CHAPTER 7

Changes in Global Value Chains and International Division of Labor

The rise and evolution of global value chains (GVCs) reflect the inherent rationale of economic globalization and the underlying logic of modern international trade, illustrating historical trends in the adjustments of the international economic landscape. Currently, the world is undergoing major changes unseen in a century, with economic globalization encountering significant challenges. GVCs are entering a phase of restructuring, leading to shifts in the positions of countries in the international division of labor.

I. Current Status of and Trends in GVCs

With advancements in global technology and the deepening of the international industrial division of labor and cooperation, GVCs are currently in a dynamic adjustment of simultaneous expansion and contraction, influenced by factors such as geopolitical tensions, financial crises, and the COVID-19 pandemic. Some countries are inclined to build close and self-sufficient production systems within specific regions, while certain industries and segments of GVCs are experiencing contraction, with increasing signs of regionalization.

1. Progress of GVCs amid Challenges

Due to the impact of the 2008 global financial crisis, both forward and backward GVC participation[1] dropped to historic lows in 2009. Gradually, GVCs then recovered and expanded gradually amid fluctuations, reaching a peak in 2018, with forward and backward participation being 22.89 percent and 22.03 percent, respectively. However, due to the escalation of the US-China trade frictions and the global spread of COVID-19, global trade and economic activities were severely affected in 2019 and 2020, leading to a decline in GVC participation. After 2021, as the pandemic situation improved and with the positive influence of digital technologies and other factors, GVCs entered a new phase of expansion, with GVC participation reaching historic highs (see fig. 7.1).

This trend shows that although economic globalization has been hit by various shocks such as economic crises, geopolitical tensions, trade policy adjustments, and pandemics, it continues to advance, driven by strong underlying momentum from technological progress and market demand, without any fundamental reversal.

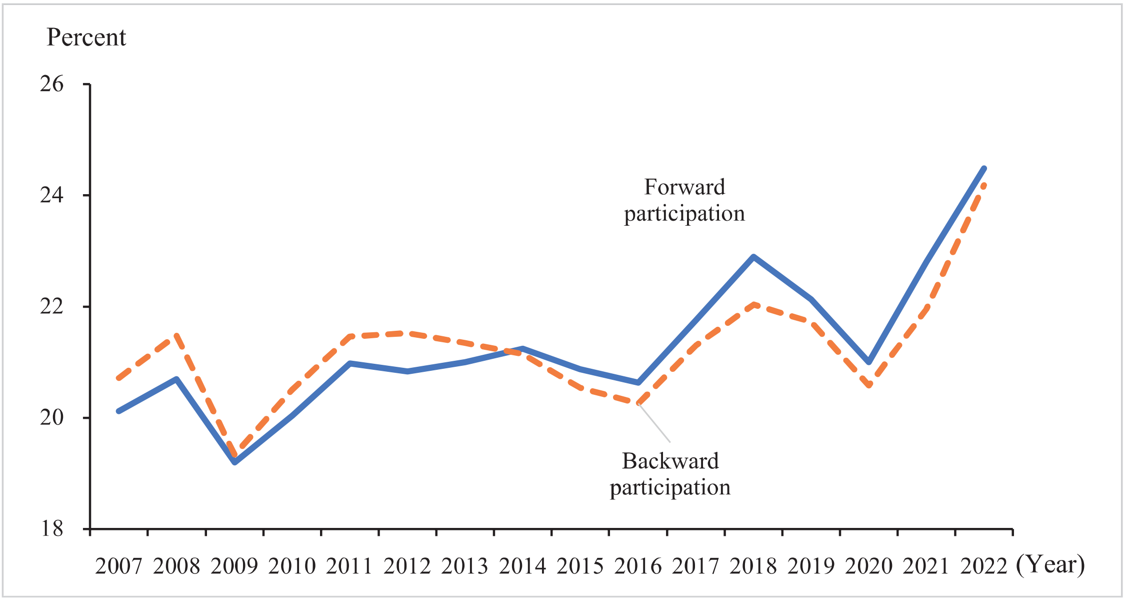


Figure 7.1 Forward and backward GVC participation: 2007–2022

1 The forward participation represents the share of value-added in intermediate goods exported by an economy, indicating its upstream position in the GVCs and contribution to other economies' supply chains. A higher forward rate suggests a stronger focus on exporting intermediate goods. Likewise, the backward participation measures the share of value-added from imported intermediates, reflecting an economy's downstream reliance on foreign inputs for final product production. A higher backward rate signals greater dependence on external imports in its production process.

Note: Forward participation = Average forward participation of all countries. Backward participation is calculated similarly.

Source: The Global Value Chain Database of the University of International Business and Economics, ADBMRIO 2024 version.

2. Increasing regionalization of GVCs

In response to a complex and ever-changing global environment, countries are actively promoting diversification of their domestic industrial and supply chains, leading to a more pronounced trend of regional cooperation in supply chains. Three major regional value chains gradually took form: North America, Europe, and Asia, among which the North American value chains, centered around the United States, and the East Asian and Southeast Asian value chains, centered around China, are particularly prominent.

For example, in the case of the electronics manufacturing industry, a tripartite regional structure has emerged in the Asian GVCs, with China, Japan, and Rep. of Korea being its pillars, while in North American GVCs, the regional pattern is centered around the United States. Moreover, within the East Asian value chains centered on China, the relative scale of Japan and Rep. of Korea is smaller than that of China; similarly, within the North American value chains centered on the United States, Canada and Mexico are comparatively smaller (see fig. 7.2).

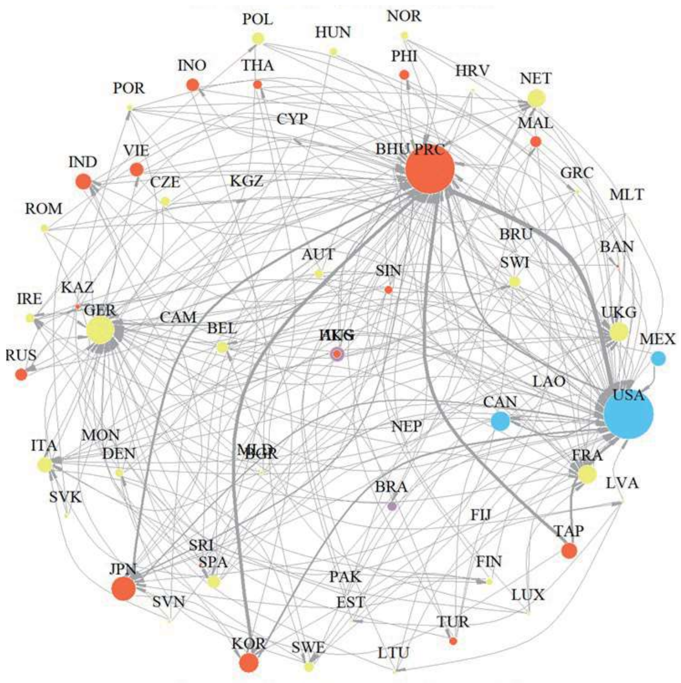


Figure 7.2 Network of the division of labor within GVCs in the electronics manufacturing industry: 2021

Note: The three-letter code in the figure is the standard country code defined by the International Organization for Standardization, for example, PRC stands for China, USA stands for the United States, JPN stands for Japan, and KOR stands for Rep. of Korea.

Source: Xiao et al. (2020).[2]

Within Asia, in the export of ASEAN, the proportion of value-added contributed by intermediate goods from China, Japan, and Rep. of Korea increased from 21.1 percent in 2007 to 32.3 percent in 2022 (see fig. 7.3). In the future, advancements in digitization, intelligentization, green development, and the deepening of regional cooperation will further promote the development of these regional value chains, enhancing the economic resilience and international competitiveness of the region.

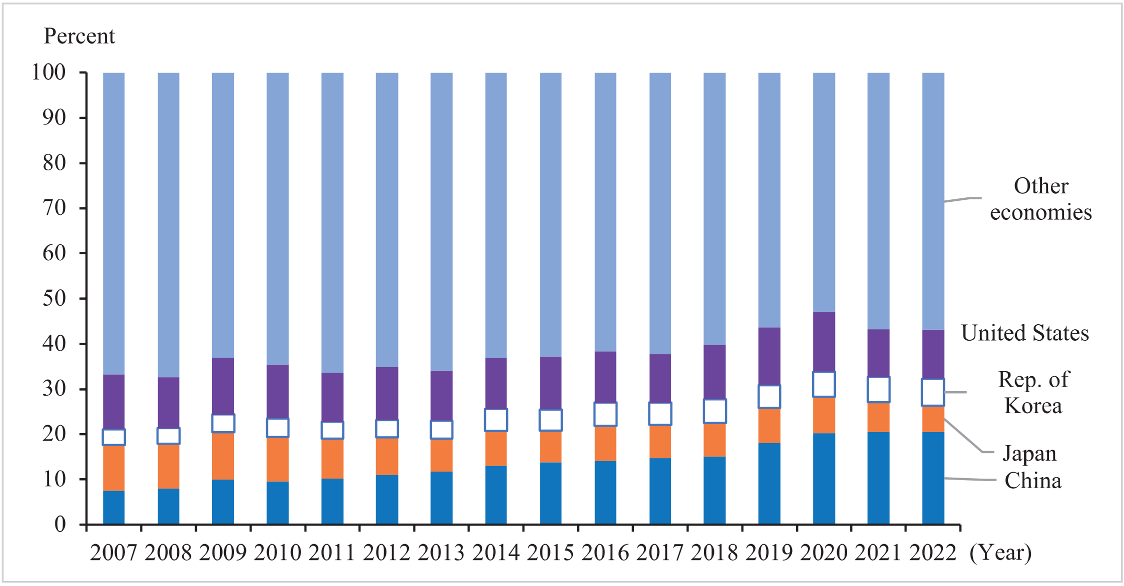


Figure 7.3 Sources of foreign value added in ASEAN exports of selected economies: 2007–2022

Note: The proportion of value added from abroad in exports = total value added from abroad in exports / total value added from the world in exports.

Source: Global Value Chain Database of the University of International Business and Economics, ADBMRIO 2024 version.

2 Xiao, H., Meng, B., Ye, J., and Li, S., "Are Global Value Chains Truly Global?" *Economic System Research* 3, no.4 (2020): pp. 540–564.

Regional economic integration has become an important buffer for Asia against global shocks. Developing economies in Asia are actively participating in the division of labor within the regional value chains. From 2017 to 2019, the year-on-year growth rate of imports and exports of intermediate goods between developing economies in Asia and China remained positive, indicating an ever-expanding scale of intermediate goods trade. However, due to US-China trade frictions and the pandemic, the volume of intermediate goods trade among developing Asia saw a slight decline in 2020.

To maintain stability in regional supply chains, Asian countries are promoting the establishment of "fast lanes" for personnel exchanges and "green channels" for cargo transportation. In 2021, China's imports and exports of intermediate goods from/to other developing economies in Asia grew by 27.4 percent and 32.7 percent, respectively. In 2022, there was a slight decline, but regional supply chains in Asia continued to adjust and recover amid fluctuations (see fig. 7.4). In the context of rising protectionism and increasing risks of global fragmentation, value chain cooperation among Asian economies helps enhance economic and supply chain resilience and achieve mutual benefits.

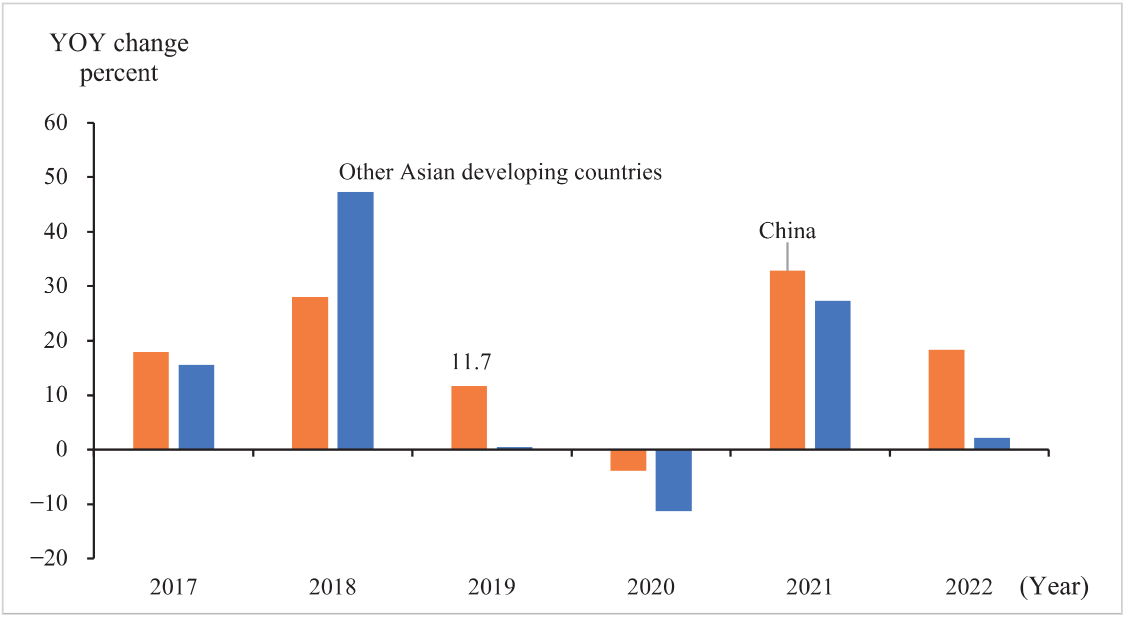


Figure 7.4 Value-added of trade in intermediate goods of China and other developing countries within Asia: 2017–2022

Note: Developing economies in Asia include Bangladesh, Bhutan, Brunei, Cambodia, Fiji, India, Indonesia, Kazakhstan, Kyrgyzstan, Laos, Malaysia, Maldives, Mongolia, Nepal, Pakistan, China, the Philippines, Sri Lanka, Thailand, and Vietnam.

Source: Calculated based on the Asian Development Bank's Multi-Regional Input-Output Database.

The United States leads the world in the domestic value-added of the exports. As shown in fig. 7.5, from 2007 to 2022, the share of domestic value added in US exports averaged between 85 percent and 90 percent, surpassing that of other economies, including China, the EU, and Japan. Since 2020, with a few exceptions such as China, this indicator has consistently declined for most economies (see fig. 7.5).

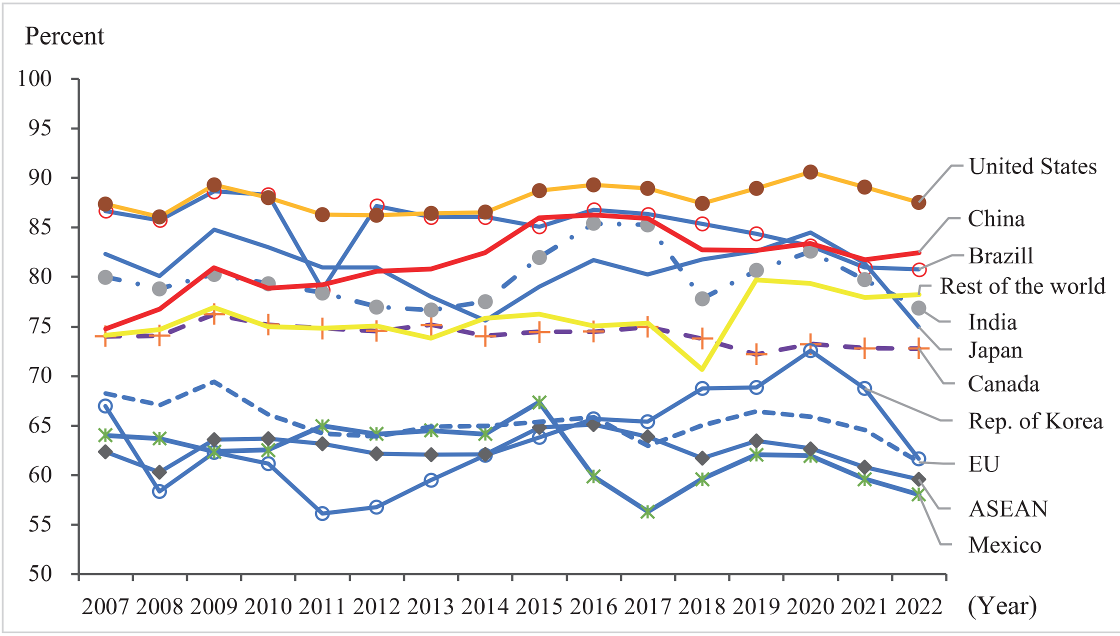


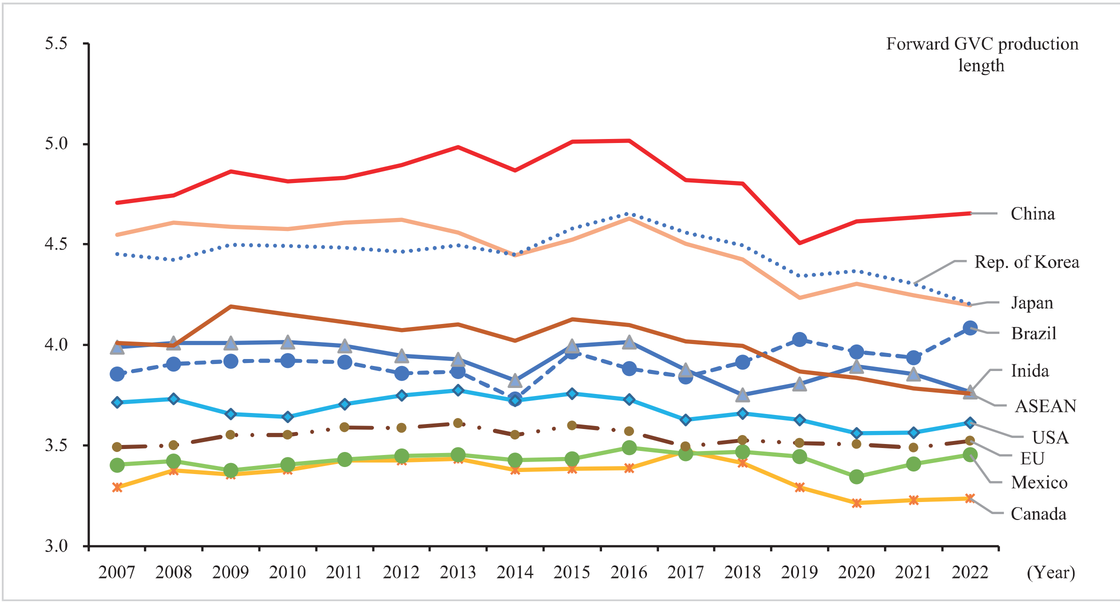
Figure 7.5 Shares of domestic value added in total exports of selected economies: 2007–2022

Source: Global Value Chain Database of the University of International Business and Economics, ADBMRIO 2024 Version.

3. Increasing shortening of GVCs

The forward and backward production lengths are key indicators of a country or region's position and role in GVCs. Specifically, they reflect the relative number of production stages involved in the entire process from the input of raw materials to the output of final consumer goods. Economies with longer forward production lengths are further upstream in the GVCs, closer to primary producers and further away from the final consumers, while those with shorter lengths are further downstream and closer to the final consumers; the opposite is true for backward production lengths.[3]

Most economies have experienced a decrease in production lengths. Figure 7.6 illustrate the continuous fluctuations in forward and backward production lengths, which mostly move in sync. From 2016 to 2019, due to factors such as the slowdown of economic globalization, major economies—particularly Asian countries such as China, Japan, and Rep. of Korea—showed a significant reduction in both forward and backward production lengths. This indicates that the distance from raw inputs to the final product reaching consumers has gradually shortened, presenting a trend of "shortening chains."



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3 The length of GVC production indicates the average number of production stages from initial value-added inputs to the final goods used for consumption in a specific industry within a specific economy. This metric reflects the complexity of participation in GVCs; a greater number of stages signifies a more complex division of labor. GVC participation can be categorized into forward and backward participation based on the value chain's direction. A higher forward production length indicates proximity to upstream activities, while a longer backward production length suggests closeness to downstream activities.

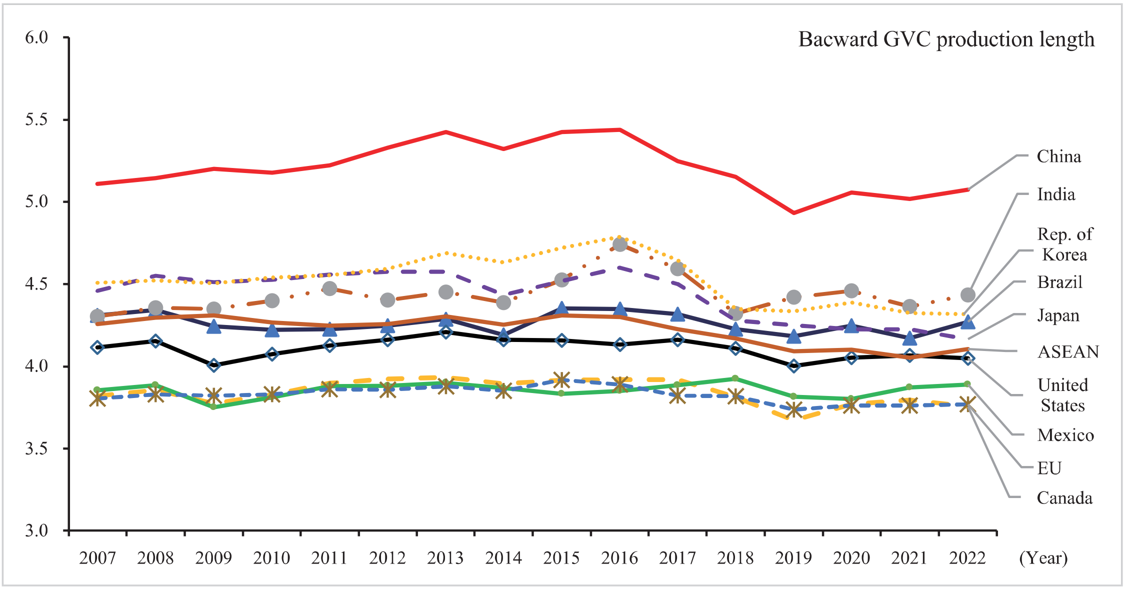

Figure 7.6 Length of forward and backward production in manufacturing GVCs of selected economies: 2007–2022

Source: Global Value Chain Database of the University of International Business and Economics, ADBMRIO 2024 Version.

However, the sustainability of this trend remains to be observed. Since 2020, except for Japan, Rep. of Korea, India, and ASEAN, forward and backward production lengths in countries like China, the United States, Canada, Mexico, Brazil, and the EU have increased, possibly due to "reshoring" policies or the post-pandemic recovery of the global economy. In the medium to long term, the primary doubt concerning the shortening of GVCs is that it is inconsistent with the rationale of free and open market economies based on comparative advantages.

II. Impact of Evolving International Situation on GVCs

1. Severe impact of external shocks on division of labor in complex GVCs

Based on the complexity of the production process and the segments involved, value chains can be categorized into simple and complex value chains.[4] This section utilizes a counterfactual analysis framework, specifically an extended computable general equilibrium model,[5] to assess the impact of the COVID-19 pandemic on GVCs. The overall results indicate that from 2019 to 2024, the pandemic is projected to reduce complex GVC divisions by approximately 10 percent and simple GVC divisions by about 5 percent.

Most manufacturing sectors are expected to experience declines between 3 percent and 10 percent, with the decline in complex GVCs being more pronounced. For example, in the agriculture, hunting, forestry, and fishing sectors (S1), which were most affected by the pandemic, complex and simple GVCs fell by 123 percent and 104 percent, respectively, in 2020. In contrast, the postal and telecommunications sector (S15), which was least affected, saw a 4 percent decline in complex GVCs while simple GVCs increased by 0.4 percent. However, in the later stages of the pandemic, both types of value chains experienced varying degrees of decline (see fig. 7.7). This demonstrates that while complex GVCs reflect the high degree of specialization and internationalization in the modern economy, the risks associated with such complexity increase when faced with external shocks.

4 The complex value chain refers to a process that involves at least two or more instances of crossing national borders from the initial input of factors to the formation of final products, while the simple value chain only involves one instance of crossing national borders.

5 The counterfactual analysis framework is a method used to evaluate the impact of decisions or events on outcomes. It explores how results would change if certain conditions or actions were different by constructing a hypothetical scenario. An extended computable general equilibrium model is an economic tool used for counterfactual analysis to study the effects of changes in economic policies on the entire economic system. It predicts the long-term impacts of policy changes on macroeconomic variables such as prices, output, consumption, and investment by simulating the behavior of economic agents (such as households, firms, and governments) under different market conditions. This study primarily focuses on simulating the impact of the COVID-19 pandemic on GVCs, mainly through reduced labor supply, increased trade costs, and changes in consumption preferences, particularly in sectors such as healthcare, electronic information and communication, and public services, as well as a decline in tourism demand.

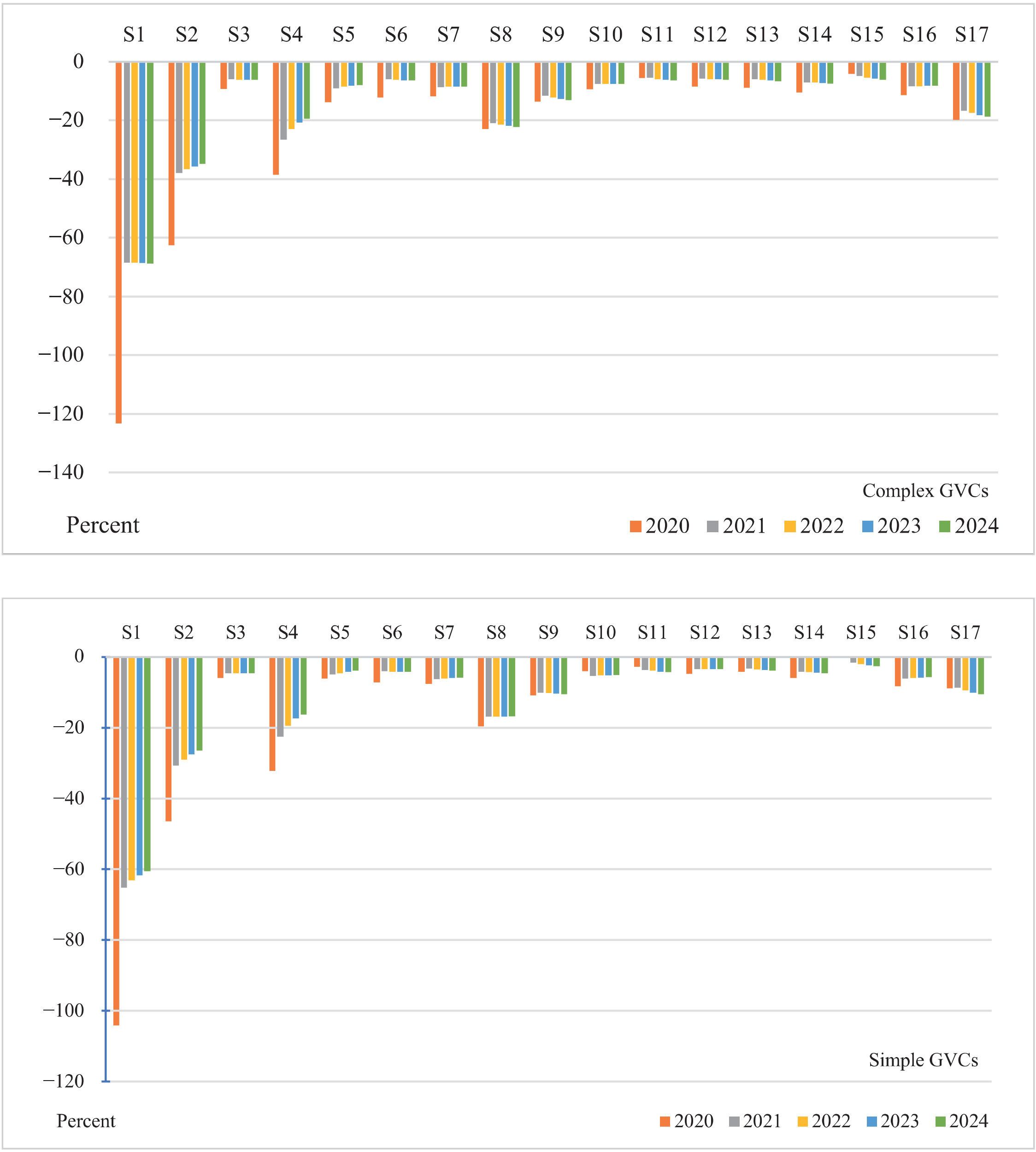

Figure 7.7 Changes in complex and simple GVCs across 17 industries: 2020–2024

Note: The names of the sectors in the figure are as follows: S1 = Agriculture, hunting, forestry, and fishing; S2 = Food, beverages, and tobacco; S3 = Wood, wood products, and paper products; S4 = Coking, refining of petroleum, and nuclear fuel; S5 = Mineral products; S6 = Textiles and clothing; S7 = Chemicals, rubber, and plastics; S8 = Basic metals and metal products; S9 = Transport equipment; S10 = Electrical and optical equipment; S11 = Machinery; not classified elsewhere; S12 = Construction; S13 = Wholesale and retail trade; S14 = Transport activities; S15 = Postal services; S16 = Financial intermediation; S17 = Other services.

Source: Calculated based on the Global Trade Analysis Project version 10.

2. Increasing pressure of geopolitical tensions on vulnerability of GVCs

Geopolitics is a significant factor influencing changes in GVCs. For instance, in the semiconductor industry, US-China trade frictions and a complex geopolitical landscape have prompted many countries to elevate the development of a more self-sufficient semiconductor industry to a national strategic level. The semiconductor value chain is characterized by high capital and knowledge intensity, intricate division of labor, strong inter-dependencies among participants, and lengthy manufacturing cycles. Over the past few decades, these characteristics have interacted to bring about significant changes[6] within the semiconductor global value chain, which include most value-added activities in the value chain are characteristic of an oligopolistic market structure dominated by a few companies; relatively cautious capacity investments in times of economic downturns, relying mostly on existing capacities; and the concentration of certain production processes within specific geographic areas. All these factors have rendered the semiconductor value chain less flexible and resilient in the face of external shocks.

Currently, semiconductors are widely recognized as a critical technological foundation for economic and national security. Enhancing competitiveness in the semiconductor sector and ensuring the safety of supply chains has become a common consensus among countries. However, the extensive industrial policies implemented by certain developed economies to foster global capacity competition in semiconductors have led to the fragmentation of the semiconductor industry, potentially causing issues such as overcapacity and stagnation in innovation (see box 7.1).

Box 7.1 COVID-19, geopolitical shocks, and the reconstruction of the global semiconductor industry

The weaknesses in the resilience of the semiconductor value chain were highlighted and amplified during the COVID-19 pandemic, and have recently been exacerbated by rising geopolitical tensions. This situation has generated widespread anxiety and fueled techno-nationalism in the field, where ideological geopolitical considerations have overshadowed economic efficiency,[7] becoming a dominant force in reshaping the supply chain.[8]

6 Hess, J. and Kleinhans, J.-P, "Governments' Role in the Global Semiconductor Value Chain #2: Recommendations for the EU Chips Act: Long-Term Government Value Chain Mapping," INTERFACE, *Policy Brief* (July 2022); Kleinhans, J.-P. and Baisakova, N., "The Global Semiconductor Value Chain: A Technology Primer for Policy Makers," INTERFACE, *Policy Brief* (October 2022).

7 White House, "Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth: 100-Day Reviews under Executive Order 14017" (DC: White House, 2021).

8 Yeung, H. W., Huang, S., and Xing, Y., "From Fabless to Fabs Everywhere? Semiconductor Global Value Chains in Transition," in *Global Value Chain Development Report 2023* (WTO, 2023), pp. 132–187.

Teno-nationalism is manifesting as a tendency of de-globalization. Since 2022, some developed economies have implemented techno-nationalist industrial policies, encouraging the reshoring, or at least the nearshoring or friend-shoring, of the semiconductor value chain—particularly advanced manufacturing capacities—through direct subsidies and tax breaks. [9] Some economies have even adopted a "small courtyard, high walls" strategy, [10] weaponizing parts of their controlled supply chains through export controls and increasingly unilateral, aggressive, and extraterritorial measures. In the short term, these measures appear to have yielded some results, as companies like TSMC and Samsung have begun investing in advanced fabrication plants in these relevant economies.[11]

However, these measures are unlikely to achieve their long-term goals. The semiconductor industry is characterized by extremely high R&D intensity and capital intensity.[12] Significant investments in R&D capital are required for design, equipment manufacturing, EDA software, and core intellectual property. Additionally, substantial upfront capital investment is necessary for front-end manufacturing. As a result, most value-added activities in the semiconductor value chain are dominated by a few companies operating in an oligopolistic market, where their economic sustainability relies critically on access to global markets. Any disruption to this model poses a threat to the sustainable development of the industry.

Spurred by techno-nationalist industrial policies, the reshoring of semiconductor manufacturing and the global race to build semiconductor fabs locally have begun to lead to the fragmentation of the semiconductor GVCs, resulting in overcapacity and underutilization, global technological bifurcation, and stagnation in innovation, which could, in turn, threaten the highly efficient and innovative business models of the global semiconductor industry characterized by the fine specialization along the GVCs.[13]

9 Luo, Y. and van Assche, A., "The Rise of Techno-Geopolitical Uncertainty: Implications of the United States CHIPS and Science Act," *Journal of International Business Studies* 54 (2023): pp. 1423–1440, https://doi.org/10.1057/s41267-023-00620-3.

10 Sullivan, J., "Remarks by National Security Advisor Jake Sullivan on the Biden-Harris Administration's National Security Strategy" (White House, October 10, 2022).

11 Semiconductor Industry Association, "Emerging Resilience in the Semiconductor Supply Chain" (May 8, 2024), https://www.semiconductors.org/emerging-resilience-in-the-semiconductor-supply-chain/.

12 Boston Consulting Group and Semiconductor Industry Association, "Strengthening the Global Semiconductor Supply Chain in an Uncertain Era" (May 2021), https://www.semiconductors.org/emerging-resilience-in-the-semiconductor-supply-chain/.

13 Yeung, H. W., Huang, S., and Xing, Y., "From Fabless to Fabs Everywhere? Semiconductor Global Value Chains in Transition," in *Global Value Chain Development Report 2023* (WTO, 2023), pp. 132–187.

3. Strong support of emerging technologies to positive evolution of GVCs

Improving technological levels and reducing factor costs are the main pathways for countries to move toward higher-end positions in GVC.[14] Countries are placing significant emphasis on digital inputs in their manufacturing processes. Leading nations such as China, the United States, Germany, Japan, and Rep. of Korea benefit from comprehensive advantages arising from technological innovation, digital infrastructure development, digital transformation of industries, policy support, and talent cultivation. In recent years, the Fourth Industrial Revolution, represented by smart manufacturing, has been evolving, accelerating the digital transformation of global production and consumption. The integration of AI and the digital economy with traditional manufacturing not only alters the production modes at the micro level but is also expected to promote changes in the global production models in the long term (see fig. 7.8).

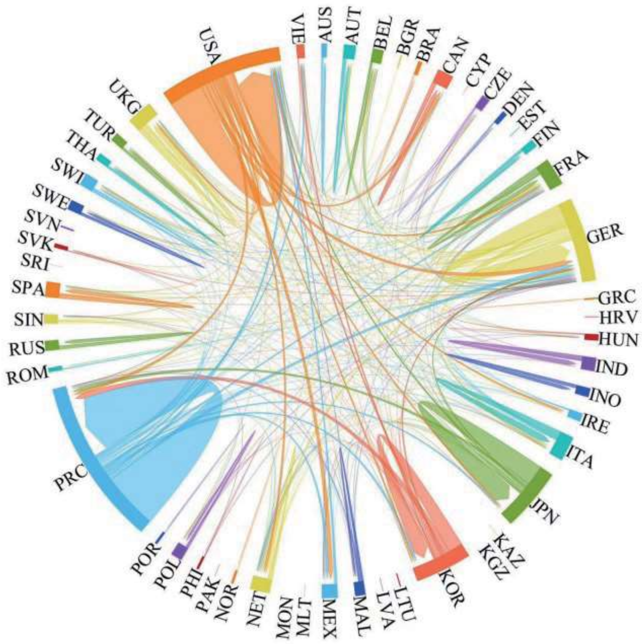

Figure 7.8 Composition of digital inputs embedded in manufacturing exports of selected economies: 2021

Source: Calculated based on the Asian Development Bank's Multi-Regional Input-Output Database.

14 Pol, A. and Alonso, G., "On the Geography of Global Value Chains," *Econometrica* 88, no. 4 (2020): pp. 1553–1598.

Box 7.2 The impact of AI on the division of labor in the GVCs

AI is deepening the GVCs. Specialization in AI can facilitate industrial intelligentization and upgrades in adjacent sectors through interconnections between upstream and downstream industries.

Koopman (2024) analyzes the relationship between AI specialization and the specialization of goods and services exports. He finds that a country's investment in the AI sector has spillover effects on the development and upgrading of other industries. For example, investments in AI-related drones and satellite products can enhance the specialization levels in fields such as chemicals, pharmaceuticals, coal, oil, and intellectual property.

Given the varying economic strengths, export dependencies, and endowments among countries, the positive effects of AI on the GVCs are particularly pronounced in developing countries, countries with high export dependencies, and labor-intensive industries.

III. Enhancing GVCs Collaboration by Deepening Industrial Cooperation

GVCs involve diverse participants and widespread interests in international economic practices. Their core principles are openness, inclusiveness, and win-win cooperation. The development of GVCs relies on the continuous expansion of high-level openness and the acceleration of mutual opening up across the world.

It is crucial to understand the new trends in the development of GVCs. Stakeholders should closely monitor changes in GVCs, actively adapt to and lead these trends, and promote interconnectivity and interoperability in trade, technology and other domains. Strengthening multinational cooperation, establishing a more open and inclusive trade system, promoting technology exchange and knowledge sharing, and facilitating the application of smart manufacturing and advanced technologies are essential. Additionally, efforts should focus on guiding GVCs toward greener, smarter, and higher-end transformations, achieving sustainable and resilient growth in the global division of labor.

Building a more stable global division of labor. The diversified development of GVCs is key to enhancing global economic stability. All parties should actively participate in the global production division system, strengthen economic exchanges and cooperation with neighboring economies, and promote the optimal allocation of resources within regions to create closer trade partnerships, fostering a new international division of labor that is more stable, vibrant, and equitable.