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Visualizing Global Value Chains: Smile Curve, Network and Revealed Comparative Advantage

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Abstract

This paper explains how we use inter-country input-output models and databases to develop new indicators for visualizing global value chains (GVCs). We created three GVC visualization tools: smile curves, networks and value-chain based revealed comparative advantage (RCA). These tools rely on new indicators of trade in value-added (TiVA), value-chain position and value-chain length. Smile curve tools show the value-added gains, positions and productivities of different countries and sectors in a specific value chain; network tools reveal the interdependence of value-added transfers among countries, their evolution over time and the role of a specific hub country in GVCs; value-chain based RCA tools measure the relative strength or weakness of a certain country in a certain type of goods and services based on TiVA flows.

Keywords: Global value chain, trade in value-added, smile curve, network, revealed comparative advantage

JEL classification: F6; F13; F15, D57

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Technical Note for the Institute of Developing Economies (IDE)-JETRO's GVC Visualization Database (Version 1.0) (***IDE Discussion Paper*** No. 924)

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This paper explains how we use inter-country input-output models and databases to develop new indicators for visualizing global value chains (GVCs). We created three GVC visualization tools: smile curves, networks and value-chain based revealed comparative advantage (RCA). These tools rely on new indicators of trade in value-added (TiVA), value-chain position and value-chain length. Smile curve tools show the value-added gains, positions and productivities of different countries and sectors in a specific value chain; network tools reveal the interdependence of value-added transfers among countries, their evolution over time and the role of a specific hub country in GVCs; value-chain based RCA tools measure the relative strength or weakness of a certain country in a certain type of goods and services based on TiVA flows.

***For the relevant GVC visualization results (figures and data), one can freely download them from the following IDE-JETRO's website.**

https://www.ide.go.jp/Japanese/Publish/Reports/Collabo/vgvc_2023.html

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Introduction

Given the rapid evolution of global value chains (GVCs) over the past three decades, the "made in" label, which is typical of manufactured goods, attributing them to a specific economy, has become an archaic symbol of a bygone era, as most manufactured goods are now "Made in the World" (Antràs and Chor 2021). The rise of GVCs, which is accompanied by a substantial improvement in the economic efficiency of multinationals, has significantly changed the nature and structure of international trade (WTO 2019), as well as the topology of interdependency and influencing powers of countries (Xiao et al. 2020). As a response to providing better measures of GVCs, various indicators based on inter-country input–output (ICIO) models have been developed. They mainly include trade in value-added (Johnson and Noguera 2012), decomposition of gross exports in value-added terms (Koopman et al. 2014), as well as value-chain participation, value-chain position, and value-chain length indicators (Antràs et al. 2012, Wang et al. 2017, Meng et al. 2020). Those indicators can be presented individually at the country, sector, and bilateral levels, but without proper combination and design, they are difficult to be used to present an entire storyline for a specific GVC phenomenon. GVCs can be shown from various perspectives. To give a better mapping of the geometry of GVCs, and to provide a reader-friendly presentation on the nature and structure of complexly evolved GVCs, we develop three visualization tools—the smile curve, network and value-chain based revealed comparative advantage (RCA)—and apply them to the OECD ICIO (http://oe.cd/icio) and ADB MRIO datasets (https://kidb.adb.org/mrio).

1. Smile curves

1.1 The concept of smile curve

Shih (1996) observed that in the personal computer industry, both ends of the value chain command higher value-added to the product than the middle part of the value chain. If this phenomenon is presented in a graph with value-added represented on the Y-axis and the value chain stages represented on the X-axis, the resulting curve appears like the shape of a smile. Borrowing this idea, Meng et al. (2020) and Meng and Ye (2022) provided the pioneering methods to identify smile curves in GVCs using ICIO model and data.

1.2 How to visualize a smile curve in GVCs

With regard to how to visualize smile curves, we need two fundamental measures. The first measure is used to express the magnitude of the benefit (i.e., the absolute gain of value-added) for countries, sectors, and firms that are involved in GVCs. The second measure is the distance between producers and consumers in the value-added propagation process, which can be used to identify the position of a country, sector, or firm in a GVC. These two measures have been propounded by Ye et al. (2015) and expounded by Meng et al. (2020).

First, value-added gains from exporting can be measured as follows. Following the definition of trade in value-added (TiVA: Johnson and Noguera, 2012), we can use an IO model to measure value-added gains induced by exporting final goods and services. The

advantage of using TiVA is that it can trace value-added created upstream (GDP by sector) and absorbed downstream (final demands by product) without any double counting because all transaction of intermediates across countries, sectors, and firms are treated as endogenous variables (see Koopman et al., 2014).

For ease of explanation, consider a closed national IO model as follows:

$$x = Ax + y, \tag{1}$$

where x is the $N \times 1$ gross output vector with N sectors, y is the $N \times 1$ final demand vector, and A is the $N \times N$ input coefficient matrix (the share of intermediate input in output). In other words, all gross output (total supply) must be used either as an intermediate product or as a final product (total demand). This equation expresses the ex-post equilibrium of market supply and demand in a closed economy. After rearranging terms, we have the following:

$$x = (I - A)^{-1}y = Ly, \tag{2}$$

where L denotes the $N \times N$ block matrix, commonly known as a Leontief inverse, which is the total requirement matrix that gives the amount of gross output required for a one-unit increase in final demand. We define v as a $1 \times N$ value-added coefficient vector. Each element (v_s) in v shows the share of value-added in the gross output of sector s. Then, we can measure the value-added gained (π_k) by sector induced by exports (e_k) of a final product k as follows:

$$\pi_k = \hat{v}Le_k, \tag{3}$$

where, $\hat{v}$ is the diagonal matrix of v, e_k is the $N \times 1$ vector, with just an element of the exported final product k. Without loss of generality, this model can be applied to an inter-country input–output (ICIO) model.

Second, value-chain position index can be measured as follows. By definition, in an IO system, the following equation always holds true:

$$vL = v(I + A + A^2 + A^3 + \cdots) = u \tag{4}$$

where u denotes an $1 \times N$ unit vector. The value-added (v_s) of a specific sector s induced by the final demand (y_k) of a specific product k can be given as v_sLy_k (a scalar). Following Antràs et al. (2012) and Meng et al. (2020), the distance from a specific sector s (value-added creator) to consumers of a specific final product k, can be defined as follows:

$$D_{sk} = v_s(1I + 2A + 3A^2 + 4A^3 + \cdots)y_k/v_sLy_k = v_sL^2y_k/v_sLy_k. \tag{5}$$

The aforementioned indicator measures the total number of value-added propagation steps, on average, when the value-added of a specific sector upstream is embodied in all downstream steps and ultimately reaches the final demand of a specific

product. Without loss of generality, this distance measure could be applied to the ICIO model as well. The originality and innovation of the above works are that they consistently combined the "trade in value-added" concept to measure value-added gains and the "value-added propagation length" to measure the positions of countries, sectors, and firms along the upstream and downstream of a conceptual GVC.

1.3 How to read the smile curves shown in our GVC visualization database

To give a better mapping of GVC using smile curves, the most popular and simple approach is to focus on the export of a specific final good produced by a specific type of firm and to consider how value is added from one country, sector, and firm to another country, sector, and firm throughout the entirety of the value chain, as well as considering how the product is ultimately consumed. For example, we can use China's ICT goods (e.g., Computer, electronic and optical equipment) exports to the US market as a starting point for separating the whole value chain into upstream stages and downstream stages. All countries and industries that directly and indirectly provide intermediate goods and services to China's production of ICT exports are considered as participants in the upstream stages along the value chain. All countries and industries involved in the distribution process of imported ICT products to the US consumers are considered as participants in the downstream stages.

Using the logic of Leontief's backward linkage, we can calculate the value-added by country and industry induced in the upstream stages by China's exports of ICT goods to the US in an inter-country IO system. In the same manner (Leontief's backward linkage), we can measure the value-added induced in the downstream stages by country and industry from commerce, transportation, and marketing services (markup or margin) when imported ICT goods are delivered to the US consumers, assuming that there is no difference in markup rate across users of products in the US domestic market. Relevant trade and transportation margin information is from the supply-use tables of the OECD. By first employing all observations in the annual OECD ICIO tables (Yamano et al. 2024) (63 economies × 35 industries = 2,205) to derive binomial regression, and then labeling the most important participants with value-added gain above a threshold percentage (e.g., 0.1% of the total induced value-added in the whole value chain) in both upstream and downstream stages, a map of the ICT export-related GVCs can be created. As shown in Figure 1 (China's ICT goods export related value chain for 2018), specifically, the y-axis denotes the industrial value-added rate (value-added gained by producing one unit US$ output; which can also be replaced by labor compensation per hour as a proxy of technology level or a first-order approximation of labor productivity in current or constant US$); the x-axis denotes distance, measured by the value-added propagation length between global consumers of ICT products and a specific participating industry in the corresponding value chain (based on the distance index presented in equation (5) with appropriate normalization). The smooth line is fitted by binomial regression smoothing and the shadowed area represents the confidence interval around the smooth line. This GVC mapping can finally help us identify whether the so-called "smile curve" exists, and if so, what the participants (countries and industries) of a specific value chain, as well as their positions and gains, look like.

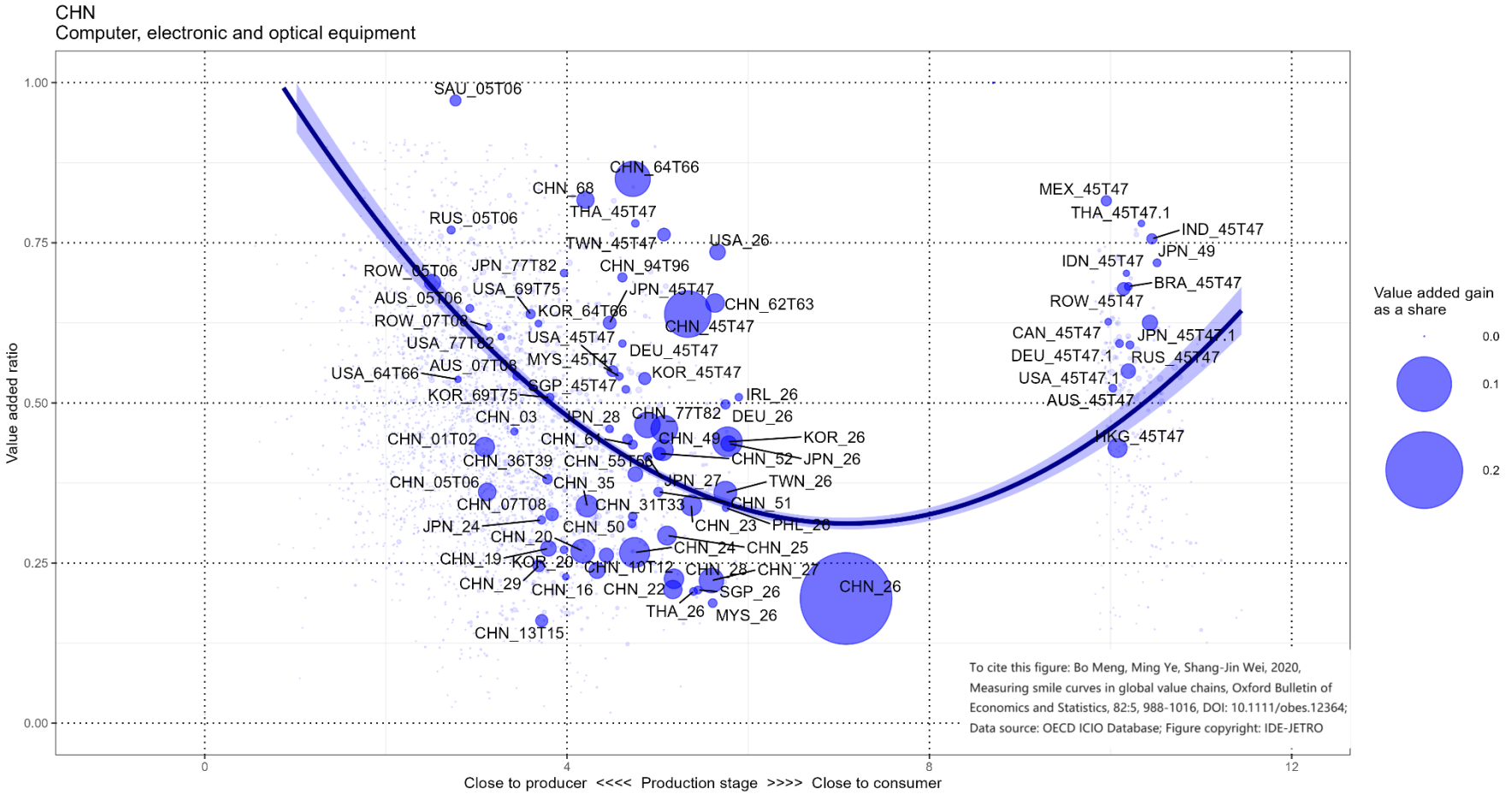


Figure 1. Smile curve of China's ICT exports related value chain based on the OECD ICIO data (2018)

Note: From the file name in the zip file provided by IDE-JETRO, one can find smile curve figures by country, sector, year, database; for country/region and sector names, please refer to Appendix 2.1.

2 Networks

2.1 Why the network-based visualization can help better understanding of GVCs

Given the increasing complexity and sophistication of GVCs, there are increasing interests about: Do GVCs truly function as a global system or are they more regional? how to clearly identify the types of trade that should belong to GVC activities; how views of GVCs differ between suppliers and demanders, and how the detailed topology of trade changes within GVCs. To provide a better view on those issues, networks analyses are considered useful tools. So far, Network analyses have been widely used to visually simplify and conceptualize GVC activities (Ferrarini, 2013, Cerina et al., 2015, Zhu et al., 2015, Zhou et al., 2016, Xiao et al., 2017, Amador & Cabral, 2017). In the quest to further enable a methodology on 'how to make GVCs visible', TiVA-based network analyses by value-chain route have been developed and helped better understanding about who dominates what types of GVC as well as the interdependency among countries in GVCs (Xiao et al. 2020, Gao et al., 2023).

2.2 How to trace value-added by trading route along GVC networks

The method for identifying GVC activities using an ICIO model is rooted in the work of Wang et al. (2017) and Xiao et al. (2020). Without loss of generality, let us consider an ICIO model for G countries and N sectors. In this model, Z^{sr} is an N×N matrix of intermediate input flows that are produced in country s and used in country r; y^{sr} is an N×1 vector giving final products produced in country s and consumed in country r; x^s is also an N×1 vector giving gross outputs in country s; and va^s denotes an 1×N vector of direct value added in country s. In this ICIO model, the input coefficient matrix can be defined as $A = Z \cdot \widehat{X}^{-1}$, where $\widehat{X}$ denotes a diagonal matrix with the output vector x in its diagonal. The value added coefficient vector can be defined as $v = va \cdot \widehat{X}^{-1}$. A country's domestic value added can be decomposed into three types of production activities as shown below.:

$$
\begin{aligned}
(va^s)' &= \widehat{V}^s \cdot x^s \\
&= \underbrace{\widehat{V}^s \cdot L^{ss} \cdot y^{ss}}_{(1):V\_D} + \underbrace{\widehat{V}^s \cdot L^{ss} \cdot \sum_{r\neq s}^{G} y^{sr}}_{(2):V\_RT} \\
&+ \underbrace{\widehat{V}^s \cdot L^{ss} \cdot \sum_{r\neq s}^{G} A^{sr} \cdot L^{rr} \cdot y^{rr}}_{(3a):V\_GVC\_S} + \underbrace{\widehat{V}^s \cdot L^{ss} \cdot \sum_{r\neq s}^{G} A^{sr} \cdot \sum_{u}^{G} B^{ru} \cdot y^{us}}_{(3b):V\_GVC\_D} \\
&\quad + \underbrace{\widehat{V}^s \cdot L^{ss} \cdot \left(\sum_{r\neq s}^{G} \sum_{t\neq s}^{G} A^{st} \cdot \sum_{u}^{G} B^{tu} \cdot y^{ur} - \sum_{r\neq s}^{G} A^{sr} \cdot L^{rr} \cdot y^{rr}\right)}_{(3c):V\_GVC\_C}. \qquad (6)
\end{aligned}
$$

(1) Production of domestically produced and consumed value added ($\widehat{V}^s \cdot L^{ss} \cdot y^{ss}$). This is the domestic value added that satisfies domestic final demand and unrelated to international trade, so no cross-country production sharing is involved. We label it as V_D for short. As an example, this type of activity could include value added produced by China's metals sector in the form of Chinese-made smartphones purchased by Chinese consumers.

(2) Production of domestic value added embodied in final-product exports ($\widehat{V}^s \cdot L^{ss} \cdot \sum_{r\neq s}^{G} y^{sr}$). This is the domestic value added used to satisfy foreign final demand that does not involve any cross-country production activities. It crosses a national border for consumption,

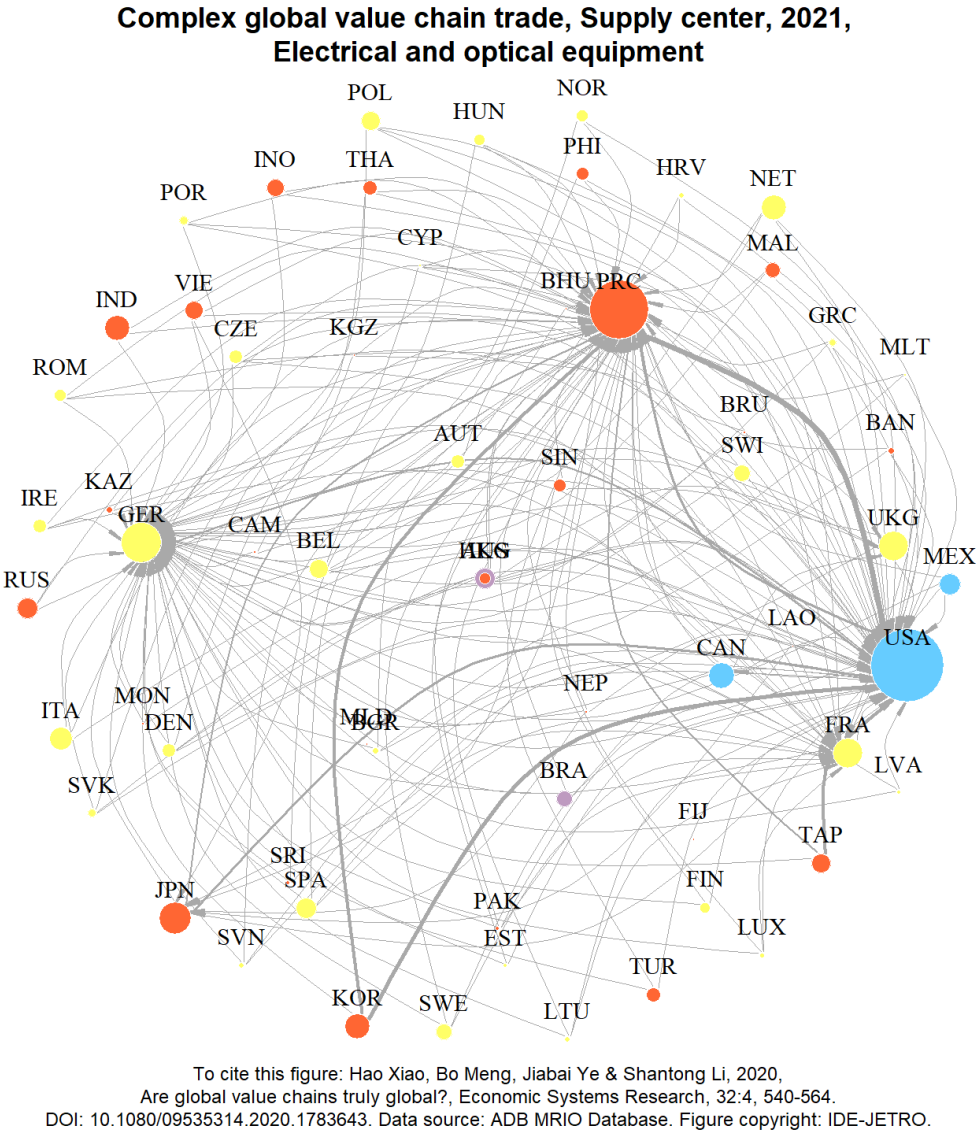
so it is very similar to the traditional "Ricardian" type trade, i.e. "French wine in exchange for English cloth". We label this V_RT for short. As an example, this activity could include value added in China's metals sector that is embodied in Chinese-made smartphones exported to Japan and purchased by Japanese consumers.

(3) Production of domestic value added that is embodied in exports of intermediate goods and services. This category is the domestic value added that relates to production activities outside the source country—the source country's contribution to global production. We label this V_GVC for short. It can be further split into three categories:

(3a) Domestic value added absorbed by the trading partner country without further border crossing. Value added of country s embodied in intermediate exports that are used by a trading partner to produce its domestic final products, which are then consumed in the direct importing country r. In this case, domestic value added crosses a national border only once, with no indirect exports via third countries or re-export activities involved. We label this V_GVC_S for short. As an example, this type of activity could include the value added in China's metals sector that is embodied in Chinese-made car parts, which are imported by Japan's automakers to produce cars purchased by Japanese consumers.

(3b) Returned (re-imported) domestic value added that is absorbed domestically. The value added of country s that is embodied in intermediate exports that are used by the importing country r to produce either intermediate (possibly via a third country in the production chain) or final goods and services that are ultimately shipped back to the source country s as imports and consumed there. In this case, production sharing via intermediate trade happens between home and foreign countries and results in two or more cross-border transactions. We denote this scenario as V_GVC_D. As an example, this case could include value added by China's metal sector that is embodied in Chinese-made car parts that are exported to South Korea to produce more complex car parts, which are used by Japan to produce cars, which are later imported by China and purchased by Chinese consumers. In this case, even if South Korea is substituted by Japan, or Japan by South Korea or China, the definition of (3b) still holds.

(3c) This category (labeled by V_GVC_C for short) includes two parts as shown in Equation (12). The first part represents the value added by country s that is induced by the final demand of country r for imports from a third country u. This implies that the value added by country s needs to first be embodied in its intermediate products that are exported directly to country t (including country r), which will be further directly and indirectly used by country u (including country r) to produce final products for satisfying the final demand of country r. With the second part which equals to minus (3a), it is easy to see that (3c) represents the value added of country s that is absorbed by country r via third countries (factor contents move across country borders at least twice). As an example, this case includes the case where China (country s) exports metal products to Japan (country t), which it then uses to produce car parts, which are imported by Mexican (country u) automakers that sell cars to US consumers. In the above example, when Japan is replaced by Mexico or the US and Mexico are replaced by Japan or the US, but Japan and Mexico are not replaced by the US at the same time, the example still reflects category (3c) activities – namely, production-sharing via intermediate trade happens between home and foreign countries with more than two cross-border transactions.



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Are global value chains truly global?, Economic Systems Research, 32:4, 540-564.
DOI: 10.1080/09535314.2020.1783643. Data source: ADB MRIO Database. Figure copyright: IDE-JETRO.

Figure 2. Global value chain network base on trade in value added

Note: From file name in the zip file provided by IDE-JETRO's website, one can find more network figures by sector, year, trade route, database for all countries; for country/region name, please refer to Appendix 2.2.

2.3 How to read the networks shown in our GVC visualization database

Given the measure of bilateral TiVA at the sector level by different trading route as shown in the above section, we could simplify the identification of the relationship between periphery and core countries of various networks from the perspectives of importers and exporters of value added separately, thus networks can be presented in two ways. The first uses a specific country as a supply center if the majority of other countries' value-added imports are from that country. The second uses a specific country as a demand center if the majority of other countries' value-added exports go to that country. In our network figures, a bubble's size represents the share of a country's value-added exports or imports of the

world total. The shares of value added flowing through trading partners are represented by the thickness of the arrow. The point of the arrow shows the direction of the value-added flow. Note that whether or not there is an arrow in the network figures depends on two standards. In the example of supply-center-related networks as shown in Figure 2 (cross-border TiVA via complex GVC trade for the year of 2021 based on the ADB MRIO data), we use the following criteria: (1) if country A is included in the most important top 3 importers of value-added from country B, there will be an arrow leading from A to B; or (2) if country A's share of country B's value-added imports is larger than 5%, there will be an arrow leading from A to B. The first standard extends the so-called "Top 1" to "Top 3" threshold, which is widely used in network analyses to identify the most important arcs or links. The second standard is used to adjust the density of the network and thus can avoid omitting other important links. We must emphasize that the arrows we identify between nodes in the complex GVC trade networks as shown in Figure 2 are not about the relationship of any direct bilateral trade partners by definition as mentioned in section 3.2. It is used to explore the complexity of the whole structure of interactions among countries who are indirectly linked each other in terms of TiVA through third countries.

3 Value-chain based RCA

3.1 The concept of RCA

The concept of RCA is mainly based on the theory of Ricardian Comparative Advantage. It represents the relative advantage or disadvantage of a certain country in international economics for a certain class of goods or services. The most widely used indicator of RCA (see Balassa, 1965) is given as follows:

$$RCA_i^r = (EX_i^r/EX^r)/(\sum_r EX_i^r/\sum_r EX^r) \ , \qquad (7)$$

where, EX_i^r represents country r's exports of good i. EX^r is the total exports of country r. When all countries' exports just include their domestic contents, the above RCA can be considered a reasonable indicator of Comparative Advantage.

3.2 Why we redefine RCA in the era of GVCs?

In the GVC era, when much more intermediate imports are embodied in exports, this indicator may lose its original interpretability because a country's export might embody foreign contents and double counted parts of its own value-added (Meng et al. 2012, 2017, Koopman et al. 2014). When replacing the gross term export EX_i^r by $TiVA_i^r$, and using another form of RCA proposed by Hoen and Oosterhaven (2006) (which can solve the problematic properties happened in Balassa type RCA due to its multiplicative specification depending on the number of countries and sectors), the value-chain based RCA can be measured as the following two ways:

$$\mathrm{TiVARCA}_i^r = (\mathrm{TiVA}_i^r / \mathrm{TiVA}^r) - (\sum_r \mathrm{TiVA}_i^r / \sum_r \mathrm{TiVA}^r) \quad (8)$$

TiVA_i^r follows the definition proposed by Johnson and Noguera (2012), meaning country r's sector i's value-added exports (country r's sector i's value-added induced by foreign final demands). Therefore, the value-chain based RCA can be used to evaluate the relative advantage or disadvantage of a certain country in a certain class of sectoral value-added exports in GVCs.

3.3 How to read the RCA figures shown in our GVC visualization database

As shown in Figure 3.1, we use the ADB MRIO data to estimate RCAs for Electrical and optical equipment sector for the year of 2021 based on different measures including the so-called traditional statistics of gross term export (TSGT) and TiVA. In addition, RCAs based on TiVA by three trade routes including Ricardian type trade (RT: final goods trade), Simple GVC trade (GVCs) and Complex GVC trade (GVCc) can also by listed and compared across countries as shown in Figure 3.4.

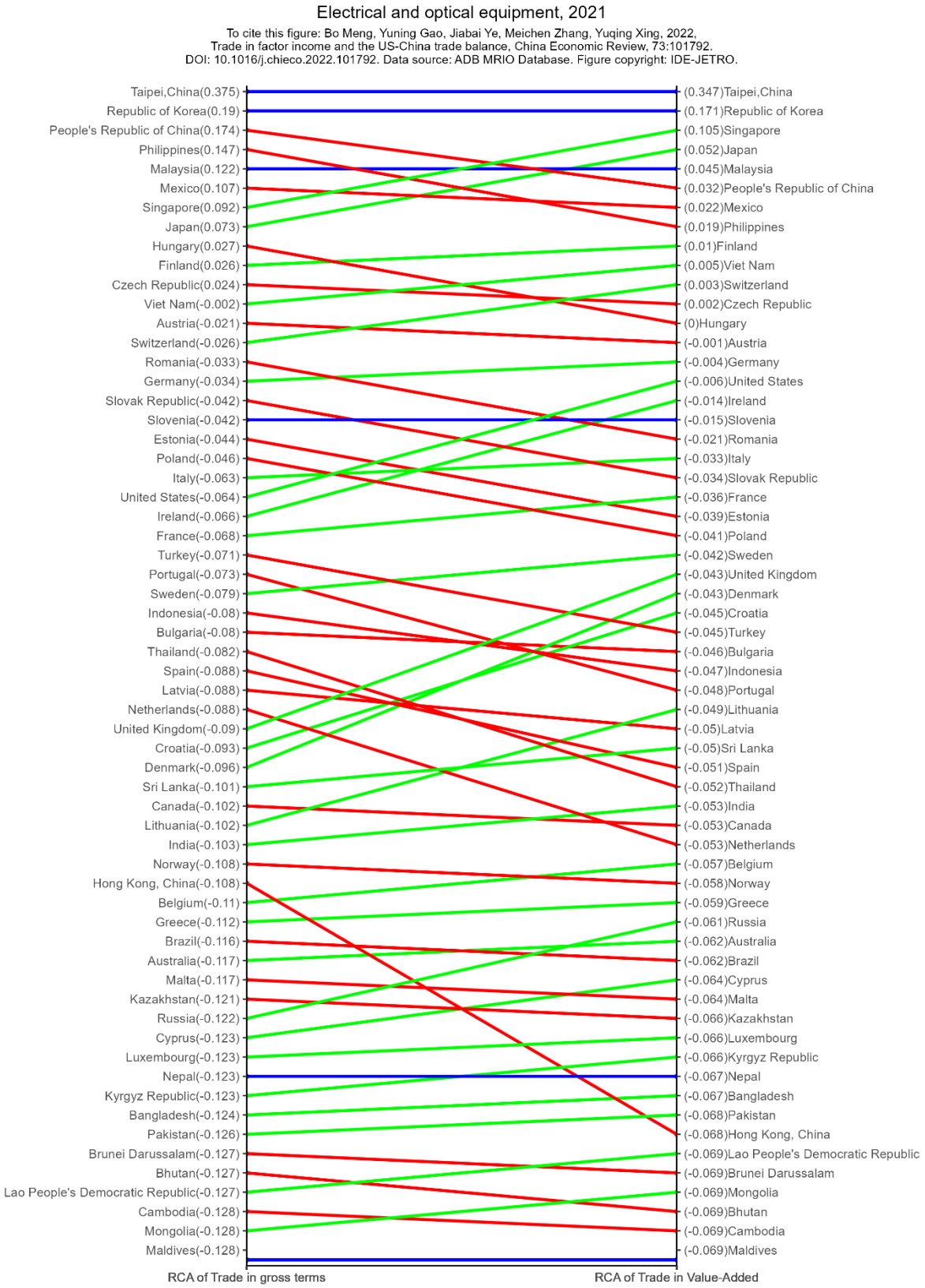

Figure 3.1 RCA indices based on gross term export and value-added export

Note: From the file name in the zip file provided by IDE-JETRO's website, one can find more RCA figures by sector, year, trade route, database for all countries.

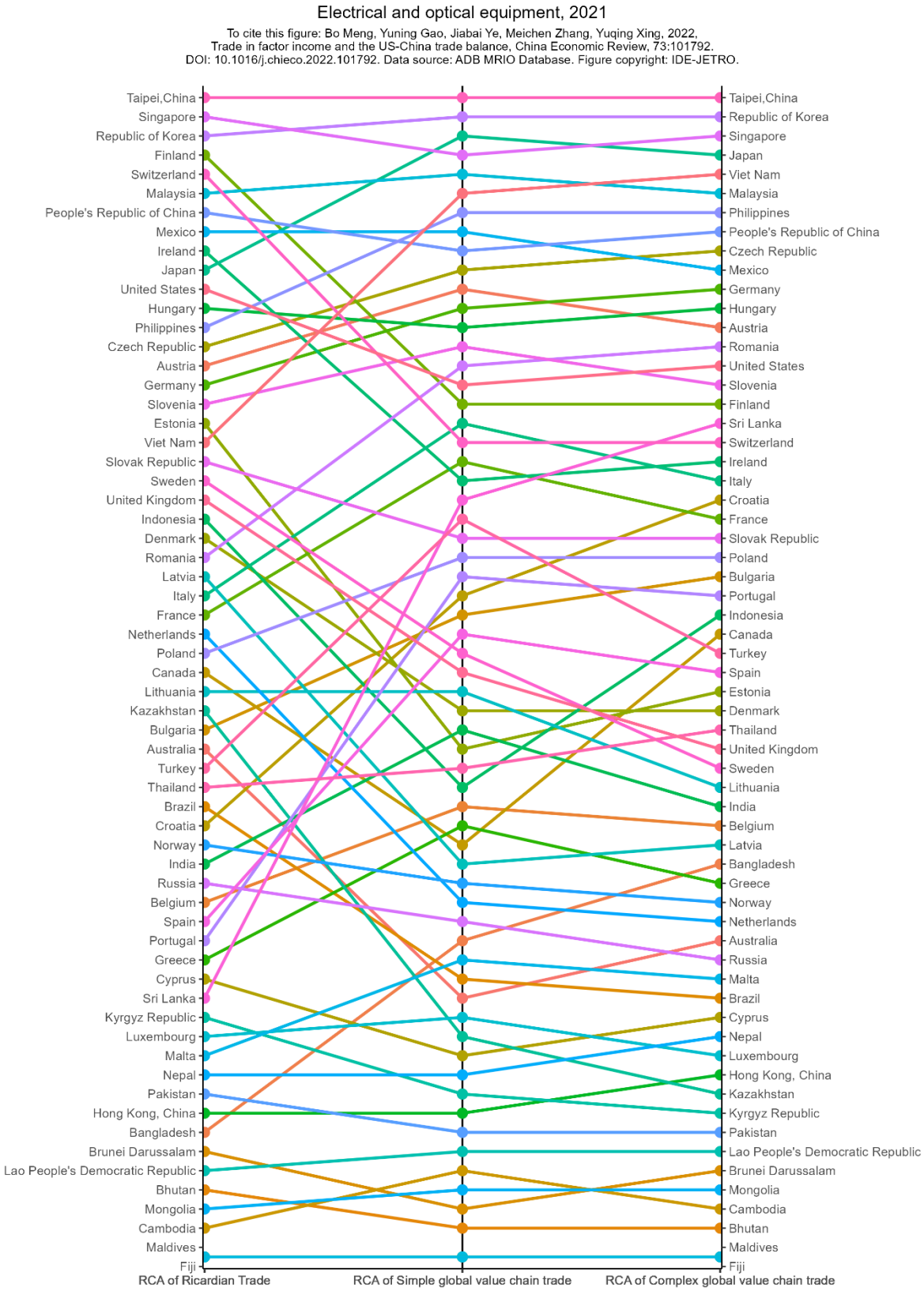

Figure 3.2 RCA indices based on TiVA by three trading routes

Note: From the file name in the zip file provided by IDE-JETRO's website, one can find more RCA figures by sector, year, trade route, database for all countries.

Appendix 1. Notation and abbreviation used in file names

TiVA: Trade in value added
RT: TiVA by Ricardian type trade (final goods trade)
GVCs: TiVA by simple GVC trading route
GVCc: TiVA by complex GVC trading route
TSGT: Trade statistics in gross terms
ADB: Asian Development Bank
OECD: Organisation for Economic Co-operation and Development
RCA: revealed comparative advantage
ICIO: Inter-country input-output
MRIO: Multiregional Input-output

Appendix 2.1 Country/region and sector codes and names used in the OECD ICIO database

OECD ICIO Country/region codes and names

Code	OECD countries
AUS	Australia
AUT	Austria
BEL	Belgium
CAN	Canada
CHL	Chile
COL	Colombia
CRI	Costa Rica
CZE	Czech Republic - Czechia
DNK	Denmark
EST	Estonia
FIN	Finland
FRA	France
DEU	Germany
GRC	Greece
HUN	Hungary
ISL	Iceland
IRL	Ireland
ISR	Israel1
ITA	Italy
JPN	Japan
KOR	Korea
LVA	Latvia
LTU	Lithuania
LUX	Luxembourg
MEX	Mexico
NLD	Netherlands
NZL	New Zealand
NOR	Norway
POL	Poland
PRT	Portugal
SVK	Slovak Republic
SVN	Slovenia
ESP	Spain
SWE	Sweden
CHE	Switzerland
TUR	Turkey
GBR	United Kingdom
USA	United States

Code	Non-OECD economies
ARG	Argentina
BRA	Brazil
BRN	Brunei Darussalam
BGR	Bulgaria
KHM	Cambodia
CHN	China (People's Republic of)
HRV	Croatia
CYP	Cyprus2
IND	India
IDN	Indonesia
HKG	Hong Kong, China
KAZ	Kazakhstan
LAO	Lao People's Democratic Republic
MYS	Malaysia
MLT	Malta
MAR	Morocco
MMR	Myanmar
PER	Peru
PHL	Philippines
ROU	Romania
RUS	Russian Federation
SAU	Saudi Arabia
SGP	Singapore
ZAF	South Africa
TWN	Chinese Taipei
THA	Thailand
TUN	Tunisia
VNM	Viet Nam
ROW	Rest of the World

OECD ICIO sector codes and names

Code	Name
D01T02	Agriculture, hunting, forestry
D03	Fishing and aquaculture
D05T06	Mining and quarrying, energy producing products
D07T08	Mining and quarrying, non-energy producing products
D09	Mining support service activities
D10T12	Food products, beverages and tobacco
D13T15	Textiles, textile products, leather and footwear
D16	Wood and products of wood and cork
D17T18	Paper products and printing
D19	Coke and refined petroleum products
D20	Chemical and chemical products
D21	Pharmaceuticals, medicinal chemical and botanical products
D22	Rubber and plastics products
D23	Other non-metallic mineral products
D24	Basic metals
D25	Fabricated metal products
D26	Computer, electronic and optical equipment
D27	Electrical equipment
D28	Machinery and equipment, nec
D29	Motor vehicles, trailers and semi-trailers
D30	Other transport equipment
D31T33	Manufacturing nec; repair and installation of machinery and equipment

Code	Name
D35	Electricity, gas, steam and air conditioning supply
D36T39	Water supply; sewerage, waste management and remediation activities
D41T43	Construction
D45T47	Wholesale and retail trade; repair of motor vehicles
D49	Land transport and transport via pipelines
D50	Water transport
D51	Air transport
D52	Warehousing and support activities for transportation
D53	Postal and courier activities
D55T56	Accommodation and food service activities
D58T60	Publishing, audiovisual and broadcasting activities
D61	Telecommunications
D62T63	IT and other information services
D64T66	Financial and insurance activities
D68	Real estate activities
D69T75	Professional, scientific and technical activities
D77T82	Administrative and support services
D84	Public administration and defence; compulsory social security
D85	Education
D86T88	Human health and social work activities
D90T93	Arts, entertainment and recreation
D94T96	Other service activities
D97T98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

Source of the OECD ICIO database: OECD Inter-Country Input-Output (ICIO) Tables - OECD

Appendix 2.2 Country/region and sector codes and names used in the ADB MRIO database

ADB MRIO Country/region codes and names

Code	Name	Code	Name
AUS	Australia	ROM	Romania
AUT	Austria	RUS	Russia
BEL	Belgium	SVK	Slovak Republic
BGR	Bulgaria	SVN	Slovenia
BRA	Brazil	SWE	Sweden
CAN	Canada	TUR	Turkey
SWI	Switzerland	TAP	Taipei,China
PRC	People's Republic of China	USA	United States
CYP	Cyprus	BAN	Bangladesh
CZE	Czech Republic	MAL	Malaysia
GER	Germany	PHI	Philippines
DEN	Denmark	THA	Thailand
SPA	Spain	VIE	Viet Nam
EST	Estonia	KAZ	Kazakhstan
FIN	Finland	MON	Mongolia
FRA	France	SRI	Sri Lanka
UKG	United Kingdom	PAK	Pakistan
GRC	Greece	FIJ	Fiji
HRV	Croatia	LAO	Lao People's Democratic Republic
HUN	Hungary	BRU	Brunei Darussalam
INO	Indonesia	BHU	Bhutan
IND	India	KGZ	Kyrgyz Republic
IRE	Ireland	CAM	Cambodia
ITA	Italy	MLD	Maldives
JPN	Japan	NEP	Nepal
KOR	Republic of Korea	SIN	Singapore
LTU	Lithuania	HKG	Hong Kong, China
LUX	Luxembourg	RoW	Rest of the World
LVA	Latvia		
MEX	Mexico		
MLT	Malta		
NET	Netherlands		
NOR	Norway		
POL	Poland		
POR	Portugal		

ADB MRIO sector codes and names

Code	Name
c1	Agriculture, hunting, forestry, and fishing
c2	Mining and quarrying
c3	Food, beverages, and tobacco
c4	Textiles and textile products
c5	Leather, leather products, and footwear
c6	Wood and products of wood and cork
c7	Pulp, paper, paper products, printing, and publishing
c8	Coke, refined petroleum, and nuclear fuel
c9	Chemicals and chemical products
c10	Rubber and plastics
c11	Other nonmetallic minerals
c12	Basic metals and fabricated metal
c13	Machinery, nec
c14	Electrical and optical equipment
c15	Transport equipment
c16	Manufacturing, nec; recycling
c17	Electricity, gas, and water supply
c18	Construction
c19	Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel
c20	Wholesale trade and commission trade, except of motor vehicles and motorcycles
c21	Retail trade, except of motor vehicles and motorcycles; repair of household goods
c22	Hotels and restaurants
c23	Inland transport
c24	Water transport
c25	Air transport
c26	Other supporting and auxiliary transport activities; activities of travel agencies
c27	Post and telecommunications
c28	Financial intermediation
c29	Real estate activities
c30	Renting of M&Eq and other business activities
c31	Public administration and defense; compulsory social security
c32	Education
c33	Health and social work
c34	Other community, social, and personal services
c35	Private households with employed persons

Source of the ADB MRIO database: Asian Development Bank (adb.org)

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