Chapter 1 Building Resilient Global Value Chains

This chapter will point out that awareness is growing about the supply chain risks faced by Japanese companies, mainly geopolitical and economic security risks, because of the escalation of the U.S.-China trade friction and the rise of authoritarian states, among other factors. It will also mention that against that backdrop, there have been changes in the countries and regions that are considered to be important as suppliers and sales and investment destinations. In light of the abovementioned changes, it will identify the challenges for building resilient supply chains. This chapter will also explain Japan's implementation of economic security policy and activities to strengthen domestic manufacturing bases for critical goods, such as semiconductors, in the increasingly severe supply chain environment due to growing uncertainty.

Section 1 Building resilient global value chains

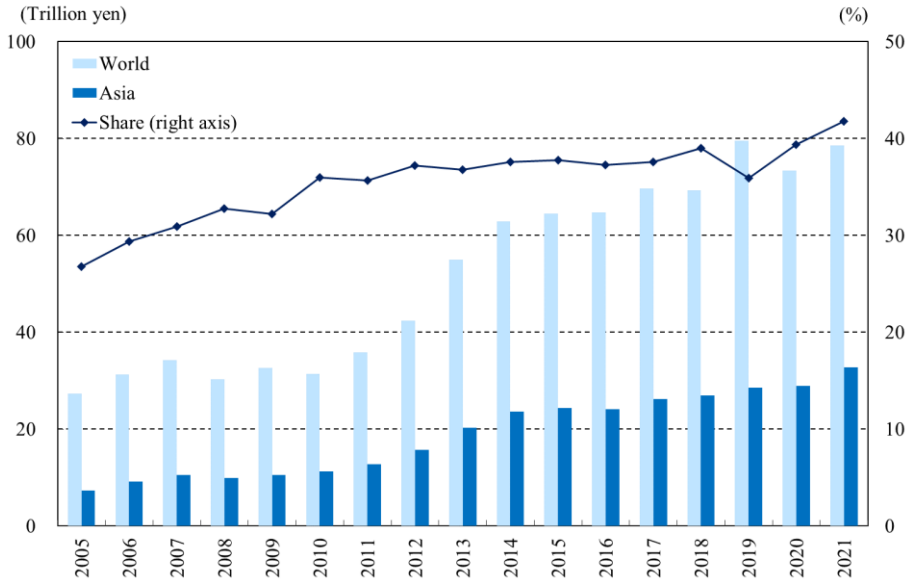
1. The reality of global value chains

(1) Overseas development of Japanese manufacturing industries

To grasp Japanese companies' global value chains, we will first provide an overview of overseas development of Japanese manufacturing industries' production bases. That is because flows of materials between production bases, including headquarters in Japan, are considered to form important parts of global value chains.[200] First, according to statistics on outward foreign direct investments, Japanese manufacturing industries' production bases are located in Asia in many cases. On an outstanding balance basis, some 40% of outward direct investments by Japan are made in Asia, and Asia's share is growing as a trend (Figure II-1-1-1).

[200] Generally speaking, the term "global value chain" refers to a broad range of processes, from planning, research and development to manufacturing, sales, and maintenance, while in many cases, the term "supply chain" refers particularly to a network of supply of raw materials and products in the manufacturing process. The meanings of these two terms overlap in many cases, so no strict distinction is made in this section, either.

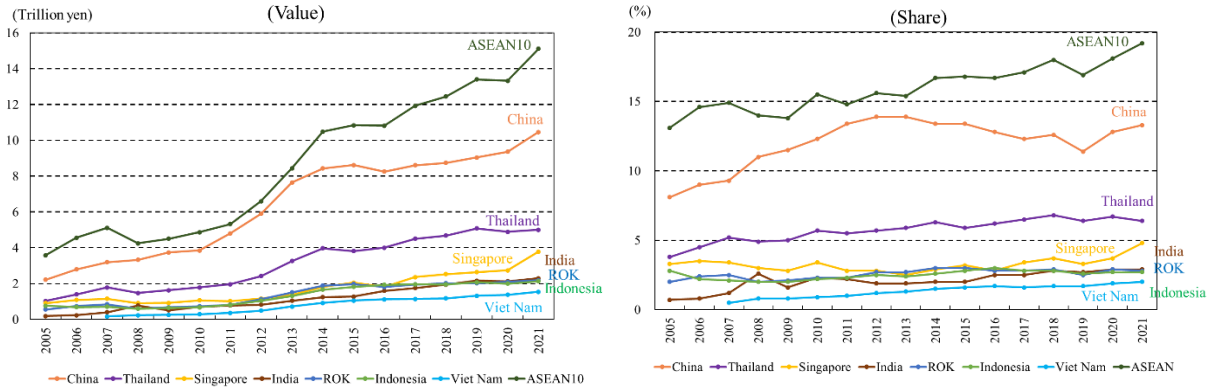
Figure II-1-1-1. Changes in balance of outward direct investment by Japan (manufacturing)



Source: Japan's International Investment Position (MOF).

Among Asian business locations, China, which is called "the world's factory," has the largest share of outward direct investments by Japan, followed by Thailand (Figure II-1-1-2).[201] Although the value of investments in China has continued to increase, China's share in the total outstanding balance of investments has been declining since peaking in 2012. Instead, the shares of Thailand, India and Viet Nam are rising, indicating that diversification is proceeding at a moderate pace. ASEAN as a whole is attracting a larger amount of investments than China. Since the mid-2010s, the outstanding balance of investments in ASEAN and ASEAN's investment share have continued to expand at a faster pace than China's outstanding balance and share. Since 2020, China's share has expanded once again, and this presumably reflects the effects of the positive growth achieved by China amid the slowdown of the global economy due to the COVID-19 pandemic.

Figure II-1-1-2. Changes in balance of outward direct investment from Japan to major Asian countries and regions (manufacturing)



Source: Japan's International Investment Position (MOF).

[201] In this section, unless otherwise stated, "China" refers to mainland China, excluding Hong Kong. "ASEAN" refers to the 10 ASEAN member countries as a whole.

Let us look at the locations of Japanese companies' business bases and procurement flows based on corporate statistics. According to the Basic Survey on Overseas Business Activities by the Ministry of Economy, Trade and Industry, approximately 11,000 overseas subsidiaries of Japanese manufacturing industries are operating across the world (Table II-1-1-3).[202] Of those affiliates, around 80%, or approximately 8,500 affiliates, are located in Asia, so in terms of the number of companies, manufacturing industries' presence in Asia is even more prominent. In Asia, China and ASEAN are the main business locations for Japanese companies. By industry, materials industries, such as chemicals, Iron and steel and metals, and machinery industries, such as general machinery, electrical & information and communication equipment, and transportation equipment, have a large presence. In those industries, the system of international division of production is well-developed, with procurements of materials conducted across national borders.

Table II-1-1-3. Number of Japanese companies' overseas subsidiaries (FY2020)

(Unit: Company; billion yen)

	World	U.S.	Asia	China	ASEAN10	Thailand	Indonesia	Viet Nam	India	Europe
All industries	25,703	3,008	17,342	6,303	7,414	2,362	1,147	1,188	616	2,913
Manufacturing	11,070	1,063	8,529	3,651	3,632	1,324	666	677	302	853
Food	498	69	342	155	146	50	30	30	9	46
Textiles	462	12	424	245	153	49	36	43	3	15
Chemistry	1,092	116	803	291	328	110	62	44	30	123
Iron and steel and metals	1,298	92	1,093	435	525	202	92	101	37	46
General machinery	1,742	185	1,321	629	455	178	67	80	41	167
Electrical & information and communication equipment	1,569	133	1,284	596	482	155	39	94	21	109
Transportation equipment	2,387	310	1,607	592	799	359	211	104	124	214
Average sales per company (manufacturing)	12.3	28.9	9.3	9.8	8.3	10.5	7.7	5.1	12.8	18.1

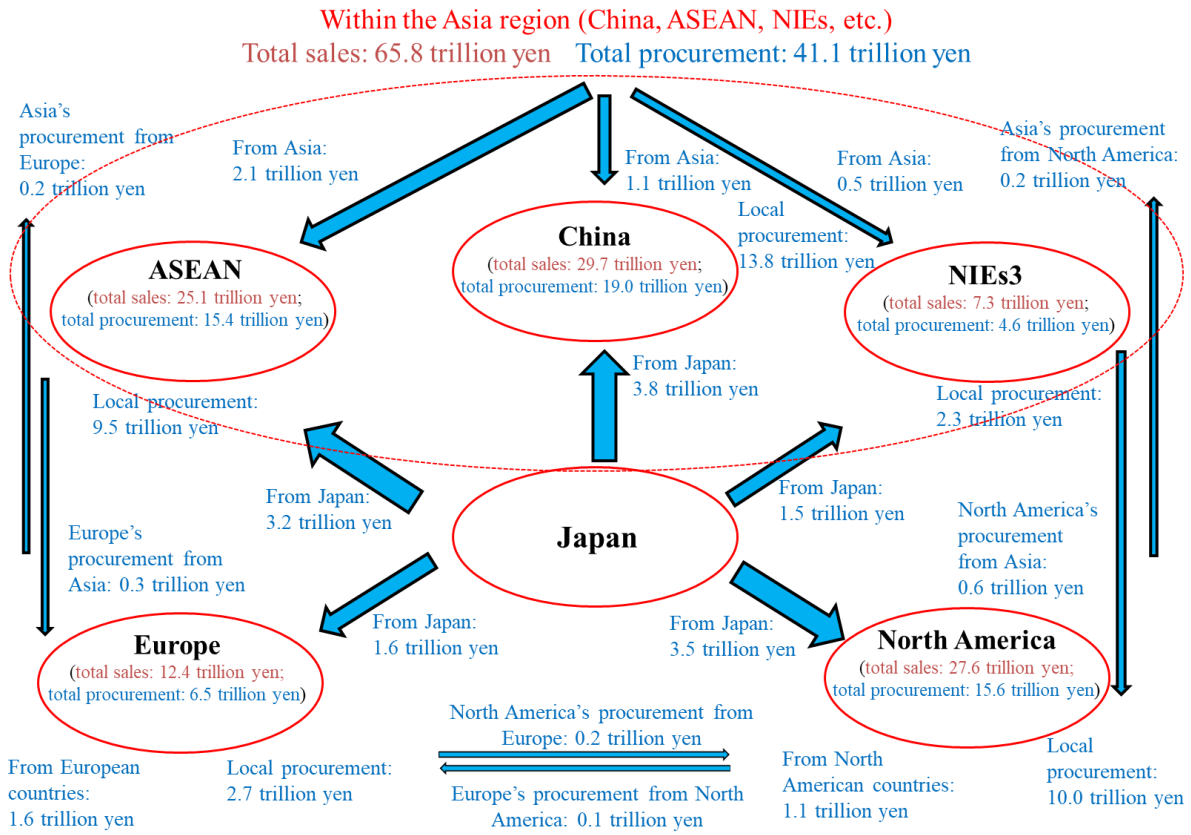
Note: The term "Iron and steel and metals" refers to the sum of the companies in the iron, non-ferrous metal, and metal products sectors. The term "General machinery" refers to the sum of companies in the general-purpose machinery, production machinery, and business-oriented machinery sectors. The term "Electrical & information and communication equipment" refers to the sum of the companies in the electrical machinery, and information and communication equipment sectors.
Source: *Basic Survey on Overseas Business Activities* (METI).

Here, we will consider procurement flows of parts and materials between overseas and Japanese production bases (Figure II-1-1-4). Parts and materials procurements by overseas subsidiaries are conducted mainly from Japan, or locally, that is, in the countries or regions where the affiliates are located (host countries and regions). Although the share of procurements conducted in the host countries is the largest, some amount of parts and materials, mainly core parts that cannot be locally made, are supplied from Japan. Procurements are conducted within Asia on a large scale, but the value of cross-

[202] The "Basic Survey on Overseas Business Activities" is a survey of Japanese companies with overseas subsidiaries (excluding finance, insurance, and real estate). In this context, "overseas affiliates" is a general term for overseas subsidiaries and sub-subsidiaries. An overseas subsidiary refers to a foreign corporation with a Japanese investment ratio of 10% or more, and an overseas sub-subsidiary to a foreign corporation with an investment ratio of more than 50% from an overseas subsidiary with a Japanese investment ratio of more than 50%. The recovery rate was 75.2% (survey of FY2020 results).

regional procurements, such as between Asia and North America and between Asia and Europe, is limited.

Figure II-1-1-4. Locations and procurements of Japanese manufacturing subsidiaries (FY2020)

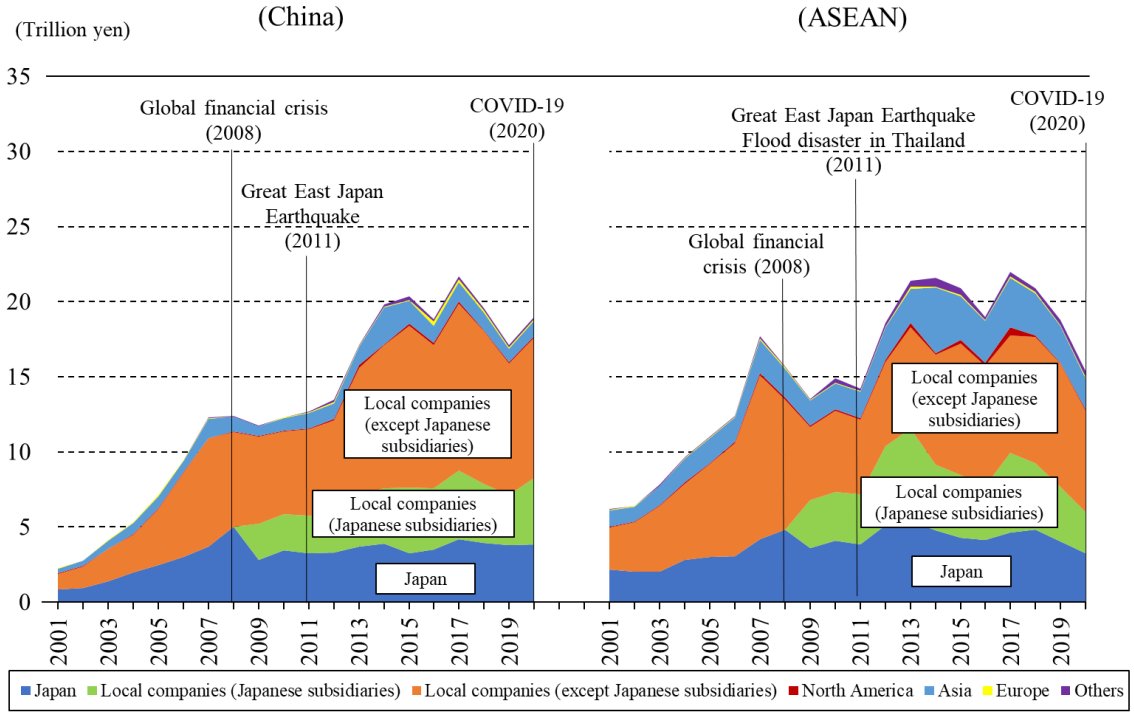


Note: For statistical purposes, some overlaps in the data on Singapore are seen as Singapore is covered by both ASEAN and NIEs3.
Source: *Basic Survey on Overseas Business Activities* (METI).

A look at changes in suppliers for manufacturing subsidiaries in Asia shows that local procurements, including from Japanese companies' local operations, are expanding (Figures II-1-1-5 and II-1-1-6). Although the value of procurements from Japan has remained at a certain level, the share of procurements from Japan has declined to around 20%. Even though the share may not be large, many procurements from Japan are presumed to be core parts essential to production, and as a result, at the time of the Great East Japan Earthquake, delays in supplies of parts and materials from Japan affected production at overseas bases. There is not much difference in this trend between China and ASEAN. However, in the case of manufacturing subsidiaries in China, the share of procurements from Japan is large compared with the case of manufacturing subsidiaries in ASEAN, indicating that industrial agglomeration, including Japanese and local companies, are well-developed in China. On the other hand, in the case of manufacturing subsidiaries in ASEAN, the share of procurements from within Asia is relatively large, indicating that parts and materials are shared among subsidiaries in ASEAN. Presumably, it is because of mutual procurements within ASEAN that the effects of the flood disaster in Thailand in 2011 spread to other ASEAN countries. It should be noted that the procurement

characteristics differ from industry to industry: in the information and communications equipment industry, the shares of procurements from Japan and from within Asia are large, while in the transportation machinery industry, the share of local procurements is large (Figure I-1-1-7).

Figure II-1-1-5. Procurement sources (value) of Japanese manufacturing subsidiaries located in Asia (China and ASEAN)

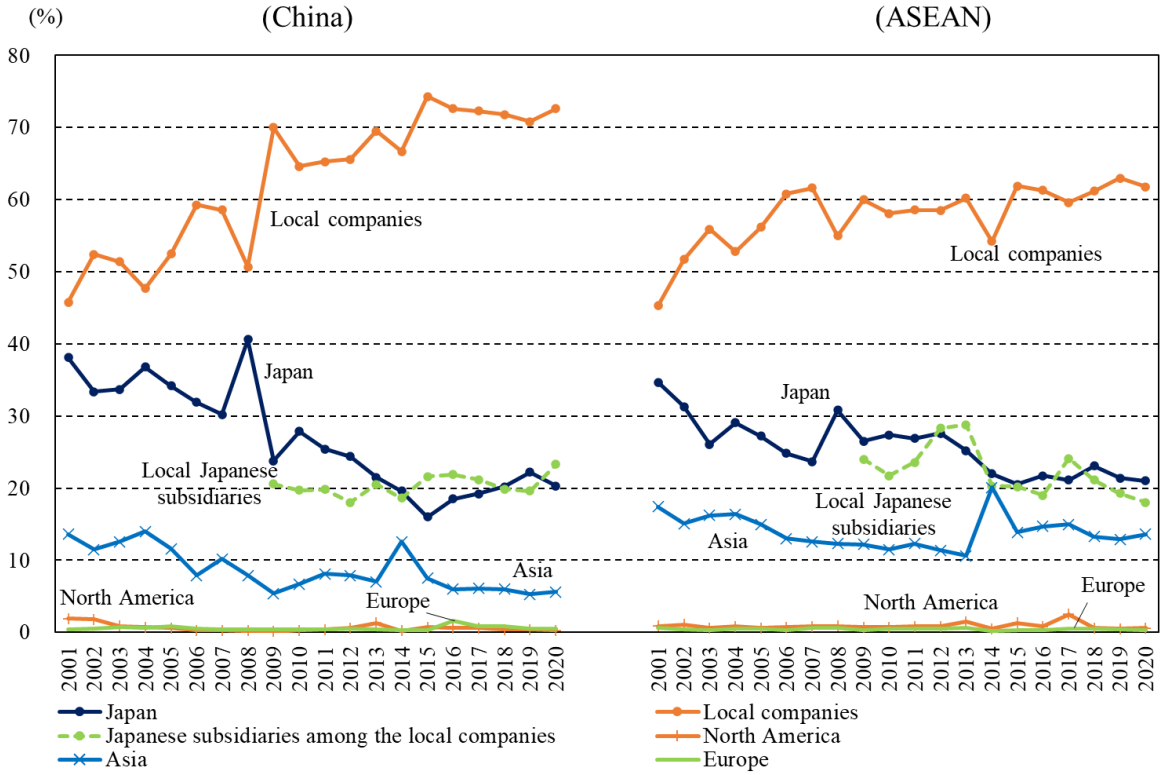


Note 1: The data on local Japanese subsidiaries are based on the surveys in and after FY2009. In the surveys before FY2009, the term "Local companies" includes both Japanese subsidiaries and companies except Japanese subsidiaries.

Note 2: In principle, the data on ASEAN is based on 10 economies. However, for statistical reasons, the data for four economies (Indonesia, Malaysia, the Philippines, and Thailand) are aggregated about the years in and before FY2006.

Source: *Basic Survey on Overseas Business Activities* (METI).

Figure II-1-1-6. Procurement sources (share) of Japanese manufacturing subsidiaries located in Asia (China and ASEAN)

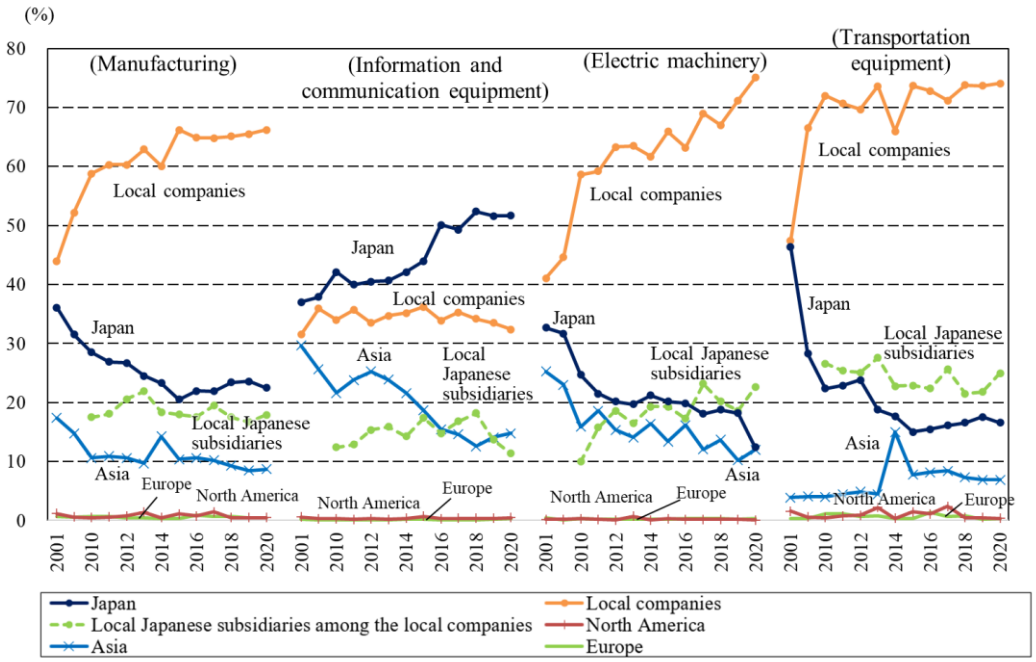


Note 1: The data on local Japanese subsidiaries are based on the surveys in and after FY2009. The term "Local companies" includes Japanese subsidiaries.

Note 2: In principle, the data on ASEAN is based on 10 economies. However, for statistical reasons, the data for four economies (Indonesia, Malaysia, the Philippines, and Thailand) are aggregated about the years in and before FY2006.

Source: *Basic Survey on Overseas Business Activities* (METI).

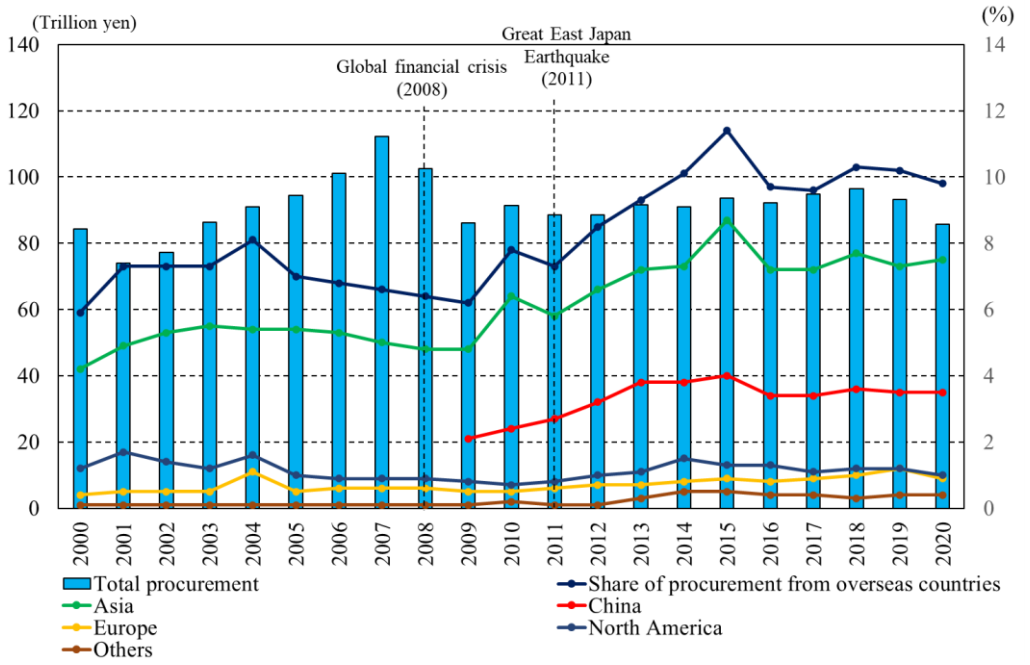
Figure II-1-1-7. Procurement sources of Japanese manufacturing subsidiaries located in Asia (by industry)



Note 1: The data in FY2001, FY2005, and FY2010 are displayed around every 5 years, while the data in and after FY2011 are displayed annually.
Note 2: As the surveys on local Japanese subsidiaries started in FY2009, the data from the surveys are those aggregated from FY2010. The term "Local companies" includes Japanese subsidiaries.
Source: *Basic Survey on Overseas Business Activities* (METI).

Meanwhile, according to the Basic Survey of Japanese Business Structure and Activities, the value of procurements by manufacturing industries in Japan declined at the time of the global financial crisis and the Great East Japan Earthquake but recovered moderately later. The value has remained almost flat since the mid-2010s (Figure II-1-1-8). As for suppliers, the share of procurements from overseas trended upward from the end of the financial crisis to the mid-2010s, with the share of procurements from Asia, including China, showing a particularly steep rise. Presumably, Japanese manufacturing industries procure from overseas when they manufacture products in Japan using labor-intensive general-purpose parts and materials. However, since the COVID-19 pandemic, the supply of parts and materials from overseas, particularly from China, has been disrupted, causing production in Japan to come to a halt or slow down, and as a result, concerns over risks associated with procurements from overseas have heightened.

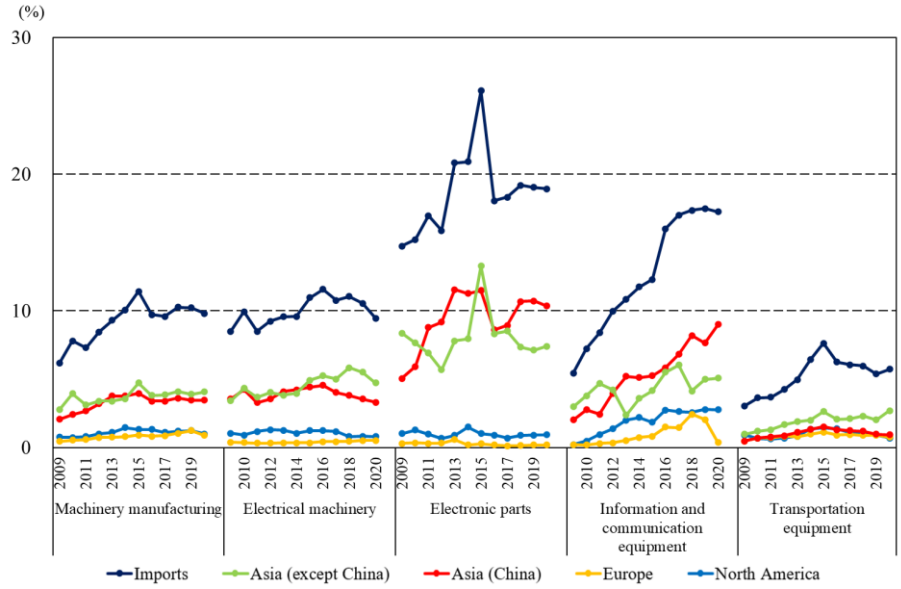
Figure II-1-1-8. Share of procurement sources in total procurement by machinery manufacturing industries located in Japan



Note 1: The values of the machinery manufacturing industry are the total values of "general-purpose machinery," "production machinery," "business-oriented machinery," "electronic parts, devices and electronic circuits," "electrical machinery," "information and communication equipment" and "transportation equipment."
Note 2: The term "Asia" includes China. The surveys started to target China from FY2009. The term "China" includes Hong Kong.
Source: *Basic Survey of Japanese Business Structure and Activities* (METI).

By industry, the share of procurements from overseas, mainly from China, is increasing in the electronic parts industry and the information and communications equipment industry (Figure II-1-1-9). Even though the share of procurements from overseas is not necessarily high in the transportation machinery industry, shortages of only a few parts items could significantly affect the production of automobiles, the representative product of that industry, because automobiles are an integral type of product composed of numerous parts for which close coordination is necessary.

Figure II-1-1-9. Share of procurement sources for machinery manufacturing industries located in Japan (by industry)



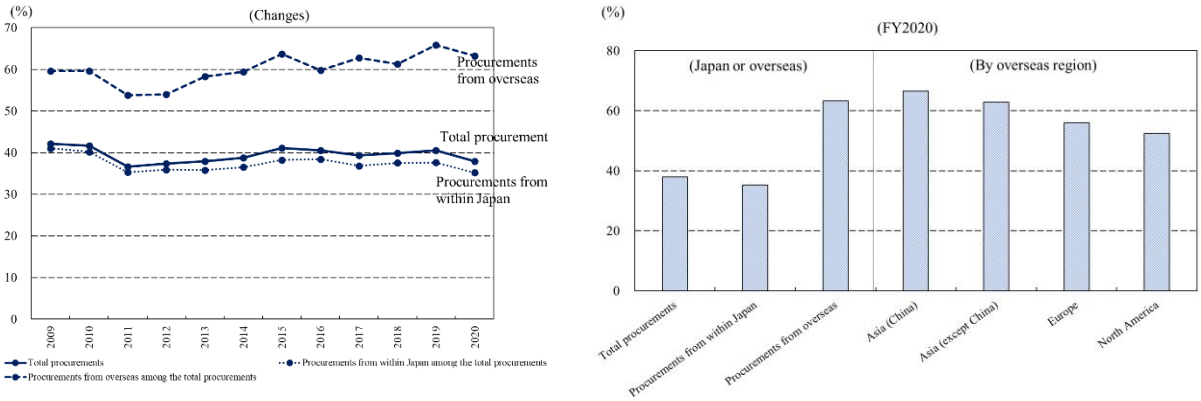
Note 1: The values of the machinery manufacturing industry are the total values of "general-purpose machinery," "production machinery," "business-oriented machinery," "electronic parts, devices and electronic circuits," "electrical machinery," "information and communication equipment" and "transportation equipment."
Note 2: The surveys started to target China from FY2009. The term "China" includes Hong Kong.
Source: *Basic Survey of Japanese Business Structure and Activities* (METI).

Moreover, procurements from abroad by Japanese machinery industries are more likely to be intra-firm transactions compared with procurements from within Japan (Figure II-1-1-10).[203] Specifically, as for overseas suppliers, the share of procurements from companies with which the sourcing companies have a capital relationship is large, and this is presumably because quality assurance can be secured more easily and it is easier for headquarters in Japan to exercise control when there is a capital relationship.[204] By region, the share of intra-firm procurements is relatively large in the case of

[203] If we look at the whole of the manufacturing industry, the focus of analysis would become blurred because of the inclusion of industries such as import and refining of crude oil, and therefore, the scope of the analysis of global value chains was narrowed to the machinery manufacturing industry.
[204] In the Basic Survey of Japanese Business Structure and Activities, "companies with capital relation" include a "parent company," "subsidiaries," and "relevant companies." "Parent companies" means companies owning more than 50% of the voting rights in subsidiaries, "subsidiaries" means companies with more than 50% of the voting rights" (including companies with less than 50% of the voting rights that have effective control), and "relevant companies" means companies with 20% to 50% of the voting rights (including companies with 15% to 20% that may have material effects).

procurements from China and is relatively small in the case of procurements from Europe and the United States.

Figure II-1-1-10. Share of procurements from related companies in the procurement of machinery manufacturing industries located in Japan

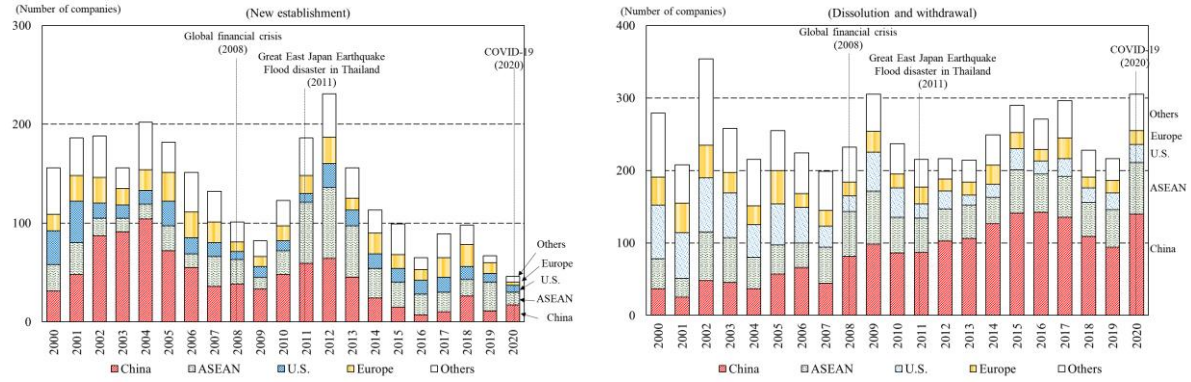


Source: *Basic Survey of Japanese Business Structure and Activities* (METI).

From the viewpoint of relocation of overseas subsidiaries, let us look at the trends in "new establishment" and "dissolution, withdrawal, and decline in the control share" (hereinafter "withdrawal, etc.") in the Basic Survey on Overseas Business Activities. Following economic shocks, relocation activity can be observed. For example, at the time of the global financial crisis, the number of new establishments declined but the number of withdrawals, etc. increased in FY2008 and 2009 (Figure II-1-1-11). The situation was similar in FY2020, when the COVID-19 pandemic broke out. Conversely, in FY2011, the number of new establishments increased, mainly in ASEAN and China, due to the effects of the Great East Japan Earthquake and the flood disaster in Thailand, and in FY2012, the number continued to rise. This suggests that following the disasters, disaster-affected facilities were relocated. By country/region, new establishments and withdrawals, etc. are observed to some degree in any country or region every year, but in the 2000s, there were many new establishments in China while in the 2010s, many companies opted for withdrawal, etc.[205] By industry, in China, the relocation of facilities was implemented in many cases, not only in the textile and other labor-intensive industries but also in machinery industries, including electrical & information and communication equipment and transportation equipment (Figure II-1-1-12). Naturally, it should be kept in mind that the percentage of companies that opted for relocation was not necessarily high compared with the total number of companies in China, with many companies choosing to continue operating there. Even so, the above finding indicates that companies are constantly considering relocation in accordance with their business environment and the risks that they face.

[205] The increase in the number of new establishments in the 2000s indicate that expectations were growing for China, which acceded to the WTO at the end of 2001. Possible factors behind the increase in the withdrawals, etc. in the 2010s include increased anti-Japan protests due to the Japanese nationalization of the Senkaku Islands in 2012, the stock price plunge in the Shanghai stock market that started in June 2015, and reduced confidence in the Chinese economy due to the devaluation of the Chinese yuan in August.

Figure II-1-1-11. Number of new establishments, withdrawal, etc. by local Japanese manufacturing subsidiaries

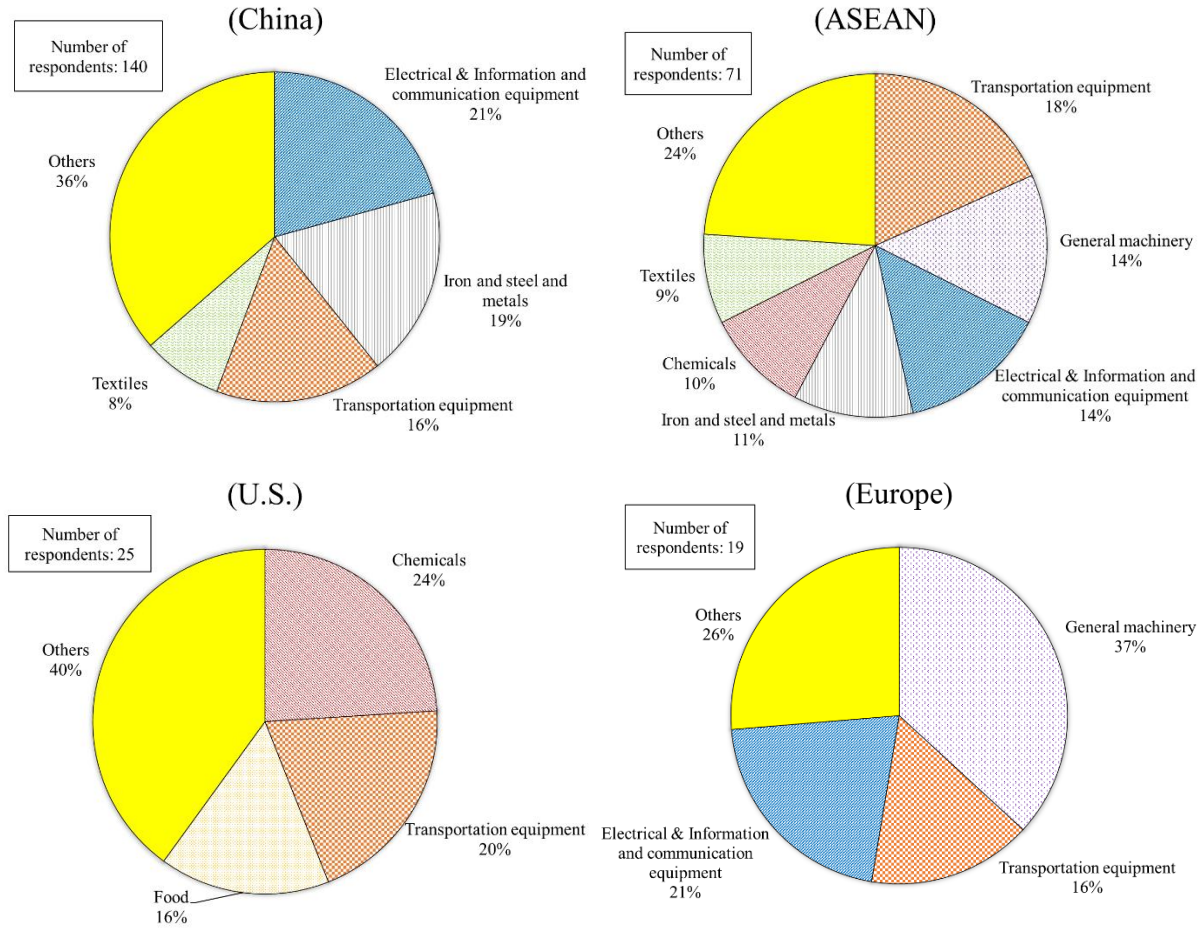


Note 1: These graphs represent the number of companies that have responded that they were "newly established" or "dissolved, etc." during the relevant fiscal year. Note that a case where a company merely faces a decrease in investment rates does not necessarily lead to a decrease in the number of local subsidiaries.

Note 2: In principle, the data on ASEAN is based on 10 economies. However, for statistical reasons, the data for four economies (Indonesia, Malaysia, the Philippines, and Thailand) are aggregated about the years in and before FY2006.

Source: *Basic Survey on Overseas Business Activities* (METI).

Figure II-1-1-12. Major industries to which companies withdrawn, etc. belong (FY2020)



Note 1: The term "Iron and steel and metals" refers to the sum of the companies in the iron, non-ferrous metal, and metal products sectors. The term "General machinery" refers to the sum of companies in the general-purpose machinery, production machinery, and business-oriented machinery

sectors. The term “Electrical & information and communication equipment” refers to the sum of the companies in the electrical machinery, and information and communication equipment sectors.
Note 2: Some details of the data were kept confidential.
Source: *Basic Survey on Overseas Business Activities* (METI).

To sum up the above, global value chains involving Japan have changed as follows. Japanese manufacturing industries expanded overseas business operations mainly in Asia, thereby building global value chains linking production bases. While China’s presence is substantial, there have been moves to diversify business locations by relocating to ASEAN countries. While local procurements have increased at overseas production bases, procurements from Japan, including core parts, have continued to some degree, above all in the information and communication equipment industry. At production bases in Japan, the share of procurements from overseas increased after the global financial crisis and the Great East Japan Earthquake, with the level of dependence on China for parts and materials growing. However, since the COVID-19 pandemic in 2020, awareness has increased about the risk of supply disruption. Companies are considering relocating production bases in accordance with changes in the business environment, such as natural disasters and economic shocks. Although many companies still continue to operate at existing locations, some are moving to relocate production bases in China.

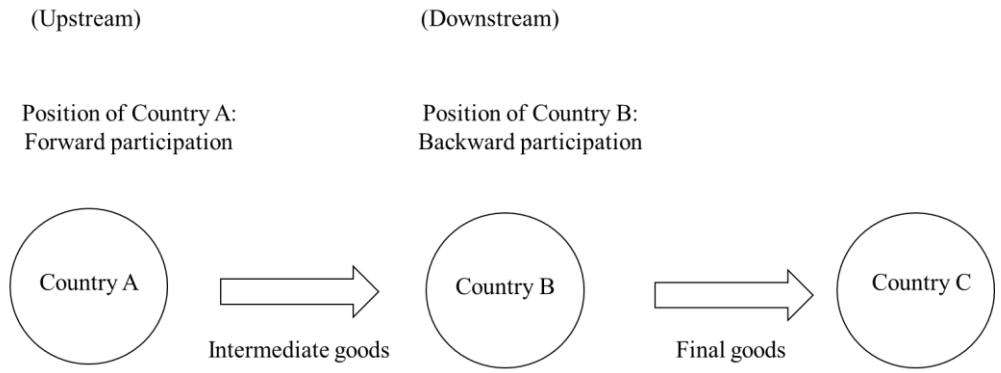
(2) Major countries’ global value chains

Until now, we have looked at international flows of materials in Japanese manufacturing industries (global value chains), but what are other countries’ global value chains like? Although it is possible to track international flows of materials based on trade statistics, it has become difficult to do so using ordinary trade statistics because value-added created overseas in the form of intermediate goods continue to accumulate in global value chains. To deal with this problem, the OECD has developed value-added trade statistics called OECD TiVA. Below, using OECD TiVA, we will consider the status of major countries’ and regions’ participation in global value chains.[206]

There are two types of participation in global value chains. To cite simple examples, there are cases where a country (Country A in the figure below) that is located in the upstream sector of the flow of production supplies intermediate goods (forward participation) and cases where a country (Country B) receives the supply of intermediate goods for the purpose of domestic production (backward participation) (Figure II-1-1-13).

[206] Used OECD TiVA (2021 version). The 2021 version provides data for the period from 1995 to 2018. As of June 1, 2023, the provisional 2022 version was published, but it was not used because it does not necessarily reflect the systems of national accounts for the most recent year published by countries and also because it is scheduled to be revised in the near future.

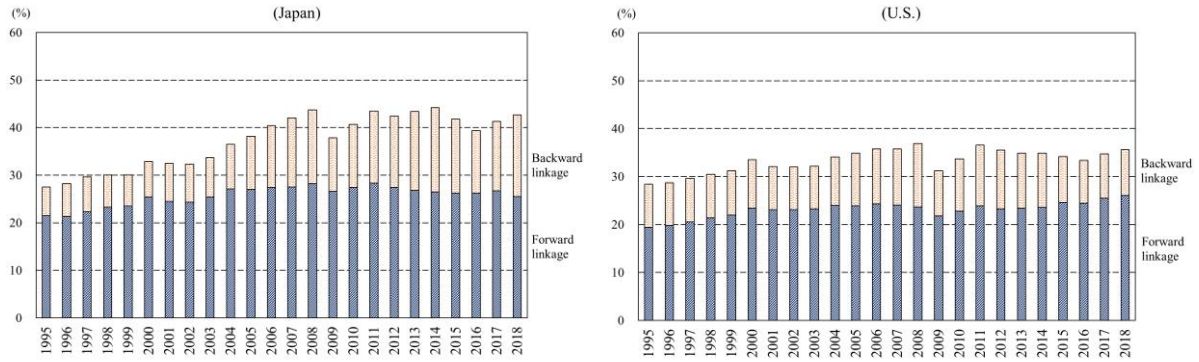
Figure II-1-1-13. Forward and backward participation in global value chains

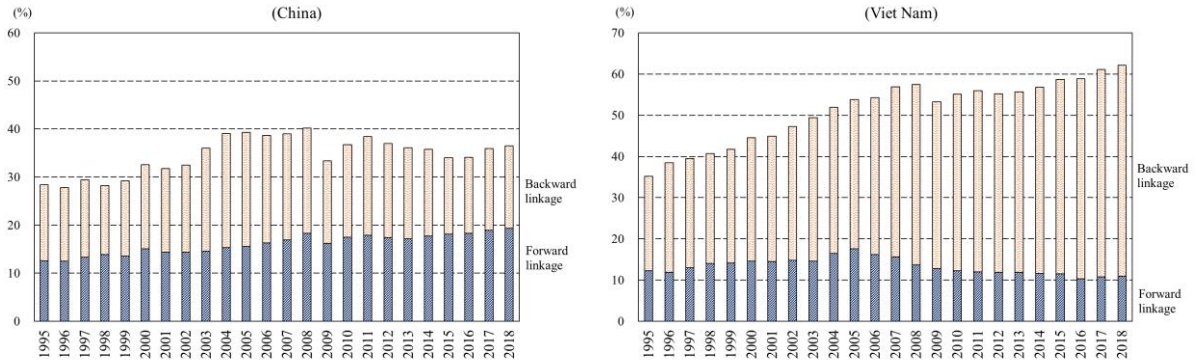


Source: METI.

As a general rule, developed countries, including Japan, the United States and Europe, are participating in the form of forward participation—supplying intermediate goods—to a greater degree while emerging countries, such as China and Viet Nam, are participating in the form of backward participation—receiving the supply of intermediate goods for the purpose of domestic assembly—in many cases (Figure II-1-1-14). This relationship has been changing due to changes in the industrial and trade structures of the countries concerned. For example, in the case of Japan in the 2000s, while the degree of forward participation remained stable, the degree of backward participation gradually increased. Conversely, China is shifting from backward participation—receiving the supply of intermediate goods from other countries for the purpose of processing and assembly—to forward participation—supplying intermediate goods to other countries. In other words, China is transforming its position from a production base focusing merely on processing and assembly to a supplier of intermediate goods for other countries. From trade counterparts' standpoint, this means that their dependence on China for the supply of intermediate goods is growing, indicating that there is an increasing risk that the kind of global value chain disruptions that occurred during the COVID-19 pandemic may happen again.

Figure II-1-1-14. Participation of major countries in global value chains (forward and backward linkages with the world)



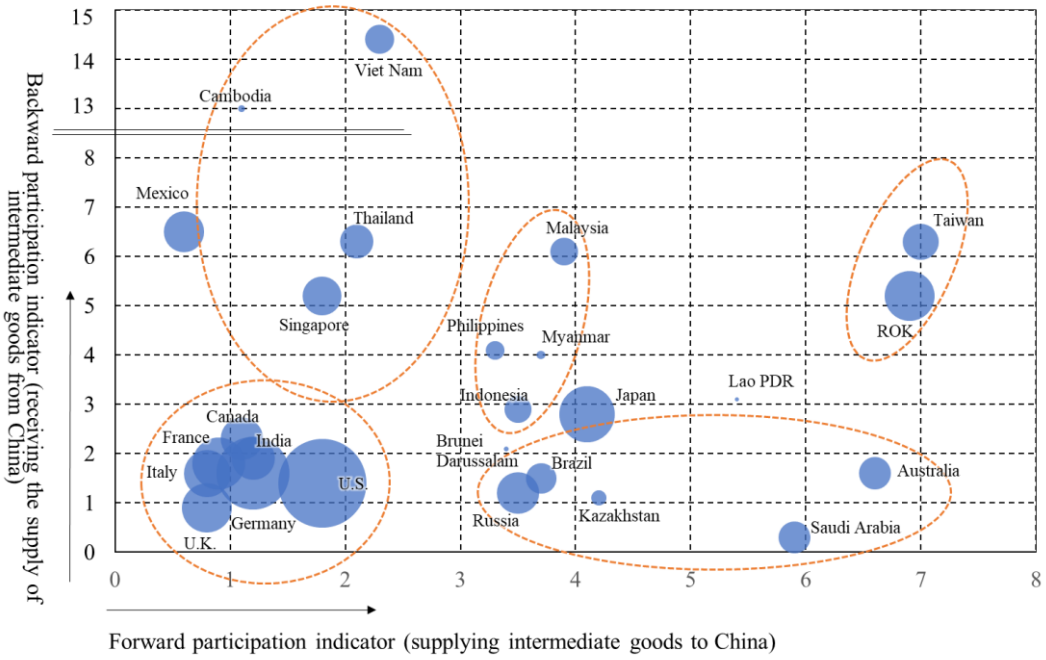


Note: The definition of forward and backward participation indicator in OECD TiVA is as follows:
Forward participation indicator = Value-added created by the home country in the total export value of other countries / Total export value of the home country; and
Backward participation indicator = Value-added created by other countries in the total export value of the home country / Total export value of the home country.
Source: TiVA (OECD).

(Relationship between major countries and regions and China)

Let us look at the relationship between major countries and regions and China in terms of global value chains using OECD TiVA. In Figure II-1-1-15, the horizontal axis represents the forward participation indicator regarding global chains as defined by the OECD, the vertical axis represents the backward participation indicator, and the size of the circles reflects the total export value for the countries and regions. When the countries and regions are divided into several groups, it becomes easier to identify distinctive trends. For example, the Republic of Korea (ROK) and Taiwan have a particularly strong relationship with China, mainly through forward participation, by supplying intermediate goods. Resource-rich countries such as Australia and Saudi Arabia have a strong forward linkage with China through the supply of resources. This group also includes Kazakhstan and Russia, which are located along the area of the One Belt, One Road initiative. In the center of the figure, ASEAN countries are located. Within ASEAN, there are many countries that have a strong backward linkage with China—receiving the supply of intermediate goods from China for the purpose of processing, assembly and export—such as Viet Nam, Cambodia, Thailand, and Singapore. On the other hand, some ASEAN countries, including Indonesia, which is a resource-rich country, and the Philippines and Malaysia, which export semiconductors to China, have a strong forward linkage as well as a backward linkage. The United States and major European countries are concentrated in the lower-left area of the figure, which means that although the value of trade is large, the degree of participation in global value chains involving China is not necessarily large because they have strong relationships with other countries (e.g., other European countries in the case of major European countries and Canada and Mexico in the case of the United States). Among other Asian countries, India, whose relationship with China is weak, is also located in the lower-left area. In the case of Japan, although its forward linkage with China is stronger than the backward linkage, its backward linkage with China is also strong.

Figure II-1-1-15. Forward and backward linkages between major countries and regions and China



Note: The details of the horizontal axis, vertical axis, and the size of circles are as follows.

Horizontal axis: Forward participation indicator = Value-added created by home country or region in the total export value of China / Total export value of home country or region;

Vertical axis: Backward participation indicator = Value-added created by China in total export value of home country or region / Total export value of the home country or region; and

Circles: The results reflecting the total export value of the country or region concerned.

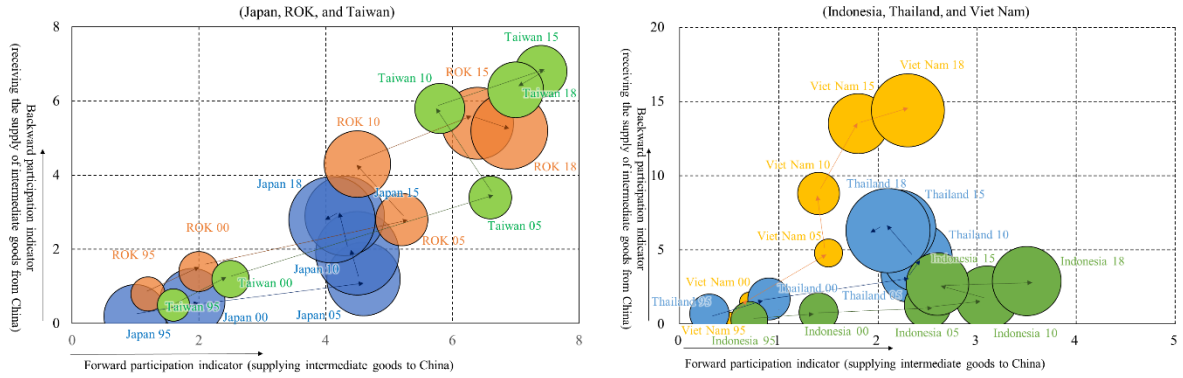
Note that METI focused on major countries and regions with export value above a certain size, and showed the data on ASEAN for all 10 economies.

Source: TiVA (OECD).

As for time series changes, major countries' and regions' relationships with China rapidly strengthened between 2000, when China acceded to the WTO, and 2005 (Figure II-1-1-16). Subsequently, Japan mainly significantly shifted vertically in the figure, which means that its backward linkage—receiving the supply of intermediate goods—with China strengthened.[207] On the other hand, the ROK and Taiwan later continued to shift diagonally upward, which means that the countries' respective relationships with China strengthened in terms of both forward and backward linkages. However, in the case of ASEAN, the nature of the relationship varied from country to country. While Indonesia, a resource-rich country, shifted horizontally, indicating a stronger forward linkage, Viet Nam and Thailand mainly shifted vertically from around 2010 onward, and this means that their backward linkage with China strengthened as they used more and more intermediate goods from China.

[207] OECD TiVA collects data on value-added on a producing country basis and regards value-added created by foreign companies as value-added created locally. The strengthening of Japan's backward linkage with China reflects the effects of imports of Japanese suppliers operating in China as well.

Figure II-1-1-16. Changes in forward and backward linkages between major countries and regions and China
(1995 → 2000 → 2005 → 2010 → 2015 →2018)

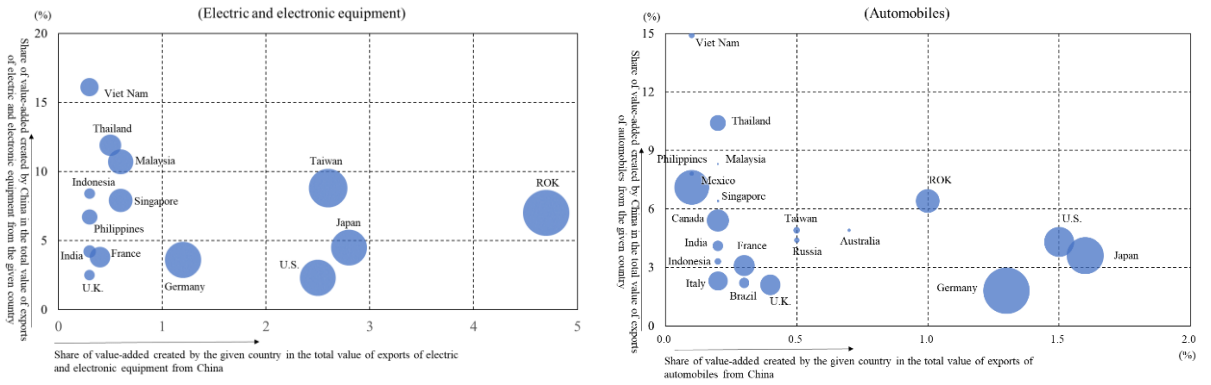


Note 1: For the details of the horizontal axis, vertical axis, and the size of circles, see the note in Figure II-1-1-15.
Note 2: These graphs show the changes at 6 points in time from 1995 to 2018.
Note 3: Note that the left and right graphs have different scales. In particular, in the right graph, the scales of the vertical axis are dramatically larger than those of the horizontal axis, and they are different.
Source: TiVA (OECD).

Figure II-1-1-17 shows countries' and regions' relationships with China in terms of global value chains on an industry-by-industry basis. It indicates the extent to which the countries and regions depend on counterpart countries and regions for parts and materials when exporting electric and electronic equipment and automobiles. In the left figure, the horizontal axis represents the share of value-added created by the regions and countries in the value of China's exports of electric and electronic equipment. The share in the Chinese export value came to slightly under 5% for the ROK and 2-3% for each of Japan, Taiwan, and the United States.[208] Although it is not clear from OECD TiVA which specific items the countries and regions supplied, chemicals, metals and electronic parts are considered to be among the items supplied. For the countries and regions, China is an important customer, and at the same time, for China, they are important suppliers of critical goods for its industries.

[208] Under OECD TiVA, there is no definition of the indicator of industry-by-industry forward or backward participation between specific two countries. We focus on partner's value-added in our export by industry. Here, the horizontal axis represents the share of value-added created by the counterpart country/region in the Chinese electrical and electronic industries' total value of exports. In this case, the industry category in the counterpart country/region does not matter (the category may be electronic parts, metals, or chemicals, for example). The vertical axis represents the share of value-added created by China in the total export value of electronic and electronics industries in the counterpart country/region. In this case, the industry category in China does not matter.

Figure II-1-1-17. Linkages between major countries and regions and China (electric and electronic equipment, and automobiles)



Source: TiVA (OECD).

The vertical axis represents the share of value-added created by China in the value of exports of electric and electronic equipment by the counterpart countries and regions. For example, value-added created by China accounted for more than 15% of the value of exports of electric and electronic equipment by Viet Nam and more than 10% of the value of exports by Thailand and Malaysia. From the above, we can see that ASEAN countries depend considerably on China for intermediate goods when exporting electric and electronic equipment. The readings of the vertical and horizontal axes indicate that the countries and regions tend to depend on China for the supply of intermediate goods, rather than supply those goods to China.

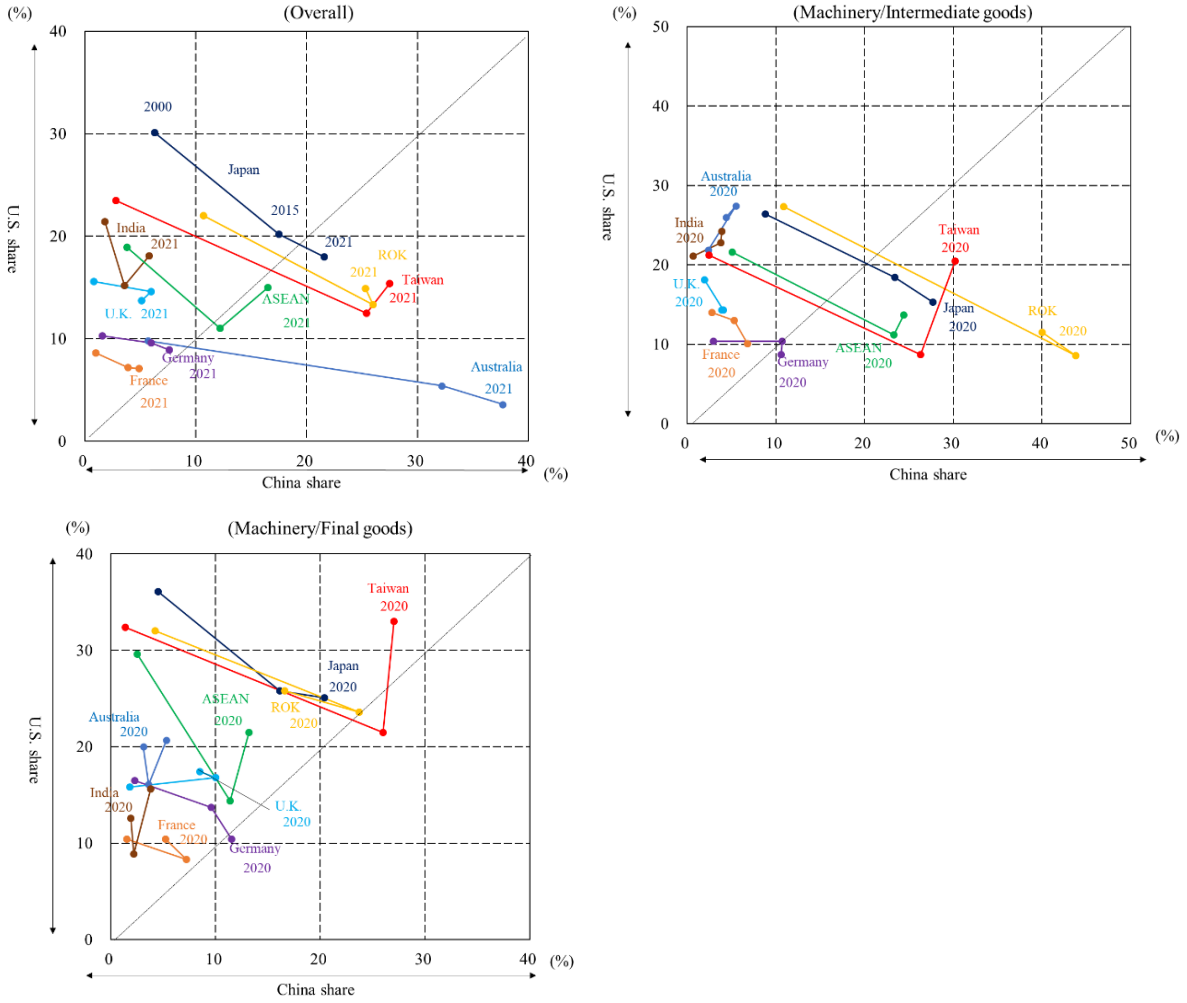
Likewise, the right figure shows China's relationships with major countries and regions in terms of automobile exports. Looking at the horizontal axis, we can see that regarding China's automobile exports, Asian countries, such as Japan and the ROK and Western countries, such as the United States and Germany, have a forward linkage with China, supplying intermediate goods, but the strength of the linkage is limited. On the other hand, looking at the vertical axis, we can see that ASEAN countries, such as Viet Nam and Thailand, are located in the upper side of the figure. This indicates that those countries, as well as Mexico and Canada, have a strong backward linkage with China, receiving the supply of intermediate goods from that country for the purpose of domestic assembly of automobiles.

(Balance between United States and China in exports from major countries and regions)

So far, we have examined global value chains from the viewpoint of the supply and procurement of intermediate goods. Below, let us look at global value chains from the viewpoint of export destinations. In recent years, how has the importance of the United States and China as export destinations changed amid concerns over the escalation of the U.S.-China trade friction? Figure II-1-1-18 shows changes in the two countries' shares in exports by major countries and regions. Since the beginning of the 2000s, when China acceded to the WTO, China's share in exports by the countries and regions has expanded in line with its growth. In particular, the dependence of Asian countries and regions, such as Japan, the ROK, Taiwan and ASEAN, on China increased significantly. Among the factors behind that trend were the international division of production within Asia and the expansion of global value chains based on that. A figure plotting changes in the shares of exports of each of intermediate and final goods to the United States and China in the machinery sector, for example, shows that the share of exports to China

in exports of intermediate goods by Asian countries and regions expanded more than the share of exports to the United States.[209] On the other hand, regarding exports of final goods, the United States' presence as an export destination for Asian countries and regions is still larger than China's presence.

Figure II-1-1-18. Shares of U.S. and China in exports from major countries and regions (2000→2015→2021)



Note 1: For statistical reasons, the data on the "Overall" of ASEAN is based on 10 economies. The data on the "Machinery/Intermediate goods" and "Machinery/Final goods" is based on the data on 8 economies of Brunei Darussalam, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam.

Note 2: For statistical reasons, the latest data on the "Machinery/Intermediate goods" and "Machinery/Final goods" is the one in 2020.

Source: *Direction of Trade Statistics* (IMF), Global Trade Atlas, and RIETI-TID.

Focusing on the period since the mid-2010s, we can see that there was a swing-back in the balance, with ASEAN and Taiwan shifting along the 45-degree line in the above figure, meaning that the U.S. share turned around and increased. By type of goods, in the case of intermediate goods, the share of exports to China continued to be larger than the share of exports to the United States, but in exports from ASEAN and Taiwan,

[209] The whole of intermediate goods includes resources, such as crude oil and natural gas, so when looking at the situation of international division of production, we examined machinery-sector data.

the share of exports to the United States increased, indicating that the momentum of the shift to China as an export destination weakened. In the case of final goods, the share of exports to the United States continued to be larger than the share of exports to China, with the U.S. share in exports by ASEAN and Taiwan expanding further.

To sum up the above, in global value chains, China is strengthening relationships with other countries by supplying intermediate goods to them. As for the relationships between Asian countries and regions and China, the ROK and Taiwan have a strong relationship, mainly a forward linkage, with China, while among the ASEAN countries, Indonesia has a strong forward linkage and Viet Nam has a strong backward linkage with China. In the electric and electronic sector and the automobile sector in particular, ASEAN countries have a strong backward linkage with China, receiving the supply of intermediate goods from it. However, that indicates the presence of a high risk of supply chain disruption. As for the balance between the United States and China as export destinations, amid the recent U.S.-China trade friction, although the share of exports to China, particularly exports of intermediate goods, increased previously, in recent years, there has been a swing-back in the balance, with the share of exports to the United States growing.

2. The impact of supply chain disruptions on Japan's economy

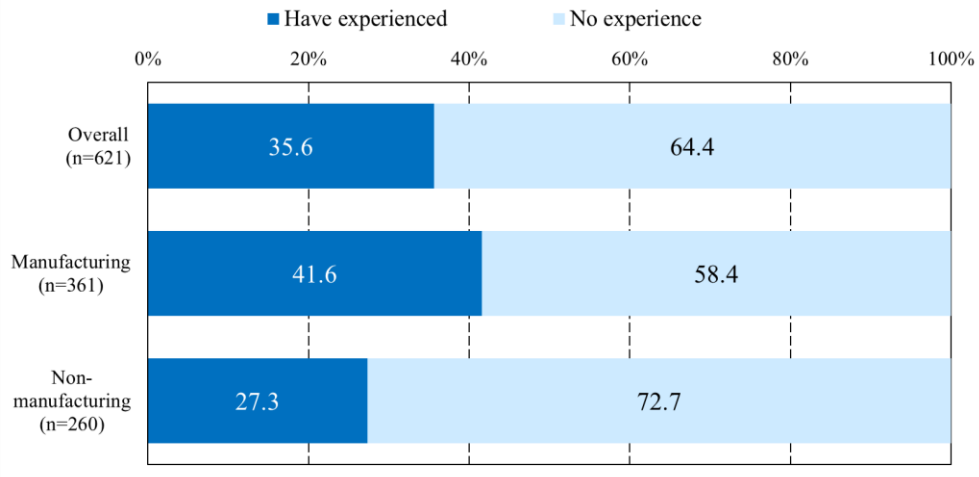
The previous subsection examined the situation of global value chains involving Japan. The current and next subsections will look at the status of awareness of supply chains risks from the viewpoint of Japanese companies operating overseas, mainly based on the results of the Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022),[210] conducted by Nomura Research Institute Singapore Pte., Ltd., and it will also sort out the challenges for building resilient supply chains.

First, this subsection will look at the impact on Japanese companies of supply chains' vulnerabilities exposed by the COVID-19 pandemic and examine what they perceive as challenges based on that experience.

Figure II-1-1-19 shows the replies to a question asking Japanese companies about their experience of supply chain disruptions since the COVID-19 pandemic. The percentage of companies that replied that they experienced disruptions was only around 20% in non-manufacturing industries but was as high as 40% in manufacturing industries.

[210] The questionnaire survey period: February-March 2023; the survey subjects: the questionnaire was sent to companies whose main businesses exclude finance and insurance and whose companies with capital relation include foreign companies (relevant companies are those with an investment ratio of 50.1% or higher); the survey method: sending the questionnaire by postal mail and requesting response via the website; the number of companies that gave a valid response: 621; the recovery rate: 6.6%.

Figure II-1-1-19. Experience of supply chain disruption since 2020



Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Figure II-1-1-20 shows the replies to a question asking Japanese companies in which countries and regions their supply chain disruptions occurred. From this, we can see that China was the location where supply chain disruptions occurred most frequently, followed by Japan and ASEAN6. In short, Japan experienced supply chain disruptions many times. However, the causes of supply chain disruptions in Japan are presumed to have originated abroad in some cases.

Figure II-1-1-20. Countries and regions in which supply chain disruptions occurred (FY2020-FY2022)

(n=221)		China	Japan	ASEAN6	North America	NIEs3	Other regions	Europe	Other ASEAN	India
Procurement	FY2020	35.7%	25.8%	20.4%	8.1%	7.2%	3.6%	5.9%	2.7%	1.8%
	FY2021	40.3%	29.9%	21.3%	9.5%	5.9%	3.6%	5.4%	4.1%	1.4%
	FY2022	43.4%	31.7%	14.9%	8.6%	5.9%	5.4%	5.4%	3.2%	0.9%
Production	FY2020	29.4%	25.3%	16.7%	6.8%	5.0%	4.5%	4.1%	2.7%	3.2%
	FY2021	31.2%	27.1%	17.2%	6.8%	2.3%	5.4%	3.2%	4.1%	2.3%
	FY2022	35.3%	30.3%	9.0%	6.3%	2.7%	5.0%	3.2%	2.7%	2.3%
Sales	FY2020	23.5%	30.3%	19.9%	11.3%	7.2%	11.3%	5.9%	4.1%	5.4%
	FY2021	24.0%	34.4%	18.1%	11.3%	8.6%	16.7%	7.2%	6.3%	5.9%
	FY2022	27.6%	33.5%	14.0%	10.4%	7.7%	11.8%	8.1%	4.1%	5.4%

Note: Respondents were requested to select all regions where procurement and production disruptions occurred and where sales destinations were affected. The "N/A" category is excluded.
Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Figure II-1-1-21 shows the replies to a question regarding the intensity of the impact of supply chain disruptions on each of production and sales. Regarding both production and sales, the largest percentage of respondents chose the reply, "The whole or parts of production and sales were halted for less than 1 month," but some companies chose the reply, "The whole or parts of production and sales were halted

for more than 1 month," or, "The whole of production and sales were halted for more than 1 month." The percentage of companies which replied that the impact had lasted for more than 1 month was higher in the case of the impact on sales than in the case of the impact on production. This indicates the possibility that while the direct impact that companies received on their production via suppliers may have been temporary, halts or delays to sales and delivery due to the dysfunction of entire supply chains may have lasted for an extended period of time.

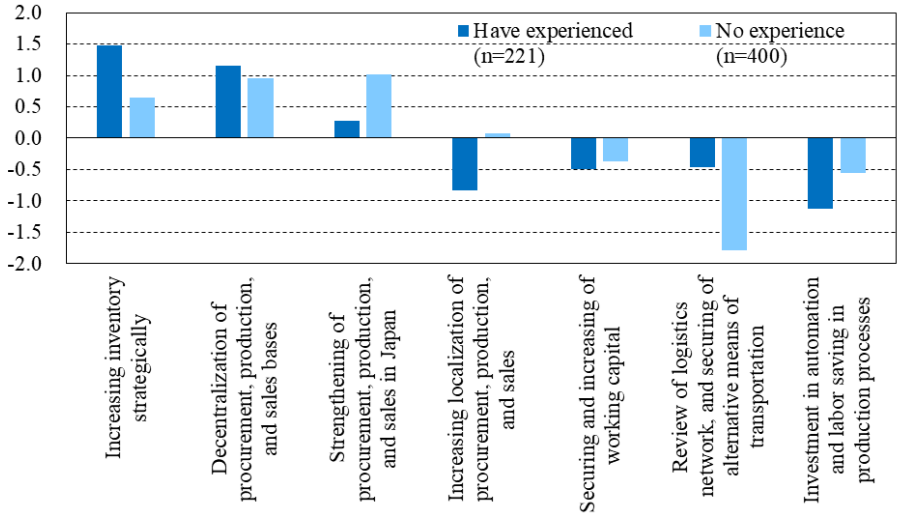
Figure II-1-1-21. Impact of supply chain disruptions on production and sales

		No impact	The whole or parts of production and sales were halted for less than 1 month	Less than 10% were halted for more than 1 month	10-30% were halted for more than 1 month	30-50% were halted for more than 1 month	More than 50% were halted for more than 1 month	The whole of production and sales were halted for more than 1 month
Production	FY2020 (n=116)	6.3%	15.4%	2.3%	4.1%	3.2%	5.4%	4.5%
	FY2021 (n=126)	9.5%	26.2%	9.5%	7.1%	8.7%	7.1%	9.5%
	FY2022 (n=134)	11.9%	24.6%	6.7%	10.4%	6.7%	9.0%	7.5%
Sales	FY2020 (n=111)	6.3%	21.6%	10.8%	14.4%	6.3%	9.0%	4.5%
	FY2021 (n=119)	6.7%	21.8%	12.6%	15.1%	8.4%	5.0%	8.4%
	FY2022 (n=125)	9.6%	18.4%	14.4%	13.6%	5.6%	8.0%	8.0%

Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Figure II-1-1-22 shows the replies to a question regarding the perception of challenges for the way of building resilient supply chains, with the respondent companies divided into a group of those which experienced supply disruptions and a group of those which did not. The values in the figure represent the results of a scoring whereby the top three challenges were weighted by points (No.1= 3 points, No. 2= 2 points, No. 3 = 1 point), with arrangements made to set the average value at zero and the standard deviation at 1. This figure shows that in the group of companies that experienced disruptions, there was a strong tendency to perceive "increasing inventory strategically" and "decentralization of procurement sources, and production and sales bases" as challenges, and the score regarding "strengthening procurement, production and sales in Japan" as a challenge was also higher than the average. On the other hand, in the group of companies that did not experience disruptions, the score regarding "increasing localization of procurement, production and sales" as a perceived challenge was higher than the average, although the score was lower than the average in the group of companies that experienced disruptions. From this, we can say that compared with companies that did not experience supply chain disruptions, companies that experienced disruptions did not strongly perceive the increasing localization of procurement, production, and sales as a challenge.

Figure II-1-1-22. Perception of challenges based on the experience of supply chain disruptions



Note: The numerical values are the results of weighting the top three (No. 1: 3 points, No. 2: 2 points, and No. 3: 1 point) and scoring them to obtain "average value = 0, standard deviation = 1."
Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Above, we looked at the impact of supply chain disruptions on Japanese companies. Our findings include: that since the COVID-19 pandemic, supply chain disruptions have been experienced mainly in manufacturing industries; that even if the impact on production is localized or temporary, a halt to the functions of an entire supply chain may prolong halts or delays to sales and delivery; and that while Japanese companies perceive strategic inventory buildup and decentralization of procurement, production and sales as challenges for building resilient supply chains in principle, they tend to attach more importance to Japan than to overseas operations with respect to procurement, production and sales.

The next subsection will look at Japanese companies' awareness of supply chain risks and identify the challenges for building resilient supply chains.

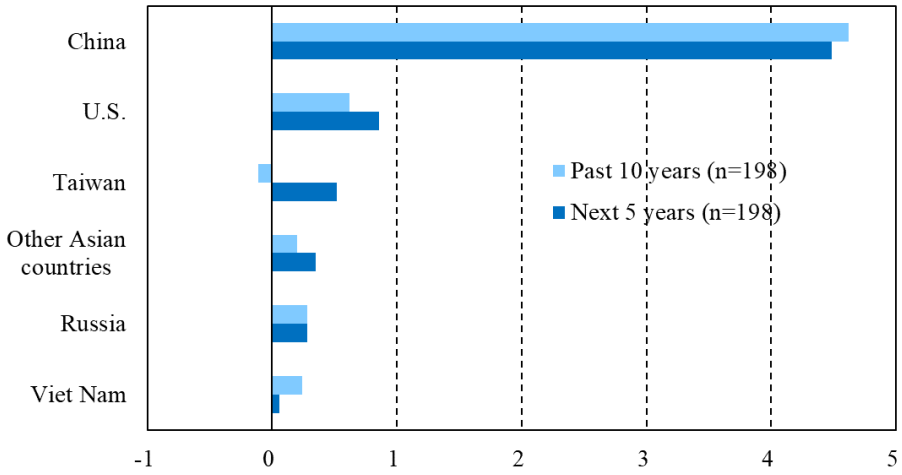
3. Growing awareness of supply chain risks and activities to build resilient supply chains

In recent years, in the supply chain environment surrounding Japanese companies, awareness is growing not only about the impact of the COVID-19 pandemic but also about various risks, including political and economic factors. This subsection will look at specifically which risks are increasing in which countries and regions with respect to supply chains involving Japanese companies and which countries and regions are important as procurement sources, production bases, and investment destinations based on the risk awareness. The subsection will also present measures to build resilient supply chains, mainly among Japanese companies.

Figure II-1-1-23 shows the replies to a question asking Japanese companies operating overseas to cite countries and regions where supply chain risk has heightened in the past 10 years and countries and regions where supply chain risk is expected to heighten in the next five years. The values in the figure represent the results of a scoring whereby the top three countries and regions in terms of an increased level of risk awareness were weighted by points (No.1= 3 points, No. 2= 2 points, No. 3 = 1 point), with

arrangements made to set the average value at zero and the standard deviation at 1. The countries and regions shown in the figure are ones whose score was higher than the average. Both for the past 10 years and the next five years, the level of risk awareness regarding China was outstandingly high.

Figure II-1-1-23. Countries and regions where supply chain risk has heightened



Note: The numerical values are the results of weighting the top three countries or regions in terms of an increased level of supply chain risk awareness (No. 1: 3 points, No. 2: 2 points, and No. 3: 1 point) and scoring them to obtain "average value = 0, standard deviation = 1." The graph shows the countries and regions whose scores are above the average.
Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Figure II-1-1-24 shows the replies to a question as to which risks heightened, with multiple replies allowed. With respect to China, regarding the past 10 years, the highest percentage of companies cited geopolitical risk and economic security risk, and some companies also cited environmental risk, including infectious diseases, macroeconomic risk, supply chains risk and human rights risk. On the other hand, as for the future outlook, the percentage of companies that cited environmental risks, including infectious diseases, was lower compared with the replies regarding the past 10 years, while the percentage of companies that cited geopolitical and economic security risks was higher. This indicates that among Japanese companies, there is awareness of rising geopolitical and economic security risks related to China.

Figure II-1-1-24. Supply chain risks

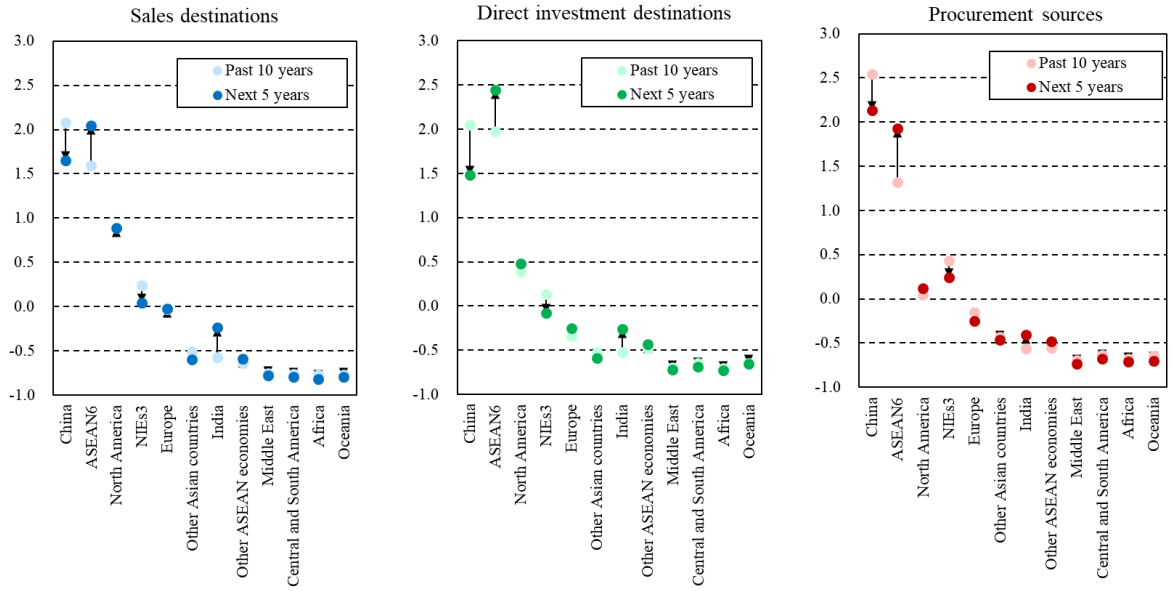
Past 10 years (n=167) Next 5 years (n=169)		Geopolitical risks	Environmental risks	Economic security risks	Macroeconomic risks	Supply chain risks	Human rights risks	Financial risks
China	Past 10 years	53.4%	45.0%	48.9%	27.9%	27.9%	16.5%	5.6%
	Next 5 years	69.5%	22.6%	61.6%	28.7%	17.4%	22.1%	7.6%
U.S.	Past 10 years	26.3%	31.6%	31.6%	35.5%	36.8%	0.0%	1.3%
	Next 5 years	37.3%	18.7%	49.3%	45.3%	25.3%	2.7%	0.0%
Taiwan	Past 10 years	54.2%	25.0%	45.8%	25.0%	8.3%	4.2%	8.3%
	Next 5 years	78.0%	2.0%	62.0%	12.0%	0.0%	0.0%	0.0%
Other Asian countries	Past 10 years	34.8%	58.7%	13.0%	34.8%	23.9%	6.5%	13.0%
	Next 5 years	34.7%	49.0%	36.7%	38.8%	20.4%	12.2%	8.2%
Russia	Past 10 years	94.2%	3.8%	32.7%	5.8%	11.5%	15.4%	11.5%
	Next 5 years	98.1%	0.0%	40.4%	25.0%	30.8%	30.8%	26.9%
Viet Nam	Past 10 years	18.4%	55.1%	6.1%	28.6%	14.3%	0.0%	10.2%
	Next 5 years	28.6%	34.3%	11.4%	51.4%	0.0%	5.7%	0.0%

Geopolitical risks: Growing tensions between countries, unstable political systems, conflicts, terrorism, etc.
Environmental risks: Natural disasters, climate change, infectious diseases, etc.
Economic security risks: US-China trade friction, economic coercion, forced technology transfer, trade restrictions and tariffs, investment restrictions, etc.
Macroeconomic risks: Demand fluctuations, commodity price fluctuations, currency fluctuations, etc.
Supply chain risks: Transportation infrastructure failures, information and communication disruption, etc.
Human rights risks: Human rights issues
Financial risks: Capital trading restrictions, unstable settlement systems, etc.

Note: Respondents were requested to select all applicable risks that have heightened in the past 10 years and are expected to heightened in the next 5 years.
Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Figure II-1-1-25 shows the replies to a question asking Japanese companies operating overseas which countries and regions they considered to be important as procurement sources and sales and direct investment destinations in the past 10 years and which countries and regions they expect to become important as procurement sources and sales and direct investment destinations in the next five years. The values in the figure represent the results of a scoring whereby the top three countries and regions in terms of importance were weighted by points (No.1= 3 points, No. 2= 2 points, No. 3 = 1 point), with arrangements made to set the average value at zero and the standard deviation at 1. In the past 10 years, China was considered to be the most important country as a procurement source and as a sales and direct investment destination, followed by ASEAN6. Regarding the outlook for the next five years, although China is expected to become the most important country as a procurement source, ASEAN is expected to become more important than China as a sales and direct investment destination. A comparison between the replies regarding the past 10 years and the next five years shows that the tendency to consider India important became stronger.

Figure II-1-1-25. Countries and regions considered important as procurement sources, sales and direct investment destinations

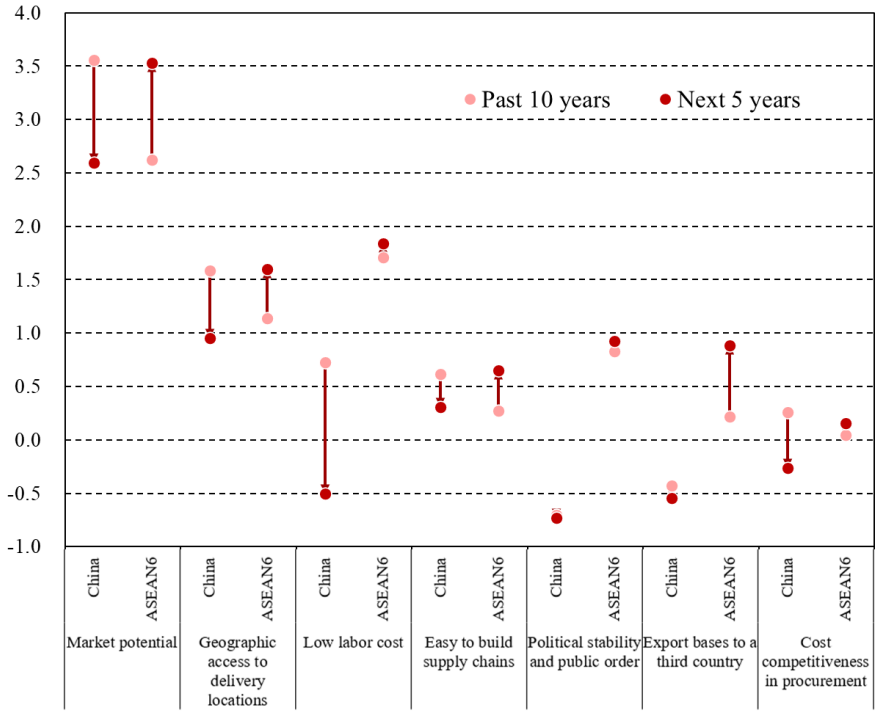


Note: The numerical values are the results of weighting the countries and regions considered important (No. 1: 3 points, No. 2: 2 points, and No. 3: 1 point) and scoring them to obtain "average value = 0, standard deviation = 1."

Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Figure II-1-1-26 shows the replies to a question asking Japanese companies about reasons for the perceived importance of countries and regions in the past 10 years and in the next five years. While there was a strong tendency to cite "market potential" and "geographical access to delivery destinations" as reasons for perceived importance both in the past 10 years and in the next five years with respect to China and ASEAN6, this tendency was more pronounced for ASEAN's perceived importance in the next five years than for China's importance. It is also noteworthy that while there was a strong tendency to cite "political stability and public order" as a reason in the case of ASEAN6, there was no such tendency in the case of China. Regarding the outlook for the next five years, the tendency to cite "low labor cost" as a reason for considering China to be important was extremely low compared with the replies regarding the past 10 years. Also noteworthy was that the tendency to cite "export to a third country" as a reason was higher for ASEAN's perceived importance in the next five years than for its importance in the past 10 years.

Figure II-1-1-26. Reasons for considering China and ASEAN6 important as direct investment destinations



Note: The numerical values are the results of weighting the countries and regions considered important as direct investment destinations (No. 1: 3 points, No. 2: 2 points, and No. 3: 1 point) and scoring them to obtain "average value = 0, standard deviation = 1."

Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

The Survey Report on Overseas Business Operations by Japanese Manufacturing Companies (December 2022),[211] compiled by Japan Bank for International Cooperation, asked the respondents about countries promising as locations for future business operations in the medium and long terms.

As shown by the figure below (Figure II-1-1-27: left-side figure), India (40.3%) was selected as the most promising country in the medium term (the next three years or so), above China, the United States, and ASEAN countries. Among the most popular reasons for selecting India as a promising country were "future growth potential of the local market" (85.5%) and "current size of the local market" (43.4%), indicating that there are strong expectations for the current and future Indian market.

[211] See "The Survey Report on Overseas Business Operations by Japanese Manufacturing Companies—Results of the FY2022 Questionnaire Survey on Outward Foreign Direct Investments" (December 2022) by JBIC at the following website: https://www.jbic.go.jp/ja/information/press/press-2022/pdf/1216-017128_3.pdf.

Figure II-1-1-27. Promising countries as locations for future business operations in the medium and long terms

Medium term (next 3 years or so)

Ranking	(Name of countries and regions)	(%)
1	India	40.3
2	China	37.1
3	U.S.	32.2
4	Viet Nam	28.9
5	Thailand	23.2
6	Indonesia	21.0
7	Malaysia	8.4
8	Philippines	7.6
9	Mexico	7.4
10	Taiwan	6.3

Long term (next 10 years or so)

Ranking	(Name of countries and regions)	(%)
1	India	50.6
2	China	36.6
3	U.S.	29.4
4	Viet Nam	28.1
5	Indonesia	22.6
6	Thailand	19.1
7	Philippines	9.4
8	Mexico	8.1
9	Malaysia	7.2
10	Taiwan	6.0

Note: Multiple responses were allowed to indicate up to five promising countries for future business operations. The numerical values represent the percentage of votes for each country or region to the number of respondents.

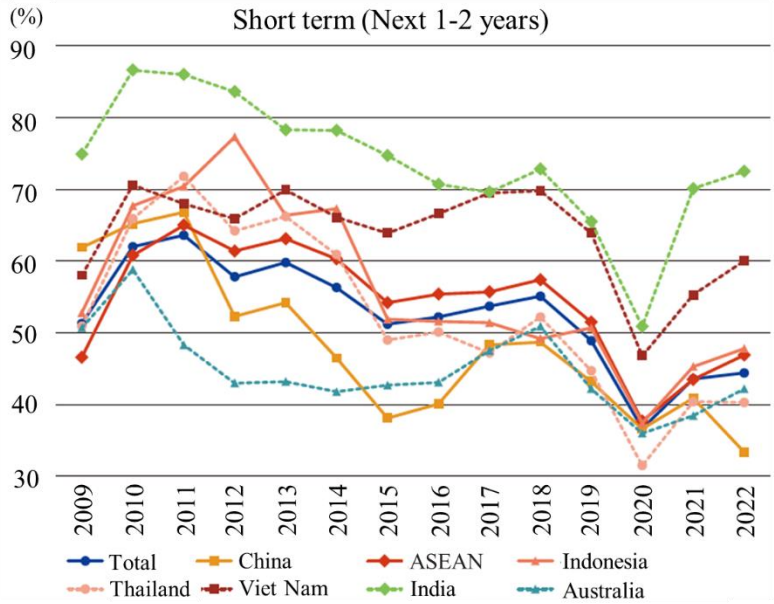
Source: *Survey Report on Overseas Business Operations by Japanese Manufacturing Companies (December 2022)* (JBIC).

India (50.6%) was also selected as the most promising country in the long term (in the next 10 years or so), followed by China, the United States and ASEAN countries (Figure II-1-1-27: right-side figure). In this questionnaire survey, which is conducted annually, India held its position as the most promising country in the long-term for 13 consecutive years, indicating that the high expectations for India have been long-lasting.

The Survey on Business Conditions of Japanese Companies Operating Overseas (December 2022),[212] compiled by JETRO asked the respondents about the future direction of business operations in the short term (the next one to two years). More than half of the respondent companies indicated an intention to expand business in India (72.5%) and Viet Nam (60.0%) in the short term. Compared with the same survey in 2021, the percentages of companies that indicated an intention to expand business rose in 2022 for both countries, indicating that Japanese companies are taking an aggressive approach to business expansion after recovering from the COVID-19 pandemic.

[212] See "Survey on Business Conditions of Japanese Companies Operating Overseas" (December 2022) by JETRO at the following website: https://www.jetro.go.jp/ext_images/_Reports/01/e98672da58f93cd3/20220039rev2.pdf.

Figure II-1-1-28. Changes in the rates of business "expansion" in the short term



Note 1: The numerical values include the non-manufacturing industry.
Note 2: The ASEAN's rates are those calculated from the total of nine countries, excluding Brunei Darussalam.
Note 3: The data on Cambodia and Lao PDR are included in the ASEAN averages from 2010 and 2011, respectively.
Source: Excerpts from the *Survey on Business Conditions of Japanese Companies Operating Overseas (December 2022)* (JETRO).

This survey also asked the respondents about problems that they were facing in expanding business. Regarding problems related to India, "increased wages" (77.2%), and "increased procurement costs" (76.1%) were the two most frequently cited problems, followed by "complicated customs clearance procedures" (63.0%), and "growing market shares of competitors (in terms of cost/price) (59.2%)," and "tax burdens" (e.g., corporate taxes, transfer pricing taxes) (58.6%). Cost increases have become a challenge, and improvements should be made in terms of customs clearance and tax systems as well.

India was regarded as the most promising country in the surveys by JBIC and JETRO. Indeed, in terms of nominal GDP, India was the fifth largest economy in 2021, after the United States, China, Japan, and Germany in 2021. In terms of the growth rate of real GDP, India (9.1%) outpaced China (8.5%) in 2021.

Figure II-1-1-29. Management problems in India

Ranking	Management problems (India)	(%)
1	Increased wages	77.2
2	Increased procurement costs	76.1
3	Complicated customs clearance procedures	63.0
4	Growing market shares of competitors (in terms of cost/price)	59.2
5	Tax burden (corporate tax, transfer pricing tax, etc.).	58.6

Note: Multiple responses were allowed and Top 5 items are listed.
Source: *Survey on Business Conditions of Japanese Companies Operating Overseas (December 2022)* (JETRO).

In terms of population size as well, the State of World Population report 2023, compiled by the United Nations Population Fund (UNFPA)[213] projected that India will surpass China by the middle of 2023 with a population of 1.4826 billion people (Figure II-1-1-30). One notable feature of India is its large youth population, which serves as a growth driver. As stable population growth is expected to continue in the future, there are high expectations for future economic growth against the backdrop of expanding domestic demand.

Figure II-1-1-30. Demographic Indicators of the United Nations Population Fund (UNFPA)

	Total population (mid-year estimates)	Aged 14 or younger	Aged 15 to 64	Aged 65 or older	Birth rate (per woman)
India	1.4286 billion people	25%	68%	7%	2.0
China	1.4257 billion people	17%	69%	14%	1.2
World	8.045 billion people	25%	65%	10%	2.3

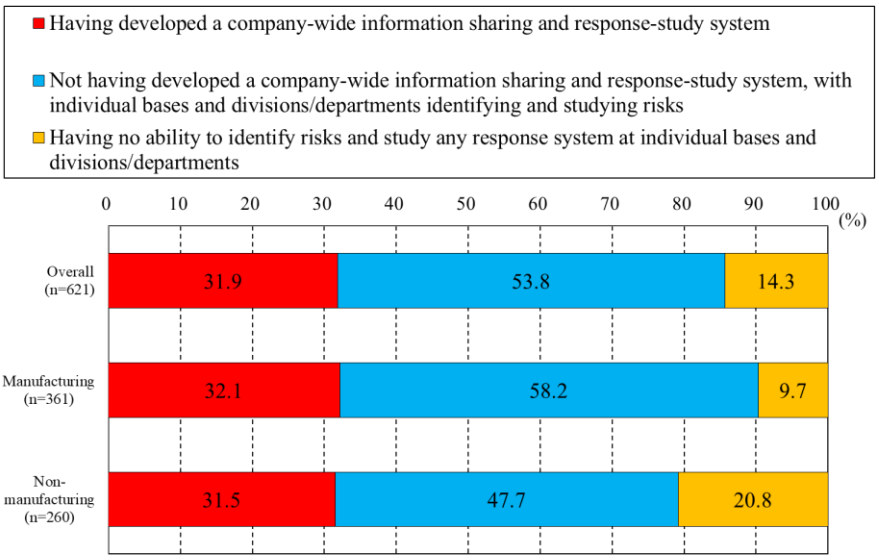
Note: The data of China does not include those on Hong Kong, Macau, or Taiwan.
Source: *State of World Population Report 2023* (UNFPA).

Above, we looked at the growing awareness of supply chain risks and changes in the countries and regions that are considered to be important as procurement sources and sales and investment destinations. Below, we will examine the extent to which Japanese companies have identified the status of supply chains and challenges, mainly based on the abovementioned questionnaire survey by Nomura Research Institute Singapore. Figure II-1-1-31 shows the replies to a question regarding the status of the internal system to manage supply chain risk. The percentage of companies which replied that the system has been developed on a company-wide basis was around 30%, the percentage of companies which replied that the system has not been developed on a company-wide basis, with individual divisions and departments identifying the risks, was around 50%, and the percentage of companies which replied that

[213] See "State of World Population report 2023" by the United Nations Population Fund (UNFPA) at the following website: https://www.unfpa.org/sites/default/files/swop23/SWOP2023-ENGLISH-230329-web.pdf.

they are unable to identify the risks was around 10%. In short, around half are able to identify risks only at the individual division/department level.

Figure II-1-1-31. Status of the internal system to manage supply chain risk



Note: The term "a response-study system" refers to a system in which a company can identify high-risk locations in the company's supply chains based on the information on clients, geopolitics, environment, economic security, macroeconomics, infrastructure, business resources, human rights, and other environmental changes, and can envision alternative suppliers even at normal times.

Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Figure II-1-1-32 shows the replies to a question regarding the extent to which they identified the status of supply chains. It is more difficult for companies to identify the status when they are removed farther from suppliers or customers in the supply chain. Regarding tertiary or more distant suppliers and customers, more than half are unable to identify the status.

Figure II-1-1-32. Status of actual situations identified in supply chains

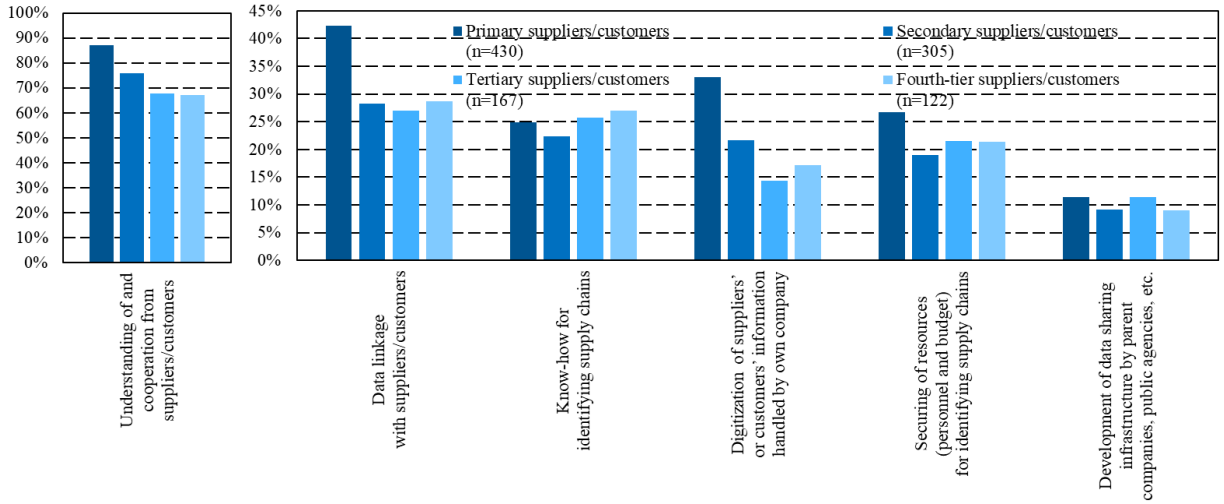
		Fully identified	Generally identified	Identified more than half	Identified less than half	Identified very little
Suppliers (n=621)	Primary suppliers	36.2%	46.1%	5.8%	2.3%	1.1%
	Secondary suppliers	3.9%	27.1%	17.1%	15.1%	14.7%
	Tertiary suppliers	1.6%	7.7%	6.6%	9.7%	30.9%
	Fourth-tier suppliers	1.4%	5.3%	4.3%	4.7%	31.9%
Customers (n=621)	Primary suppliers	37.4%	41.5%	5.5%	3.1%	2.6%
	Secondary suppliers	6.8%	27.9%	13.7%	11.3%	15.9%
	Tertiary suppliers	1.6%	8.1%	8.2%	9.3%	26.6%
	Fourth-tier suppliers	0.8%	5.6%	4.5%	4.7%	28.3%

Primary suppliers/customers: Direct suppliers/customers,
Secondary suppliers/customers: Suppliers/customers of the primary suppliers/customers,
Tertiary suppliers/customers: Suppliers/customers of the secondary suppliers/customers,
Fourth-tier suppliers/customers: Suppliers/customers of the tertiary suppliers/customers

Note: Respondents were requested to select one appropriate item concerning the level of their awareness of the delivery and sales schedules and the status about their suppliers and customers.
Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Figure II-1-1-33 shows the replies to a question regarding the challenges for identifying the status of supply chains, with multiple replies allowed. The percentage of companies that cited obtaining understanding and cooperation from suppliers and customers as a challenge was higher with respect to suppliers and customers that are closer to them in the supply chain. On the other hand, regardless of how close to or distant from suppliers and customers the companies are, they recognize data linkage with suppliers and customers as a challenge. This indicates that data sharing is a challenge for identifying the status of supply chains.

Figure II-1-1-33. Challenges in identifying the actual status of supply chains



Note: Respondents were requested to select all appropriate items for each stage of the challenges in identifying the actual status of supply chains.
Source: *Questionnaire Survey Regarding the Situation of Japanese Companies' Overseas Operations and Challenges (FY2022)* (Nomura Research Institute Singapore Pte. Ltd.).

Above, we showed that while Japanese companies are increasingly aware of heightening supply chain risk related to China, they recognize the growing trend of considering ASEAN and India to be important, that data linkage with suppliers and customers are challenges, and that sharing data in order to identify the status of supply chains has become a challenge for companies. For Japan as well, it is a critical challenge to develop infrastructure to promote data linkage between companies in Asia and reinforce supply chains through data linkage while strengthening cooperation with ASEAN and other friendly countries and regions.

Under these circumstances, the Study Group on Advancing Global Supply Chains in the Digital Age , which was convened by the Ministry of Economy, Trade and Industry in FY2022, and the Working Group on Supply Chain Data Sharing and Linkage, which is subordinate to the Study Group, conducted a study on this matter with a particular focus on identifying the supply chain structure, an immediate task that industries must perform regarding their existing supply chains, and sorted out the factors and challenges that need to be examined in order to identify the status of supply chains through data linkage between companies. As a result of the study, it was found that if the government, the public sector (e.g., organizations in which both the government and the private sector play necessary roles across institutional barriers), and the private sector address challenges, such as a lack of understanding on the need for data linkage, underdevelopment of databases and data-sharing methods, a lack of understanding on handling of information, the low priority given to resource allocation to data linkage through the division of roles in order to prepare use cases, develop data sharing infrastructure, and establish business rules, structures and ecosystems, that may help to achieve the advancement of manufacturing industries while dealing with the ongoing challenges, such as identifying the status of supply chains and making GHG emissions visible.

In addition, amid data's expanding role in industries and ecosystems, from a medium- to long-term perspective and with a medium- to long-term time horizon, the abovementioned study group and working group conducted a study on the future direction and vision of industrial ecosystems extending across Japan and ASEAN, which have already been strongly interconnected through manufacturing industries. They also conducted a study on models for the use of data in industries (hereinafter "use cases") and what the architecture and ecosystems that support the models should be like.

First, the study group and working group argued that in order to conceive an architecture of a digital supply chain, it is necessary to ensure autonomy in addition to securing universal interconnectivity. They also argued that to do so, it is necessary to ensure that when there are systems and rules disadvantageous to its territories, each country reserves the right to decide whether to accept them in the territories and has the ability to present conditions for acceptance or have alternative options, depending on the situation, while maintaining cooperation with other countries.

Therefore, in order to realize data linkage and digitalization across Asia-wide supply chains, the Economic Research Institute for ASEAN and East Asia (ERIA), has started preparations to investigate the current status of Japan-ASEAN supply chains and launch an experts' group to study how to build resilient supply chains in the future. A plan to accelerate this initiative at a digital innovation sustainable economy center, which is scheduled to be established at ERIA in 2023, has been indicated. Therefore, the study on realizing supply chain data linkage between Japan and ASEAN and, by extension, integrated supply chain management, will be accelerated.

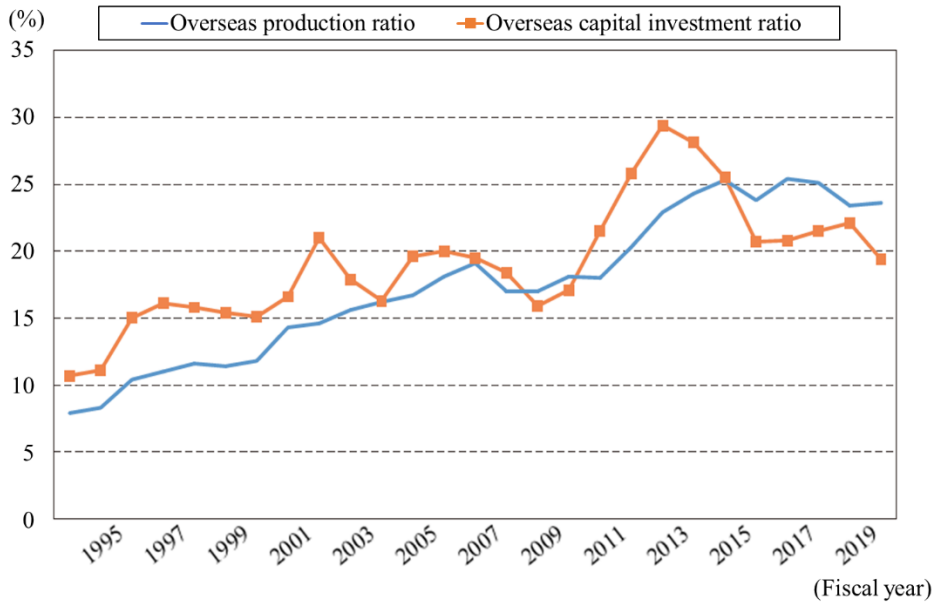
4. Strengthening domestic manufacturing bases

The previous subsection showed that Japanese companies have a growing awareness of risks related to China and that there is a trend of attaching importance to ASEAN and India. At a time when it is an urgent task to reorganize supply chains in accordance with recent changes in the international political and economic environments, there are growing expectations and calls from overseas for Japan to supply strategic goods, such as semiconductors and storage batteries. This subsection will provide an overview of activities to strengthen manufacturing bases as a way of building resilient supply chains for semiconductors and other strategic goods, a task that like-minded countries expect Japan to perform.

(1) Changes in the environment surrounding manufacturing bases in Japan

Because of various factors, including challenges related to manufacturing cost, such as rising domestic labor cost, trade friction, foreign exchange developments, and expectations for the merits of production in emerging countries and their neighboring regions due to those countries' potential, Japanese manufacturing industries have been shifting production from Japan to foreign countries and regions as a trend. If we look at changes in the overseas production ratio, we can see that after the ratio continued to rise until the global financial crisis around the middle of the 2000s, the rise temporarily came to a pause. However, the ratio started to rise again, with the rise continuing until the mid-2010s, and in recent years, the ratio has mostly stayed between 20% and 30%. The overseas capital investment ratio recorded a marked rise particularly in the first half of the 2010s, and in recent years, it has mostly stayed between 20% and 30% (Figure II-1-1-34).

Figure II-1-1-34. Overseas production ratio and overseas capital investment ratio of Japanese manufacturing industry

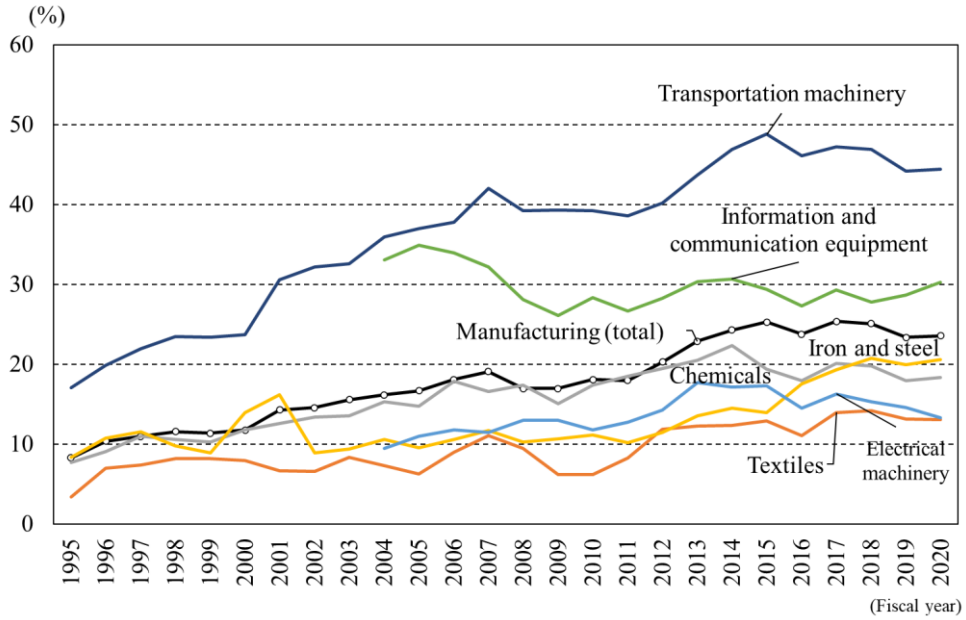


Note: The "overseas capital investment ratio" is the result of: the amount of local companies' capital investment/(the amount of domestic capital investment + the amount of local corporations' capital investment) × 100. The data on the amount of domestic capital investment is based on the Financial Statements Statistics of Corporations by Industry (MOF). The overseas production ratio is the result of: the local corporation (manufacturing) sales/(local corporation (manufacturing) sales + domestic corporation (manufacturing) sales) × 100.

Source: *Survey on Overseas Business Activities* (METI).

By industry, the overseas production ratio is relatively high in the transportation machinery industry (higher than 40% in FY2020) and the information and communication equipment industry (around 30% in FY2020) (Figure II-1-1-35).

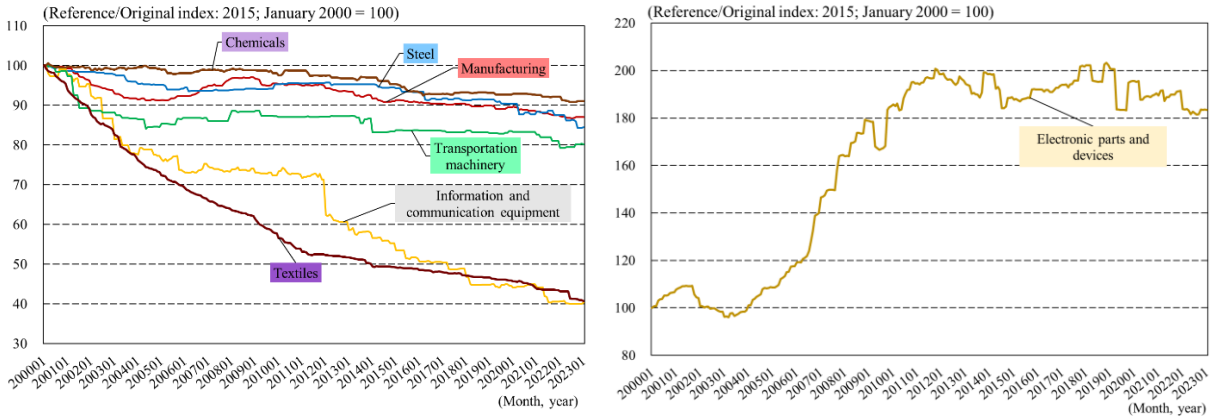
Figure II-1-1-35. Overseas production ratio of the manufacturing industry in Japan (by industry)



Note 1: The overseas production ratio is the result of: the local corporation (manufacturing) sales/(local corporation (manufacturing) sales + domestic corporation (manufacturing) sales) × 100.
Note 2: The data on "Electrical machinery" and "Information and communication equipment" before 2003 falls under the one category of "Electrical machinery." In this graph, the indices for electrical machinery before 2003 are not shown.
Source: *Survey on Overseas Business Activities* (METI).

In line with that trend, domestic production capacity in manufacturing industries as a whole is shrinking as a trend. On the other hand, in the transportation machinery industry, the domestic production capacity index has risen somewhat in recent years. In the electronic parts and devices industry, domestic production capacity increased considerably in the 2000s and the pace of increase has slowed down since the latter half of the 2010s. (Figure II-1-1-36).

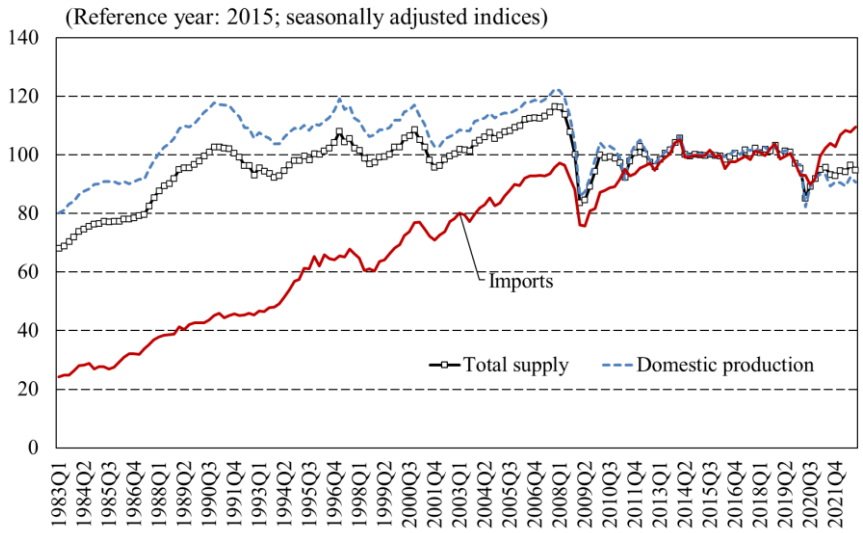
Figure II-1-1-36. Changes in indices of production capacity



Note: These graphs show the original indices (monthly) taking 2015 as a reference year, showing changes by taking the indices in January 2000 as 100.
Source: *Indices of Industrial Production (Production Capacity)* (METI).

In the total industrial supply table, which represents the total sum of domestic industrial shipments and imports, the import index is rising as a trend above the level seen before the COVID-19 pandemic (Figure II-1-1-37).

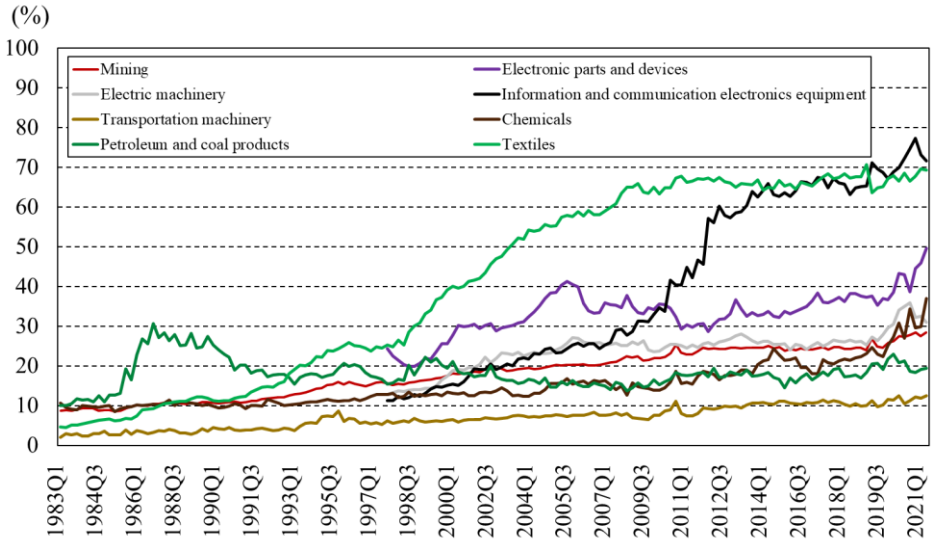
Figure II-1-1-37. Changes in total industrial supply, domestic production, and import indices



Source: *KOUKOUGYOU SOUKYOUKYUU HYOU* (METI).

In line with an increase in manufacturing industries' overseas production, the import penetration ratio (the ratio of imports to total domestic supply) is also on an uptrend. Although the level and the rate of increase of the penetration ratio vary from industry to industry, the ratio is high in the textile industry and the information and communication equipment industry, in which domestic capacity has shrunk. In the electric parts and devices industry, the import penetration ratio declined in the latter half of the 2000s because of the expansion of domestic production capacity in the same period, but since the 2010s, it has until now continued to rise again (Figure II-1-1-38).

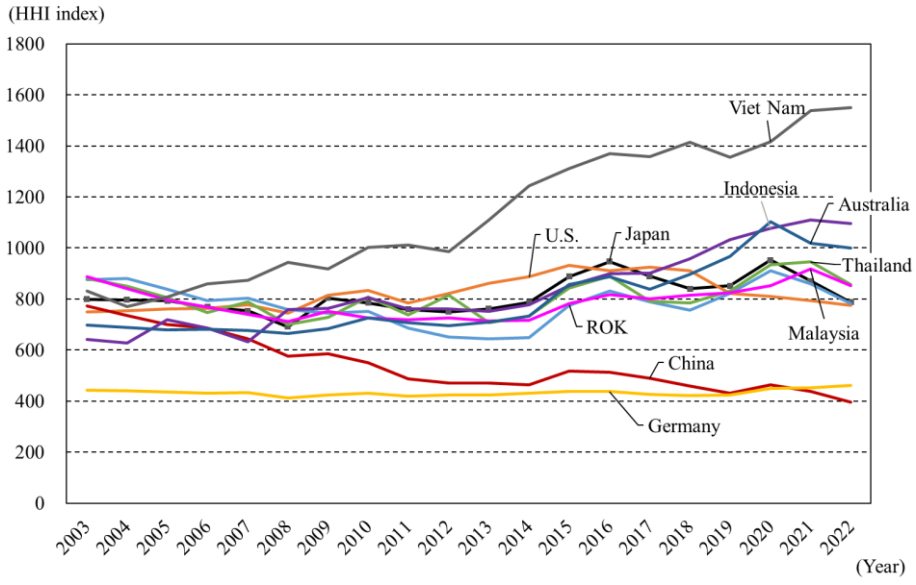
Figure II-1-1-38. Import penetration ratio by industry



Note: Import penetration ratio = (import index × import weight)/(total supply index × total supply weight)) × 100.
Source: *KOUKOUGYOU SOUKYOUKYUU HYOU* (METI).

If we look at the level of import source concentration expressed in terms of the Herfindahl–Hirschman index,[214] we can see that the level of concentration is higher in Japan than in the United States, China, and Germany (Figure II-1-1-39).

Figure II-1-1-39. Import source concentration in Japan and major countries

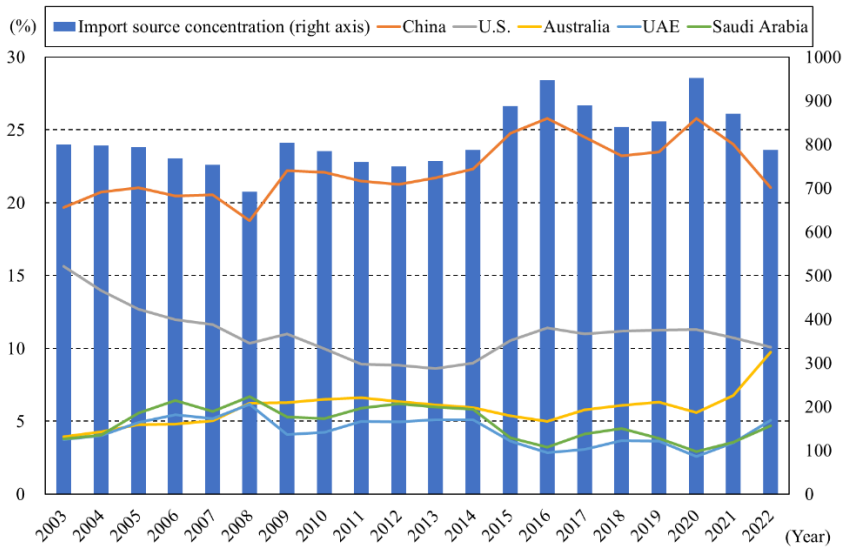


[214] The value of the Herfindahl-Hirschman Index (HHI) is calculated by adding up the squares of shares of import source countries in each country's overall imports. When there is only one import source country, the value of the index is maximum at 10,000 (=100^2). The more diversified import sources are, the lower the value of the index is, with zero as the minimum level. For example, when Country A imports 50% of its overall imports from Country B, 30% from Country C, and 20% from Country D, the index of Country A is 3,800 (=$50^2 + 30^2 + 20^2$) (Ministry of Economy, Trade and Industry (2020) *White Paper on International Economy and Trade 2020*).

Source: International Trade Centre Trade Statistics (https://intracen.org/resources/data-and-analysis/trade-statistics).

Regarding Japan's import ratio, the ratio of imports from China is by far the highest, around 24%, followed the ratio of imports from the United States, around 11%, and the ratio of imports from Australia, around 7% (Figure II-1-1-40).

Figure II-1-1-40. Import source concentration and share of top importing countries in Japan



Note 1: This figure shows shares of the top 5 countries in the importing countries as of 2022.
Note 2: The import source concentration is calculated using the Herfindahl-Hershman indices.
Source: International Trade Centre Trade Statistics (https://intracen.org/resources/data-and-analysis/trade-statistics).

Companies have been prodded into reviewing their existing production and procurement systems by the emergence of challenges related to supply chains due to the COVID-19 pandemic and Russia's aggression against Ukraine, some countries' protectionist moves, increased geopolitical risks, the U.S.-China conflict, growing awareness of excessive dependence on supply from particular countries, interest in capturing in-bound demand, and the exchange market situation. As a result, diversification of production bases and strengthening of domestic production have come to be discussed in the context of supply chain optimization. Studies and initiatives to build resilient global value chains and supply chains have started between Japan and like-minded and friendly countries, including the ASEAN Vision, the strengthening of ERIA's organizational system, and the Supply Chain Resilience Initiative (SCRI), which is a framework of Japan, Australia, and India. Given that the level of countries' import source concentration is rising as mentioned earlier and that there is a need to increase supply chain resilience through appropriate decentralization of import and procurement sources, production bases in Japan that possess high technological expertise and produce high-quality products in a stable manner have a significant role to play on behalf of friendly countries as well.

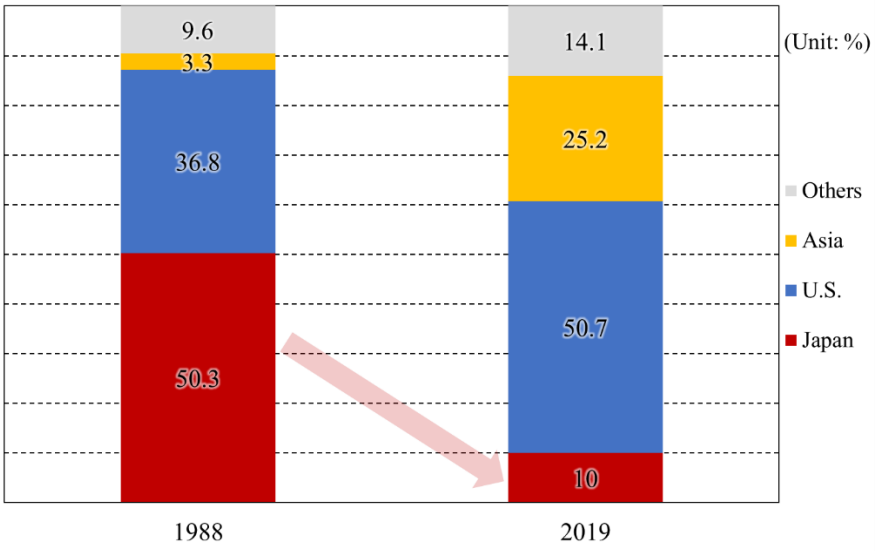
(2) Activities to strengthen domestic manufacturing bases

As an example of accelerating activity to strengthen domestic manufacturing bases, let us take up the case of semiconductors.

Because of increased demand for digital products (e.g., personal computers and television sets) under the restrictions imposed on activities due to the COVID-19 pandemic and a rebound in demand for automobiles and other items amid the recovery from the pandemic, global semiconductor shortages emerged, starting around the autumn of 2020. While various factors of the shortages have been pointed out, disruptions in semiconductor supply impeded production activity in Japan and other countries. Moreover, semiconductors constitute important infrastructure that supports elements of digital society, such as 5G, big data, AI, IoT, autonomous driving, robotics, smart cities, and digital transformation (DX) and is also a critical strategic technology directly related to security.[215] In particular, Russia's aggression against Ukraine caused supply chain turmoil, highlighting the importance of economic security. Under those circumstances, countries continue to take unconventional measures to support the semiconductor industry in order to secure production infrastructure for semiconductors, which are important from the viewpoint of economic security.

With respect to the manufacturing of semiconductors, a critical basic item whose importance is growing, Japan's international competitiveness has considerably declined. Japanese companies' share in global semiconductor sales declined after peaking at 50.3% in 1988 and was as low as around 10% in 2019. (Figure II-1-1-41).

Figure II-1-1-41. Global shares of semiconductor sales

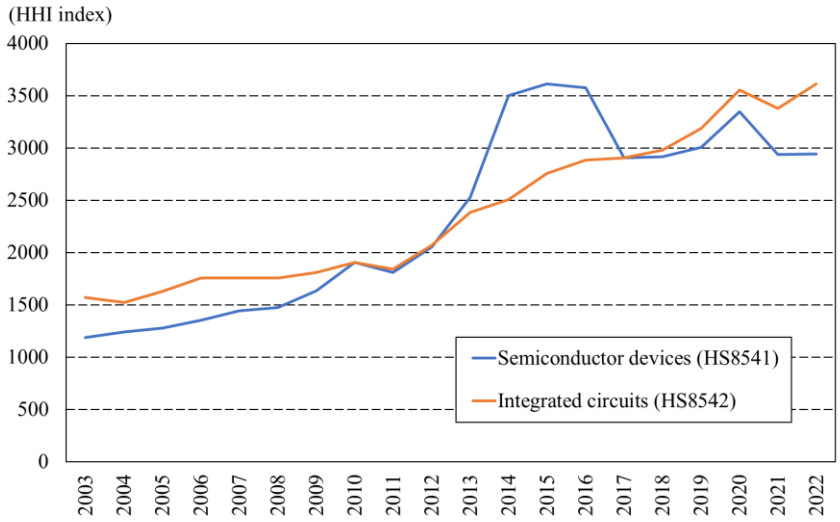


Source: Strategy for Semiconductors and the Digital Industry (Outline)(METI). The original data are obtained from Omdia.

[215] Ministry of Economy, Trade and Industry (2021) "Strategy for Semiconductors and the Digital Industry (Outline)" (June 2021).

In addition, the level of import source concentration concerning semiconductor devices and integrated circuits is also rising (Figure II-1-1-42).

Figure II-1-1-42. Import source concentration of semiconductor devices and integrated circuits in Japan



Note: The import source concentration is calculated using the Herfindahl-Hershman indices.
Source: International Trade Centre Trade Statistics (https://intracen.org/resources/data-and-analysis/trade-statistics).

Under these circumstances, Japan has steadily implemented the basic policy for reviving the semiconductor industry based on the Strategy for Semiconductors and the Digital Industry, formulated by the Ministry of Economy, Trade and Industry in June 2021 and other guidelines.

Regarding advanced semiconductors, while their use is increasing in various sectors, including automobiles and medical equipment, due to the progress made in digitalization, there is a growing risk that the global supply chain may be affected by geopolitical factors, making it an urgent challenge to secure production capacity in Japan. Therefore, in order to encourage business operators to make decisions on investment in developing manufacturing infrastructure, the Minister of Economy, Trade and Industry authorized, by May 2023, three plans (a plan by TSMC and JASM [Kumamoto Prefecture], a plan by Kioxia and others [Mie Prefecture], and a plan by Micron Technology [Hiroshima Prefecture]) related to the development of production facilities and production of advanced semiconductors that had been authorized based on the Act on Promotion of Development, Supply and Introduction of Specified Advanced Information and Communication Technology Utilization Systems. For example, in the Kumamoto-Kyushu area, where TSMC and JASM are implementing their project, there are emerging signs of a virtuous cycle, such as an increase in investments by relevant industries, the development of a personal training system through industry-academic-government collaboration, and an uptrend in wages in the Kyushu area.

With respect to conventional semiconductors, such as micro computer chips, analogue semiconductors, and power semiconductors, in order to support the renewal of equipment at manufacturing bases, the subsidy program to cover the cost of projects for decarbonization and renewal

of production facilities for semiconductors that are highly indispensable for supply chains has been established because those semiconductors are indispensable to various industries' production activity. As a result, the domestic production capacity of conventional semiconductors is expected to increase more than 15% compared with the level seen before the COVID-19 pandemic (2019).

In addition, amid the growing importance of semiconductors as strategic goods, maintaining and strengthening domestic manufacturing infrastructure is an important challenge from the viewpoint of economic security with respect to semiconductor-manufacturing equipment and semiconductor-related parts and materials, in which Japan has an advantage, as well as conventional semiconductors. Therefore, in light of the fact that semiconductors have been designated as specified critical goods based on the Economic Security Promotion Act, enacted in May 2022, the Ministry of Economy, Trade and Industry provides subsidies to business operators engaging in activities to maintain and strengthen domestic manufacturing capacity in order to secure a stable supply of conventional semiconductors, semiconductor-manufacturing equipment, and semiconductor-related parts and materials.

Regarding research and development, Japan started initiatives to build design and production infrastructure for next-generation semiconductors in the latter half of 2020. At present, Japan is proceeding with a next-generation semiconductor project comprised of two pillars, namely, developing an open research and development platform and establishing a manufacturing base with an eye to future mass production. Regarding the first pillar, national research and development institutions, universities, and industry will participate in the project to develop a research and development platform open to both domestic and foreign partners whereby they cooperate with relevant foreign organizations and organize and implement technology development projects toward realizing mass production of next-generation semiconductors. For that purpose, the establishment of the Leading-edge Semiconductor Technology Center (LSTC) was authorized in December 2022. Regarding the establishment of a manufacturing base, Rapidus Corporation, which was established in August 2022 by a group of leading Japanese engineers and has obtained support from major Japanese companies[216] was selected for a research and development project (with development expenditure of 70 billion) (November 2022) to build manufacturing infrastructure for next-generation semiconductors in the latter half of the 2020s. As the planned construction site, Chitose City, Hokkaido Prefecture was selected (February 2023). In addition, Rapidus and foreign research institutions and companies are making progress in organizing joint research projects. In December 2022, Rapidus formed a partnership with IBM of the United States for joint development of 2nm node semiconductors, and signed a memorandum of understanding with imec, which constitutes a leading European ecosystem for semiconductor research and development, on development of next-generation semiconductors. Going forward, LSTC and Rapidus will act as twin drivers for building mass production infrastructure for next-generation semiconductors in Japan.[217]

Building a stable supply system for critical goods such as semiconductors is an important challenge that affects efforts to ensure not only smooth economic activity but also national security, so it is

[216] Among the investors are Kioxia, Sony Group. Softbank, Denso, Toyota Motor, NEC, NTT, and MUFG Bank.

[217] Ministry of Economy, Trade and Industry (2022) "Toward the Establishment of Design and Manufacturing Bases for Next-Generation Semiconductors" (November 2022).

essential to address this challenge in cooperation with allies and like-minded countries and regions. In addition to refining technologies for semiconductor-manufacturing equipment and semiconductor-related materials that should constitute the key parts of the global semiconductor ecosystem, Japan will also enforce export and investment controls based on the Foreign Exchange Act and develop measures to prevent leakage of semiconductor technology. It is also necessary to coordinate semiconductor-related industrial policies between like-minded countries and regions and promote next-generation semiconductor projects between those countries. With the United States, Japan agreed in May 2022 on the Basic Principles on Semiconductor Cooperation, under which the two countries share an objective to strengthen supply chain resiliency in Japan, the United States, and other like-minded countries and regions based on the principles of open markets, transparency, and free trade and engage in cooperation over the two countries' semiconductor supply chain in a mutually accepted and complementary manner in principle. It has been decided to establish a joint task force on the development of next-generation semiconductors based on those principles. In addition, in July of the same year, the two countries agreed to promote Japan-U.S. joint research and development in order to nurture and protect critical and emerging technologies, and the establishment of LSTC, which was already mentioned, was announced as an initiative on the Japanese side. Japan will cooperate not only with the United States but also with other countries and regions, such as the EU, Belgium, the Netherlands, the United Kingdom, the Republic of Korea (ROK), and Taiwan, in developing use cases, conducting research and development and dealing with emergencies and when doing so, it will give consideration to partner countries' and regions' needs and circumstances. With Taiwan, Japan will periodically engage in close information sharing and exchange of opinions on semiconductors as part of private-sector exchange. In addition, at the GAMS (Government/Authorities Meeting on Semiconductors), which is a meeting between government authorities, Japan will share information on countries' subsidy programs and lead discussions so that transparent, nondiscriminatory subsidy programs that do not distort trade are implemented.

Under these circumstances, in April 2023, Japan published the draft revised version of the Strategy for Semiconductors and the Digital Industry, which sets the goal of increasing the total sales (semiconductor-related sales) of companies producing semiconductors in Japan to more than 15 trillion yen by 2030 and securing a stable supply of semiconductors in Japan. To achieve this goal, the revised strategy calls for Japan to take the following three steps while strengthening complementary, cooperative relationships with like-minded countries and regions: Step 1—secure and strengthen manufacturing infrastructure indispensable to industry and society for the moment; Step 2—establish technologies necessary for next-generation computing infrastructure; and Step 3—develop game-changing future technologies while looking ahead to 2030. The revised strategy shows a roadmap regarding the five sectors targeted by this initiative (advanced logic semiconductors, advanced memory semiconductors, industrial-use specialty semiconductors, advanced packaging technology, and manufacturing equipment/parts and materials. By steadily implementing those steps, Japan will realize DX, GX and economic security and create a virtuous cycle between domestic investment, innovation, and income growth at the same time.