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Isha Chawla and Nagesh Kumar*

Abstract: With the rise of global value chains (GVCs), gross trade data tends to mask complex patterns of international production sharing, through foreign direct investment (FDI) or arm's length trade. Using the OECD Trade in Value Added (TiVA) database for 1995-2018, and the Asian Development Bank (2022) consolidated dataset for 2000 and 2007-2020, this paper examines value-added components of gross exports by origin (home or abroad) to study the extent of GVC participation based on forward and backward linkages. Though India's GVC participation rate has risen over time, it was lower than that of several economies in the Asia-Pacific region, and its relative share in the total participation gains was marginal. Nevertheless, India's relative share in forward GVC content from (and backward GVC content to) the region was not as peripheral. Revealed comparative advantage (RCA) based on value-added exports that is adjusted for GVC activity yields insights by avoiding over-or underestimation of competitiveness in exports. Raising net participation gains (ratio of forward to backward linkages) and seizing opportunities in GVCs in times of insecurity will require key enablers in a world where manufacturing processes are being rewired and stimulating the mutually reinforcing relationship between FDI and GVC participation by attracting quality FDI inflows.

Keywords: Global value chains; Domestic value-added; Foreign value-added; Foreign Direct Investment (FDI); Manufacturing; Services; Asia and the Pacific region

1. Introduction

In recent decades, the production of goods and services has become increasingly globalised as firms strive to become globally competitive, and for requisite skills and materials,

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strategically outsource and perform activities based on locational advantages in cost and quality, through foreign direct investment (FDI) and arm's length trade. This has led to the proliferation of fragmented networks of production-sharing, extending beyond firm boundaries and country borders, shaping complex patterns of international trade flows that include "spider-like" structures in which multiple parts and components converge to an assembly plant that exports, e.g., Boeing's Dreamliner or "snake-like" structures in which value is created sequentially in a series of stages that can cross borders multiple times, e.g., manufacturing a chip (Baldwin and Venables, 2013), or hybrid "sniker" like complex mixtures of these two production networks (Diakantoni et al., 2017). OECD (2022a) reports that "In reality, about 70% of international trade today involves global value chains (GVCs) as services, raw materials, parts and components cross borders-often numerous times. Once incorporated into final products they are shipped to consumers all over the world...For example, a smart phone assembled in China might include graphic design elements from the United States, computer code from France, silicon chips from Singapore, and precious metals from Bolivia. Throughout this process, all countries involved retain some value and benefit from the export of the final product. But much of this value added throughout the international supply chain is invisible in traditional trade statistics, which attribute the full value of a good or service to the last country in the chain that finalised production." Emphasising the increasing "indirect" trade between economies, Xing et al. (2021, p.68) note that "Taipei, China might receive semiconductor blueprints from Japan, manufacturing them for use in electronics produced in the Republic of Korea, which are then sent to Viet Nam for assembly into appliances that are sold in Singapore's shopping malls. While only adjacent economies along this chain have a direct trading relationship, all participants have an indirect relationship with one another."

While supply-chains refer to the system and resources required to move a product or service from supplier to customer, and network trade refers to trade in parts and components and final assembly, GVCs extend beyond manufacturing to design, marketing, distribution and support activities divided amongst multiple firms and workers across geographic spaces to bring a product from conception to end use, involving issues of explicit coordination, governance, and power asymmetry (Gereffi et al. 2005; Roy, 2020). With 'Made in' labels in consumer goods no longer capturing value-added¹ by country-of-origin, as embodied in products, comparative advantage and patterns of specialisation in GVCs are increasingly based on activities and tasks, on functional specialisation or hyper specialisation rather than product or industry specialisation.²³ In services also, for cost efficiency, companies outsource

¹ Value of output minus the value of intermediate inputs.

² Based on the revealed comparative advantage (RCA) index (section 7.1 below), Timmer et al. (2019) distinguish between product specialisation based on gross export value and functional specialisation based on value-added in functions, or types of activities performed in GVCs, such as fabrication, research and development (R&D), management, and marketing, with specialisation indicated when indices are greater than one.

³ For instance, Xing et al. (2021) comment that Philippines, a country with major electronics exports does not specialise in electronics per se, but in a particular segment of the electronics value chain.

their noncore business processes to specialised third-party service providers, that then offshore their labour-intensive operations to developing economies with lower labour costs. Multinational enterprises (MNEs), often lead firms in GVCs⁴ also offshore their labour-intensive services to cost-competitive locations, setting up "global capability centers (GCCs)." India, whose GVC participation is to a large extent driven by services, has been a leading destination for such strategies in software services.

In the period of "hyper globalisation" from the 1990s to the global financial crisis in 2008/09,5 the highly efficient, specialised and interconnected GVC transformation, or the gradual disintegration of production across borders was enabled by the introduction of technologies such as computers and information and communication technologies (ICTs), multilateral and regional trade liberalisation, falling transportation costs that boosted the extent to which firms could use foreign parts and components in their production processes, and intermediate input producers could sell their output internationally (Antràs, 2020). The subsequent phase saw a decline in the pace of globalisation, referred to as "slowbalisation,"⁶ with changing fragmentation costs along GVCs, brought by structural factors such as the shift in China from export-driven manufacturing to domestic markets and rising wages in Asia. The past few years have exposed the vulnerabilities of trade and GVCs to supply-chain disruptions from the Covid-19 pandemic, rising geopolitical tensions from the US-China trade war and the Ukraine war with price shocks and productivity declines. Also, Kumar (2023) argues that evolution of Industrial Revolution 4.0 (IR4.0) technologies⁷ may lead to restructuring of GVCs and new international division of labour. Robotization of production tends to neutralize the labour cost advantage enjoyed by developing countries. Furthermore, many products can be produced by 3-D printing anywhere. On the other hand, with the digital revolution, services can be delivered from anywhere. Hence, Baldwin (2020) argues that manufacturing may become non-tradeable while services could become more tradeable due to IR4.0.

The risks and potential costs of fragmentation associated with the above developments have induced strategies that include "Technological decoupling-broadly defined as the undoing of cross-border trade in high-tech goods and services...,"⁸ decoupling of GVCs "defined as increased barriers to global input trade,"⁹ reshoring and regionalisation, multi-sourcing, nearshoring or proximity sourcing, friendshoring (including of FDI) and shorter supply-chains.¹⁰ It is posited that IR4.0 may lead to reshoring and impact developing countries' prospects for exports, future integration with GVCs and attracting outsourced production that India too has been aiming for by strengthening its manufacturing sector. In the short

⁴ Reflecting the trade-investment nexus.

⁵ Brakman and van Marrewijk (2022).

⁶ OECD (2023) notes that there was no general trend towards "deglobalisation" in the period up to 2020.

⁷ These encompass new technologies such as artificial intelligence (AI), blockchain, cloud computing, big data analytics, machine learning (ML), internet of things (IoT) and 3-D printing (Kumar, 2023).

⁸ Cerdeiro et al. (2021, p.2).

⁹ Eppinger et al. (2021).

¹⁰ Javorcik et al. (2022) amongst others however show that these strategies may involve welfare costs.

run, however, a more important factor driving the reorganization of GVCs may be MNE strategies to diversify their sourcing on a China+1 basis, which India can well take advantage of (Kumar, 2023).

Further, cross-border production sharing has mostly been associated with FDI-led intra-firm trade and diversification, with firms setting up foreign affiliates and situating production process stages in other countries. Identifying FDI as an important pathway for domestic firms to internationalise and thus participate in GVCs (supplier linkages with international firms, strategic alliances with MNEs (coproduction), direct exporting, and outward FDI being non-mutually exclusive internationalisation pathways), Qiang et al. (2021, p.5) point out that "Trade with foreign markets induces initial FDI from the lead firm by lowering its entry costs into the host country; lower entry costs and high switching costs encourage the lead firm to bring its GVC partners into the host country as well, and a herd effect triggers subsequent FDI. Finally, FDI stimulates further GVC entry and upgrading through spillovers and agglomeration effects. As a result, GVC expansion has mirrored the growth of MNCs' investments to unbundle production processes and relocate them worldwide." With at least two stages of the product being produced in different countries, Antràs (2020, p.3) states that "A firm participates in a GVC if it produces at least one stage in a GVC."

Though a micro approach, based on the joint import and export activity of a firm, and firmto-firm transactions within and across countries can better capture the ways in which firms slice up their value chains across countries, a macro approach at the country or countrysector level has instead, often been employed in measuring GVC participation, combining national input-output (I-O) and foreign trade data. Using the OECD Trade in Value-Added (TiVA) database, 2021 edition, ¹¹ based on the harmonised I-O tables of 66 economies (38 OECD, 28 non-OECD) plus a "Rest of the World (ROW)" aggregate representing developing economies not individually considered in non-OECD, 45 industrial sectors according to ISIC Rev. 4, for 1995 to 2018; and the Asian Development Bank (ADB) consolidated dataset of IObased indicators for 25 economies in Asia and the Pacific (2022)¹² for 2000 and 2007 to 2020, (henceforth ADB (2022)), this paper explores patterns in GVC-related trends for India, in a world shaped by cross-border production and FDI activity. The rest of the paper is organised as follows. Section 2 outlines the value-added trade accounting framework in TiVA (2021) and ADB (2022), and presents aggregate trends in India and select economies' forward, backward, and total GVC participation. Section 3 details on the skewed distribution of valueadded gains from GVC participation. Section 4 discusses services in value-added trade and GVCs. Section 5 examines sectoral trends in GVC participation, for India. Section 6 provides sector-group trends in GVC participation, for economies in Asia-Pacific. Section 7 focuses on how RCA changes amid GVCs and examines interactions between FDI and GVCs. Section 8

¹¹ <u>https://stats.oecd.org/index.aspx?queryid=106160</u>.

¹² Based on ADB Multiregional Input-Output (MRIO) database for 62 economies and ROW, and 35 industrial sectors, <u>https://mrio.adbx.online</u>.

concludes. The appendix provides country coverage, industry description by sector-groups, and presents additional figures.

2. Value-added trade accounting framework and India's GVC participation in comparative context

"Trade in value added describes a statistical approach used to estimate the sources of **value** (by country and industry) that is **added** in producing goods and services for export (and import)" (OECD, 2022a, p.9). Using the gross export decomposition in Koopman, Wang, and Wei (2014), (henceforth KWW (2014)), TiVA (2021) indicators measure the upstream and downstream links in GVCs (section 2.1 below). Building on KWW (2014), Wang et al. (2017), (henceforth WWYZ (2017)), and Borin and Mancini (2019, 2023), (henceforth BM (2019, 2023)) decompose gross exports into meaningful value-added categories, such that the magnitudes of some of these categories reveal the GVC participation of an entity. As adopted in ADB (2022) (section 2.2 below), BM (2019, 2023) gives the trade-based approach while WWYZ (2017) gives the production-based approach to GVC participation.

2.1 Measuring GVC participation (TiVA, 2021)

The decomposition of gross export flows into value-added components, by origin (domestic and foreign) helps measure GVC participation:

- A. Domestic value-added (DVA) in gross exports can be (i) embodied either in final or intermediate goods or services directly consumed by the importing economy (ii) contained in intermediate goods or services, exported to a partner economy that re-exports them to third economies in downstream production stages as embodied in other products, yielding *forward* participation in GVCs (domestic value-added embodied in foreign exports as share of gross exports) and (iii) in exported intermediates that are re-imported (sent back to the economy of origin) as embodied in other intermediates and used to produce exports.¹³
- B. Foreign value-added (FVA) in gross exports, by value-added origin country indicates value-added of inputs (intermediates or 'tasks') imported and embodied in the production of intermediate or final goods or services to be exported, yielding *backward* participation in GVCs.

Total GVC participation in gross exports is measured as sum of forward and backward participation.

¹³ In 2018, of the domestic value-added in India's gross exports, 63.6% was sent to the consumer economy, 16.5% was sent to third economies (to GVCs) and 0.1% was re-imported in the economy.

2.1.1 Trends in India's gross exports, domestic and foreign value-added, 1995-2018

While both domestic and foreign value-added components in gross exports increased considerably from 2005 (Fig. 1.a), there was a precipitous fall at the height of the trade collapse in 2008/09. The gap between gross exports and domestic value-added widened as foreign value-added peaked in 2012/13 (reflecting deepening international fragmentation of production) before declining rapidly in 2015/16, followed by an increase in 2018. In percentage terms, domestic value-added experienced a steady decline from 90% of total gross exports in 1995 to the lowest level of 74% in 2012, before reaching 80.2% in 2018. The trend of declining domestic value added in gross exports has however been observed for most developing economies and many developed economies, accompanied by an increase in the share of gross exports in the respective countries' GDP, manifesting the increased integration of countries into global production networks (Roy, 2020). Though increasing steadily, foreign value-added in gross exports (19.8% in 2018) was 1.5 percentage points lower than in 2008 (Fig. 1.b).

The declining trend in domestic value-added has been more prominent in manufacturing, with domestic content at 71.1% of gross exports in 2018 (Fig.1.c). Banga (2014a) highlights that declining value-added growth not only adversely impacts employment generation, technology upgradation, skill development, etc. but increasing imports of inputs by industries without adding much value to their exports would have a "hollowing-out" effect.¹⁴ Further, domestic value-added in exports of intermediate goods (as share of gross exports)¹⁵ steadily declined till 2012 and the small recovery by 2015 could not be sustained. This decline was also more perceptible in manufactures than in total exports (Fig. 1.d).



Fig. 1: Trends in India's domestic and foreign value-added, 1995-2018

¹⁴ For India, Guha-Khasnobis et al. (2023) find that stronger backward linkages in GVCs have a labour displacement effect whereas stronger forward linkages created employment opportunities, though for unskilled workers. Veeramani and Dhir (2022, p.1011) however state that "greater backward GVC participation-use of imported inputs to produce for exports-leads to higher absolute levels of gross exports, DVA and employment. This result implies that labor abundant countries can reap dividends by adopting policies aimed at strengthening their backward participation in GVCs." Also, Jangam and Rath (2021) find that GVC participation enhances domestic value-added in exports.

¹⁵ India's *intermediate* products as percentage of gross exports (imports) were 52.7% (60.5%) in 2018. Correspondingly, 52% (71.7%) in China, and 57.5% (49.5%) in USA.

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1.c. Domestic and foreign value-added (percent of total 1.d. Domestic value-added in exports of intermediate manufactures gross exports) goods (percent of gross exports), total and manufactures Domestic value-added and foreign value-added (% of gross exports) Manufacturing Domestic value-added in exports of intermediate goods (% of gross exports) 50 90 -80 -70 -60 -50 -40 -30 -Percentage 0 72 20 10 30 500 2002 2003 2004 2005 2006 2008 2009 2010 2011 2012 2013 2014 3 2016 995 2015 2017 Manufacture Domestic value-added Foreign value-added

2.1.2 Forward, backward and total GVC participation, India and select economies, 1995-2018

But for somewhat higher rates (17-18.5%) during 2004-08, India's forward GVC participation mostly remained about 15-16% over the entire time period (16.5% in 2018) (Fig. 2.a). Backward GVC participation increased steadily since the mid-1990s, and but for the sharp decline during the financial crisis, it peaked to 25.9% in 2012 before declining to 17.6% in 2016, reaching 19.8% in 2018. Total GVC participation rose from 24.5% of gross exports in 1995 to 36.4% in 2018, with the highest participation rate of 41.6% in 2012, and subsequent decline till 2015-16. Over the entire period, India's overall GVC-participation rate was however amongst the lowest in comparison with selected economies in Asia-Pacific, especially, Singapore, Chinese Taipei, Malaysia and Viet Nam (Fig. 2.b). Also, while China and India had comparable GVC participation rates, India's GVC linkages have been more backward leaning over time (Fig. 3.a below).

Fig. 2: Trends in GVC participation, India and select economies, 1995-2018

2.a. India's forward, backward and total GVC participation 2.b. Total GVC participation (percent of gross exports), (percent of gross exports) India and select economies in Asia-Pacific





The extent of forward and backward GVC-participation varies substantially across developed and developing economies (Fig. 3.a). Amongst OECD economies, USA had the lowest backward linkages, 9.5% in 2018. Also, while forward linkages were stronger than backward linkages in economies such as Japan and USA (right of the 45 degree line), it was vice-versa for Korea. Between 2000 and 2018, several economies in non-OECD such as Malaysia, Chinese Taipei and China increased their forward linkages while Viet Nam experienced a decline. Backward

Source: Based on OECD TiVA Database (2021).

linkages increased for Viet Nam and Japan while there was a decline for Malaysia and Lao. India's forward linkages increased marginally from 16.2 to 16.5%, while backward linkages surpassed forward linkages to reach 19.8% (6 percentage points higher than in 2000). Fig. 3.b shows that in 2018, about a quarter of the backward and forward linkages of OECD (and non-OCED) economies with non-OECD were with China alone.¹⁶ Further, in these GVC-linkages, China's relative position was nearly four-five times that of India.







Notes: For economies' names and codes, see Appendix Table 1. *Source*: Based on OECD TiVA Database (2021).

2.2 Measuring GVC participation (ADB, 2022)

2.2.1 Trade-based approach

In BM (2019, 2023), the gross export flows are decomposed into five mutually exclusive value-added categories (Box 1), and as detailed below, GVC participation rate is measured as the share of indirect trading in gross exports.

This approach indicates the intensive rate of participation and excludes DAVAX or direct trading to arrive at 'GVC-related' or 'indirect trade' (REX + REF + FVA + PDC) as value-added crosses at least two borders before final consumption or is re-exported at least once before absorption in final demand. The total GVC participation rate $\frac{REX+REF+FVA+PDC}{Gross Exports}$ is sum of forward $\frac{REX+REF}{Gross Exports}$ and backward $\frac{FVA+PDC}{Gross Exports}$ participation rates. Fig. 4.a shows the export makeup of India for 2018, 2019 and 2020 indicating that 'traditional' trade constituted the largest component of gross exports (66.6% in 2020), while GVC-related trade was 33.4% (forward participation rate being 15.8% and backward participation rate 17.6%). Fig. 4.b

¹⁶ Banga (2014b, p.280) states that "China can be called the epicenter of GVCs in the developing world for developed countries."



(iii) Reflection (REF): domestic value-added in intermediates that is exported to and re-exported by *P* to be eventually imported back home and absorbed by *H*.

- (iv) Foreign value-added (FVA) content embodied in exports from H to P.
- (V) Pure double-counting (PDC): Though not a value-added category, it accounts for value-added exports that cross the same border twice or more.

indicates that in Asia-Pacific, while India's trade-based GVC participation increased from 30.7% to 33.4% over 2000-2020, more dynamism is evident for Nepal, Brunei Darussalam, Cambodia, and most notably Viet Nam, indicating GVC-related trade and production opportunities for these economies. Xing et al. (2021) note that despite being in the top five economies by the magnitude of indirect exports, USA and China's GVC participation rate is below the world average, unlike European players' growing integration in cross-border supply-chains. The study notes that while in 2010, China was a major export processing center, using a huge volume of components made elsewhere, a final-assembly point for export, it now produces many more inputs and the whole product for export, with more products following the traditional trade pattern.

2.2.2 Production-based approach

In WWYZ (2017), GVC participation is measured as the share of unfinished exports of domestic value-added in total value-added generated. More specifically, 'GVC-related production' is given by unfinished exports of domestic value-added (DAVAX2+REX+REF), and the share of exports of intermediates in GDP gives the *total* GVC participation rate $\frac{DAVAX2+REX+REF}{GDP}$, ¹⁷ that is conceptually similar to WWYZ's *forward* GVC participation rate $\frac{Y_GVC_S+Y_GVC_C}{Value added}$ but not additive with *backward* GVC participation rate $\frac{Y_GVC_S+Y_GVC_C}{Final Consumption}$. The trade and production based approaches can give different GVC participation rates for the same country or country-sector. Fig. 4.c for production-based GVC participation expanded (as did India's, from 11.2% to 15.8%).

Fig. 4: Measures of GVC participation, India and economies in Asia-Pacific



Source: Based on ADB (2022).

3. Skewed distribution of benefits from GVCs

The emergence of GVCs is considered to have lowered the threshold for developing economies to benefit from gains from trade and specialisation as even without establishing complete production capabilities from upstream inputs close to the producer, to middle stages of manufacturing and assembly, usually involving lower-technology inputs¹⁸ and low wages, to downstream services close to the consumer, they can plug into GVCs, and specialise in activities according to their comparative advantage. Advanced economies with

¹⁷ Further, WWYZ (2017) break down the GVC segment (production activities that are for intermediate trade or further processing along GVCs) into simple (complex) GVCs, that is, production of intermediate inputs that cross borders once (multiple times). Simple GVCs are part of traditional trade in BM (2019, 2023) where DAVAX2 is still considered as traditional trade.

¹⁸ Such as molded plastic.

higher valued-added components, however, show up in GVCs upstream (financial services, knowledge-based R&D for new technology and high-tech components, design, brandbuilding) and downstream (market knowledge and after-sales) in what is referred to as the "smile curve." Also, the "paradoxical pair of concerns" between the core and the periphery seems to have exacerbated over time with developing country-sectors' position in exports of GVC products moving further towards the bottom, getting a small proportion of the global profits, with the deepening of the "smile," while the nodes/MNE firms¹⁹ from advanced economies dominate the global assembly line,²⁰ usually with higher compensation for highskilled labour.²¹ Firms such as Apple Inc., Nike Inc., Qualcomm Inc. and Advanced Micro Devices Inc. (AMD), often examples of "factoryless" manufacturing organise GVCs on the basis of their intellectual property (IP), exporting services related to intangibles through tangibles produced by foreign contract manufactures, thus earning through trade in intangible assets along GVCs.²² Furthermore, the gains in value-added and jobs upon joining GVCs may vary greatly across different skill levels of labour domestically, that may have contributed to the move against globalisation and rise of trade protectionism (Meng et al., 2021).

3.1 Countries' share in total global value-added created within GVCs

For 2000, 2008 and 2018, Fig. 5.a shows that the gains from GVC participation are tilted towards few developed economies, and China (that increased its share from 3% in 2000 to 7% in 2008 and 9% in 2018) while India's small relative gains increased marginally (from 0.6% in 2000 to 1.5% in 2008 and 2% in 2018). For 2009, Banga (2014b) showed that 67% of the total global value-added created within GVCs accrued to OECD economies, while ROW gained only 8%. Fig. 5.b shows that even in 2018, 63% of the total gains still accrued to OECD with the share of USA (8%), Germany (7%) and Japan (4%), while ROW gained only 6%. Non-OECD (excluding China, India and ROW) gained 19%; China amassed nearly 25% of the gains that accrued to all non-OECD; and China, USA, Germany, France, Japan, Korea and United Kingdom had a combined share of nearly 39%. Also, higher participation in GVCs may not ensure higher gains. Viet Nam, Thailand and Philippines had higher GVC

¹⁹ Thun et al. (2022, p. 8) however note that "While a value chain is typically controlled by a lead firm, and an ecosystem may include firms that are able to exert strong leadership, it is often the case that no single firm "controls" the complicated constellation of firms that are working together to create collective value (Furr et al. 2022)...." Different industries in the digital economy are increasingly organised in massively modular decentalised systems.

²⁰ In discussing the inadequacy of GVC specific policies and limited role played by lead firms in India, Ray and Miglani (2020) argue for a 'whole-of-the-supply-chain' policy approach.

²¹ Global Value Chain Development Report (2017, p. 3) notes that even in rich-countries, there is "worry that manufacturing is being hollowed out—that is, that semiskilled production jobs have moved to developing countries or, to the extent that such jobs still remain in advanced economies, have suffered downward pressure on wages."

²² For example, Xing et al. (2021) report that in 2020, in the iPhone value chain, Apple's intangible assets embedded in the phone account for almost 59% of its retail price, while in 2018, Nike Inc. captured almost 43.8% of the value-added of its products sold in the global market.

participation rates than India (Fig. 2.b above), yet, their individual share in total value-added created within GVCs remained less than 1.5%, though Viet Nam experienced much higher gains in 2018 than in 2008.





Notes: In Fig. 5.b, shares are rounded off. *Source:* Based on OECD TiVA Database (2021).

3.2 Countries' share in total value-added created within forward and backward linkages

The distribution of gains in total value-added created within *forward* linkages has been tilted towards USA, China, Germany, Japan, and Russia (due to its natural resource exports) (Appendix Fig. A.1.a). India's relative gains increased from 0.7% in 2000 to 1.4% in 2008 and 1.8% in 2018, while China's gains increased from 3% in 2000 to 6% in 2008 and 10% in 2018. In 2018, 61% of the benefits accrued to OECD (Appendix Fig. A.1.b) where the top five economies had a larger share than in total value-added within GVCs. The distribution of gains in total value-added created within *backward* linkages was tilted towards China, Germany, Korea, USA and Singapore. India's share increased from 0.6% in 2008 and 9% in 2018 (Appendix Fig. A.1.c). In 2018, 65% of the benefits accrued to OECD, though the top five economies had a smaller share (Appendix Fig. A.1.d) than in total value-added within GVCs. USA's share in total global value-added created within forward linkages (12%) was substantially higher than in backward linkages (4%).

3.3 Countries' net value-added gains from GVCs

Banga (2014b) states that countries' ratio of forward to backward participation indicates 'net value-added' gains from GVCs, with a ratio less than one indicating negative net value-added gains. In this context, Roy (2020) also argues that to comprehend the gains and losses through participation in global production networks, it is necessary to measure the net gain, as though increasing backward linkages manifest a country's dependence on other countries in the production structure for technology absorption, a country's contribution in foreign

exports may increase at the same time. It is postulated that though in the regional context, an increase in productivity and participation in high value-added activities may increase a country's share in value-added in GVCs, as also protect the rents that are institutionally created in different roles,23 in the North-South context, however, despite increasing productivity and upgrading, it may not be possible for developing countries to increase their share in value-added gains due to a structurally unequal state (an undervaluation in the goods and services produced or tasks performed by developing countries, e.g., light engineering and assembly of imported inputs, and standardised services), and an overvaluation of the goods and services produced by developed countries). Taking the ratio of forward to backward linkages as a different version of the terms of trade (TOT) in the international context, a decline in the net gains for developing countries even with increasing GVC participation is discussed in the study in terms of TOT moving against developing economies, and structural asymmetry with regard to their prospects for upgradation (Kaplinsky, 2007; Milberg and Winkler, 2010).²⁴ As shown in Fig. 6.a, in 2018, the highest participation gains were indicated for Australia (2.8), USA (2.7), Norway (2.5) and Indonesia (1.7). China's net gains exceeded one, while India's net gains were 0.83 signifying that domestic value-added that entered other countries' exports was lower than what was imported from other countries for exports.

3.4 Integration into GVCs

Fig. 6.b shows that in 2018, in the low-technology textiles sector, over 45% of the foreign value-added in gross exports in China, 55% in Italy, and 35% in India was sourced from OECD, indicating that a large share of the value-added gains were located in the developed economies. While China was a major source of foreign value-added for India and Italy, India's position as a source of foreign value-added was relatively small. USA's relative share in OECD was indicated to be about 23% (for China) and 28% (for India).²⁵ In the medium-to-high-technology electricals sector, 60% of the foreign value-added in gross exports in China, 50% in USA, and 40% in India was sourced from OECD, indicating even stronger backward linkages and location of benefits in rich countries.²⁶ A similar picture was revealed in all manufacturing, and in all sectors total as well.

²³ "Chains are primarily repositories of economic rents that emerge out of scarce assets created through innovation or derived from privileged access to resources. In other words, the creation of rent at various nodes of value chains through a continuous process of upgrading and innovation defines the premium over and above the average rate of profit" (Roy, 2020, p.36).

²⁴ For details on unequal returns and value capture in global production networks related to differentials in unit price of exports, profit rates, organic composition of capital, and valuation of goods and services amongst developed and developing economies, refer Roy (2020).

²⁵ In the textiles sector, domestic value-added in gross exports was 86.5% in USA, 85.4% in Japan, 87% in China, 81.3% in India, 67.4% in Korea, 61.8% in Chinese Taipei, 65.4% in Malaysia, and 42.4% in Viet Nam.

²⁶ In the electricals sector, domestic value-added in gross exports was 91.7% in USA, 81.2% in Japan, 75.2% in China, 74.3% in India, 72.6% in Korea, 58.7% in Chinese Taipei, 47.9% in Malaysia, and 38.7% in Viet Nam.

To examine "at what stage of production is India integrated into GVCs," in UNIDO Industrial Analytics Platform (IAP)²⁷ "the foreign value added in India's exports and its value added in other countries' exports is used as an indicator of its participation in value chains. The former depicts the contribution of imports from any country at any stage of production to India's exports...The latter signifies the contribution of India to any stage of production of its partner countries' exports." Using OECD-TiVA database (2021) it is reported that in 2018, for India, *all manufacturing*, the top sources of foreign value-added in exports were Saudi Arabia (11.2%), China (9.9%), USA (8.7%), Australia (3.6%) and Indonesia (2.5%), while the top destinations for domestic value-added in foreign exports (by user country) were China (10.3%), Germany (7.4%), USA (6.3%), Korea (5.6%) and Viet Nam (4.3%).²⁸

Fig.6: Participation gains and integration in GVCs

6.a. Net value-added gains: ratio of forward to backward linkages, select developed and developing economies, 2000, 2008 and 2018







Notes: In Fig. 6.a, Russia and Saudi Arabia are dropped due to their high raw material exports. *Source:* Based on OECD TiVA Database (2021).

4. Services in value-added trade and GVCs

For OECD TiVA indicators, Martins Guilhoto et al. (2022, p.33) state that "The indicators dealing with service value added content consider only the service industries as a source of value added in the exports by all industries. Service industries include Construction, Wholesale and retail, Accommodation and food services, Transportation services,

²⁷ https://iap.unido.org/data/global-value-chains?p=IND&s=CHN&i=D.

²⁸ Alternatively, to examine "how is production in India integrated into GVCs," UNIDO IAP uses "intermediate imports and exports as indicators of a country's participation in global value chains. Intermediate products are not sold directly to consumers but are further processed by the buyer. The destination and origin countries of India's intermediate products represent its partner countries in global value chains. A higher share of intermediate exports and imports indicates stronger participation in global chains." manufacturing, using value For 2021, for India, all CEPII BACI data (http://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele.asp), it is reported that the top sources of India's intermediate imports were China (21.5%), Switzerland (10.6%), USA (6.0%), United Arab Emirates (5.3%), and Hong Kong, China (4.3%), while the top destinations for India's intermediate exports were USA (17.6%), China (6.6%), United Arab Emirates (4.6%), Hong Kong, China (4.1%) and Bangladesh (3.5%).

Information and communications, Financial and insurance, Real estate, Professional, scientific and technical services, Administrative and support services, Public Administration, Health, Education and Personal services i.e. defined as ISIC Rev.4 Divisions 41 to 98."

4.1 Services value-added content of gross exports

Globally, driven in part by the growing number of services that support manufacturing ("servicification" of manufacturing),²⁹ the past few decades have seen unprecedented expansion of services in employment, GDP, and trade shares. Heterogeneous services that differ in skill requirements, automation and exposure to digital progresses are important inputs in almost all stages of a supply-chain as well. The upstream position of many highly traded services implies that trade in services is mainly trade in intermediates and trade in value-added approach better reflects the significantly higher contribution made by services in GVCs (OECD, 2022b).³⁰ Services also make important contributions in functional upgrading,³¹ and sustaining firms' GVC participation (Reddy and Sasidharan, 2022). Xing et al. (2021, p. 106) note that "Importantly, services not only contribute to manufacturing and agricultural value chains but they also, increasingly, form their own value chains, since the "production" process of certain services allows for fragmentation similar to that of goods. For example, the software production process can be separated into architecting, developing code, testing, implementation, marketing and distribution, maintenance, helpdesk, and training and education (Sharpe 2009). This enables countries to join services GVCs just as they joined goods GVCs."

Services value-added as share of India's total gross exports has risen consistently and was 51.1% in 2018 (44.8% sourced domestically and 6.3% from other countries) (Fig. 7.a). Though this was below the OECD average of 55.7%, it was higher than that of China (37.8%). For economies at lower levels of development, the much lower contribution of services to gross exports, for instance, in Viet Nam (30.6%) and ROW (31.8%) indicate lower chances of upgrading in GVCs to higher value-added tasks associated with services activities and raising participation gains (Fig. 8.a below).

²⁹ ADBI (2018) notes that "Servicification, perhaps a more general term (see Swedish National Board of Trade definition, 2016), can come in the form of servitization (in-house provision) or servification (splintering and outsourcing)."

³⁰ Cadestin and Miroudot (2020) point out that "Not only do manufacturing firms rely on services inputs to create value and to organise their activities in global value chains, they also produce and sell services together with goods, a phenomenon described as the servitisation of manufacturing...Leaving aside the specific case of distribution services, 'Other business services', 'Construction' and 'Research and development' are the most common services supplied by manufacturing firms. With respect to industries, 'paper and printing', as well as 'repair and installation' come first in terms of prevalence of bundles of goods and services."

³¹ Banga (2022a) shows that an increase in digital capability has a positive and significant impact on firms' product sophistication, enabling them to upgrade and climb up the value-chain ladder. Manghnani et al. (2021) find that firms with more intensive use of complex services, IT and IT-enabling services are more deeply integrated into GVCs.

Domestic value-added contribution of primary and manufacturing sectors to global gross exports has come down and was 35.3% in 2018, while domestic value-added contribution of services sectors has risen (38.2% in 2018). Foreign value-added contribution of primary and manufacturing sectors to global gross exports has risen and was 13.1% in 2018, as has foreign value-added contribution of services sectors (13.4% in 2018) (Fig.7.b). As it is firms from developed economies that generally possess the intangibles for higher value-added GVC activities, it is in the 13.1% component that developing economy firms can plug in (Banga, 2014b). The foreign value-added contribution to India's gross exports (19.8% in 2018) reflects the same rising pattern as at the global level, including the modest decline between 2008 and 2018 (Fig. 7.c).

Fig. 7: Services value-added content (percent of gross exports), by origin

7.a. Services content (percent of total
and manufactures gross exports), India, value-added (percent of gross exports), value-added (percent of gross exports),
Global, 2000, 2008, 20187.c. Domestic and foreign sectoral
value-added (percent of gross exports),
India, 2000, 2008, 2018



Source: Based on OECD TiVA Database (2021).

While services value-added contribution to total gross exports was higher in India than in several developed and developing economies (Fig. 8.a below), though rising consistently for manufactures (Fig. 7.a), this share, at 23.9% of gross exports in 2018 (16% sourced domestically and 7.9% from other economies) was below the OECD average (34.5%) and that of several other developing economies, including China (29.4%) (Fig. 8.b). Also, though the rising contribution of foreign services in both total and manufactures gross exports reflects the "servicification" of India's backward linkages, the services foreign value-added content of India's manufactured exports was lower than that of several developing economies.³²

Fig. 8: Services value-added content (percent of gross exports)

8.a. Domestic and foreign sectoral value-added (percent of 8.b. Services content (percent of total manufactures gross total gross exports), India and selected economies, 2018 exports), India and selected economies, 2018

³² For role of imported services in linkages into GVCs, see Goldar et al. (2018).



Source: Based on OECD TiVA Database (2021).

4.2. Industry foreign value-added contribution

For 2018, average shares of foreign value-added contribution to gross exports, for primary, low-technology manufacturing, medium-to-high technology manufacturing, ³³ and services sectors, for OECD (6%, 17%, 50% and 28%), non-OECD (13%, 19%, 38% and 30%), and ROW (20%, 23%, 31% and 26%) reflect that GVC engagement via backward linkages had "bypassed low-technology manufacturing" (Banga, 2014b). In India, as well, less than 25% of foreign value-added in gross exports is indicated to have gone into low-technology manufacturing. A relatively higher share (20%) went to services sectors, in comparison with China (7.4%), where manufacturing, especially, medium-to-high technology captured relatively higher foreign value-added (Fig.9).

³³ The primary sector covers agriculture, hunting, forestry and fishing; and mining and quarrying. Low-technology manufacturing covers food products, beverages and tobacco; textiles, wearing apparel, leather and related products; wood and products of wood and cork; paper products and printing; rubber and plastics products; manufacturing n.e.c.; and repair and installation of machinery and equipment. Medium-to-high technology manufacturing covers coke and refined petroleum products; chemical and chemical products; pharmaceuticals, medicinal chemical and botanical products; other non-metallic mineral products; basic metals; fabricated metal products; machinery and equipment n.e.c.; computer, electronic and optical products; electrical equipment; motor vehicles, trailers and semi-trailers; and other transport equipment. For consistency, sector categorisation follows ADB (2022), (Appendix Table 2).



Fig.9: Industry foreign value-added contribution to gross exports (percent), 2018

Source: Based on OECD TiVA Database (2021).

5. Sectoral trends, India

In the following analysis, GVC participation follows the BM (2019, 2023) trade-based approach, and export-sector based disaggregation (based on the sector that actually exports rather than where the value-added originated).

5.1 Total GVC participation, 2000, 2010, 2018, 2020

5.1.1 Agriculture, mining, manufacturing and utilities

Nearly all sectors in agriculture, mining, manufacturing and utilities are indicated to have higher GVC participation in 2010 than in 2000. Some waning is indicated in refined fuels, chemicals, leather, manufacturing, n.e.c., and utilities in 2018, while all sectors exhibited a decline, thereafter. In 2020, metals, and refined fuels exhibited the highest GVC participation rate, followed by rubber and plastics, chemicals, machinery, n.e.c., electricals, and transport equipment; while agriculture, wood, food and beverages had the lowest GVC participation (Fig. 10.a).

5.1.2 Services

While most services sectors exhibited increased GVC participation in 2010 than in 2000 (Fig. 10.b), some decline is indicated in business activities, n.e.c.,³⁴ wholesale and retail trade, sale of motor vehicles, personal services, n.e.c., real estate, and education. While nearly all sectors exhibited increased GVC participation in 2018, slowing GVC dynamics is observed thereafter, especially in transport sectors that experienced weakening economic activity due to induced travel restrictions following the Covid-19 crisis. Despite this, in 2020, water transport, inland transport, transport activities, n.e.c., hotels and restaurants, air transport and telecommunications had the highest GVC participation rates. Personal services, n.e.c., and education had the lowest GVC participation. The construction sector exhibited relatively higher participation in 2018 than in the other years.



Fig. 10: Trade-based GVC participation, by sector, India, 2000, 2010, 2018 and 2020

5.2 Forward and backward GVC participation, 2020

The extent of forward and backward leaning of a sector informs whether it is oriented towards a particular role in a value chain, or is balancing its 'seller' side in re-exported and reflected domestic value-added with its 'buyer' side in absorbing foreign value-added in exports. In 2020, rubber and plastics, chemicals, mining, metals, and agriculture had higher forward participation indicating that re-exported domestic value-added from these sectors was important in India's forward supply-chain; while food and beverages, and utilities had minimal forward participation. Backward participation was the highest in refined fuels, metals, electricals, transport equipment, machinery n.e.c., manufacturing, n.e.c., and in utilities; while wood, mining, and agriculture had amongst the lowest backward

Notes: For sector description and short title, see Appendix Table 2. Source: Based on ADB (2022).

³⁴ Xing et al. (2021, p. 12) note that the "other business activities" sector is a residual category that captures various business-related services in management, law, and information technology besides other areas (covering J582, J62-J63, M69-M74, N77-N78, and N80-N82 in ISIC Rev. 4), with India for software services and the Philippines for business process outsourcing (BPO) being well-known specialists. However, their participation in these services GVCs is largely in routine and low value-added tasks due to the technology and market gap. The study notes that getting into higher-end, generic software packages and softwareas-a-service (Amazon Inc., Google LLC, and Microsoft Corp. being the biggest firms) requires a dynamic domestic market and high level of R&D expenditure in which small firms are at a disadvantage.

participation. Further, forward and backward participation showed near synergy in textiles (Fig. 11.a). In services sectors, forward participation in water transport, transport activities, n.e.c., and services of private households was amongst the highest; while lowest forward participation was exhibited in other community services, health and social work, and education. Hotels and restaurants, inland transport, and telecommunications had the highest backward participation; while real estate, public administration, and services of private households had zero or nearly zero backward participation (Fig. 11.b). Further, most manufacturing sectors embodied more foreign value-added in exports; while most services sectors had greater domestic value-added content in "indirect" trade.





5.3 Forward and backward orientation, 2010 and 2018

The slope of each line connecting participation rates of each sector in 2010 and 2018 (Fig. 12.a) reveals changes in value-added composition or sourcing patterns. Evidently, some sectors increased the gap between forward and backward linkages hugely while some sectors showed near synergy. Increased forward linkages in agriculture (paired with near about the same backward linkages); in rubber and plastics, chemicals, machinery, n.e.c., transport equipment, and manufacturing, n.e.c. (paired with decreased backward linkages); in mining, textiles, wood, minerals, n.e.c., and electricals (paired with increased backward linkages). Decreased forward linkages in refined fuels (paired with decreased backward linkages); and in metals, food and beverages, paper, and leather (paired with increased backward linkages).

In the services sector, *increased forward linkages* in personal services, n.e.c. (paired with decreased backward linkages) and in construction, real estate, retail trade, education, health and social work, wholesale trade, finance, sale of motor vehicles, construction, transport activities, n.e.c., inland transport (paired with increased backward linkages). Decreased forward linkages in business activities n.e.c. (paired with decreased backward linkages) and in water transport, telecommunications, air transport (paired with increased backward linkages) (Fig.12.b).

Source: Based on ADB (2022)



Fig. 12: Forward and backward orientation, 2010 and 2018

Source: Based on ADB (2022).

5.4 Net participation gains in GVCs, by sector, 2010 and 2018

In 2018, the highest participation gains in net value-added terms were indicated in agriculture and mining, followed by wood, rubber and plastics, chemicals (Fig. 13.a) and several services sectors including those in trade and finance that were indicated to have net participation gains exceeding one (Fig. 13.b). Participation gains in leather and paper, and several services sectors including telecommunications exhibited lower gains than in 2010. In comparison, China experienced positive and increasing net participation gains in most manufacturing and services sectors (Fig.13.c, Fig.13.d),³⁵ while despite high GVC participation rates, Viet Nam did not experience net gains in manufacturing and several services sectors (Fig.13.e, Fig.13.f).36

Global Value Chain Development Report (2017) shows that between 1995 and 2009, the total value-added produced by Chinese electrical and optical sector expanded about tenfold, and though China was at the bottom point of the "smile curve" throughout this period, reflecting assembly activity at low wages in the value chain, a huge number of workers could be engaged for work in related factories. Despite its dominating position in global exports in electricals, as in 2009 (Banga, 2014b), and though higher than in 2010, China did not report net positive gains in this sector.

³⁶ For Vietnamese firms, Korwatanasakul and Hue (2022) find that forward linkages have a positive and significant effect on firms' labour productivity via learning by exporting and learning by supplying.



13.a. Agriculture, mining, manufacturing and utilities, India

13.b. Construction and services, India

13.d. Construction and services, China





13.c. Agriculture, mining, manufacturing and utilities, China



13.e. Agriculture, mining, manufacturing and utilities, Viet 13.f. Construction and services, Viet Nam Nam



Source: Based on ADB (2022).

6. Sectoral trends, Asia-Pacific

Regionally, in manufacturing capabilities, China accounted for the largest share (55.6%) of Asia's manufacturing value-added (MVA) in 2020, while India was the fourth largest (share of 5.8%), a top hub in Southern Asia (71.8% of MVA). Manufacturing accounted for 15.9% of India's GDP in 2020, while in China, this share was higher (26.2%).³⁷ In 2021, Asia accounted for 44.4% of India's exports, and 61.8% of imports (with China's share as high as 15.3%).³⁸

³⁷ Based on UN National Accounts (2021), Analysis of Main Aggregates (database), <u>https://unstats.un.org/unsd/snaama/</u>.

³⁸ Based on UN Comtrade (2021) database, <u>https://comtrade.un.org/</u>.

India's regional cooperation and trade integration have provided opportunities to scale up merchandise exports.³⁹ In 2020, India was the top destination for FDI in Asia-Pacific by project numbers with a regional market share of 16.2% while China's share was 15.6%. In capital investment in the region, while China was the largest recipient of regional FDI (18% share), it was followed by India (15% share).⁴⁰

6.1. Forward and backward GVC orientation, 2010 and 2018

Regionally, in GVC orientation, between 2010 and 2018, India's overall forward (backward) participation changed from 19.5% (19%) to 19.5% (22%) reflecting increased backward leaning (Fig. 14.a). The primary sector revealed a strong forward leaning (in 2018, forward participation of 33% paired with a backward participation of 7%) (Fig. 14.b). Low-technology manufacturing exhibited marginal change, though more in forward content (in 2018, forward participation of 18.3% paired with a backward participation of 18.5% exhibiting evenness in the two rates) (Fig. 14.c). Medium-to-high-technology manufacturing also saw marginal change, though more in backward content (in 2018, forward participation of 19% paired with a backward participation of 33.5%) (Fig. 14.d).⁴¹ In exporting business services, both forward and backward linkages increased (in 2018, forward participation of 24% paired with a backward participation of 16%) (Fig. 14.e). Personal and public services exhibited forward leaning (in 2018, forward participation of 16%) (Fig. 14.e). Personal and public services exhibited forward leaning (in 2018, forward participation of 16%) (Fig. 14.e).



Fig. 14: Forward and backward GVC orientation, selected economies in Asia-Pacific, 2010 and 2018

³⁹ PIB (20 July 2022), <u>https://pib.gov.in/PressReleasePage.aspx?PRID=1843902.</u>

⁴⁰ Based on The fDi Report 2021, Asia-Pacific, pp.12-13 (fDi Markets).

⁴¹ Both low and medium-to-high-technology manufacturing displayed more prominent backward linkages and wider dispersion in all regional economies.

⁴² This sector features the smallest GVC participation as these services are not commonly imported into other economies (ADB, 2022).



14.e. Business services

14.f. Personal and public services

Notes: For sector description, short title and code, see Appendix Table 2. *Source*: Based on ADB (2022).

While broad sectoral comparisons of the changing extent and forward (backward) leaning in GVCs hides industry level dynamics, nevertheless, the forward leaning of the primary sector suggests the possibility of increasing GVC-gains towards farmers, food-product makers, and innovative policies that favour upgrading for sustainable development.⁴³ Also suggested is the need to further linkages of lead firms with local businesses, credit schemes to enable farmers to access small loans, large corporations helping local partners or suppliers to upgrade to meet environmental standards. Despite potential for raw material and labour absorption, and possibilities for small and medium enterprises (SME) integration, in comparison with several other economies in the sub-region, such as Korea, Malaysia, Chinese Taipei, Sri Lanka and Bangladesh, India's forward linkages expansion in lowtechnology manufacturing has been modest. Also, IR4.0 technologies that are expected to change the dynamics of advantage from tangible to intangible resources will impact leveraging labour cost differences among other locational factors, as in the past (Kumar, 2023). The backward leaning in medium-high technology manufacturing while indicating that "exports require imports," also bring forth questions related to tariffs. OECD (2022a) notes that "GVCs magnify the costs of tariff protection, since tariffs are cumulative when intermediate inputs are traded across borders multiple times."44 Also in comparison are Malaysia and Chinese Taipei that are firmly embedded in GVCs, and have experienced substantial reductions in backward participation and increased forward participation. The small slant in forward participation in business services suggests the imperative need to raise

14.d. Medium-to-high technology

⁴³ For example, in Uganda, Uganda Breweries Limited has been spearheading in the implementation of sustainable, domestic value creation across its supply-chain by emphasising on procuring raw materials from local communities and assisting local farmers in streamlining their supply-chains. https://supplychaindigital.com/company-reports/uganda-breweries-procuring-local-communitiesdrive-change-uganda.

⁴⁴ For Indian electronics firms, for instance, Francis and Kallummal (2021) emphasize on relating "macro policy aspects of trade and FDI liberalisation and industry-specific policies with firm-level business strategies, to understand the impact of policies on the nature of an industry's FDI-led GVC engagement and its implications for the industry's development trajectory."

competitivesss in all sectors apart from those that have so far been dominating in services offshoring to India. Increasing forward participation in personal and public services suggests potential in capturing the gains for an educated and skilled workforce through increased GVC participation.

6.2 Forward and backward GVC content, 2018 and 2020

In Asia-Pacific, by sector, electricals had the largest share in forward GVC content from the region (and backward GVC content to the region), that is, it was the most GVC-intensive sector. Next in prominence, though substantially less than electricals were sectors such as metals, chemicals, transportation equipment, refined fuels, machinery, n.e.c., textiles, rubber and plastics; and water transport, wholesale trade, and other business activities, n.e.c. that had relatively more GVC-interconnections than the remaining sectors (Fig. 15.a). By economy, China had the largest share in forward GVC content from the region (and backward GVC content to the region) followed by Korea, Japan, Chinese, Taipei, Singapore and India. Though India is a small player in GVCs in terms of the share in value-added gains (section 3 above), its position at the regional level in terms of this metric, is not as peripheral (Fig. 15.b). At the individual sector level (Appendix Fig. A.2), in 2018 and 2020, China had the highest share in forward (and backward) GVC content in both low-and-medium-to-high technology manufacturing sectors, with a higher share in forward than in backward GVC content. India's share in forward GVC content was between 5-10% in most sectors, higher in manufacturing, n.e.c. than in the other sectors. Further, in most manufacturing sectors, China's share increased from 2018 to 2020.



Fig. 15: Share in forward and backward GVC content, Asia-Pacific, 2018 and 2020

Notes: For sector description, short title and code, see Appendix Table 2. *Source*: Based on ADB (2022).

7. Trade, FDI and GVCs

RCA helps assess trade specialisation or an economy's standing in global production (ADB, 2022). The traditional revealed comparative advantage (TRCA) index (Balassa, 1965), that is the ratio between the share of sector *i* in economy (*j*)'s exports and the share of that sector in global exports reveals the economy's comparative advantage (or relative international competitiveness) in sectors where this ratio is over one.⁴⁵

7.1 RCA based on gross exports and value-added exports, India, 2020

As not all exported value originates domestically, the gross exports based TRCA index may be misleading in characterising an economy's comparative advantage, and the GVC-activity adjusted new revealed comparative advantage (NRCA) index (ADB, 2022) based on valueadded exports instead may provide a more accurate picture of competitiveness and reveal diverging pictures of comparative advantage,⁴⁶ with a value greater than one for a sector suggesting that "domestic value-addition from this sector was embodied in the exports actually sent out by the economy." For 2020, some re-ordering is observed in agriculture and utilities where the comparative disadvantage is reversed under NRCA (Fig.16.a). In lowtechnology manufacturing, near stability is observed in both the indicators that suggest a comparative advantage in textiles and leather; while the comparative advantage in minerals, n.e.c., and manufacturing, n.e.c. is reversed under NRCA. In medium-to-high technology manufacturing, both indicators suggest a comparative advantage in refined fuels, chemicals, and metals (Fig.16.b). In the services sectors, telecommunications, air transport, business activities, n.e.c., inland transport, personal services, n.e.c., and private households show a comparative advantage under both gross and value-added exports. For sectors such as education, finance and retail trade, a comparative disadvantage is exhibited under conventional trade statistics but a comparative advantage when adjusted for value-added exports. ADB (2022, p.84) notes that "Such "hidden" portions of specialization are useful to uncover for a more comprehensive analysis on the positioning of firms, sectors, or economies within GVCs." Construction, hotels and restaurants, real estate, transport activities, n.e.c., water transport exhibit the reverse (Fig.16.c). Sectors where revealed comparative index of over one is indicated under the traditional method but is less than one under the new method suggest that exports in these sectors contain much foreign value-added.47

⁴⁵
$$TRCA_{i,j} = \frac{Export_{i,j}}{\sum_{j=1}^{M} Export_{i,j}} \sum_{j=1}^{N} Export_{i,j}} \sum_{j=1}^{N} \sum_{i=1}^{N} Export_{i,j}}$$

⁴⁶ NRCA_{*i*,*j*} =
$$\frac{\sum_{j=1}^{M} VAX_{i,j}}{\sum_{j=1}^{M} VAX_{i,j}} / \sum_{j=1}^{N} \sum_{i=1}^{N} VAX_{i,j}}$$

⁴⁷ ADB (2020, p.208) notes that "These findings often show in industry sectors where fragmentation of production processes is pervasive, such as in the metals, automotive, and electronics sectors. Correcting for the double counting of imported intermediates in gross trade provides a more accurate picture of *Contd...*

Fig. 16: India's revealed comparative advantage (traditional and new), 2020



Source: Based on ADB (2022).

7.1.1 NRCA and GVC participation, India, 2020

Fig. 17 shows that sectors' GVC participation rate is not aligned with their comparative advantage (based on value-added exports). A comparative advantage position in textiles and leather suggests that GVC-linked benefits can be captured through focus on developing resilient supply-chains. Given the recent challenges in GVC dynamics due to geopolitical risks, companies' strategies will centre more on securing critical resources than on achieving economies of scale by outsourcing to the cheapest producers. A similar situation is revealed in several services sectors such as telecommunications. Further, though the electricals sector did not reveal a comparative advantage, yet, given that GVCs in the region are resetting and new opportunities are coming with reallocation of FDI in the semiconductor industry, it is pertinent that India capture the transformations due to value chain disruptions and resource competition in globally connected and multi-local value chains. It is also necessary that regional processing GVC archetype in food and beverages be expanded and aligned with the advantage in agriculture for stronger food-processing linkages at the regional level, given the more extreme weather changes that are predicated with climate change.





Source: Based on ADB (2022).

domestic production because it traces where the value-added originally comes from-not from the exporting developing economy where low value-added activities, such as processing and assembly activities, are based, but from developed economies where parent firms retain high value-added activities."

7.1.2 GVC participation rank, light and heavy manufacturing, Asia-Pacific, 2018

In external linkages in 2018, the indicator performance for India [in square brackets] compared with other economies in the region (the highest rank of one and the lowest rank of 25) shows that in light manufacturing, India's relative performance in trade compared low (export to output ratio [20], import to input ratio [24]) and despite the not so low comparative advantage position (TRCA [8], NRCA [12]), forward GVC linkages (simple GVC [21], complex GVC [20]) ranked much lower (Fig.18.a). In heavy manufacturing (Fig.18.b), India's relative performance in trade ranked higher (export to output ratio [17], import to input ratio [20]) and given its comparative advantage position (TRCA [9], NRCA [11]) forward GVC linkages (simple GVC [14], complex GVC [14]) ranked comparatively higher than in light manufacturing.⁴⁸





Notes: The scores for India (0-1) are shown on the vertical axis. *Source*: Based on Part 3, South and Central Asia: Economy Profile, Table 3.3, ADB (2020), https://dx.doi.org/10.22617/TCS200240-2.

7.2 FDI and GVC participation

As for many other developing countries, India experienced an upsurge of foreign capital inflows accompanied by an increasing participation in the process of global production fragmentation (section 2 above). Between 1995 and 2020, India has become a major recipient of FDI, with inflows increasing from USD 2.2 billion to USD 64.1 billion while inward FDI stock increased from USD 5.6 billion to USD 480 billion over the same time period.⁴⁹ Using ADB MRIOD for 62 economies and ROW, Mitra et al. (2020) indicate a strong positive relationship between growth in inward FDI stock and growth in GVC participation over 2010-2017. Focusing on the Asia-Pacific region, Fig. 19.a indicates that over 2010-2018, several economies such as Viet Nam and Cambodia showed more dynamism than India in leveraging FDI to stimulate GVC participation. Fig. 19.b, for 2020, indicates a similar picture using FDI, net inflows, score and GVC participation.⁵⁰

⁴⁸ In both TRCA and NRCA, China ranked seventh in light manufacturing and fifth in heavy manufacturing. Part 3 East Asia: Economy Profile: Economy Profile, Table 3.1, ADB (2020), <u>https://dx.doi.org/10.22617/TCS200241-2</u>.

⁴⁹ WIR, UNCTAD, 2022, annex tables. https://worldinvestmentreport.unctad.org/annex-tables/.

⁵⁰ WIPO Global Innovation Index (GII) subcategories, https://www.globalinnovationindex.org/analysisindicator.

The OECD FDI regulatory restrictiveness index varies on a 0 (open) to 1 (closed) scale and gauges a country's FDI rules for four main types of FDI restrictions, namely, foreign equity limitations, screening or approval mechanisms, restrictions on the employment of foreigners as key personnel, and operational restrictions.⁵¹ India's FDI restrictiveness index declined perceptibly from 0.48 in 1997 to 0.212 in 2018 and 0.207 in 2020, and though less restrictive than China (that made a huge decline from 0.625 in 1997 to 0.262 in 2018 and 0.214 in 2020), in 2020, it was still higher than both the OECD (0.063) and non-OECD (0.140) averages.⁵² For the overall FDI restrictiveness index (for all sectors), Fig. 19.c for 2018, shows that a more restrictive FDI environment that limits the incentives for GVC lead firms is associated with lower GVC participation.⁵³ In the context of integrating SMEs in GVCs, OECD-UNIDO (2019, p.15) notes that liberalizing FDI, especially in services sectors "...could translate into greater productivity in downstream manufacturing, and deeper linkages between foreign investors and local SMEs." Comparison of India with other regional economies provides an indication that possibilities exist of using liberal policies aimed at friendshoring of FDI, or channelising GVC-relevant, new FDI in strategic sectors (like semiconductors), especially as geoeconomic fragmentation (Ahn et al., 2023) affects the geography of FDI.

Fig. 19 FDI and GVC participation, Asia-Pacific



Source: Based on ADB (2022) and WIR, UNCTAD (2022).

Source: Based on ADB (2022) and WIPO Source: Based on ADB (2022) and OECD. GII database (2020). Stat.

Efficiency-seeking FDI (Dunning, 1993; Kumar, 2002) is often associated with GVCs (Mitra et al., 2020) and learning from MNEs include developing production capabilities and acquiring foreign market knowledge. For integration with MNEs' global production networks and economic upgradation, the quality of FDI inflows received by India (Kumar, 2002) in terms of several indicators is of consequence, especially in comparison with the East Asian peers that have better exploited the FDI potential. These indicators include the sectoral composition of FDI towards modern technology-intensive manufacturing for adding to the productive capacity, through greenfield mode of entry rather than acquisition of existing

⁵¹ OECD. *Stat*, https://stats.oecd.org/Index.aspx?datasetcode=FDIINDEX.

⁵² Also, in 2020, while becoming less restrictive over time, the index was relatively higher for the *tertiary* (0.311) and *primary* (0.213) sectors than for *manufacturing* (0.035).

⁵³ Mitra et al. (2020) show the negative relationship with respect to FDI restrictiveness in the manufacturing sector.

capacities (Kumar, 2005, 2009), crowding-in domestic investments with growth and welfare effects (Kumar and Pradhan, 2005), contribution to export competitiveness and potential for export-platform production (Kumar, 1998), building domestic technological capabilities through transfer of technology, in-house R&D activity and relocation of global R&D bases in India (Kumar and Agarwal, 2005). Therefore, generally a trade-off between quantity and

quality of FDI is often found in terms of the effect of performance requirements (Kumar, 2022).⁵⁴ Hence, a proactive targeting towards FDI may be fruitful for developing production capacity in select high-priority products of strategic nature,⁵⁵ inviting bids from MNEs to get the best terms.

8. Conclusion

The GVC phenomenon, often described as delocalisation, unbundling, and flattening of the world has become a dominant feature of international production and trade. In making products together, countries trade more than goods and services through the international inter-firm and intra-firm flow of technological know-how and knowledge spillovers from access to the foreign R&D pool. Depending on a country's position in the value chains and its absorptive capacity, GVC-mediated knowledge and markets connectedness can be pivotal in boosting domestic innovation, productivity growth, competitiveness, production and employment.⁵⁶ Due to complexities in gross trade data masking involved patterns of international production, an increase in gross exports does not necessarily reflect increasing share of domestic content in exports if there is an increasing share of imported intermediate products in exports instead. This paper thus adopts the value-added decomposition of exports framework to document the quantitative importance of GVCs for India, more so in the regional context.

India's GVC participation rate has risen consistently, and following the dip during the financial crisis, peaked in 2012/13, with a resurgence after 2015/16, only to be followed by uncertainties and pandemic induced challenges after 2018. India's share of relative gains in total value-added created within GVCs is low. Like other developing economies such as Viet Nam (which has experienced strong integration in international production networks), Thailand, Chinese Taipei, and Malaysia, as India's backward linkages in GVCs are stronger than the forward linkages, net value-added gains from GVC participation remain negative. China, which has been the hub of global manufacturing assembly, despite seeing a less

⁵⁴ For details on performance requirements that include transfer of technology and export orientation amongst others, refer Kumar (2022).

⁵⁵ These include semiconductor chips and displays, batteries for EVs, storage solutions for the grid, PV cells, green hydrogen electrolyzers, electronics value chain, defence equipment and assembly-line for jet aircraft, among others (Kumar, 2022).

⁵⁶ Using alternate definitions of GVC participation, including one based on cluster analysis (using export participation, material import, and outward FDI), Goldar and Goldar (2023) show that total factor productivity of manufacturing firms in India is positively and significantly impacted by GVC participation, more so in the medium-and-high-technology industries.

dramatic increase in GVC participation had positive net value-added gains due to its stronger forward linkages. Sectors matter, in that those with higher foreign value-added contribution to gross exports were in the medium-to-high technology manufacturing that have complex GVC networks and despite high GVC-intensity, India's net value-added gains were not positive.

Though GVC integration or fragmentation of production can provide developing economies with access to global markets, even by specialising in tasks rather than producing the final product, yet entering in GVCs is not sufficient to generate participation gains due to challenges in progressively moving to higher and more sophisticated value-added tasks, the structural asymmetry between the North and the South,⁵⁷ and bargaining along the value chain that may require better technology to become more productive or proficient in the tasks performed than the others. Services are increasingly the key to competitiveness not only in terms of embeddedness in merchandise exports, but for integration into services GVCs.⁵⁸

Also, beyond economic upgrading in key dimensions that include process upgrading involving reorganisation of the production system or introducing superior production technologies to transform inputs into outputs more efficiently, product upgrading by moving into higher quality product lines,⁵⁹ functional upgrading by moving to higher value added activities, that is, acquiring new superior functions in the value chain, social upgrading in terms of workers' employment conditions, supplier upgrading,⁶⁰ and environmental upgrading resulting from a reduction in firms' ecological footprint remain challenging. Lema and Rabellotti (2023), for instance, emphasise on greening traditional GVCs by switching to digital technologies in manufacturing GVCs.

Though at the regional level, China appears to be an outlier, yet India's dynamism is reflected in regional trends in total forward GVC content from Asia-Pacific (and backward GVC content to the region), where, following China, Japan and South Korea, India's relative position is amongst the top six-seven economies. For the South-Asia region, Kumar and George (2020) argue that despite the ability to becoming a trade hub and promote broader integration, the region is often characterised as the least integrated in Asia-Pacific, in part due to trade barriers making intraregional trade less competitive, infrastructural deficits, and chronic political differences that discourage the formation of regional value chains. Harnessing the potential of deepening regional and sub-regional economic cooperation and integration in South Asia, covering trade, investment, connectivity and development finance becomes a more viable strategy for sustaining dynamism through regional value chains.

⁵⁷ Roy (2020, p.87) comments that "Domestic value addition may decline because of the race to the bottom where developing countries compete with each other to reduce the offer price, including that of wage."

⁵⁸ Batra (2022) emphasizes on goods and services comprehensive free trade agreements.

⁵⁹ For Indian manufacturing firms, Banga (2022b) shows that more embedded GVC firms capture higher product sophistication gains.

⁶⁰ Lee and Gereffi (2015) argue that for emerging market firms, regional and international expansion through outward FDI is an alternative route towards GVC upgrading.

Boosting and diversifying regional production networks that remain undeveloped except in a few sectors such as textiles and garments is crucial. Improved market access through regional trade agreements and the mutual recognition of standards can assist in this end.

The new measure of revealed comparative advantage based on value-added exports indicates that India tends to specialise in agriculture, low-technology manufacturing sectors like textiles and leather, and in medium-to-high-technology manufacturing sectors like chemicals, refined fuels, and metals where capital and knowledge requirements are more demanding. Also, in services, it is indicated that India specialises in the export of several business services such as telecommunications, finance, retail trade, and in public and personal services such as education, and personal services, n.e.c., suggesting possibilities of increasing GVC participation in these sectors, and build advantage, especially in sectors such as minerals, n.e.c., and manufacturing, n.e.c., as also in services sectors such as water transport, hotels and restaurants, and health and social work that are near the threshold of one.

Through Make-in-India, *Aatmnirbhar Bharat* and the Production-Linked Incentive (PLI) initiatives, among other schemes, India is moving towards manufacturing-led-transformation, seeking to develop new sunrise and green industries such as semiconductors, electric vehicles, advanced chemistry batteries, solar PV cells and modules, among others. GVC participation will continue to remain important to harness these opportunities, while also integrating SMEs to ensure that firms of all sizes benefit from stronger GVC participation.

Kumar (2022) argues that while strategies of export oriented industrialisation as pursued by Southeast Asian economies in the past may be challenging in times of global economic slowdown and rising protectionist trends, expanding exports through GVC integration, as MNEs diversify their supply-chains on a China+1 basis following Covid-19 induced supplychain disruptions may raise new opportunities. 'Friendshoring,' might also help direct the reshoring of GVCs to India, given its extensive strategic partnership and engagement under the Indo-Pacific Economic Framework (IPEF), besides improving infrastructure and logistics, and abundant low-cost labour, among other advantages. The China+1 strategies of corporations may particularly draw them to India in sectors of its comparative advantage such as labour and skill-intensive sectors (garments and leather goods, furniture, food processing, toys, and electronics assembly); steel and aluminium industries, and heavy metal-based industries; leveraging software capabilities to develop semiconductor chip manufacturing; generic pharma and vaccine industry.

For stimulating economic transformation through GVCs, to "attract and leverage FDI for GVC participation, the legal and regulatory framework, targeted investment promotion, special economic zones, investment incentives; and for helping domestic firms integrate into GVCs, matchmaking and strengthening local supplier capacity, facilitating strategic alliances for competitive industries, safeguarding competitive and contestable markets, promoting

outward FDI and investing in R&D and human capital" are of importance.⁶¹ While FDI inflows to India are largely market-seeking, in the context of FDI reallocation and FDI fragmentation, improving the qualitative aspects of FDI by attracting strategic, exportoriented FDI for enhancing GVC integration especially in FDI-GVC intensive sectors for intra-firm trade,⁶² value capture, inclusiveness and supply-chain resilience will be critical, as will be policy for building skills, competency and international competitiveness, especially with regard to IR4.0 challenges (Kumar, 2023). The key challenge in deriving the greatest benefit from the global production network framework remains in incentivizing domestic firms to become suppliers either to subsidiaries located domestically or by exporting, increasing their absorptive potential, and strengthening domestic linkages with non-export sectors.

⁶¹ Qiang et al. (2021, Fig. O.3).

⁶² Strong FDI in related sectors has accompanied countries' upgrading into new GVCs.

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Appendix

Appendix Table 1: Country coverage

	OECD TiVA Database (2021)				021)	ADB (2022)			
		OECD			Non-OECD			Asia-Pacific region	
No.	Code	Country	No.	Code	Country	No.	Code	Country	
1	AUS	Australia	39	ARG	Argentina	1	BAN	Bangladesh	
2	AUT	Austria	40	BRA	Brazil	2	BHU	Bhutan	
3	BEL	Belgium	41	BRN	Brunei Darussalam	3	BRU	Brunei Darussalam	
4	CAN	Canada	42	BGR	Bulgaria	4	KHM	Cambodia	
5	CHL	Chile	43	KHM	Cambodia	5	CHN	China	
6	COL	Colombia	44	CHN	China (People's Republic of)	6	TWN	Chinese Taipei	
7	CRI	Costa Rica	45	HRV	Croatia	7	FIJ	Fiji	
8	CZE	Czech	46	CYP	Cyprus	8	HKG	Hong Kong, China	
		Republic							
9	DNK	Denmark	47	IND	India	9	IDN	Indonesia	
10	EST	Estonia	48	IDN	Indonesia	10	IND	India	
11	FIN	Finland	49	HKG	Hong Kong, China	11	JPN	Japan	
12	FRA	France	50	KAZ	Kazakhstan	12	KAZ	Kazakhstan	
13	DEU	Germany	51	LAO	Lao People's Democratic Rep.	13	KYG	Kyrgyz Republic	
14	GRC	Greece	52	MYS	Malaysia	14	KOR	Republic of Korea	
15	HUN	Hungary	53	MLT	Malta	15	LAO	Lao People's Democratic Republic	
16	ISL	Iceland	54	MAR	Morocco	16	MYS	Malaysia	
17	IRL	Ireland	55	MMR	Myanmar	17	MAL	Maldives	
18	ISR	Israel	56	PER	Peru	18	MON	Mongolia	
19	ITA	Italy	57	PHL	Philippines	19	NEP	Nepal	
20	JPN	Japan	58	ROU	Romania	20	PAK	Pakistan	
21	KOR	Korea	59	RUS	Russian Federation	21	PHL	Philippines	
22	LVA	Latvia	60	SAU	Saudi Arabia	22	SGP	Singapore	
23	LTU	Lithuania	61	SGP	Singapore	23	SRI	Sri Lanka	
24	LUX	Luxembourg	62	ZAF	South Africa	24	THA	Thailand	
25	MEX	Mexico	63	TWN	Chinese Taipei	25	VNM	Viet Nam	
26	NLD	Netherlands	64	THA	Thailand				
27	NZL	New Zealand	65	TUN	Tunisia				
28	NOR	Norway	66	VNM	Viet Nam				
29	POL	Poland	67	ROW	Rest of the World				
30	PRT	Portugal							
31	SVK	Slovak							
		Republic							
32	SVN	Slovenia							
33	ESP	Spain							
34	SWE	Sweden							
35	CHE	Switzerland							
36	TUR	Turkey							
37	GBR	United							
		Kingdom							
38	USA	United States							

Notes: Country codes in ADB (2022) are taken as in OECD TiVA Database (2021) for consistency. *Source*: OECD TiVA Database (2021), ADB (2022).

Appendix Table 2: Sector description in ADB (2022)

Code	Sector name	Short title							
Primary									
AG	Agriculture, hunting, forestry, and fishing	Agriculture							
MQ	Mining and quarrying	Mining							
Low-technology manufacturing (light manufacturing)									
FB	Food, beverages, and tobacco	Food and beverages							
TE	Textiles and textile products	Textiles							
LE	Leather, leather products, and footwear	Leather							
WP	Wood and products of wood and cork	Wood							
PA	Pulp, paper, paper products, printing, and publishing	Paper							
KP MT	Rubber and plastics	Rubber and plastics							
MF	Manufacturing, n.e.c.; recycling	Manufacturing, n.e.c.							
Modin	m-to high-technology manufacturing (heavy manufacturing)								
RE	Coke refined petroleum and nuclear fuel	Refined fuels							
CH	Chemicals and chemical products	Chemicals							
MI	Other nonmetallic minerals	Minerals n.e.c							
ME	Basic metals and fabricated metal	Metals							
MA	Machinery, n e c	Machinery, n e c							
EL	Electrical and optical equipment	Electricals							
TR	Transport equipment	Transport equipment							
		FF							
Busine	ess services								
SM	Sale, maintenance, and repair of motor vehicles and motorcycles; retail	Sale of motor vehicles							
	sale of fuel								
WT	Wholesale trade and commission trade, except of motor vehicles and	Wholesale trade							
	motorcycles								
RT	Retail trade, except of motor vehicles and motorcycles; repair of	Retail trade							
	household goods								
HR	Hotels and restaurants	Hotels and restaurants							
IT	Inland transport	Inland transport							
WTR	Water transport	Water transport							
AT	Air transport	Air transport							
ΤA	Other supporting and auxiliary transport activities; activities of travel	Transport activities,							
-	agencies	n.e.c.							
TEL	Post and telecommunications	Telecommunications							
FI	Financial intermediation	Finance							
RE	Real estate activities	Real estate							
OBA	Renting of M&Eq and other business activities	Business activities,							
Doroc	al and public corriges	n.e.c.							
PA	ar and public services	Public administration							
I A FD	Education	Education							
HSW	Health and social work	Health and social work							
OPS	Other community social and personal services	Personal services							
015	Oner community, social, and personal services								
рн	Private households with employed persons	Private households							
111	i invate nouscholus with employed persons	1 fivate nousenoius							

Notes: Construction (CN) is included under total services (including construction) in TiVA (2021) while both Utilities (UT) (electricity, gas, water supply, sewerage and waste) and construction are included in low-technology manufacturing in ADB (2022). For consistency, this paper considers construction in total services (including construction).

Source: ADB (2022); OECD TiVA Database (2021).



Appendix Fig. A.1: Share in total global value-added created within forward and backward linkages



A.1.a. By select economies, 2000, 2008 and 2018

A.1.d. By OECD/non-OECD, 2018

A.1.b. By OECD/non-OECD, 2018





Notes: In right panel figures, shares are rounded off. *Source:* Based on OECD TiVA Database (2021).





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