010-2017 in progress
Global MRIO LAB	220 countries	Flexible choice: 6357 products, industry root classification	1990-2015 (preliminary data)
GTAP-MRIO	140 GTAP regions	57 GTAP commodities	2004, 2007, 2011
OECD-ICIO	64 (including Rest of the World)	34 industries; 34 products	1995-2011 (ISIC 3; nowcasted 2012-2014); 2005-2011 (ISIC 4)
WIOD (2013 and 2016 release versions)	43 (including Rest of the World)	64 products; 56 industries	2000-2014
ADB MRIO	63 (including Rest of the World)	Varying SUT dimensions; harmonized to 35 industries	2000; 2007-2017 (2018 update on-going)

Source: UN Handbook on Supply Use Tables and Input-Output Tables

What do we know so far?

Data helps us contextualize global value chains.

Size

Speed

Orientation

Shape

Length

Breadth

Depth

Position

Size: How important are GVCs?

Size

Speed

Orientation

Shape

Length

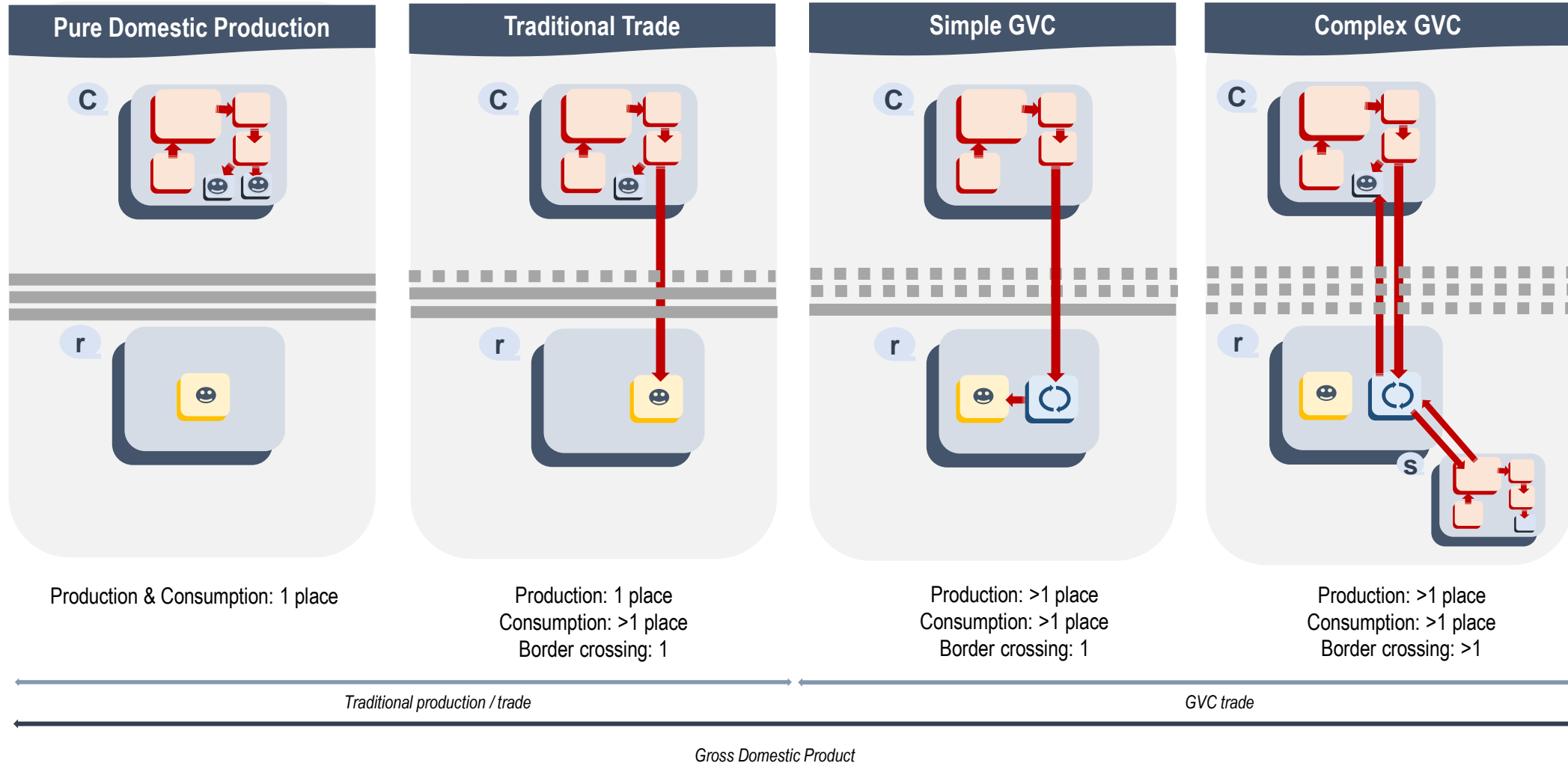
Breadth

Depth

Position

Size: How important are GVCs?

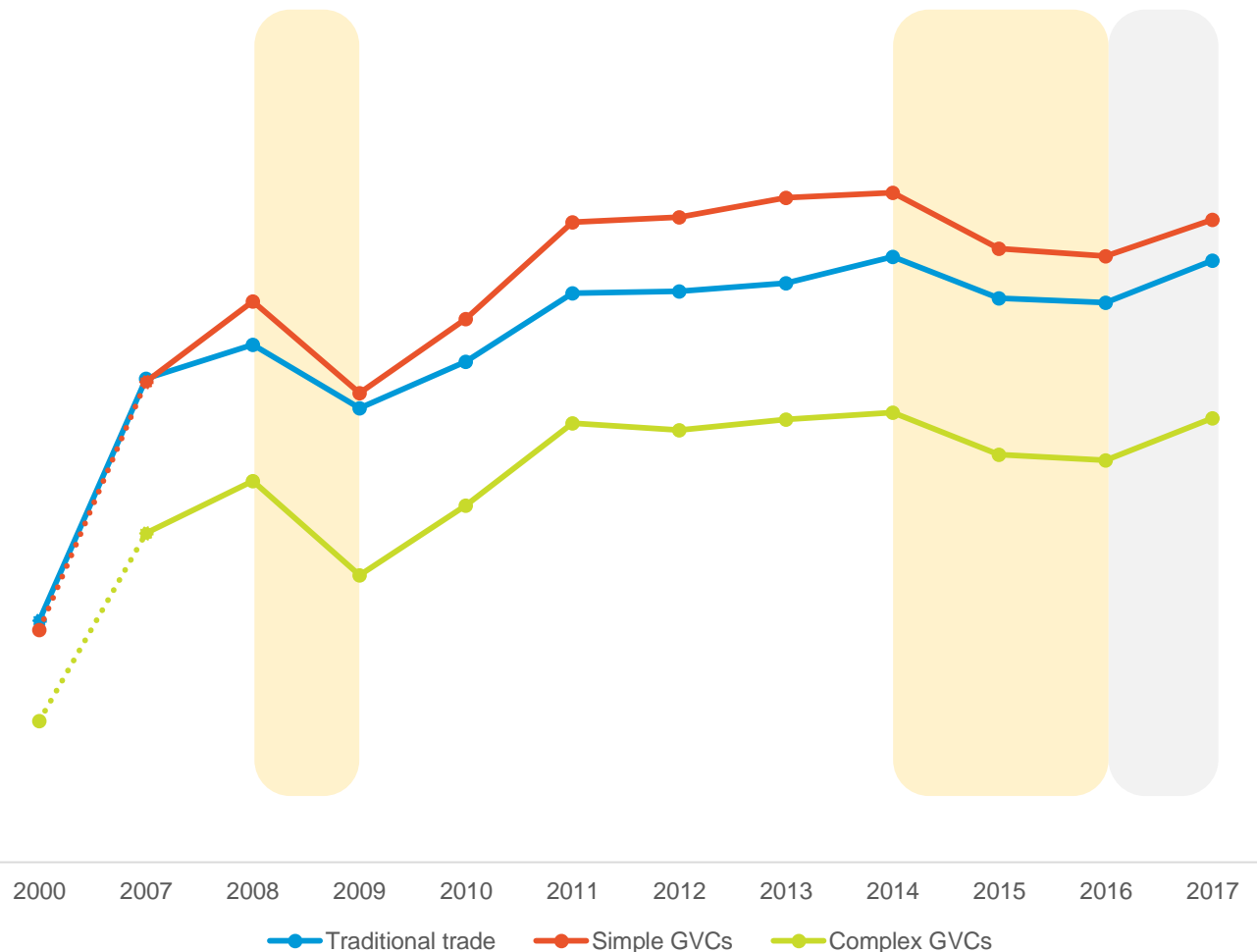
Decomposition of GDP by industry into four (4) types based on nature of cross-border production-sharing activities (Wang, Wei & Zhu 2017)



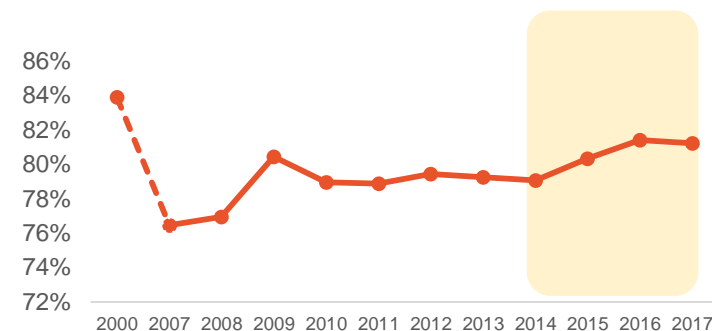
Size: How much GVC activity is happening?

Global value chains are being reshaped as domestic consumption in emerging market economies increase, domestic supply chains take inroads, and trade in services become more predominant in global trade.

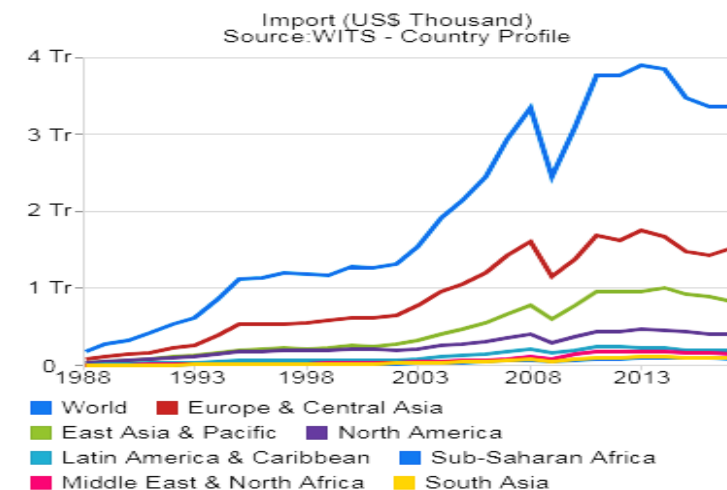
Trade components in global production (US\$ mln)



East Asia & Pacific domestic production as % of total

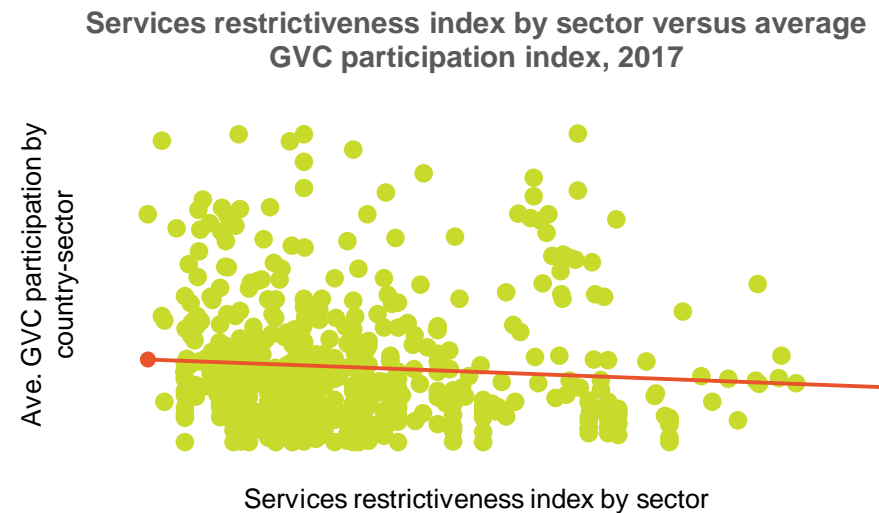
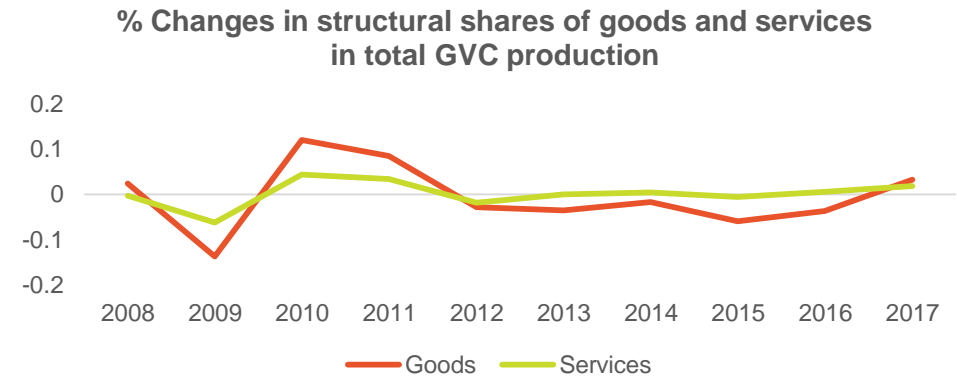
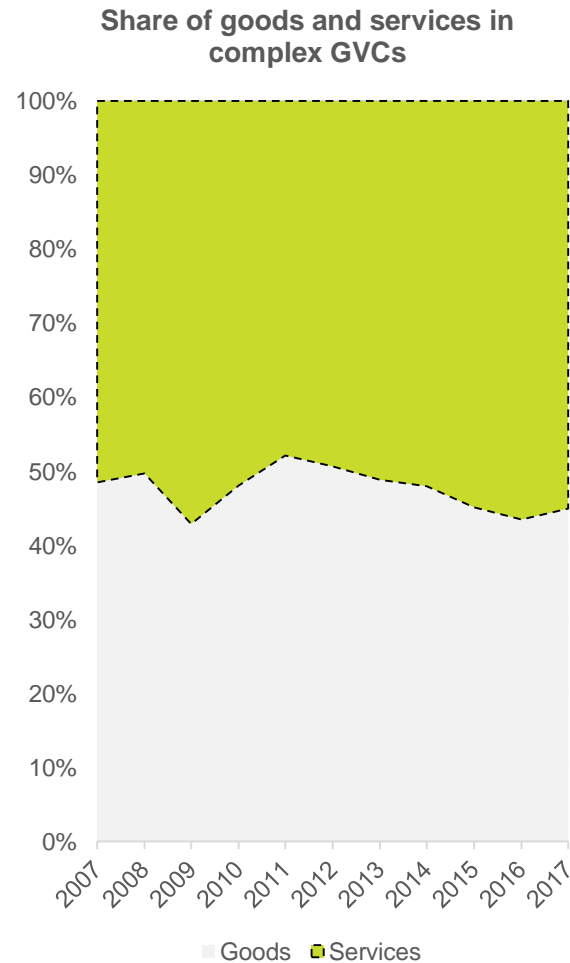
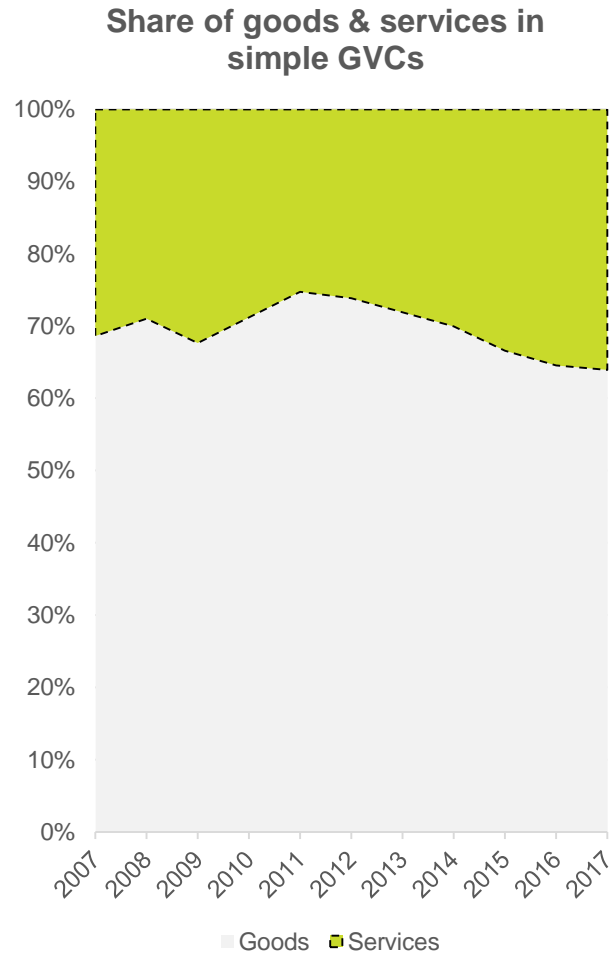


Trade in intermediate goods has slowed down in recent years.



Size: How much GVC activity is happening?

As services component in complex GVCs grow more significant, trade openness policies lean more towards the intangibles and skills development.



Speed: Are GVCs slowing down?

Size

Speed

Orientation

Shape

Length

Breadth

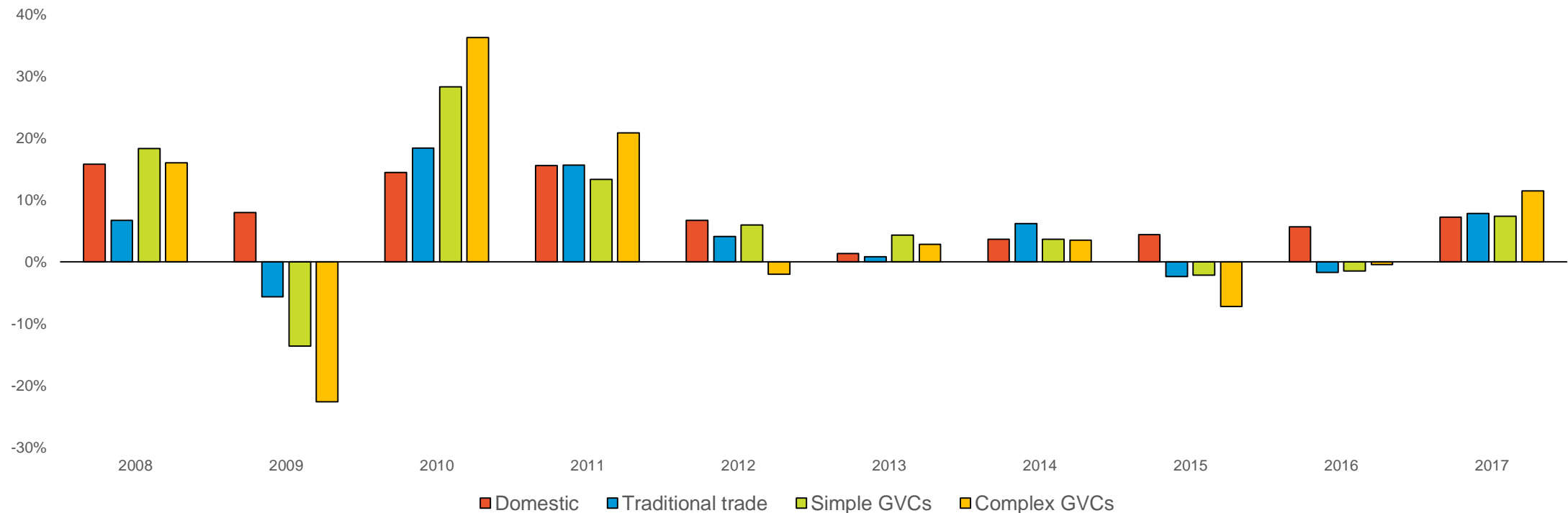
Depth

Position

Speed: The many “phases” of complex GVCs

Weak phases of GVC growth seen in recent years. Whether this is cyclical or structural is still open to debate.

Growth rates (%) of production components in East Asia and the Pacific

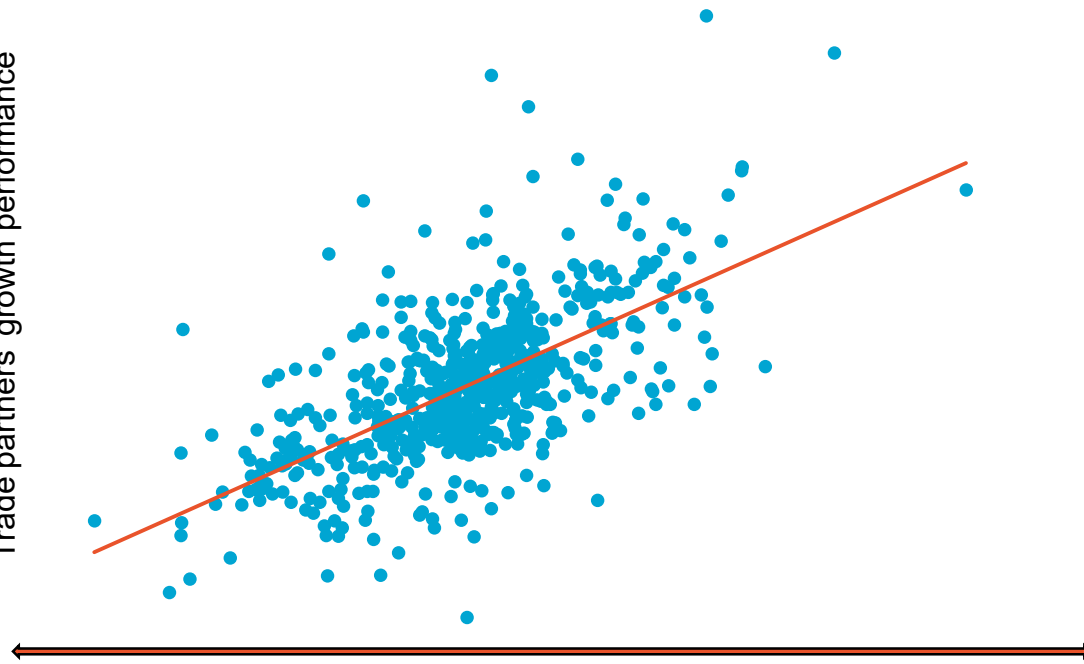


Speed: The many “phases” of complex GVCs

East Asia and the Pacific’s domestic value added contribution to exports is correlated with trading partner’s growth trajectory. Higher correlation with FVA indicate a more downstream position for East Asia and the Pacific economies.

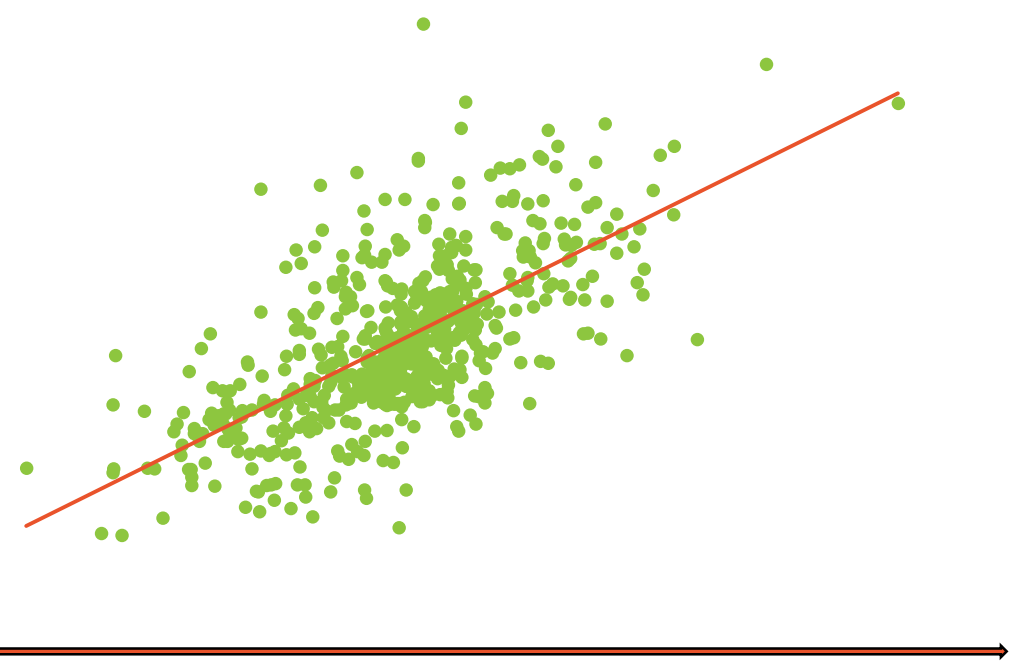
As against exports of domestic value added (DVA)

Trade partners' growth performance



$R^2 = .39$

As against foreign value added content in exports (FVA)



$R^2 = .43$

Orientation: Shifting roles in GVCs?

Size

Speed

Orientation

Shape

Length

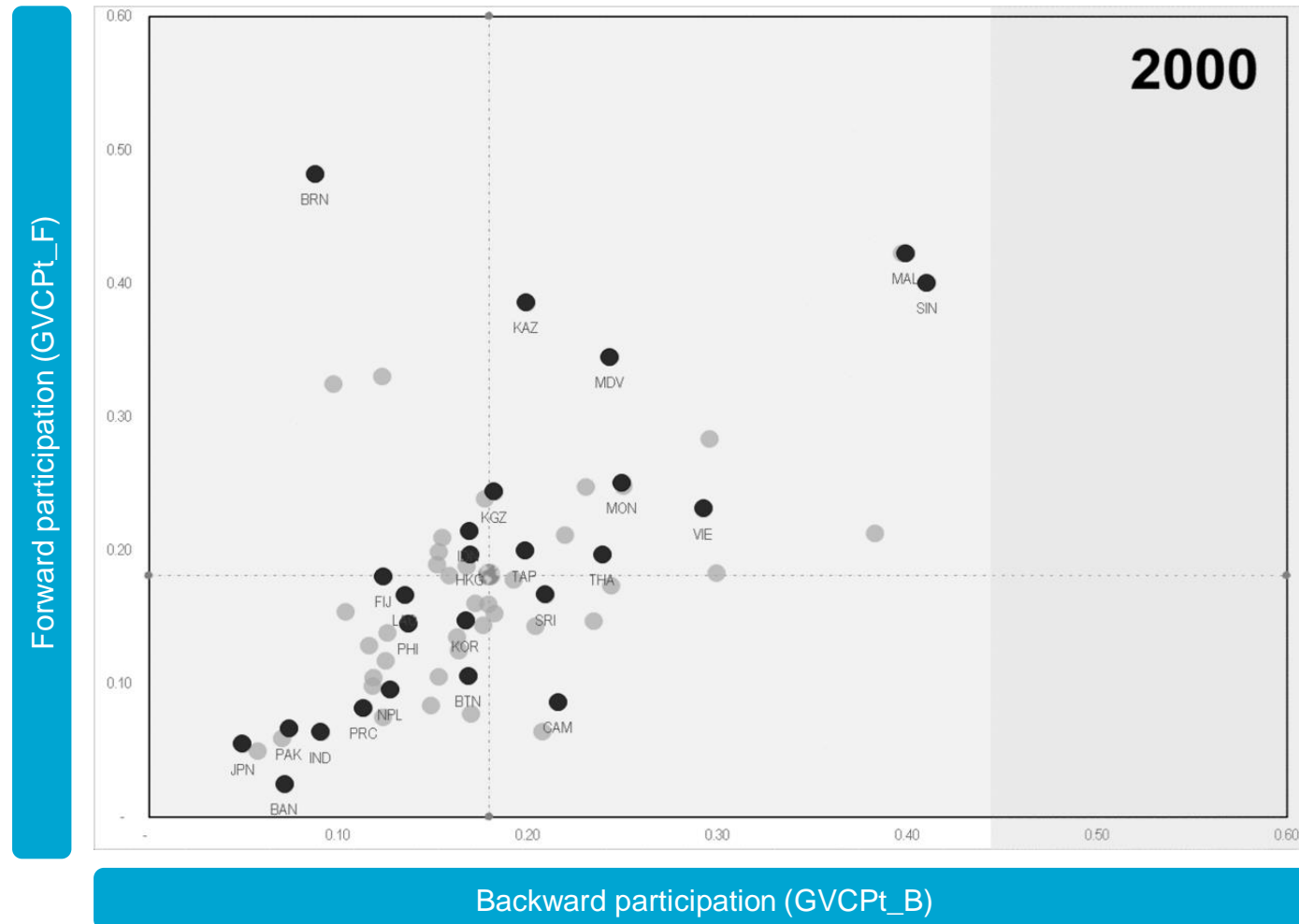
Breadth

Depth

Position

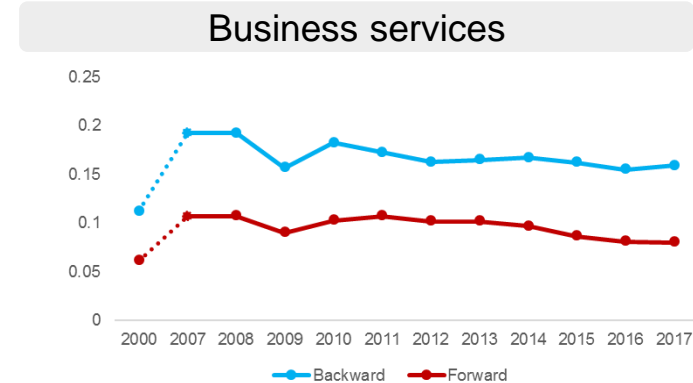
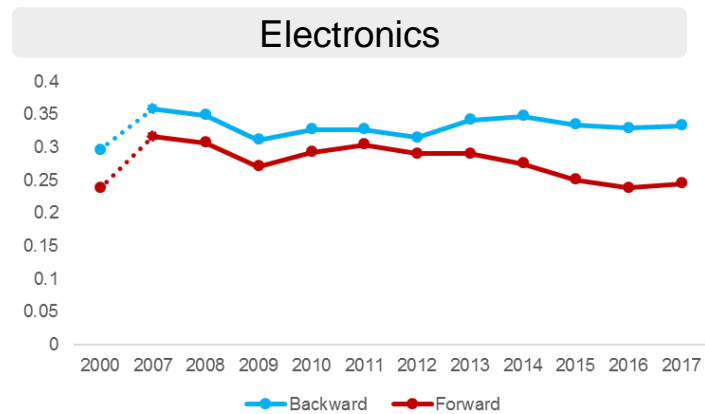
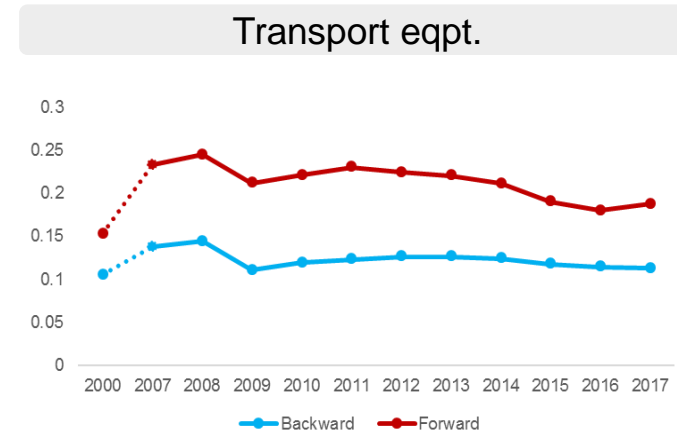
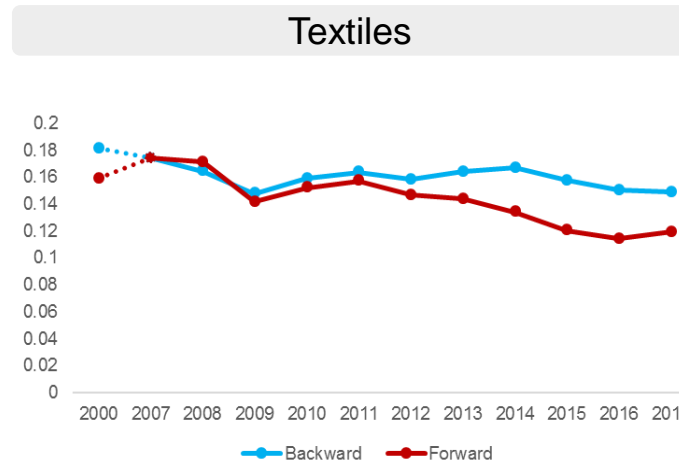
Orientation: Shifting roles in GVCs?

Supply-use relations embedded in IOTs are mostly known for exposing an industry's orientation in production chains.



Orientation: Shifting roles in GVCs?

Graphs show % of value added attributed to simple and complex GVCs by sector in East Asia & Pacific



Shape: Relational dimension of GVCs

Size

Speed

Orientation

Shape

Length

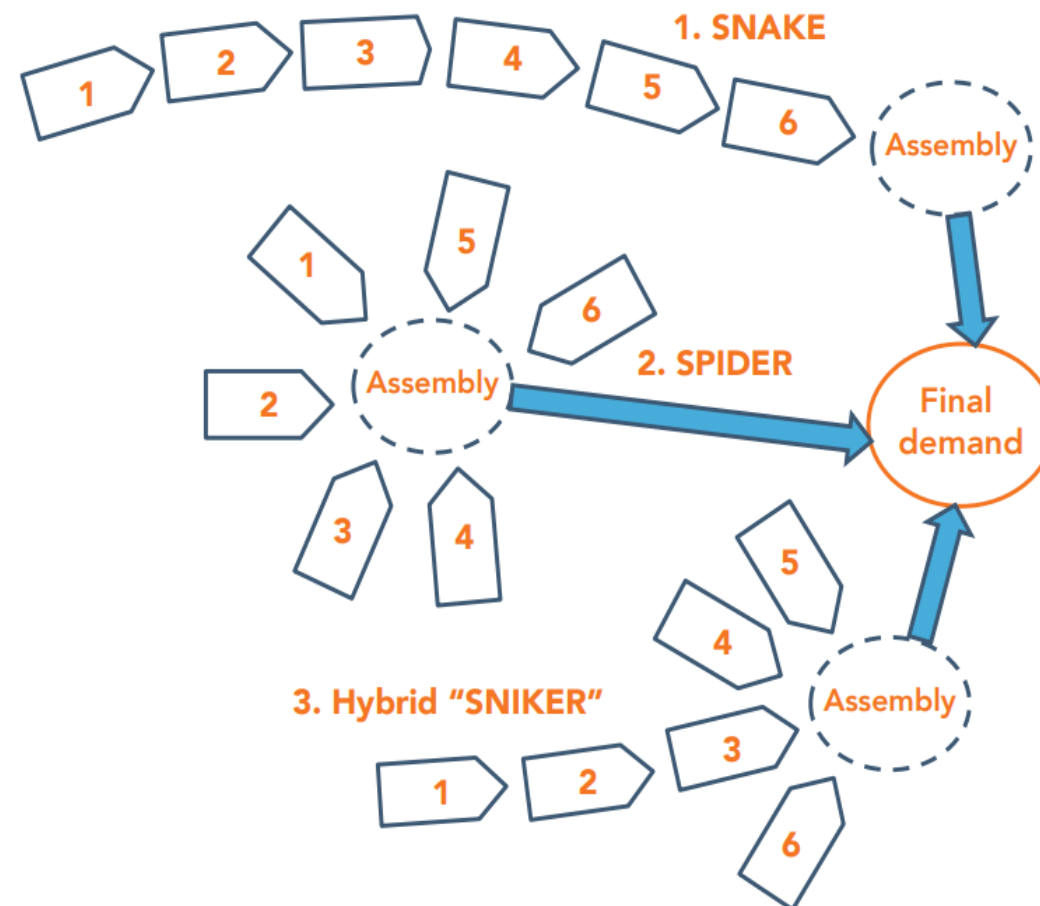
Breadth

Depth

Position

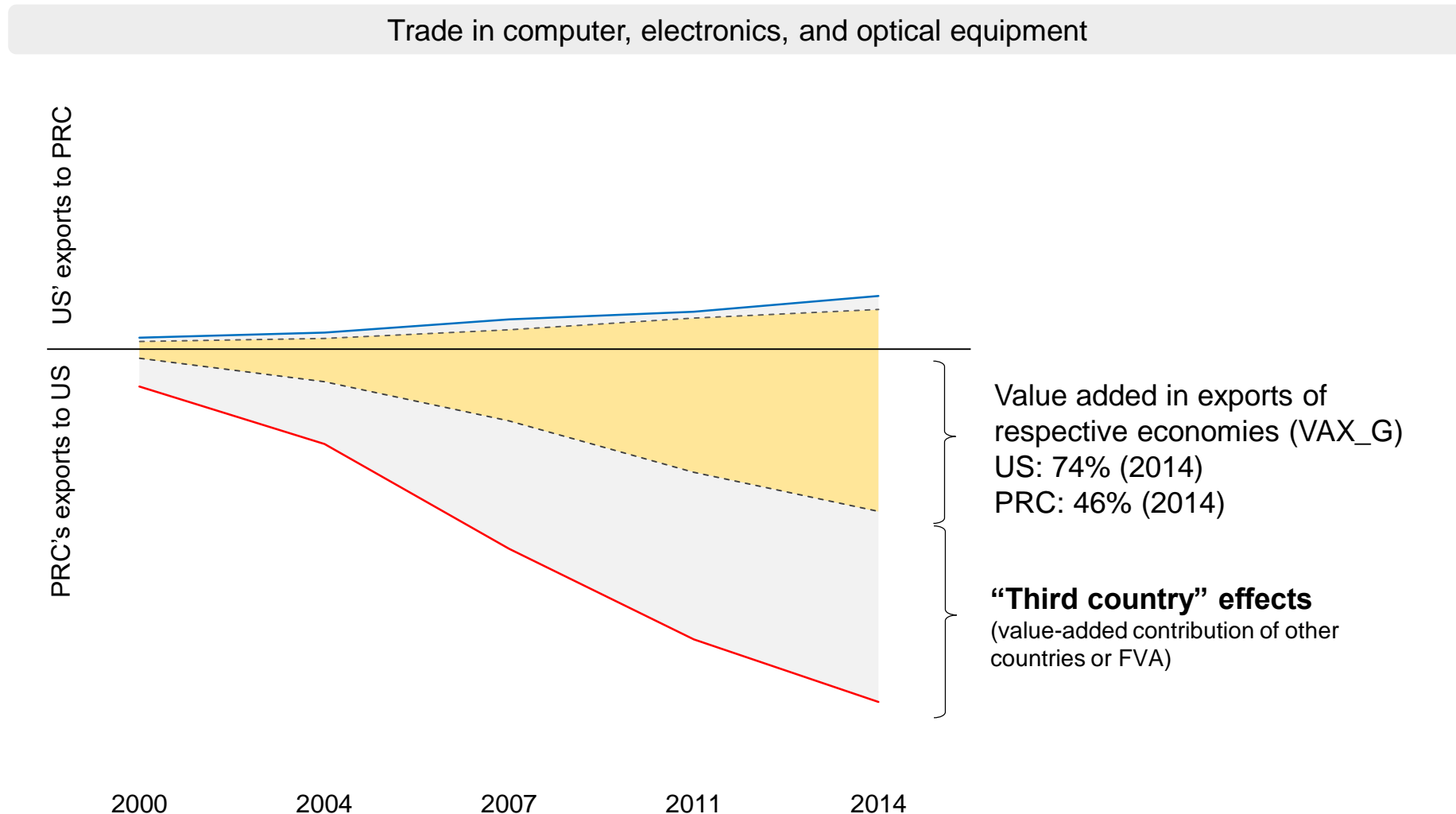
Shape: Relational dimension of GVCs

The global value chain zoo: spiders, snakes, and hybrid “snikers”: Diakantoni and others 2017, based on Baldwin and Venables 2010 explain how trade costs could accumulation at each succession in the supply chain.



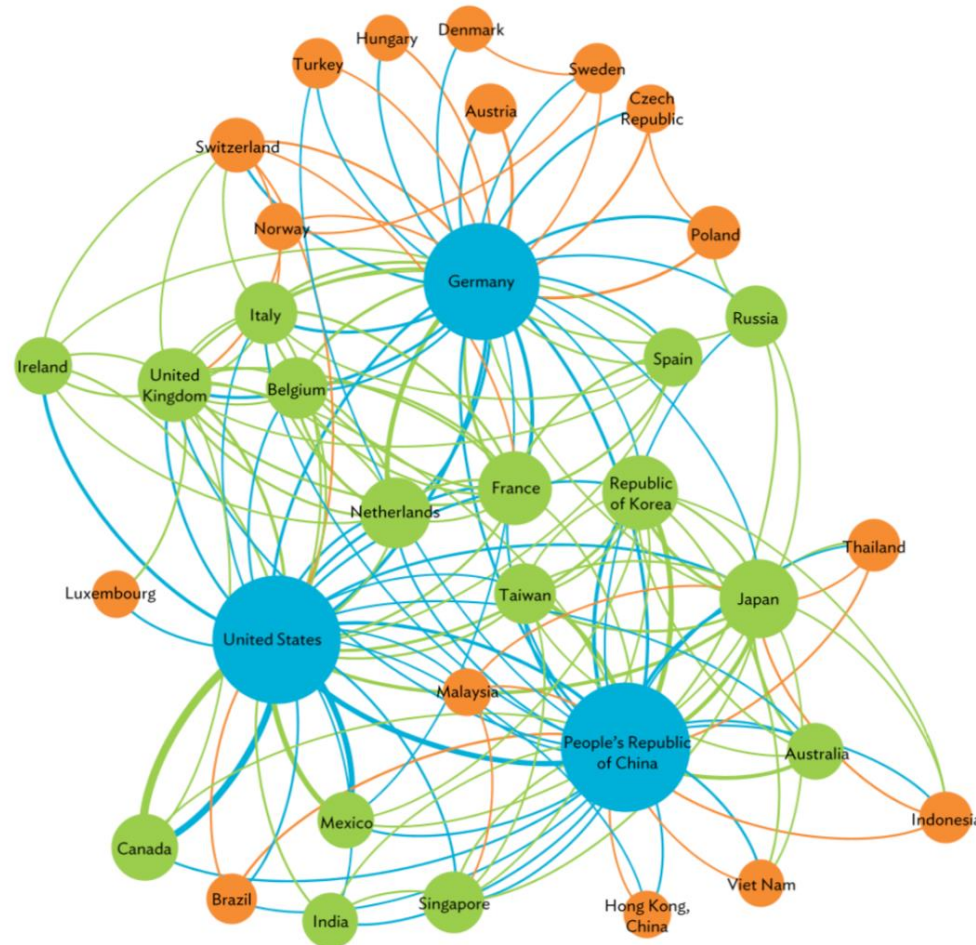
Shape: Relational dimension of GVCs

Bilateral perspective: US-PRC's trade balance in the context of GVC



Shape: Relational dimension of GVCs

Geography of supply chains. While the image of a chain implicitly projects a succession of sequential steps, most supply chains are not linear but are defined by a hub and spoke pattern.



Length: Are GVCs getting longer?

Size

Speed

Orientation

Shape

Length

Breadth

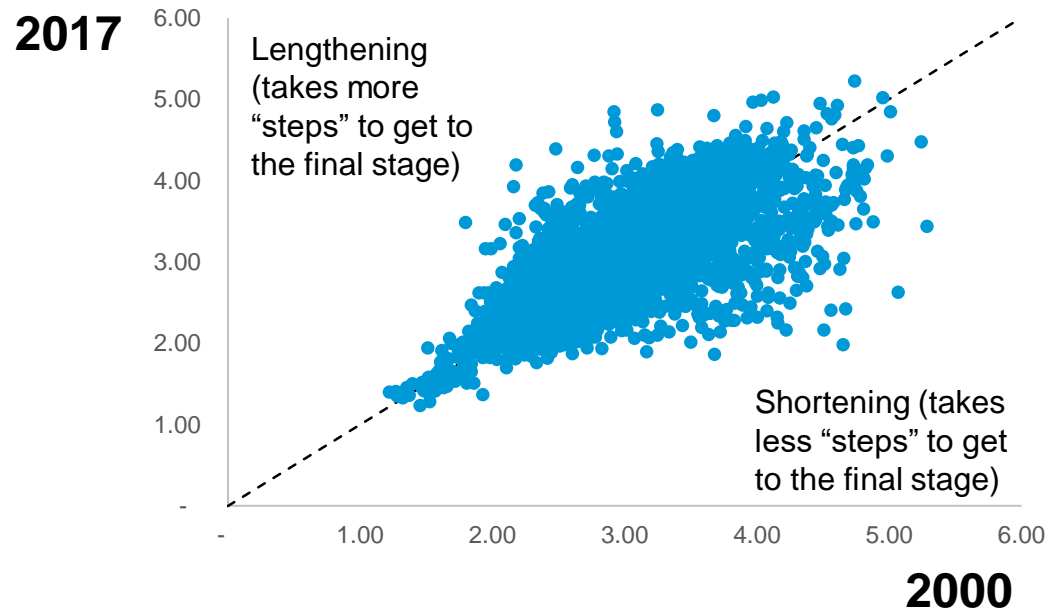
Depth

Position

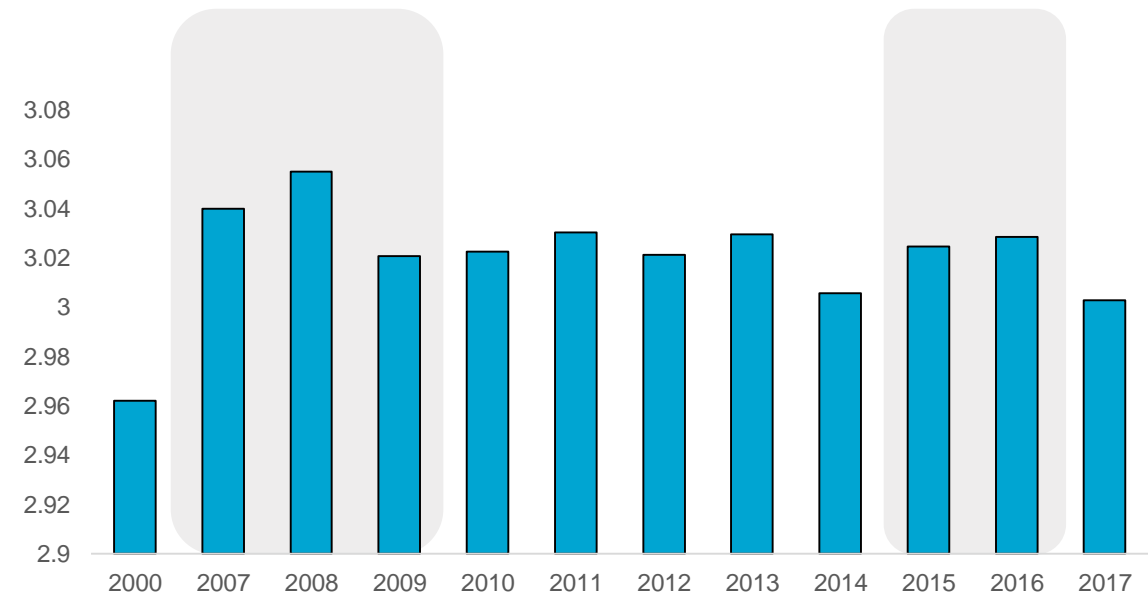
Length: Are GVCs getting longer?

- APLs: Indication of economic “distance” between two economies
- Longer chains compound transmission shocks, which could partly explain why complex GVCs are more affected than traditional trade activities during periods of slowdown. In addition, length could also relate to a country’s exposure to a demand shock.
- Why are GVCs getting longer in “crisis” periods?

Comparison of bilateral APL indices (2000 vs 2017)



Global APL from 2000 to 2017



Breadth: Are GVCs reaching far enough?

Size

Speed

Orientation

Shape

Length

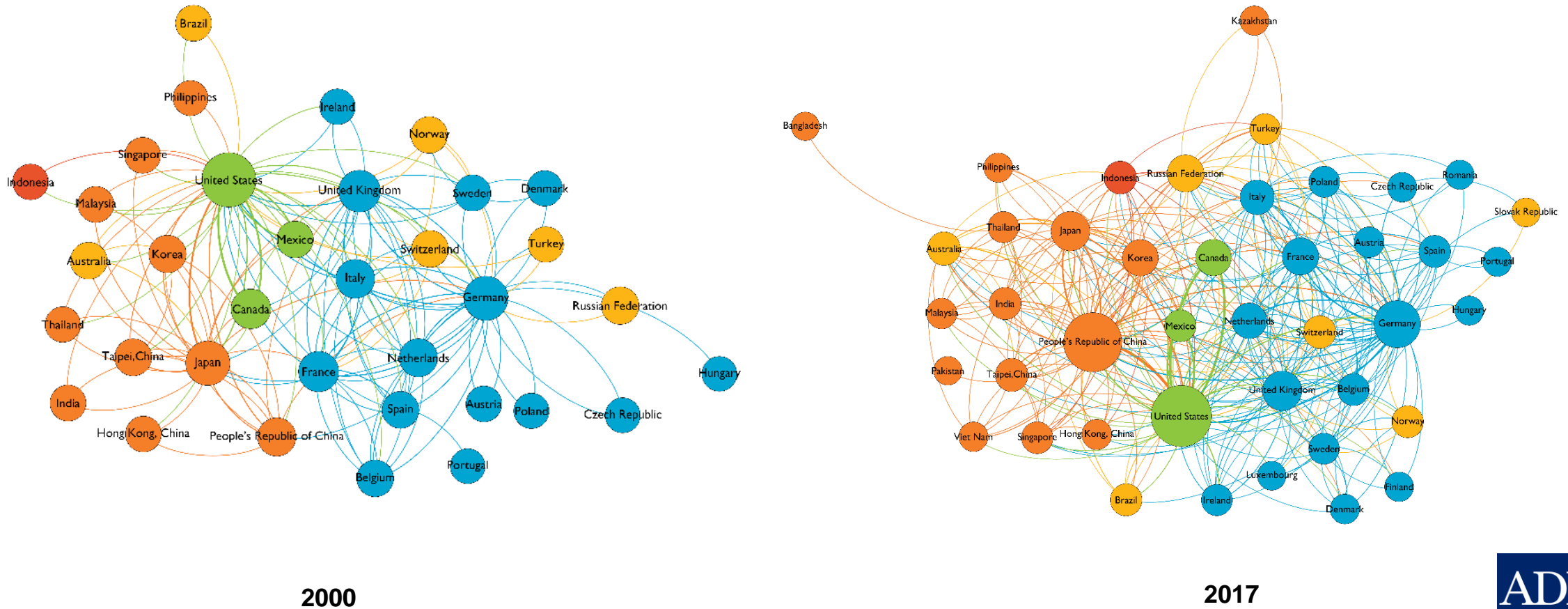
Breadth

Depth

Position

Breadth: Are GVCs reaching far enough?

Country perspective: Indonesia's expanding role in value added trade (2000 versus 2017)

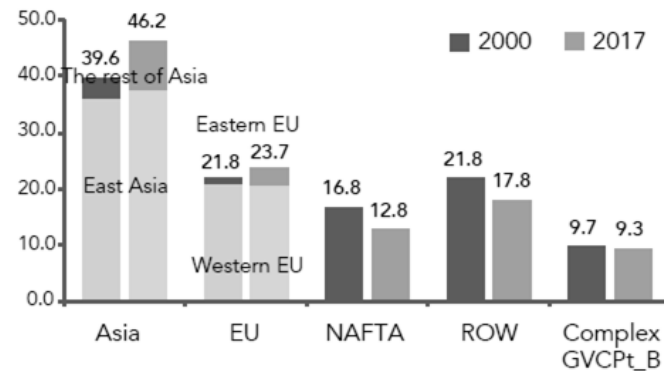


Breadth: Are GVCs reaching far enough?

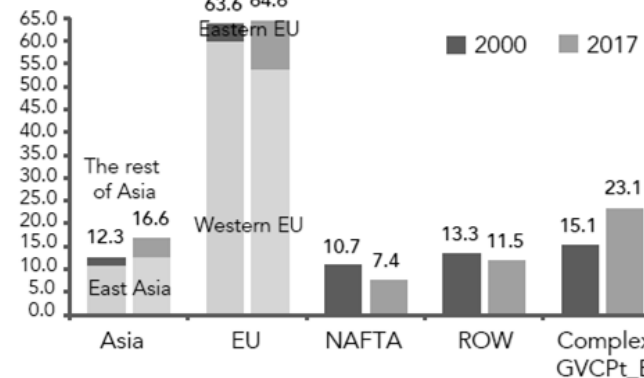
Rise of Factory Asia. Data shows the higher the degree of economic integration in regional production networks, the higher the intra-regional GVC activities.

Shares of intra-and inter-regional GVC activities in manufacturing (%)

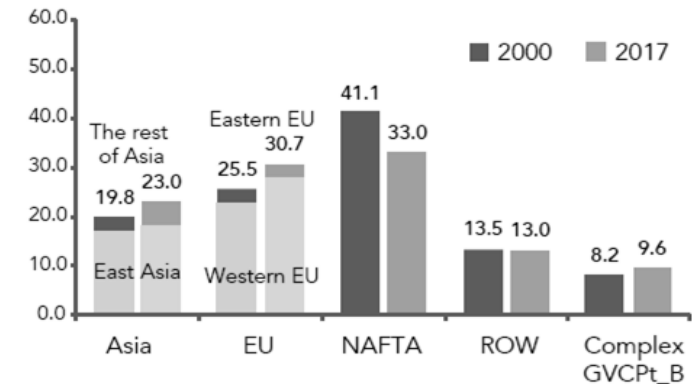
Factory Asia



Factory Europe



Factory NAFTA

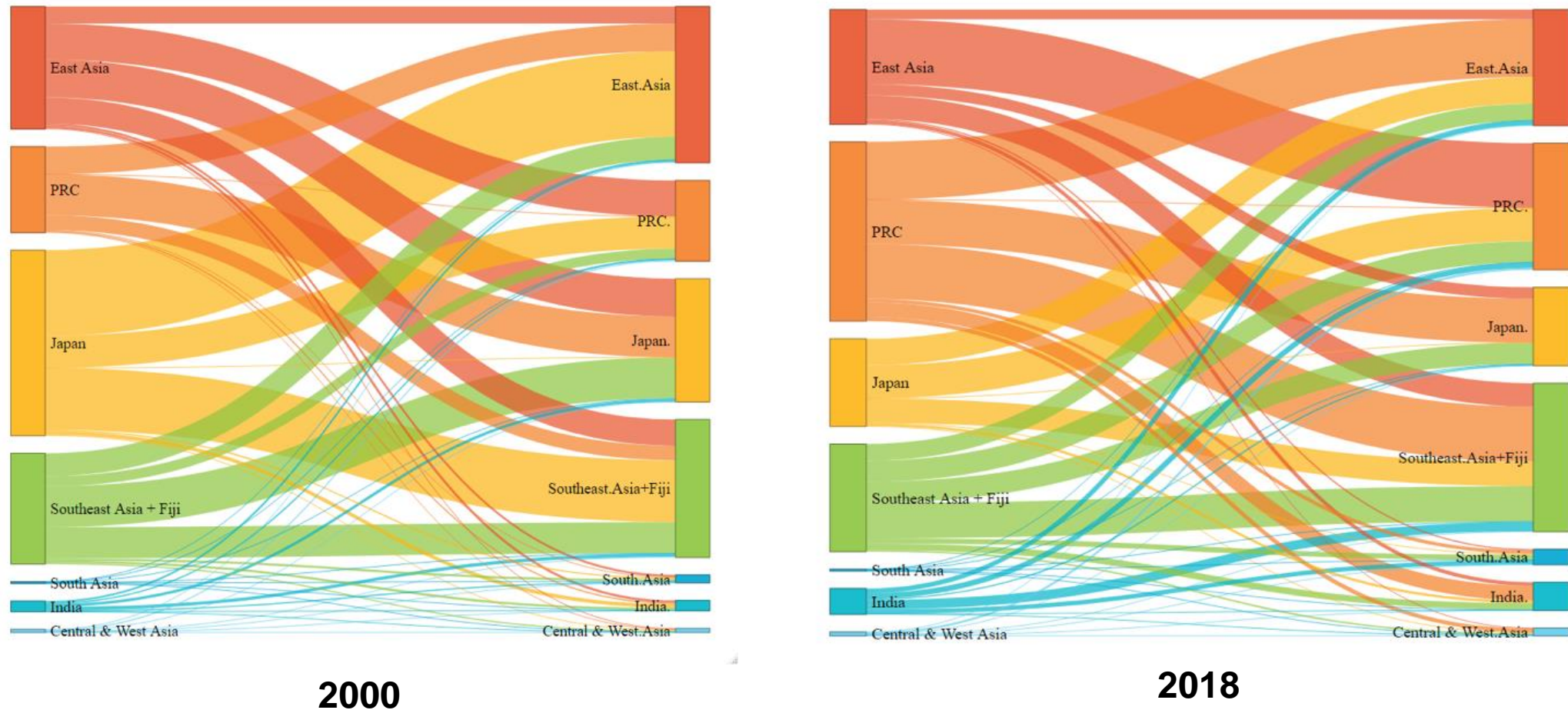


Source: GVC Development Report 2019

Breadth: Are GVCs reaching far enough?

Rise of Factory Asia. Data shows the higher the degree of economic integration in regional production networks, the higher the intra-regional GVC activities.

Flow of Domestic Value-Added (F) Generated in Asia's Exports Production that is Sent to Asia, All Sectors, 2000 vs. 2018



Depth: Intensity of global value chain trade

Size

Speed

Orientation

Shape

Length

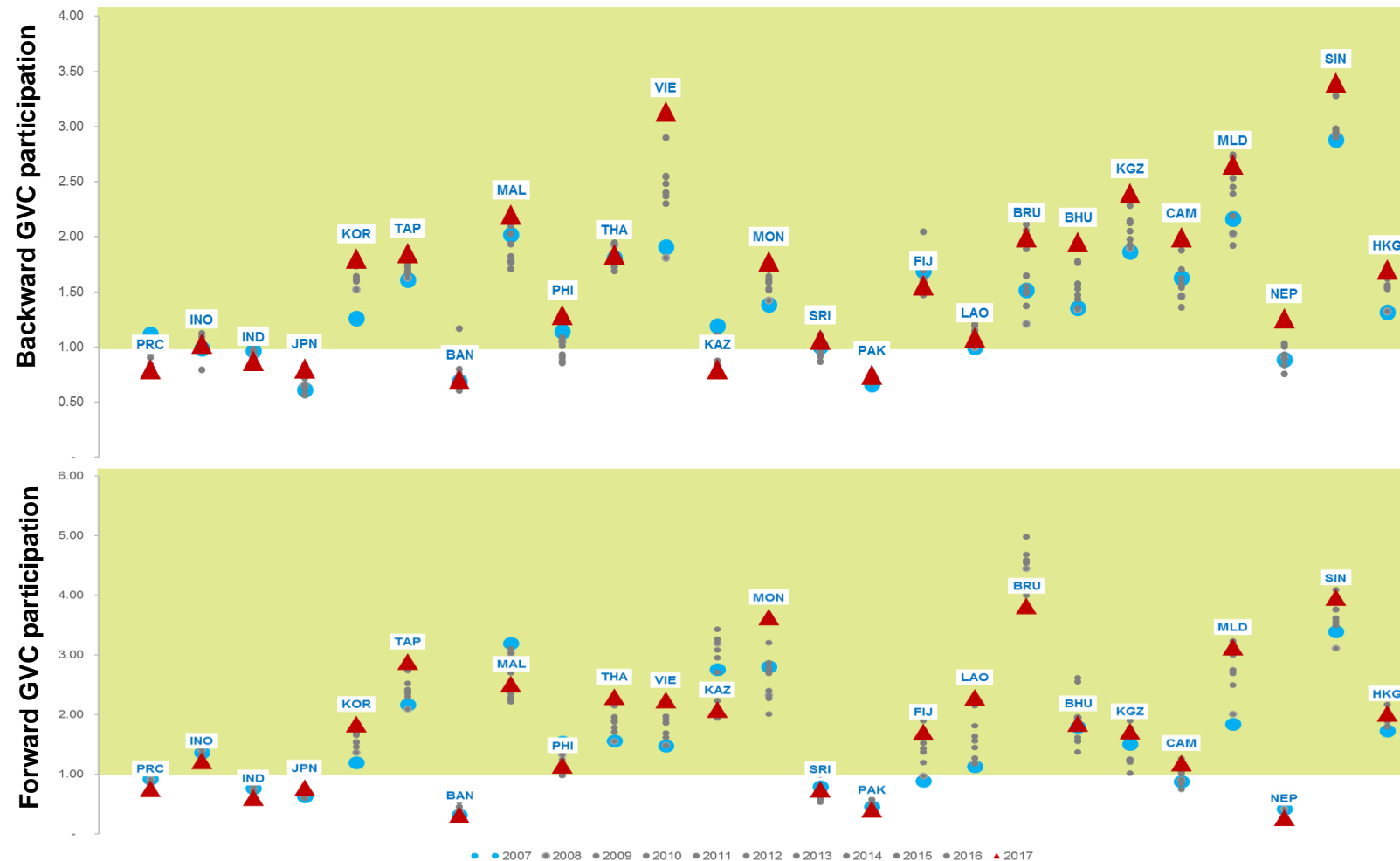
Breadth

Depth

Position

Depth: Intensity of global value chain trade

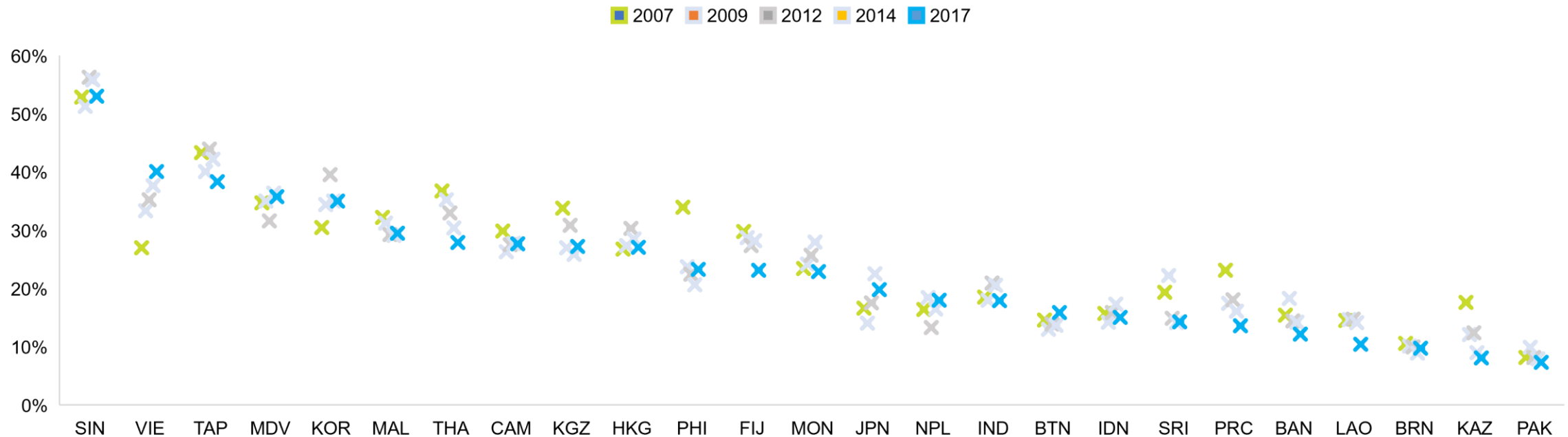
It is no surprise that GVC integration is becoming deeper for many developing economies and has matured in some. (Note: 1 represents the average participation for East Asia and the Pacific.)



Depth: Intensity of global value chain trade

Country-level comparison of VS as % share of gross exports

Indicates how dependent one country's exports are to value added inputs coming from different countries



Depth: Intensity of global value chain trade

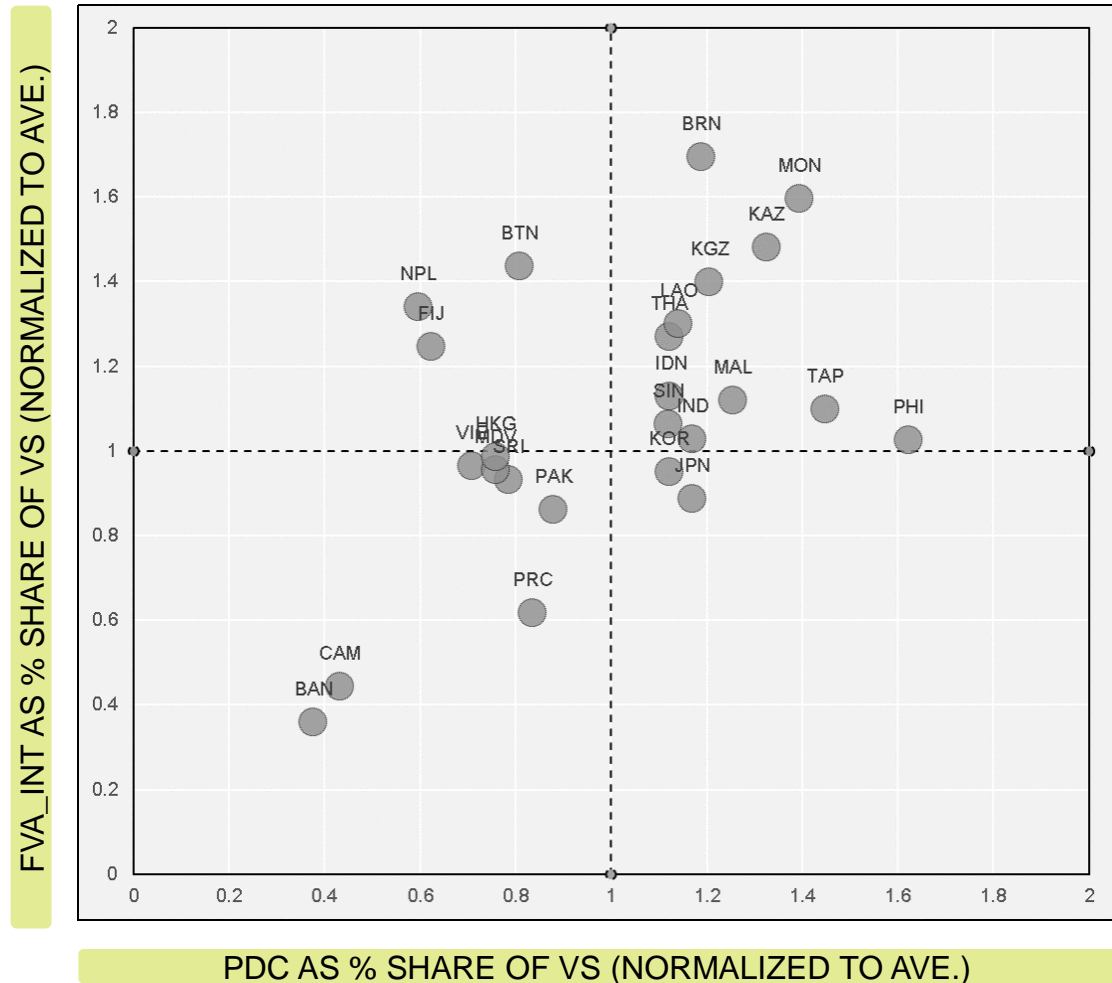
Deepening and lengthening of value chains from vertical specialization perspective, Asia, 2007-2017

Asia's regional value chains are evolving.

Cross-country comparisons reveal varied patterns.

PRC has grown in length and has become more involved in intermediate goods trade

While other resource-intensive economies, including small open economies have historically relied on foreign value added inputs.



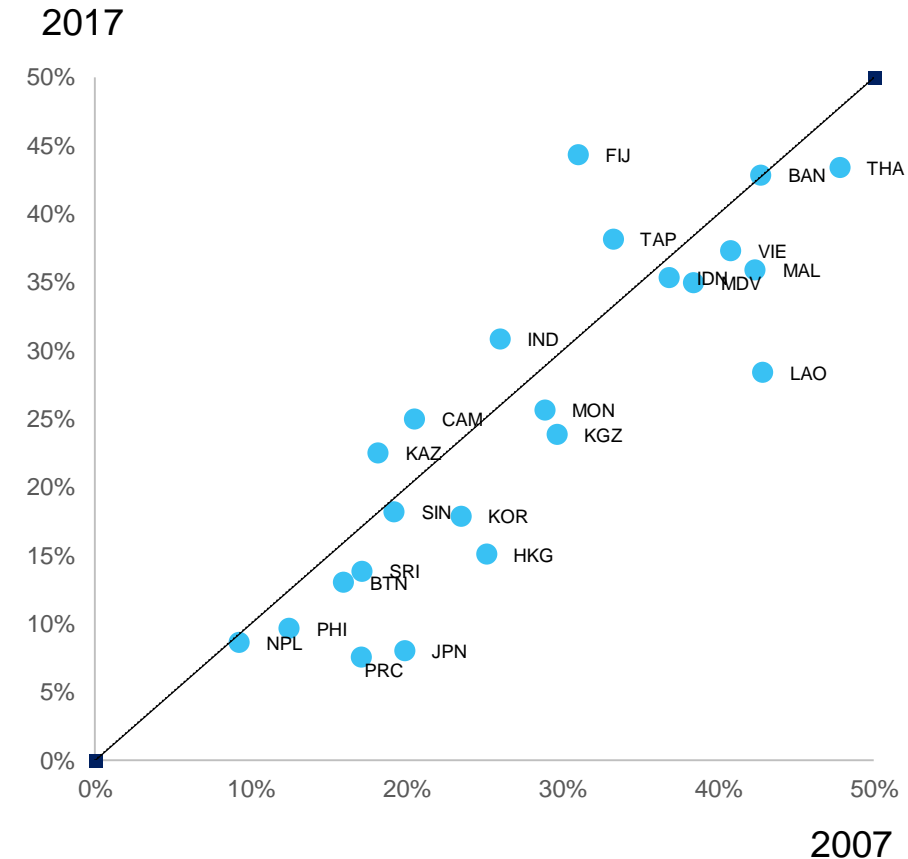
Depth: Intensity of global value chain trade

Vertical specialization performance of Asian economies: Case of Manufacturing

PRE-CRISIS



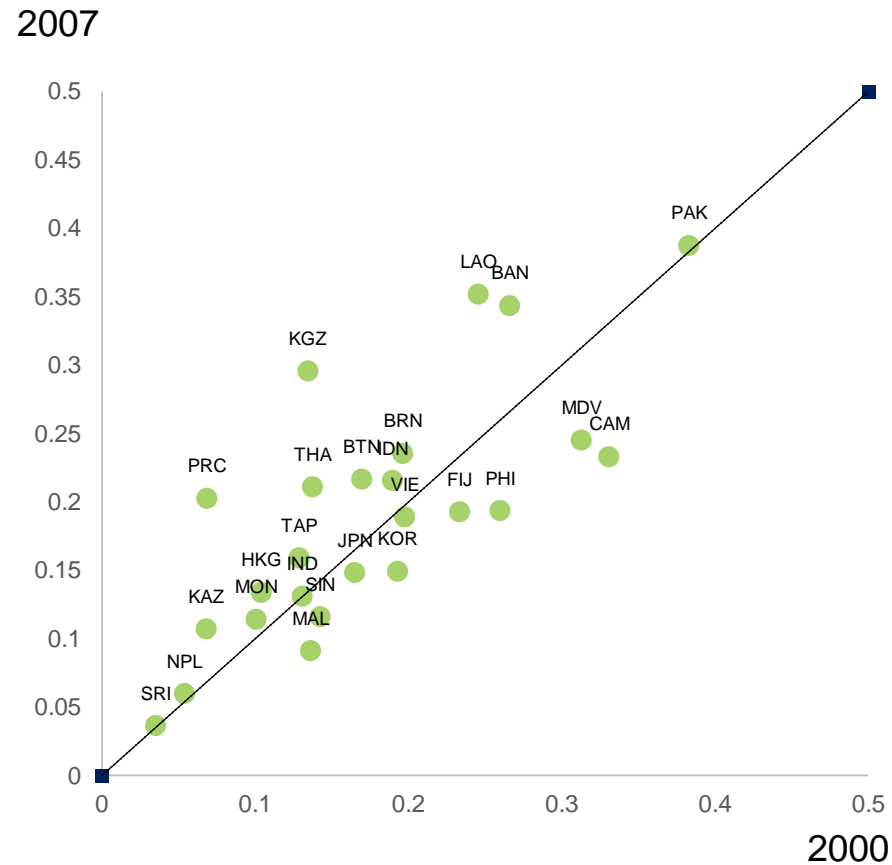
POST-CRISIS



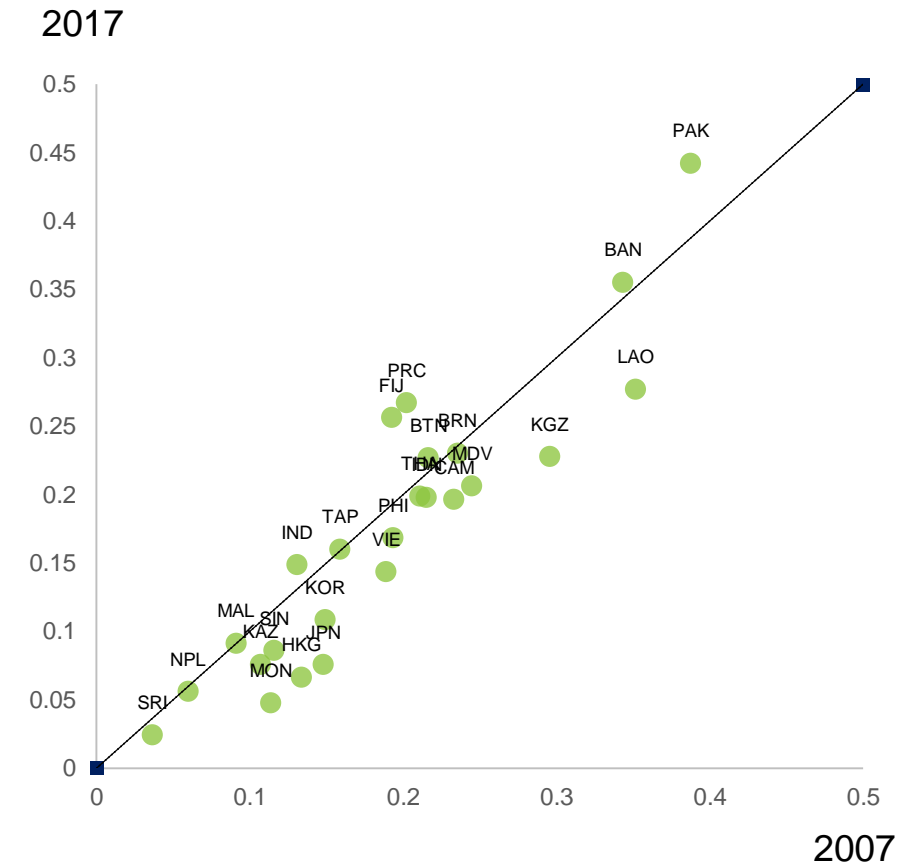
Depth: Intensity of global value chain trade

Vertical specialization performance of Asian economies: Case of Services

PRE-CRISIS

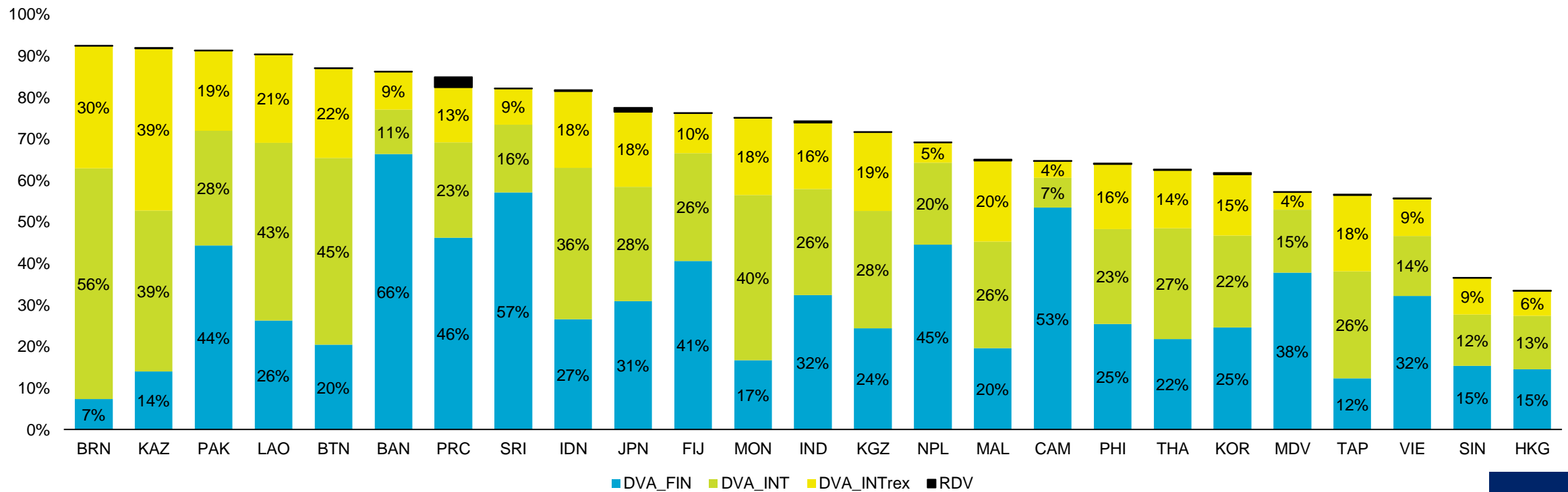


POST-CRISIS



Depth: Intensity of global value chain trade

% share of DVA_B in gross exports of manufacturing sectors, 2017



Position: Locating value in production stages

Size

Speed

Orientation

Shape

Length

Breadth

Depth

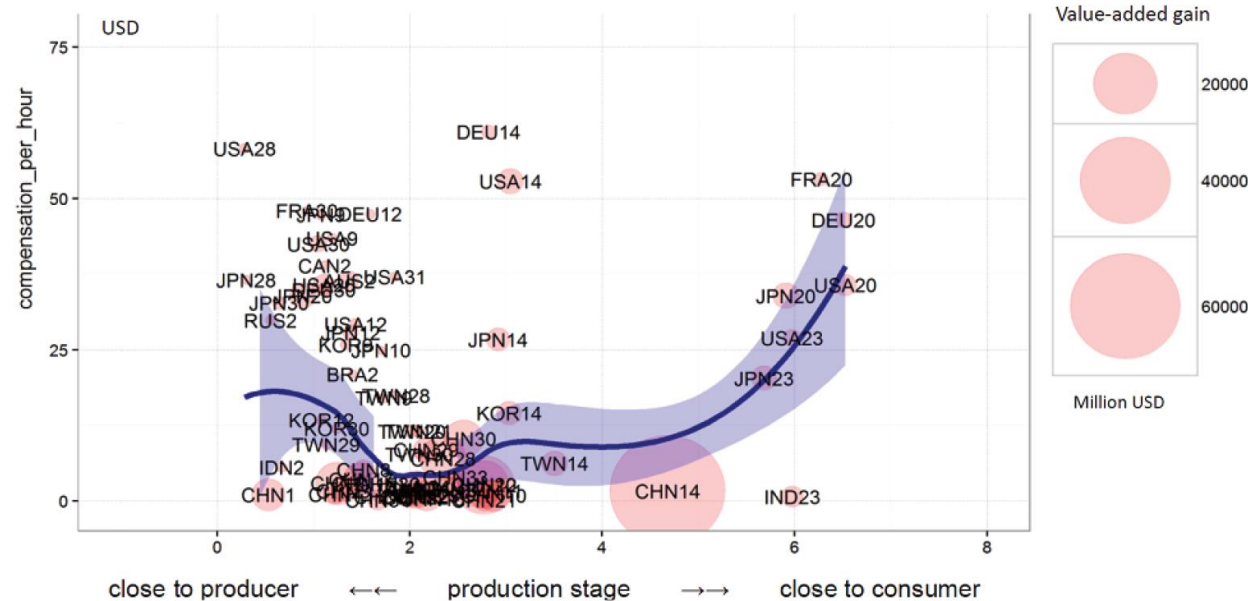
Position

Position: Locating value in production stages

Estimated smile curve for China's exports of electrical and optical equipment, 2009

For an inverted smile curve, consider value-added activities in the German auto industry, 2009

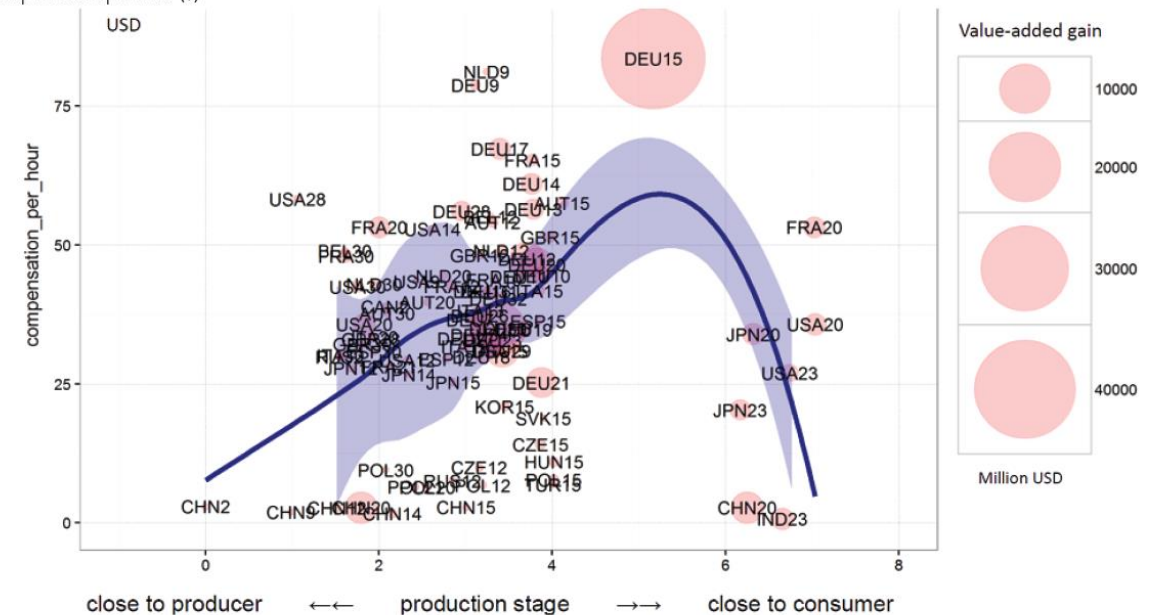
Compensation per hour (\$)



Source: Meng, Ye, and Wei 2017.

Source: GVC Development Report 2017

Compensation per hour (\$)

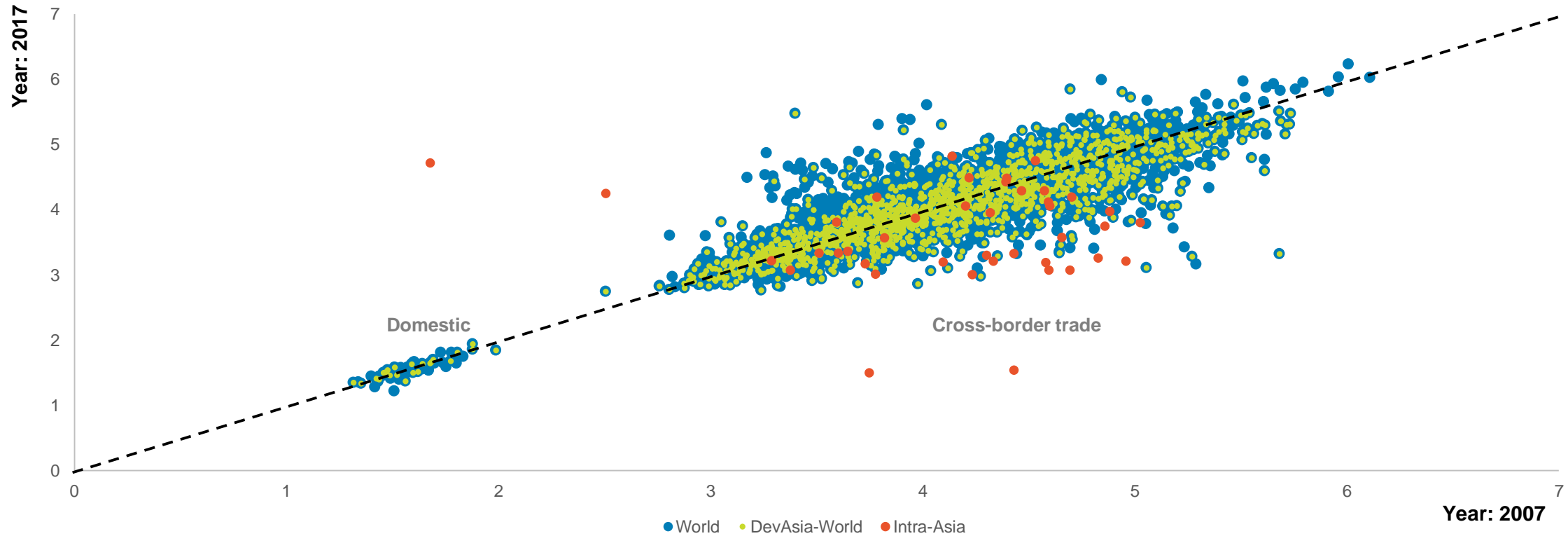


Source: Meng, Ye, and Wei 2017.

Position: Locating value in production stages

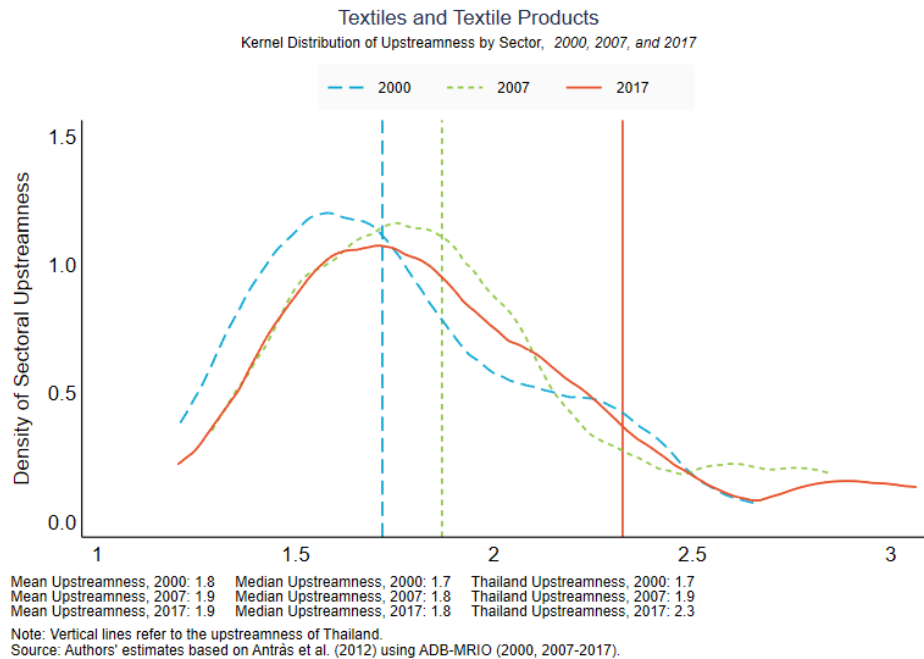
Average upstreamness indices are generally declining for Asia as it shifts to downstream segments of the value chain; Position is relative; a lot of heterogeneity is observed at the bilateral-sector levels

Upstreamness Index (2007 vs. 2017)

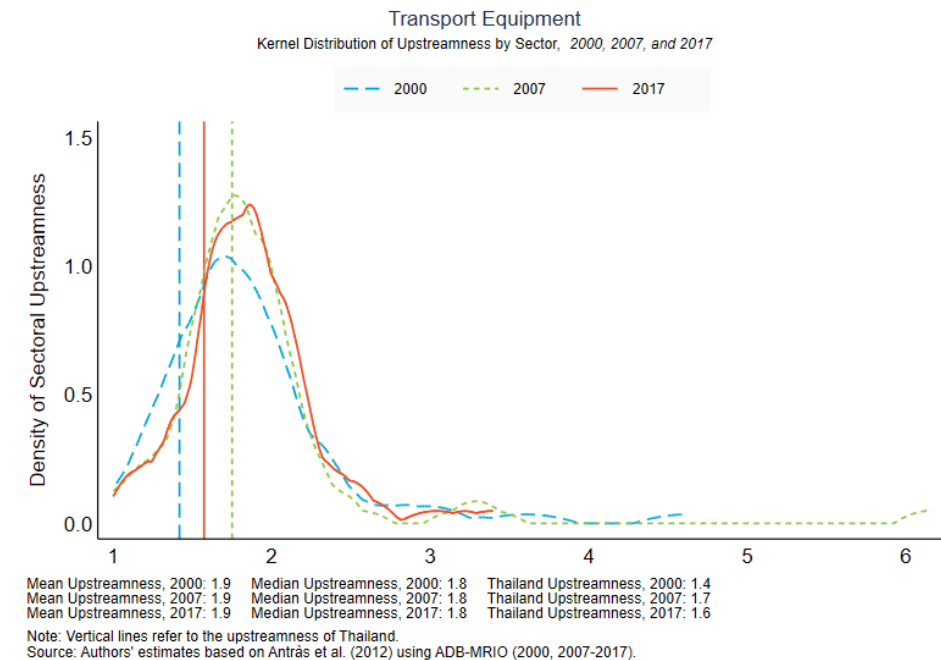


Position: Locating value in production stages

Thailand's Textile sector is relatively more downstream compared to average countries in those same sectors.



Thailand's transport equipment sector is relatively more upstream compared to the average country involved in that sector.



Salient observations from the analytical database

Size

Significant

Speed

Slower pace

Orientation

*Backward**

Shape

Hub & spokes

Length

*Shortening**

Breadth

Expanding

Depth

*Interrupted**

Position

*Downstream**

Salient observations from the analytical database

1. GVCs are a growing component of production
2. But could be slowing down as economic activities turn inward
3. GVCs are more regional than global. The presence of Factory Asia has grown with a backward-linkage orientation in the era of mass production.
4. GVCs became more networks than chains. Economies tapped into the trade potential by integrating themselves into GVC hubs
5. But signs point to shortening value chains as demand were “reshored”
6. Deepening value chains were interrupted as risks moved “offshore”

Some more observations from the analytical database

More “regional” than “global”

Presence of Factory Asia, Factory North America, & Factory Europe

More “networks” than “chains”

GVCs are less linear than “chains”; they often pertain to network of buyers, and suppliers managed by a lead firm (see Gereffi)

What you do matters more than what you sell

Trade in tasks versus trade in goods; Trade in *sources of comparative advantage*

Some “smiles” can “frown”

The “shape” of value chains differ from product to product (e.g. iPhones vs German automobiles)

Intangibles within tangibles

Services contribute significant value added to manufactured goods

“Import to Export”

Imports can be a source of competitiveness for exports; It is easier to join GVCs than build an entire chain on your own

Firms, not countries

D. Ricardo’s unit of analysis (countries) changed as GVCs denationalized comparative advantage

Low unit labor costs vs. low labor costs

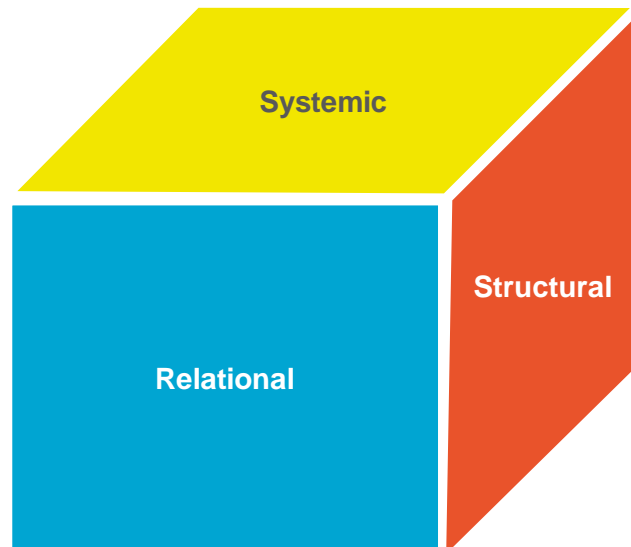
Countries with high labor productivity will have higher wages and still be low-cost producers

Risks too, not just opportunities

Spillovers/ feed through effects are amplified; these effects could either be beneficial or harmful.

Linking the database to public policy

3-dimensional characterization
of global value chains



Systemic

Size
Speed

- Magnitude and momentum of trade channel
- Strength of the trade-growth nexus
- Trade promotion and facilitation strategies

Relational

Orientation
Length
Position

- Direction (or mode) of linkage
- Downstream value chain : demand-side policies (upgrading, competitiveness, diversification)
- Upstream : supply-side policies (logistics, trade facilitation, infrastructure, ease of doing business)

Structural

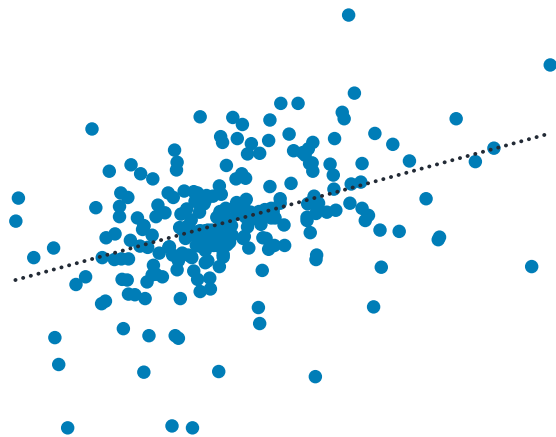
Shape
Breadth
Depth

- Channels of transmission (risk or growth)
- Design of preferential trade agreements
- Bilateral balance of trade

Linking the database to public policy

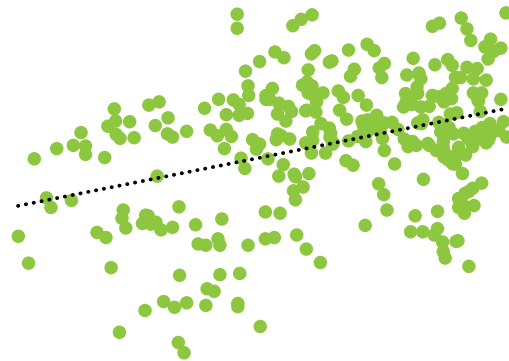
GVC matters for growth.

VS growth (X) positively correlated with value creation growth (Y) in Developing Asia (2007-2017)



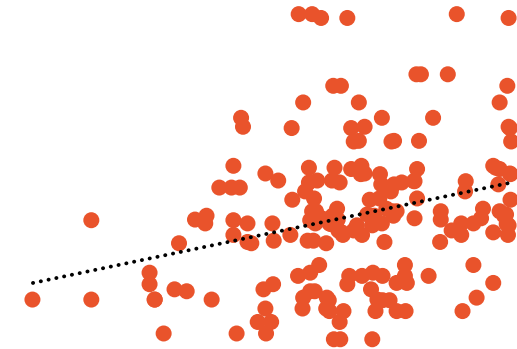
“At-the-border” policies count

Logistics performance (X) positively correlated with vertical specialization (Y), 2007-2016



As well as across- and behind-the-border policies

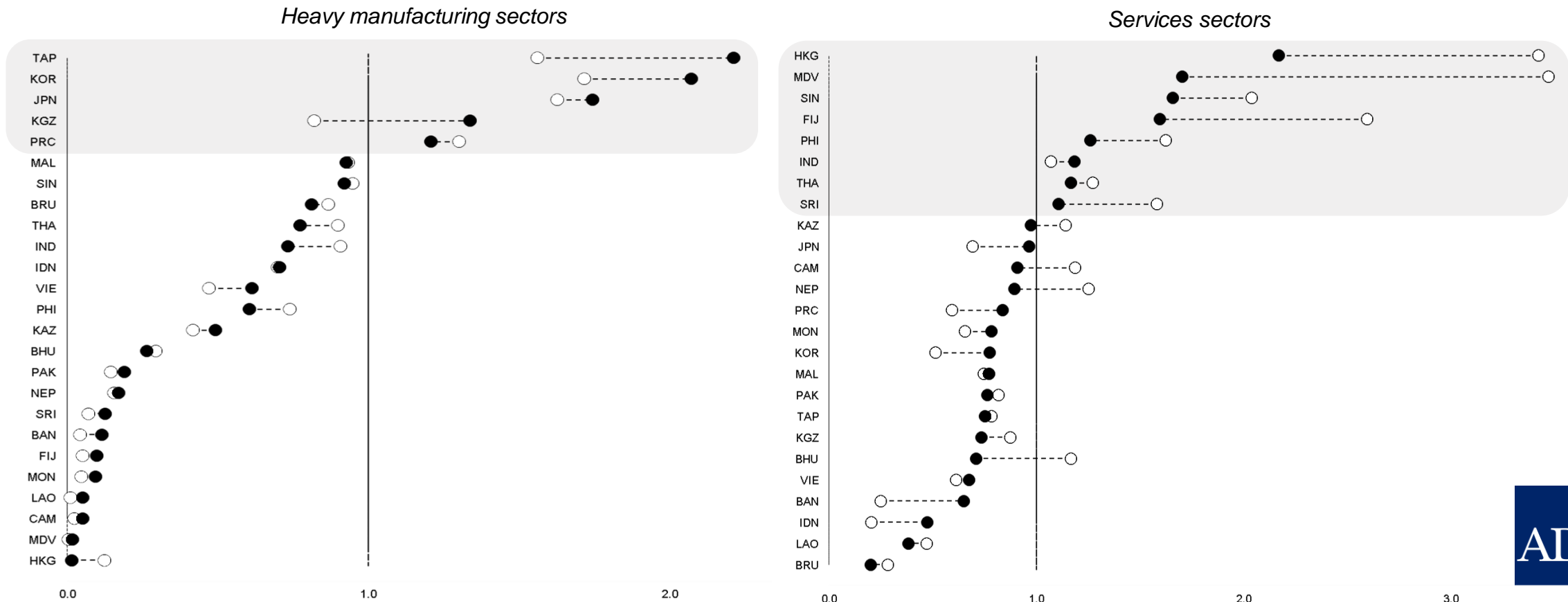
Ease of doing business (trading across borders and enforcing contracts) links with GVC intensity



Linking the database to public policy

Especially when it comes to upgrading in global value chains

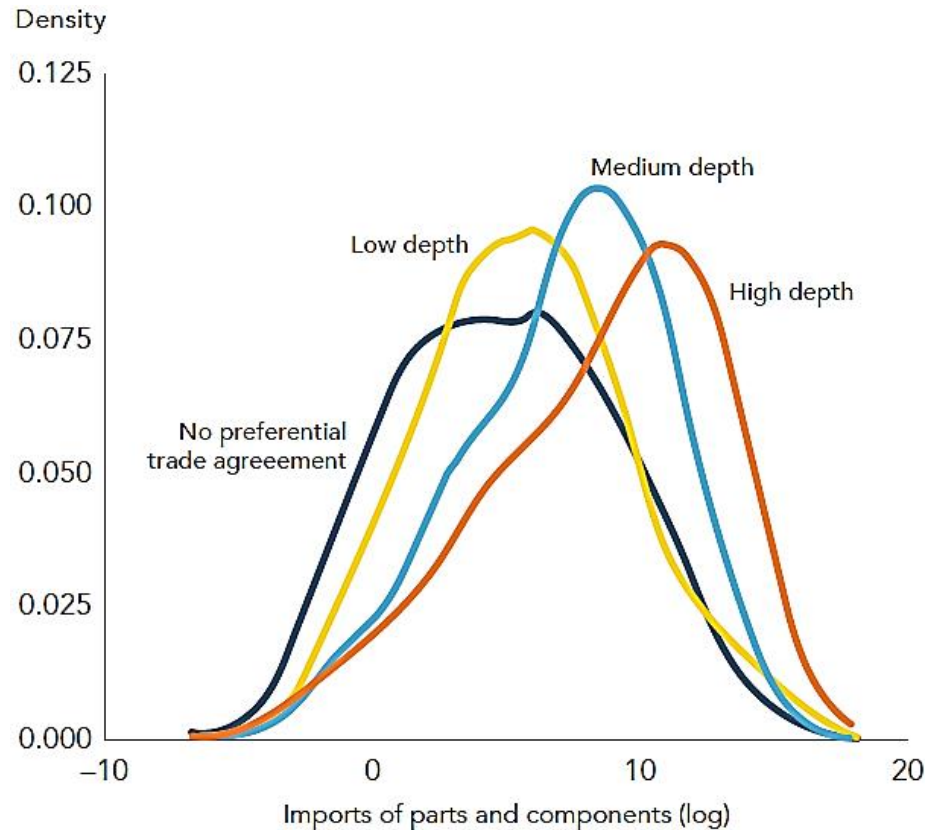
Asia's revealed comparative advantage (RCA) based on domestic value added exports (black circles) and gross exports (white circles), 2017



Linking the database to public policy

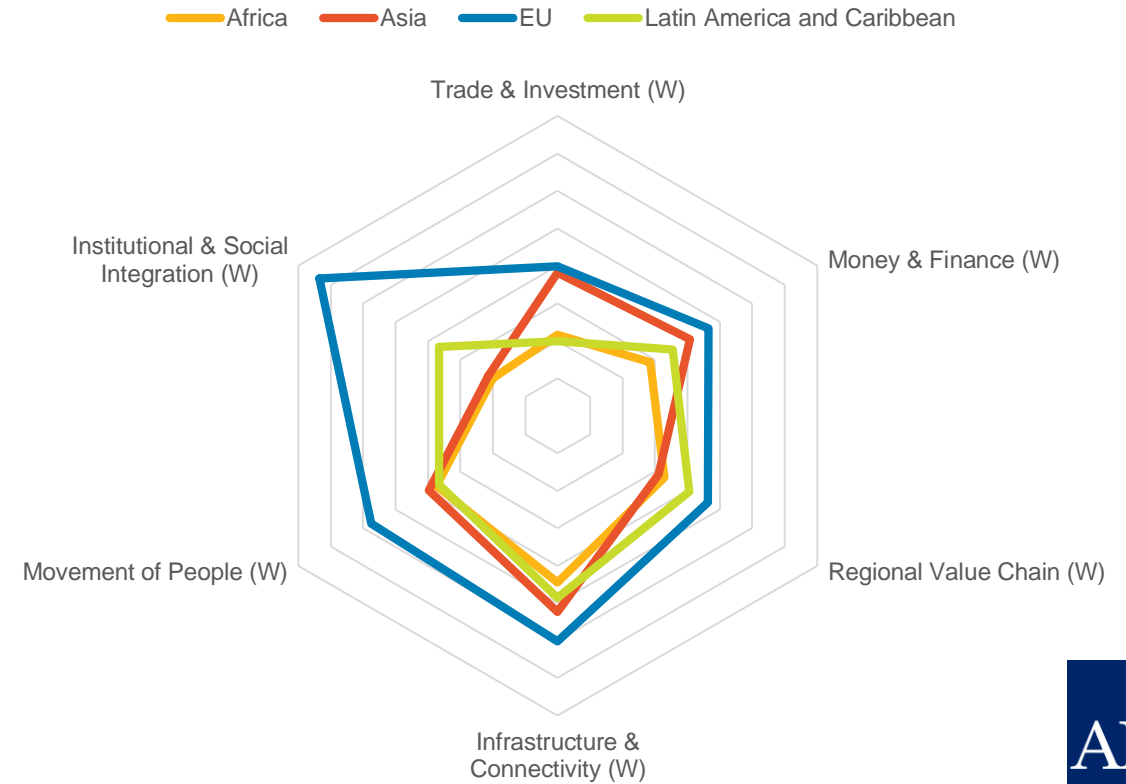
GVC integration expose the need for sustained regional cooperation

Deep preferential agreements and GVC trade mutually reinforce each other.



Source: Hoffman, Osnago, and Ruta 2017.

Regional cooperation indices reveal areas where Asia and Latin America and Caribbean could learn from each other.



Source: ADB ERIA [Asia Pacific Regional Integration Index](#) 2016



Takeaways

- **Input-output approaches** to building analytical database
- Knowledge of GVCs are still growing
- How we measure GVCs are still evolving
- Converging versus diverging approaches (multiple angles)
- Strengthening statistical systems for policy use
- Data collaboration and integrated ecosystems