CHAPTER 6

Stability and Development of Global Industrial and Supply Chains

The world is undergoing profound changes unseen in a century and has entered a new period of unrest and reformation. The stable development of industrial and supply chains has become an important issue of concern to all countries. Countries must foster a consensus on cooperation, continue to expand the scale of trade and investment, strengthen coordination in key industries and fields, and establish a secure, reliable, and more flexible industrial and supply chain system in a more open environment. Countries must raise the level of digitization and greening of industrial and supply chains so as to promote the sustainable development of the world economy.

1. Adjustment to Global Industrial and Supply Chains Has Been Accelerating

(1) Dependence on global industrial and supply chains has been deepening

The global industrial and supply chains continue to grow wider and deeper. The world economy is still in the wave of globalization. The expansion of market access, liberalization and facilitation of trade and investment, and changes in transportation and information communication technologies have expanded the depth and breadth of industrial and supply chains; capital, technology, labor, and professional knowledge have become important factors affecting the depth of global industrial and supply chains. In particular, intermediate products trade, intermediary services, and corresponding financial arrangements gradually play a dominant role in global industrial and supply chains. According to Global Trade Flow data, from 2010 to 2022, global export of intermediate goods increased by 83.8 percent, making its share in global export of goods increase to 57.7 percent from 50.9 percent, contributing an increase of 42.7 percentage to the growth of global export in goods.

Inter-regional trade and intra-regional trade continue to development.[1] Since 2000, developing economies in Asia, Central and Eastern Europe, and Latin America have been increasingly integrated into global industrial and supply chains. During this period, the adjustment of the global industrial chains presented two distinctive features. First, trade between advanced economies and emerging economies strengthened. In particular, trade among the industrial chains in Europe, North America, and Asia has significantly increased. According to OECD TiVA data, Asia's share in intermediate goods exports of Europe and the Americas increased from 10.4 percent and 22.7 percent in 2000 to 15.7 percent and 32.4 percent in 2020, respectively. The second is the growing importance of intraregional trade in Europe and Asia. Europe has been the region with the highest level of regional economic integration and is particularly prominent in complex value chains. According to OECD TiVA data, intra-regional trade accounted for 64.8 percent of European intermediate product exports in 2020 and 68.2 percent of intermediate product exports in the information technology sector. The growth of intra-regional trade in Asia is pronounced, with its share in Asian exports of intermediate goods rising from 44.4 percent in 2000 to 50.4 percent in 2020. The data shows that more and more Asian countries are deeply integrated into regional and global industrial and supply chains.

(2) The pattern of global industrial and supply chains has been basically formed

The industrial chains of North America are centered on the US, with deepening intra-regional integration. According to the OECD TiVA data, the proportion of intermediate products Canada and Mexico exported to the US exceeded 60 percent of their total intermediate product exports in 2020, while the proportion of intermediate goods they imported from the US was around 50 percent. Other American states that have a closer trade relationship with the US in intermediate products include Peru, Costa Rica, Colombia, Brazil, Argentina, and so on. Outside the American region, there is a close link between the North American industrial chains and the Asian industrial chains, with "computer, electronic and optical products," "textiles, clothing, leather, and related products," "electrical equipment," "base metals," etc. According to OECD TiVA data, approximately 32.4 percent of intermediate products from American economies were exported to Asian economies, an increase of nearly 10 percentages compared to 2000. In 2020, the share of intermediate products of US information technology sector exported to Asia was 38 percent.

The degree of industrial chains integration within the European region is relatively high. In industries such as "food, beverages, and tobacco," "wood and cork products," "paper products and printing," and "motor vehicles, trailers, and semi-trailers," the industrial chains within Europe are more closely related, with intra-European trade accounting for more than 60 percent of European total trade in some industries. In "Computer, electronic and optical products," "machinery and equipment that not be classified," "textiles, clothing, leather, and related products," etc., the proportion of intermediate goods trade between European countries

and countries outside the region is relatively high, and the industrial chains between them are more closely related. Resource-based economies and some developing economies show relative surpluses in trade with European economies, indicating that their dependence on the European industrial chains is mainly from demand side. On the other hand, economies with a high degree of participation in the global industrial chains, such as the US and Singapore, show relative deficits in their trade with Europe, which means that their dependence on the European industrial chains is mainly related to supply dependence.

The industrial chains in Asia present a gradient feature. Mineral products, textile and apparel, and electromechanical products are the three most representative industries in the Asian industrial chains. Most mineral product trade is a one-way trade flow (one-way flow from the exporting country to the importing country), with crude oil, natural gas, and jewelry as the main categories. The industrial chains of textile, apparel, and electronic products are mostly a two-way trade flow, and some Asian economies have complex competition and complementary relationships in this industrial chains. The industrial chains of textile and apparel among Asian economies present a "wild goose formation (V shape)" type. The industrial chains of electronic products are relatively longer. Some Asian economies have close trade exchanges with each other in intermediate products, with generally more cooperation with division of labor than direct competition. In terms of high-tech electronic products, other economies in the region are highly dependent on Japan, Rep. of Korea, China's Taiwan (TAP), Europe, and the US.

(3) Challenges to the resilience of global industrial and supply chains

The new generations of information technology, biotechnology, new energy, new materials, and other fields are becoming important areas for the accelerated adjustment of global industrial and supply chains and are receiving great attention from all countries. Major economies have introduced various types of science and technology development plans, with policy support, rule adjustments, institutional arrangements, and other methods, to capture the high ground in the science and technology sector. The EU passed the Chips Act in 2022 and planned to invest more than 43 billion euros. In the Chip and Science Act of 2022, the US proposed to allocate US$52.7 billion to support the development of the chip industry. Germany's National Industrial Strategy 2030, Japan's Integrated Innovation Strategy 2019, etc., have specified key technology development areas such as the new generation of the information technology, biotechnology, and green technology. It is noteworthy that some countries are under an abused concept of national security, which has seriously affected the security and stability of global industrial and supply chains, resulting in increased operational risks and significant cost increases in the global supply chains. Economies are paying more attention to the security issues in supply chains of key technologies and core components. In terms of industries, products with security risks in the supply chains are mainly electromechanical and audio-visual equipment, optical, medical, and other instruments, and base metals and base metal products (see Fig. 6.1).

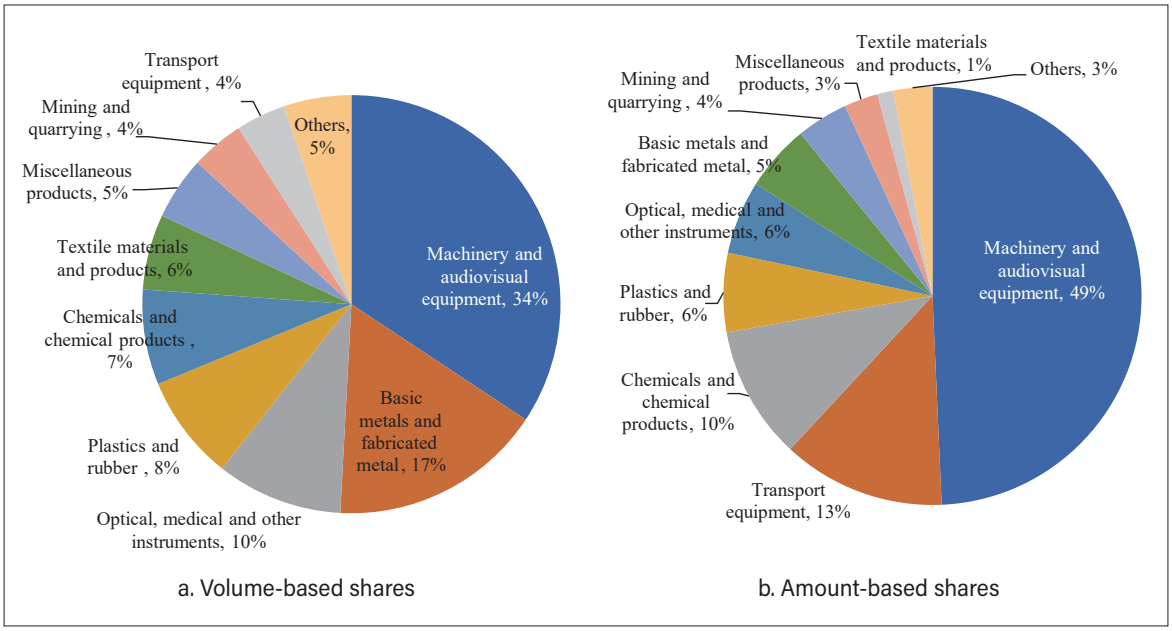

Fig. 6.1 Distribution of key intermediate goods with security risks in industrial and supply chains

Source: UN Comtrade database.

Note: Shares of each industry are averaged over 2017–2021 to reflect long-term trends and exclude short-term fluctuations.

In short, global industrial and supply chains, while becoming increasingly interdependent, have been subject to accelerated adjustment under the combined influence of many economic and political factors. Currently, with rivalry and competition between major countries escalating and the geopolitical situation remaining tense, multinational enterprises have increasingly felt the urgency of dispersing the risks of the industrial and supply chains. They have taken the initiative to adjust the layout of industrial and supply chains, which, to a certain extent, has caused the fragmentation and shortening of global industrial and supply chains.

Box 6.1 Comparison of industrial and supply chain risks between China and the US

In terms of economic factors, production risk is higher than sales risk in China, while sales risk is higher than production risk in the US. It is because China is in the midstream and downstream positions of the global industrial and supply chains, while the US is in the relative upstream positions. China's production relies more on importing intermediate goods, while the US needs to export the intermediate goods it produces.

In terms of political factors, changes in international political relations and the dominant control of the country over key links in the industrial and supply chains directly affect the relevant industrial and supply chain risks.

Since 2017, the US has taken a series of sanctions measures, such as export control against China, which has substantially increased China's risks in production and sales compared to when only economic factors are considered. In 2022, the US has placed 61 Chinese entities on the Entity List in four rounds and 64 on "the Unverified List" in two rounds as the US claimed that these companies have been involved in relevant weapons research and development or other civil-military integration activities, engage in business with Iran, or involve human rights issues. The list covers high-tech industries such as artificial intelligence chips, semiconductor equipment, aerospace, and electronic information.

The supply cut-off measures taken by the US against China's relevant high-tech fields and enterprises are not only detrimental to China but also detrimental to the US and the world. First, the cut-off of supply will make related enterprises in the US lose the huge Chinese market and high profits, which damages the US industrial interests. Second, the cut-off of supply will lead to the inability of Chinese enterprises to deliver their products on time and the disruption of the global industrial and supply chains, which will in turn affect the US consumer market and result in supply disruption, price increases, and damaging the interests of US consumers. Third, the supply cut-off will not only affect US enterprises but also affect related global enterprises, which cause significant increases in risks and uncertainties in the global economy, trade, and investment.

Taking the semiconductor industry as an example, due to the complex technology involved in chip-making, the huge capital investment, and the shorter upgrading cycle, the semiconductor industry must allocate resources worldwide and fully utilize the comparative advantages of countries in the global industrial division. It is not in line with the laws of the market if only a few countries can participate in the industry. It results in a waste of resources and ineffective investment and hinders the progress and healthy development of the high-end chip industry as the US impedes global scientific and technological progress.[2] According to the estimation of American scholars, there may be a 35 percent to 65 percent increase in chip prices if the US realizes the localization of the chip industry.[3] According to a study by the IMF, trade disruptions, technological "decoupling," and economic and trade conflicts caused by "de-sinicization" could trigger a 5 percent drop in global GDP.[4]

2. Direction of Evolution in Global Industrial and Supply Chains

(1) Strengthened localization and alliance

The demand for supply chain localization has intensified in various economies. The US, Japan, the EU, and others are promoting the reshoring of supply chains in key industries such as medical equipment. For example, since 2020, the US has introduced the Global Emergency Act, the Defense Production Act, the Clean Energy Act, and the America COMPETES Act of 2022 and has attempted to relocate key supply chains back home and to cultivate domestic supply chains of key products such as medical equipment, new energy vehicles, and chips through measures such as tax breaks, subsidies, and increasing investment. Japan has implemented a

243.5 billion yen supply chain reform program to support Japanese companies in moving back to home country. However, due to the limitations of factor endowment, domestic market size, and technology, it is impossible for a single country to engage in all the production processes of the industrial and supply chains. Some developed countries have attempted to promote supply chain alliances for strategic products. In October 2022, the US introduced a new regulation on export control to restrict the export of items used in the manufacture of local semiconductor equipment to China. In June 2023, the Netherlands imposed export restrictions on lithography, further forming a "chip alliance" with the US and Japan.

(2) Accelerated pace of regionalization and diversification

Diversification can disperse risks and avoid security risks caused by individual countries artificially disrupting the industrial and supply chains through measures such as sanctions. Regionalization can reduce transportation costs through industrial chain clusters, shorten logistics time, improve logistics efficiency, and minimize the impact caused by natural disasters and pandemics.

In recent years, the number of Regional Trade Agreements (RTAs) notified to the WTO has grown rapidly. In January 2022, the RCEP came into force. In June 2023, RCEP entered into force for all 15 member countries. RCEP member countries have been actively promoting the implementation of the agreement on the ground, demonstrating the determination and actions of all parties to support an open, free, fair, inclusive, rule-based, and development-oriented trade system. This has injected strong momentum into Asia-Pacific regional economic integration, accelerated the pace of trade and investment integration among member countries, and further deepened the industry and supply chain cooperation, making it more diversified and resilient.

(3) Evident advantages of digitization and intelligence

New-generation information technologies, such as big data, 5G, artificial intelligence, cloud computing, virtual reality, and the Internet of Things, are conducive to the construction of a long-lasting, flexible, and resilient digitalized and intelligent industrial and supply chains, which can quickly identify the risks at each supply level, promote cooperation at different levels and effectively respond to uncertainty risks. Specifically, digitization has the following three advantages in enhancing the resilience and security of industrial and supply chains.

Digitization can enhance the response speed of the industrial and supply chains to shocks, break the temporal and spatial restrictions on the flow of the factors of production, reduce the enterprises' transaction costs of industrial and supply chains, raise the resilience of industrial and supply chains, significantly improve economic efficiency, and consolidate the development advantages of regions.

Currently, countries are accelerating the improvement of digital economic governance systems, vigorously developing digital industry, and actively promoting the digital transformation of traditional industries. Since 2021, the US has successively issued a series of bills, such as the Interim National Security Strategy Guidance, the Strategic Competition Act of 2021, and the 2021 American Innovation and Competition Act, to support digital fields such as artificial intelligence, 5G, and autonomous driving. The EU, Japan, and others have also provided funding and resource support for the research and development of emerging technologies such as artificial intelligence and quantum communication through relevant plans such as the 2030 Digital Compass and the Economic Security Promotion Act. In 2023, China released the "Plan for the Overall Layout of Building a Digital China," which specifies eight major areas, including the digital economy, digital society, digital government, and digital culture, as well as major projects such as new infrastructure construction, data resource development and utilization, key core technology research, and digital industry innovation and development.

(4) Acceleration of the green transition and low carbonization

Under the pressure of climate change, environmental pollution, and geopolitical conflicts, major economies have taken the green transition of economy and energy as an important way to enhance the resilience and security of industrial and supply chains. The pace of the green transition of industrial and supply chains has been accelerated. In 2023, the EU issued the Green Deal Industrial Plan, the Net-Zero Industry Act, and the Critical Raw Materials Act to enhance the position of the green industry in the macro-industrial strategy. In green energy, energy storage, and related fields such as hydrogen energy, solar energy, advanced biofuels, and battery R&D and manufacturing, the EU has increased financial investment and stepped up green technology R&D and application. Developing countries accelerate energy transition, realize transition and development through green transition, and enhance the competitiveness of industrial and supply chains. Since 2021, the Gulf countries represented by Saudi Arabia and the UAE have continued to promote the development of clean energy industries such as solar energy, wind energy, and hydrogen energy through multiple ways such as increased investment, technological innovation, and international cooperation, to create the second growth pole in addition to oil and gas, and to boost low-carbon and sustainable development of the economy. In 2022, China issued Action Plan for Industrial Carbon Peaking, highlighting its support for the automotive, machinery, electronics, textile, telecommunications, and other industries to integrate the green and low-carbon concept into the whole process of product design, raw material procurement, production, transportation, storage, use, and recycling and disposal, accelerating the establishment of a unified green product certification and identification system of green products, and promoting the green and low-carbon development of the entire industrial and supply chains.

3. Enhance the Resilience of Global Industrial and Supply Chains through Openness

In order to enhance the resilience and security of global industrial and supply chains and deal with the risk of chain rupture when faced with various emergencies, countries should work together to promote more openness in the world economy, jointly maintaining the international public goods attributes of industrial and supply chains, fully leverage their characteristics and advantages, and optimize the layout of industrial and supply chains. Countries should grasp the opportunities in the new round of technological revolution, expand the development space of industrial and supply chains, and establish safer, reliable, and more resilient industrial and supply chain systems in an open environment.

(1) Commitment to a more open world economy

For all countries, it's important to adhere to and carry out true multilateralism, focus on global issues, and strengthen the construction of global public goods. It's pivotal to support international institutions such as the WTO and APEC and strengthen communication and consultation with them on important issues such as the digital economy and the green economy to facilitate fairer and more reasonable rules and standards. It's essential to promote global connectivity, strengthen the construction of new cross-border infrastructure, facilitate unimpeded modern logistics, and form stable transportation channels for energy, resources, and products. It's imperative to raise the level of bilateral and regional openness and cooperation among countries, continue to carry out upstream and downstream coordination in industrial and supply chains, and stabilize the confidence and determination of multinational enterprises in expanding their global trade and investment layout.

(2) Commitment to optimizing industrial and supply chain layout

For all countries, it's important to fully leverage countries' characteristics and advantages in terms of resource endowment, openness, market potential, and other factors and promote effective collaboration in global industrial and supply chains. It's pivotal to support more developing countries to deeply integrate into the global industrial and supply chains to realize sustainable development. It's essential to deepen intra-regional industrial cooperation, strengthen multi-level cooperation in different industries and production segments, optimize the global and regional linkage of raw materials, manufacturing and processing, technical standards, and other segments, and promote the orderly international transfer of capital-, technology- and labor-intensive industries to form a relatively stable pattern of global industrial and supply chains.

(3) Commitment to expanding the space of industrial and supply chains

For all countries, it's important to focus on the digital economy and information technology and encourage countries to actively cultivate new products, new business forms, and new modes to build efficient, collaborative, and flexible industrial and supply chains. It's pivotal to give attention to breakthrough technologies and emerging industries that impact the world. It's essential to create an open platform for cooperation on innovation resources and strengthen technology talent exchange and technical exchanges in emerging technology fields to better leverage technological innovation to lead and ensure the resilience of the industrial and supply chains. It's imperative to establish industrial coordination mechanisms in electronic information, the automobile industry, the pharmaceutical industry, and other sectors to create a favorable environment for industrial development. It's crucial to fully leverage the decisive role of the market in resource allocation, strengthen global macroeconomic policy coordination, and reduce the disturbance of political factors on the security of industrial and supply chains.

NOTES

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