Section 2 Economic security and making supply chain resilient

With increasing global uncertainty due to geopolitical risks such as the escalating U.S.-China conflict and Russia's aggression against Ukraine, as well as health risks like COVID-19, promoting economic security is becoming increasingly important. Given the geopolitical risks and trends in governments' economic security policies, it is important for companies to review supply chain resilience to be able to quickly and flexibly respond to sudden changing conditions and changes in rules as the scope of security quickly expands to the economic and technological sectors and competition among nations intensifies. We looked at how Russia's aggression against Ukraine affected supply chains in Part I, Chapter 1, Section 1. Here we will look at the effects of the U.S.-China conflict and other developments.

1. The rise of China and its economic ties with major countries and regions

By now it is clear that China has come a far way, maintaining a high economic growth rate for more than 40 years since its reform and becoming not only a major economic power, but also a world leader in science and technology. However, the rapid development of China's technology coupled with its military capabilities being efficiently and asymmetrically enhanced under the civil-military integration strategy has led to conflict between the U.S. and China over technological supremacy, and political tensions continue to rise under the Biden administration in the U.S.

Here we will look at the economic background of the U.S.-China conflict while examining various economic and scientific indicators and China's investment trends.

(1) China's economic growth and development of science and technology

Looking at the nominal GDP of Japan, the U.S., and China, China overtook Japan in 2010, becoming the world's second largest economy, and is closing in on the U.S., which holds the top spot. According to Japan Center for Economic Research's estimates³⁸, China's nominal GDP is predicted to overtake³⁹ the U.S.' level by 2033 (Figure II-1-2-1).

³⁸ China to Become the World's Biggest Economy by 2033 (Japan Center for Economic Research, December 2021)

³⁹ It is predicted that a decline in population will cause China's growth to drop afterwards, and that the U.S. will again overtake China by 2050 by maintaining its population and productivity.



Figure II-1-2-1. Nominal GDP in Japan, the U.S. and China

Source: IMF WEO, (April 2022), Prediction by the Japan Center for Economic Research.

China is also gaining an international presence in the field of science and technology. Looking at trends in total R&D expenditure, the source of creating innovation, Japan's R&D expenditure has remained at a similar level over the past 20 years, while R&D expenditure in the U.S. and China increased yearly by 3.1% and 14.2% respectively, showing that China is getting closer to the U.S.(Figure II-1-2-2). Compared to Japan's and the U.S.' R&D expenditure as a percentage of nominal GDP, which have been hovering between 2.5% and 3.5%, China's level remains low, but it has risen at an annual rate of 5.1%. By industry, R&D expenditure for computers, telecommunications and manufacturing of other electronic equipment, electrical machinery and equipment, and automobile manufacturing included in China's R&D expenditure have increased⁴⁰.

⁴⁰ Communiqué on National Expenditures on Science and Technology in 2020, (National Bureau of Statistics of China, September 2021)

Figure II-1-2-2. Trends in R&D expenditure in Japan, the U.S. and China



According to the statistics of the World Intellectual Property Organization (hereinafter WIPO), the number of international patent application filings in the U.S and Japan, which indicate technological strength, increased at an annual rate of 8.2% and 2.7% respectively, while in China, it increased at a significantly higher rate of 23.8%, with the country becoming the top filer of international patents in 2019 (Figure II-1-2-3). Looking at the number of international patent applications filed in China by fields of science and technology, the number of applications filed in computer technology has increased approximately 650-fold to more than 10,000 (16% of the total number of applications) in 21 years from 2000, and applications filed in fields such as digital communication and audio-video technology have increased significantly (Figure II-1-2-4).

Figure II-1-2-3. Trends in the number of international patent applications filed in Japan, the U.S., and China



Source: WIPO.

Figure II-1-2-4. Trends in the number of international patent applications by fields of science and technology in China and what percentage they account for in the total number of filed applications



Source: WIPO.

According to statistics from the Organization for Economic Co-operation and Development (OECD), the number of applications filed in China for technologies related to information and communication technology (hereinafter ICT) and artificial intelligence (hereinafter AI), is also increasing. It is evident that China is actively engaged in innovation research, with the country getting closer to Japan's and the U.S.' levels (Figure II-1-2-5).

Figure II-1-2-5. Trends in the number of patent applications filed in Japan, the U.S. and China (ICT and AI-related technologies)



Note: Number of patent families. Source: OECD.

The total number of papers (method for article count)⁴¹ which indicate the "amount" of results in scientific research, have rapidly increased in China as well, with the country ranking 4th after surpassing Japan and France in 2006, ranking 2nd after surpassing the United Kingdom and Germany in 2006, and ranking first in the world after surpassing the U.S. in 2018. Furthermore, there has been a rapid increase in the number of Chinese papers that were part of the top 1% and top 10% most cited publications⁴², which indicate the "quality" of papers. If we look at the top 10% most cited publications, China overtook Japan in 2006 and ranked first after overtaking the U.S. in 2019 while, looking at the 1% most cited publications, China

⁴¹ Benchmarking Scientific Research 2021 (MEXT 2021)

⁴² The top 10% and 1% most cited publications indicate quality publications that were frequently cited in other papers, and the number of papers cited in the top 10% and 1% in each field has been adjusted after being extracted so that the number of papers cited in actual numbers become 10% and 1% of the total.

overtook Japan in 2006 and ranked second after overtaking the United Kingdom in 2013. This, among other things, shows how remarkable the amount of and quality of China's results in scientific research are (Figure II-1-2-6).

Figure II-1-2-6. Trends in the number of papers in major countries (method for article count)



Source: Benchmarks from NISTEP and MEXT.

(2) Trends in China's outward foreign direct investment

Here we will look at the economic ties between China and the rest of the world by examining the trends in China's outward foreign direct investment. Before 2000, China generated economic growth by being a host country of investment that brings in foreign capital through accepting inward direct foreign investments. However, the country has actively promoted outward foreign direct investment since 2000 to acquire foreign resources and to strengthen industrial competitiveness.

Looking at trends in outward foreign direct investment in countries around the world (Figure II-1-2-7) in terms of stocks, China has been surpassing other countries since the 2010s and ranked third after the Netherlands in 2020. With the Chinese yuan renminbi being devalued, and the Chinese government restricting outward foreign direct investment due to currency depreciation and a decrease in foreign exchange reserves, based on flow, China's outward foreign direct investment peaked in 2016 and has been on a downward trend since then. While the spread of COVID-19 in 2020 severely affected the global economy, causing it to plunge, China's outward foreign direct investment in 2020 remained at a similar level as the previous year with the country's economy being one of the first to recover (Figure II-1-2-8). As a result, China ranked first, overtaking the U.S. which was ranked first since the mid-1990s, except when there were withdrawals by foreign investors⁴³.



Figure II-1-2-7. Trends in outward foreign direct investment in countries around the world

Source: UNCTAD.

⁴³ UNCTAD (2021), Yoichi Maie (2021)

Figure II-1-2-8. Trends in China's outward foreign direct investment (in countries around the world)



Source: National Bureau of Statistics of China, CEIC.

Regions that have low tax burdens, such as Hong Kong, the Cayman Islands and the Virgin Islands, are ranked highly in China's outward foreign direct investments and the country seems to be reinvesting from these regions to other countries (Table II-1-2-9).

	1				
	Country /	2018	2019	2020	2020
	Decien nome	(100 million	(100 million	(100 million	Composition
	Region name	dollars)	dollars)	dollars)	ratio
1	Hong Kong	11,004	12,754	14,385	56%
2	Cayman Islands	2,592	2,761	4,570	18%
3	Virgin Islands	1,305	1,419	1,556	6%
4	United States	755	778	800	3%
5	Singapore	501	526	599	2%
6	Australia	384	381	344	1%
7	Netherlands	194	239	260	1%
8	Indonesia	128	151	179	1%
9	United Kingdom	199	171	176	1%
-	Other	2,761	2,809	2,935	11%
-	Total	19,823	21,989	25,807	100%

 Table II-1-2-9. China's outward foreign direct investment (by country and region)

Source: National Bureau of Statistics of China, CEIC.

Next, we will look at China's outward foreign direct investment in the U.S., Europe, Asia, and Japan. China's outward foreign direct investment in the U.S. was \$80 billion in 2020 in terms of stocks (Figure II-1-2-10), showing an approximate 15-fold increase over 10 years since 2010. China's direct investment in the United States temporarily decreased by 49% year-on-year in 2019 partly due to the Committee on Foreign Investment in the United States (CFIUS), which reviews inward foreign direct investments, being granted new powers over particular types of foreign direct investments that mainly concern Chinese investors in 2018. It then turned around, however, increasing by 58% Year-on-Year in 2020 despite the COVID-19 pandemic. Although the incremental increases in stock has been decreasing since 2019, it continues to be on an upward trend.

Figure II-1-2-10. Trends in China's outward foreign direct investment (in the U.S.)



Source: National Bureau of Statistics of China, CEIC.

Looking at China's foreign direct investment in the U.S. by industry, while real estate, leasing and commercial services declined, industries including information and communications, software, and information technology services continued to increase steadily, and from the perspective of direct investment, the conflict between the U.S. and China seems to have had a limited effect. (Figure II-1-2-11).

Figure II-1-2-11. Trends in, and a breakdown of China's outward foreign direct investment by industry (in the U.S.)



$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	E	Breakdown l	by indust	ry	
Amount (Million dollars)Amount (Million dollars)Amount (Million dollars)Compos ition ratio ($\%$)All industries75,50777,79780,048100.0Agriculture3573083870.5Mining5,4685,7385,3526.7Manufacturing17,76919,28623,41829.3Electricity, gas and water5364985510.7Construction1,7721,9152,0372.5Transportation5925698451.1Information and communications , software, information6,7377,5999,30811.6technology services6,7377,5999,30811.6Molesale and retail6,0135,9016,7558.4Accommodation , food and commercial services11,0279531.2beverage11,22111,91811,67914.6Real estate4,1843,7573,3734.2Leasing and conservation3,1963,3673,4294.3services9,9979,4057,6799.6R&D and technical3,1963,3673,4294.3services4934794440.6Education0.00.00.00.0Personal and4934794440.6Education5,7115,6213,3564.2entrainment0.000.00.00		2018	2019	2020	
All industries $75,507$ $77,797$ $80,048$ 100.0 Agriculture 357 308 387 0.5 Mining $5,468$ $5,738$ $5,352$ 6.7 Manufacturing $17,769$ $19,286$ $23,418$ 29.3 Electricity, gas 536 498 551 0.7 Construction $1,772$ $1,915$ $2,037$ 2.5 Transportation 592 569 845 1.1 Information and communications , software, information $6,737$ $7,599$ $9,308$ 11.6 wholesale and retail $6,013$ $5,901$ $6,755$ 8.4 Accommodation , food and $1,035$ $1,027$ 953 1.2 beverage $7,679$ $9,405$ $7,679$ 9.6 Real estate $4,184$ $3,757$ $3,373$ 4.2 Leasing and commercial solution $9,997$ $9,405$ $7,679$ 9.6 R&D and technical solution $3,196$		Amount (Million dollars)	Amount (Million dollars)	Amount (Million dollars)	Compos ition ratio (%)
Agriculture 357 308 387 0.5 Mining $5,468$ $5,738$ $5,352$ 6.7 Manufacturing $17,769$ $19,286$ $23,418$ 29.3 Electricity, gas and water 536 498 551 0.7 Construction $1,772$ $1,915$ $2,037$ 2.5 Transportation 592 569 845 1.1 Information and communications , software, information $6,737$ $7,599$ $9,308$ 11.6 Wholesale and retail $6,013$ $5,901$ $6,755$ 8.4 Accommodation , food and beverage $1,035$ $1,027$ 953 1.2 Envinemental commercial $9,997$ $9,405$ $7,679$ 9.6 R&D and technical $3,196$ $3,367$ $3,429$ 4.3 services 493 479 444 0.6 Environmental conservation 0.0 0.0 0.0 Personal services 493 479 444 0.6 Education 0.0 0.0 0.0 0.0 Healthcare 0.0 0.0 0.0 Culture, sports and $5,711$ $5,621$ $3,356$ 4.2 Other 427 411 480 0.6	All industries	75,507	77,797	80,048	100.0
Mining5,4685,7385,3526.7Manufacturing17,76919,28623,41829.3Electricity, gas and water5364985510.7Construction1,7721,9152,0372.5Transportation5925698451.1Information and communications , software, information6,7377,5999,30811.6Wholesale and retail6,0135,9016,7558.4Accommodation , food and beverage1,0351,0279531.2Finance11,22111,91811,67914.6Real estate4,1843,7573,3734.2Leasing services9,9979,4057,6799.6R&D and conservation3,1963,3673,4294.3services4934794440.6Environmental conservation0.00.00.0Healthcare0.00.00.0Culture, sports and5,7115,6213,3564.2entertainment0.00.00.0	Agriculture	357	308	387	0.5
Manufacturing $17,769$ $19,286$ $23,418$ 29.3 Electricity, gas and water 536 498 551 0.7 Construction $1,772$ $1,915$ $2,037$ 2.5 Transportation 592 569 845 1.1 Information and communications , software, information $6,737$ $7,599$ $9,308$ 11.6 technology services $6,737$ $7,599$ $9,308$ 11.6 Mholesale and retail $6,013$ $5,901$ $6,755$ 8.4 Accommodation retail $1,035$ $1,027$ 953 1.2 beverage $11,221$ $11,918$ $11,679$ 14.6 Real estate $4,184$ $3,757$ $3,373$ 4.2 Leasing services $9,997$ $9,405$ $7,679$ 9.6 R&D and conservation $3,196$ $3,367$ $3,429$ 4.3 services 493 479 444 0.6 Environmental conservation 0.0 0.0 0.0 Personal services 493 479 444 0.6 Education 0.0 0.0 0.0 0.0 Healthcare 0.0 0.0 0.0 Culture, sports and $5,711$ $5,621$ $3,356$ 4.2 entertainment 0.711 $5,621$ $3,356$ 4.2	Mining	5,468	5,738	5,352	6.7
Electricity, gas and water536498551 0.7 Construction $1,772$ $1,915$ $2,037$ 2.5 Transportation592569 845 1.1 Information and communications , software, information $6,737$ $7,599$ $9,308$ 11.6 technology services $6,737$ $7,599$ $9,308$ 11.6 Wholesale and retail $6,013$ $5,901$ $6,755$ 8.4 Accommodation , food and beverage $1,035$ $1,027$ 953 1.2 Finance $11,221$ $11,918$ $11,679$ 14.6 Real estate $4,184$ $3,757$ $3,373$ 4.2 Leasing services $9,997$ $9,405$ $7,679$ 9.6 R&Dand technical $3,196$ $3,367$ $3,429$ 4.3 services 493 479 444 0.6 Environmental conservation 0.0 0.0 0.0 Personal services 493 479 444 0.6 Education 0.0 0.0 0.0 Healthcare 0.0 0.0 Culture, sports and $5,711$ $5,621$ $3,356$ 4.2 entertainment 0.1 427 411 480 0.6	Manufacturing	17,769	19,286	23,418	29.3
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Electricity, gas and water	536	498	551	0.7
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Construction	1,772	1,915	2,037	2.5
Information and communications , software, information 	Transportation	592	569	845	1.1
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Information and communications , software, information technology services	6,737	7,599	9,308	11.6
Accommodation , food and beverage $1,035$ $1,027$ 953 1.2 Finance $11,221$ $11,918$ $11,679$ 14.6 Real estate $4,184$ $3,757$ $3,373$ 4.2 Leasing commercial services $9,997$ $9,405$ $7,679$ 9.6 R&D services and technical services $3,196$ $3,367$ $3,429$ 4.3 Environmental conservation 0.0 0.0 0.0 Personal services 493 479 444 0.6 Education 0.0 0.0 0.0 Culture, sports and $5,711$ $5,621$ $3,356$ 4.2 Other 427 411 480 0.6	Wholesale and retail	6,013	5,901	6,755	8.4
Finance 11,221 11,918 11,679 14.6 Real estate 4,184 3,757 3,373 4.2 Leasing and commercial services 9,997 9,405 7,679 9.6 R&D and technical services 3,196 3,367 3,429 4.3 Services 0.0 0.0 0.0 Personal services 493 479 444 0.6 Education 0.0 0.0 0.0 0.0 Velocities 5,711 5,621 3,356 4.2 entertainment 427 411 480 0.6	Accommodation , food and beverage	1,035	1,027	953	1.2
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Finance	11,221	11,918	11,679	14.6
Leasing commercial servicesand $9,997$ $9,405$ $7,679$ 9.6 R&D and technical services $3,196$ $3,367$ $3,429$ 4.3 Environmental conservation 0.0 0.0 Personal services 493 479 444 0.6 Education 0.0 0.0 Healthcare 0.0 Culture, sports and Other $5,711$ $5,621$ $3,356$ 4.2	Real estate	4,184	3,757	3,373	4.2
R&D and 3,196 3,367 3,429 4.3 services 3,196 3,367 3,429 4.3 Environmental conservation 0.0 0.0 Personal services 493 479 444 0.6 Education 0.0 0.0 0.0 Healthcare 0.0 0.0 0.0 Culture, sports and 5,711 5,621 3,356 4.2 entertainment 427 411 480 0.6	Leasing and commercial services	9,997	9,405	7,679	9.6
Environmental conservation0.0Personal services4934794440.6Education0.0Healthcare0.0Culture, sports and entertainment5,7115,6213,3564.2Other4274114800.6	R&D and technical services	3,196	3,367	3,429	4.3
Personal services4934794440.6Education0.0Healthcare0.0Culture, sports and5,7115,6213,3564.2entertainment4274114800.6	Environmental conservation				0.0
Education0.0Healthcare0.0Culture, sports and entertainment5,7115,6213,3564.2Other4274114800.6	Personal services	493	479	444	0.6
Healthcare0.0Culture, sports and entertainment5,7115,6213,3564.2Other4274114800.6	Education				0.0
Culture, sports and entertainment5,7115,6213,3564.2Other4274114800.6	Healthcare				0.0
and 5,711 5,621 3,356 4.2 entertainment 0 411 480 0.6	Culture, sports				
Other 427 411 480 0.6	and	5,711	5,621	3,356	4.2
	Other	427	411	480	0.6

Source: National Bureau of Statistics of China, CEIC.

China's outward foreign direct investment in the EU amounted to \$122.4 billion in terms of stocks in 2020, showing an approximate eightfold increase over 10 years since 2010. Although still being on an increasing trend, the incremental increases have become smaller since around 2018 with screening frameworks for inward foreign direct investments being developed and strengthened in the EU and member states (Figure II-1-2-12).



Figure II-1-2-12. Trends in China's outward foreign direct investment (in Europe)

Source: National Bureau of Statistics of China, CEIC.

Although China's outward foreign direct investment in financial services, leasing and commercial services, and the manufacturing industry in the EU decreased significantly in 2020, outward foreign direct investment in information and communications was on an upward trend. (Figure II-1-2-13).





Breakdown by industry				
	2018	2019	2020	
	Amount	Amount	Amount	Com-
	(Million	(Million	(Million	position
	dollars)	dollars)	dollars)	ratio
				(%)
All industries	90,739	93,912	83,016	100%
Agriculture	693	787	700	1%
Mining	14,450	14,807	15,431	19%
Manufacturing	26,744	30,827	28,761	35%
Electricity, gas and	2,696	2,173	2,212	3%
water				
Construction		174	196	0%
Transportation	1,766	1,764	1,274	2%
Information and	2,389	3,236	4,895	6%
communications,				
software,				
information				
technology services				
Wholesale and	5,017	5,300	5,027	6%
retail				
Accommodation,	640	950	925	1%
food and beverage				
Finance	17,020	16,480	11,868	14%
Real estate	3,143	1,267	432	1%

Leasing and	10,774	11,287	7,607	9%
commercial				
services				
R&D and technical	3,177	3,054	2,437	3%
services				
Environmental				0%
conservation				
Personal services	493	391	529	1%
Education	183			0%
Healthcare				0%
Culture, sports and	1,163	1,183	601	1%
entertainment				
Public services				0%
Other	391	233	122	0%

Source: National Bureau of Statistics of China, CEIC.

China's outward foreign direct investment in Asia has been steadily increasing against the backdrop of the One Belt and One Road Initiative and amounted to \$1.6 trillion in terms of stocks in 2020, showing an approximate sixfold increase over 10 years since 2010. (Figure II-1-2-14).



Note: Includes the highly ranked countries of Hong Kong and Singapore included in China's outward foreign direct investments.

Source: National Bureau of Statistics of China, CEIC.

As mentioned before, Hong Kong accounted for about half of China's outward foreign direct investment and Singapore ranked highly as well, however, outward foreign direct investments in Macao, Malaysia, Laos and other Asian countries greatly increased (Figure II-1-2-15).





Note: Excludes Hong Kong and Singapore. Source: CEIC.

Compared to the U.S., Europe, and other countries and regions, China's outward foreign direct investment in Japan increased only slightly and amounted to \$4.2 billion in terms of stocks in 2020, showing an approximate fourfold increase over 10 years since 2010 (Figure II-1-2-16).



Figure II-1-2-16. Trends in China's outward foreign direct investment (in Japan)

Source: CEIC.

(3) Trends in the U.S.' outward foreign direct investment

Although The U.S.' outward foreign direct investment position in countries around the world temporarily decreased⁴⁴ due to large-scale withdrawals by foreign investors in 2018 and 2019, it is on an upward trend. The U.S.' outstanding outward foreign direct investment which totaled \$6.2 trillion in 2020 included outstanding outward foreign direct investments of \$3.6 trillion (59% of the total) in Europe and \$969.6 billion (16% of the total) in Asia while outstanding outward foreign direct investment in China accounted for only a small amount of \$123.9 billion (2% of the total) (Figure II-1-2-17).





⁴⁴ A tax reform was implemented in 2018 to reduce the tax burden on U.S. companies returning foreign profits to the country in order to encourage investment in the U.S.

Source: Bureau of Economic Analysis (hereinafter Source: CEIC. BEA).

The U.S.' outward foreign direct investment in China continued to increase since 2013 despite foreign investors withdrawing in 2011 and 2012, and outward foreign direct investment in China increased even in 2018 and 2019 when the outward foreign direct investment in countries around the world decreased sharply (Figure II-1-2-18).



Source: CEIC.

Looking at the U.S.' outstanding foreign direct investment in China by industry, information and communications was on a slight downward trend in 2019 and 2020 and while computers and electronic components and transportation equipment declined slightly in 2019, they started to increase in 2020. Meanwhile, the chemical industry increased steadily, and it cannot be confirmed whether the U.S.-China conflict has had any effect in terms of outward foreign direct investment.



Figure II-1-2-19. Trends in the U.S.' outward foreign direct investment in China (by industry)

Note: In terms of stocks Source: BEA.

(4) Trends among major countries' and regions' trade with and dependence on China

China has increasingly become a prominent production base for the manufacturing and assembly of parts and general purpose products. The country is able to have workers perform labor-intensive work at low costs and has been the factory of the world up until now. However, there is concern that supply chains will be disrupted if a disaster or emergency occurs in such prominent production bases which potentially can also affect the entire production process. From here we will look at how the U.S., EU, and Japan are increasing their dependence on China in supply chains by firstly looking at the trends in trade value.

Since diplomatic relations were established between the U.S. and China in 1979, the trade value exchanged between the two countries increased yearly. China became the U.S.' largest import partner in 2009 and accounted for 18% of the country's total imports in 2021 (Figure II-1-2-20). Although being the third largest export partner after Canada (18 percent of total exports) and Mexico (16 percent of total exports), China's import value far exceeds its exports value, and the U.S. trade deficit with China remains at a high level. The U.S. has pointed out that China's exports to the U.S. increased due to Chinese companies' overseas expansion and overproduction of steel and other products, while U.S. exports to China stagnated due to country having a closed market, business practices, infringement of intellectual property rights, and forced technology transfers⁴⁵. Although President Biden, who took office in 2021, has continued to allow economic, scientific, and technological conflict between the U.S. and China that became serious since 2018 due to Former President Trump's aggression towards China, imports of electronic equipment and plastic products in the U.S. increased due to consumer spending mainly in goods recovering in 2021, and the value Chinese exports and imports in the U.S. was greater than ever with the increase in exports of natural gas.

⁴⁵ White Paper on International Economy and Trade 2018

Figure II-1-2-20. Trends in U.S. trading partners' total and share of trade value





Source: Global Trade Atlas.

The EU has also been trading more with China. China surpassed the U.S. to become the EU's largest import trading partner in 2005 (Figure II-1-2-21). China accounted for 22% of the EU's total imports in 2021 and China's import value increased 7.4-fold over 19 years since 2002. Although exports are smaller in scale compared to imports, China surpassed Switzerland in terms of exports in 2010, becoming the EU's second largest export partner after the U.S. (17% of total exports). China accounted for 10% of the EU's total export value in 2021, and China's export value increased 8.5-fold over 19 years since 2002.



Note: Excluding the United Kingdom. Source: *Global Trade Atlas*.

While China's share of the EU's exports and imports is increasing, the EU, which has differing values from China, is becoming increasingly wary of China's influence on the region's economy.

Like the aforementioned countries, Japan too has been trading more with China. China remains Japan's largest import trading partner with the country accounting for 24% of Japan's total imports in 2021 (Figure II-1-2-22). China's import value increased threefold over 19 years since 2002. With the U.S.' share in total export value decreasing and China's increasing, the country overtook the U.S. in 2009, becoming the biggest export partner. Afterwards, China and the U.S. have repeatedly switched between being Japan's biggest and second biggest export partners, with China taking the top spot in 2020 and 2021. China accounted for 22% of Japan's total export value in 2021, and China's export value increased 4.1-fold over 19 years since 2002.



Figure II-1-2-22. Trends in Japan's trading partners' total and share of trade value



Source: Global Trade Atlas.

Next we will look at trends in the share of the total value of parts being imported from China in Japan, the U.S., and the EU (Figure II-1-2-23) to determine how much supply chains rely on China. Although the share of parts being imported from China increased sharply in all three countries and regions in the 2000s, the U.S. decreased to 15% in 2020 after remaining at a similar level in the 2010s and peaking at 21% in 2021. It has been relying less on China for imported parts in recent years. On the other hand, while the share of parts being imported from China in the EU rose to 27% in 2011, it slightly decreased and has started to rise again, accounting for 28% of the value of parts being imported in the EU in 2020. Parts being imported from China in Japan increased at a higher rate than the EU and the U.S. until 2015, and remained at a high level, reaching 37% in 2021. The trend of supply chains surrounding China might change in the future with Europe trying to reduce its dependency on China as seen within the update of the 2020 Industrial Strategy released by the European Commission in May 2021 and Japan moving forward to strengthen the resilience of supply chains.



Figure II-1-2-23. Trends in China's share of the parts being imported by Japan, the United States and the EU

Note: Parts are the sum of parts and accessories in the Broad Economic Categories (BEC) classification i.e.,
 42: Parts and accessories in Capital goods (except transport equipment), and 53: Parts and accessories in Transport equipment and parts and accessories thereof
 Source: UN Comtrade Database.

2. The dependence on specific countries in a supply chain

(1) Analysis of import dependence of important items in the United States and Europe

The COVID-19 pandemic has again shed light on the growing concentration of production bases in specific countries and supply chain vulnerabilities, which have been a challenge in the face of changes in geopolitical conditions, including the US-China conflict. In this situation, in 2021, the United States and the EU conducted a government-led survey on supply chain vulnerabilities in order to build a more diverse and resilient supply chain.

The United States, according to the Executive Order 14017 signed in February 2021, investigated important items (semiconductors, high-capacity batteries, important minerals and materials, and pharmaceuticals) to enhance supply chain resilience. The results were reported in June of the same year. In the report⁴⁶, U.S. supply chain vulnerabilities common to important items include: (A) lack of production capacity in the United States (loss of employment due to competition with low-wage countries), (B) lack of incentives and short-term resultism in the private market (the return of profits to investors is not contributed to research and development), (C) the impact of industrial policies adopted by allies and competitors

⁴⁶ The White House (2021)

(increase of public industrial support in other countries). Five points were pointed out: (D) excessive concentration of procurement partner countries and (E) lack of international cooperation (lack of diplomatic negotiations with supply chain-related countries). As a result of the geographical concentration of supply chains in some regions due to the influence of inexpensive labor, and industrial support policies in producing countries, it was found that the U.S. was heavily dependent on China for many of the most advanced batteries and active pharmaceutical ingredients, and concluded that it lead to the US supply chain vulnerabilities.

In Europe, the update of the 2020 Industrial Strategy⁴⁷ was published in May 2021 in order to break away from mutually dependent relationships and promote the European Commission's goal of Open Strategic Autonomy. The report showed the result that 137 of 5,200 imported items are highly dependent on imports, of which 34 items (6 percent of total import values), which are particularly vulnerable, have large differences in domestic and foreign prices, making it particularly difficult to disperse the importing countries and produce alternatives. It was also found that Europe depends on China for 52% of 137 items with high import dependence (Figure II-1-2-24). The report stated that the shared recognition that excessive dependence on specific countries would disrupt the supply chain in the event of an unforeseen situation caused by the spread of COVID-19 and the semiconductor shortage problem would lead to the diversification of the procurement sources to a maximum extent and the implementation of stockpile and autonomous acts as necessary.





Source: Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery (European Commission).

⁴⁷ European Commission (2021)

In September 2020, the European Raw Materials Alliance was launched to reduce Europe's dependence on specific countries for raw materials. "Industrial alliances" and so on in strategic fields such as semiconductors, batteries, and hydrogen are being launched.

(2) Analysis of import dependence of important items in Japan

With regard to Japan, in light of changes in geopolitical conditions and the spread of COVID-19, we will analyze the import dependence of important items, etc. of Japan to capture the degree of concentration of production bases in specific countries and its resulted supply chain vulnerabilities. Since the analysis based on the impact of Russia's aggression against Ukraine is carried out in section 1 of Chapter 1, Part I of this paper, "Economic Risks and Increasing Geopolitical Uncertainty Regarding the World Economy," other parts will be dealt with here.

Using the analytical techniques used in the European Commission's update of the 2020 Industrial Strategy, we will look at Japan's foreign dependence based on three indicators (the import dependence, the feasibility of domestic alternative production of imports, and the Herfindahl-Hirschman Index (HHI, degree of concentration in import partner countries) for industrial products in the Input-Output Table, particularly important items, i.e., semiconductors, batteries, rare metals/earths, and pharmaceuticals(Table II-1-2-25 and Figure II-1-2-26).

Table II-1-2-25. The dependence of important items, etc., and the alternativeness in Japan

Item in the Input-Output Table	Domestic production value (A) (100 million yen)	Export value (B) (100 million yen)	Import value (C) (100 million yen)	Import dependence C/(A+C): (%)	Alternative ness C/B: (Times)
PCs	6,213	1,219	10,758	63.4	8.83
Mobile phones	1,277	178	20,478	94.1	114.83
Semiconductor devices	8,108	7,474	4,007	33.1	0.54
Integrated circuits	41,939	27,246	23,460	35.9	0.86
Batteries	10,651	4,627	1,845	14.8	0.40
Other non-ferrous metals (*)	14,066	9,528	11,888	45.8	1.25
Pharmaceuticals	70,370	5,919	28,548	28.9	4.82

Note: According to the Ministry of Internal Affairs and Communications, "other non-ferrous metals" include gold, silver, platinum, palladium, nickel, tin, cobalt, silicon, etc.

Source: Ministry of Economy, Trade and Industry based on data from Global Trade Atlas.

Figure II-1-2-26. Import partner countries and regions

Importers share of laptops (2020)



Importers share of mobile phones (2020)



Importers share of processors and controllers (2020)



Importers share of photoelectric semiconductor devices and LEDs (2020)



Importers share of storage element (2020)



Importers share of Non-recording optical media (2020)





Source: Ministry of Economy, Trade and Industry based on data from Global Trade Atlas.

Among industrial products, items with high import dependence⁴⁸ are personal computers and mobile phones accounted for 63.4 percent and 94.1 percent, respectively. The import dependence exceeds 50%, indicating that the dependence is higher in imports than those produced domestically. In addition, the domestic alternativeness⁴⁹ is 8.83 times and 114.83 times respectively, indicating that the domestic alternativeness is low, since the import value far exceeds the export value. China accounts for the majority of import partner countries. This analysis shows that Japan relies on China to import finished products for both personal computers and mobile phones. However, assembly of the middle-stream process in the value chain is less added-value than product design in the upstream process and sales and after-sales service in the downstream process, so it is presumed that China is chosen in terms of cost. For such low added-value items, it will be necessary to consider strengthening the supply system by diversifying production bases.

Among semiconductor-related products, which are indispensable in a wide range of industries, the import dependence of semiconductor devices is 33.1%, and its alternativeness is 0.54 times; the import dependence of integrated circuits is 35.9%, and its alternativeness is 0.86 times; the import dependence of batteries is 14.8%, and its alternativeness is 0.40 times. The import dependence is below 50% and the alternativeness is below 1 times, indicating a certain degree of risk in terms of import dependence and the alternativeness in Japan, although the risk of supply disruption is not high. However, attention should also be paid to the degree of concentration in import partner countries indicated by the Herfindahl-Hirschman Index (HHI), which will be explained later.

⁴⁸ Import dependence (%) = Import value / (Domestic production value + Import value) * 100

⁴⁹ Alternativeness by domestic production (times) = Import value / export value (indicating that the higher the number is, the lower the alternativeness by domestic production becomes)

For pharmaceuticals that are directly linked to the safety of life, although the import dependence is low at 28.9%, the alternativeness is 4.82 times. The import value is higher than the export value, making it difficult to produce domestic alternatives. Import partner countries vary depending on the item, including the United States, Germany, and Switzerland.

If the import dependence is high and the alternativeness is low, the concentration of imports in a particular country can be an additional risk.

Next, we use the Herfindahl-Hirschman Index $(HHI)^{50}$ to measure the degree of concentration in the import partner countries. HHI indicates that the closer to the maximum value (= 100) the value is, the smaller the number of import partner countries is, and the lower the HHI is, the greater the number of import partner countries is.

Rare metals and rare earths, which are important items, are indispensable materials in various industries, including the electric vehicle industry, and are also important bases for the digital society. The HHI of trade items that corresponds to rare metals and rare earths shows that imports tend to be concentrated in a small number of countries, indicating a high risk of supply disruption.

Summarizing the items with a high HHI value (Table II-1-2-27), the HHI of mobile phones and laptops are high at 71.3 and 98.7 respectively, and China accounts for the majority of import partner countries. As for semiconductor devices, the HHI of photoelectric semiconductor devices and LEDs is 45.9, which is a prominent figure in imports from China. Among the integrated circuits, the HHI of processors, controllers, and storage elements is 36.0 and 38.8 respectively, and imports from Taiwan account for the majority. Since many of the important items have high HHI values, they have high degree of concentration and import dependence on import partner countries. It can be said that, from the viewpoint of economic security, it is necessary to secure a stable supply of important items, which have a low feasibility of domestic alternative production, by promptly establishing a domestic supply system and diversifying import partner countries.

Item	HHI (On the 2020 import basis)
Beryllium ingot and powder *Metal	100
Other substances containing ephedrine *Ingredient of herbal medicines	100
Other substances containing pseudoephedrine *Pharmaceutical ingredients	100
Sintered nickel oxide and other intermediate products of nickel smelting	99
Laptops	98.7
Magnesium ingot containing 99.8% or more magnesium to the total weight	96.1
Tungsten ingot *Rare metal	95.8
Molybdenum ingot *Rare metal	82.9
Nickel and hydrogen batteries	82.1
Optical media (with no record)	80.6
Tin alloy	75.9
Mobile phones	71.3
Nickel mats	70.7
Lithium-ion batteries	46.6
Photoelectric semiconductor devices and LEDs	45.9

Table II-1-2-27. Main items with a high Herfindahl-Hirschman Index (HHI)

⁵⁰ A key indicator that measures the degree of concentration of import partner countries. HHI = Σ (import share of any country) 2 / 100

Disinfectants		45.4
Storage elements	*Integrated circuits	38.8
Processors and controllers	*Integrated circuits	36.0

Ministry of Economy, Trade and Industry based on data from Global Trade Atlas.

Japan imports almost all of its oil and natural gas. In order to secure a stable supply of oil and natural gas, it is extremely important for Japanese companies to secure upstream interests in overseas countries, for which the Japanese companies are directly involved in the development and production of oil and natural gas, and to promote self-development through domestic resource development. In particular, since domestic resource development enables securing a stable energy supply regardless of geopolitical risks, it is important to continue promoting domestic resource development, including methane hydrate⁵¹. For this reason, Japan aims to start a project for commercialization of methane hydrate, which is expected to exist with a substantial amount in the waters around Japan by FY2027, and is promoting technological development, etc. so that results can be obtained as soon as possible.

(3) Geographical concentration risks in the supply chain

The risks associated with geographically concentrated supply chains can also be confirmed from the International Input-Output Table⁵². Japan, which has a high risk of natural disasters, and China, which has a high geopolitical risk, are targeted at six major industries: Food (10T12), textiles, clothing (13T15), chemicals, pharmaceuticals (20T21), ICT, electronic equipment (26), electrical equipment (27), and automobiles (28). The following scatter diagram shows the geographical concentration of global supply chains using the International Input-Output Table (Figure II-1-2-28). Here, the vertical axis shows the frequency of going through industries in the target country (left: Japan, right: China) (concentration risk of frequency), and the horizontal axis shows the share of the target country as a source of added value (concentration risk of quantity). The distribution of supply chains in each country is shown to be lower in quantity and frequency than in Japan, while the distribution of supply chains in China is dispersed in the upper right direction, which shows a positive correlation. In some countries and industries, both quantity and frequency are high, indicating that supply chains are more concentrated geographically in China than in Japan. When analyzing the dependency of the supply chain, only the quantitative risk of direct trade transactions can be understood from the viewpoint of import dependence seen in the previous item. However, in addition to the quantitative concentration risk, a more realistic analysis can be made by using the International Input-Output Table from two aspects of the frequency concentration risk that goes through various countries along the way in a long and complex global supply chain.

⁵¹ A material with methane and water crystallized at low temperature and high pressure.

⁵² Inomata and Hanaka (2021)

Figure II-1-2-28. Risk positions in the global supply chains of major manufacturing industries (2018)



Source: Inomata and Hanaka (2021).

Looking at the ICT and electronic equipment sectors in the United States (U.S._26), the quantitative concentration risk shows a low value while the frequency concentration risk shows a high value. In the ICT and electronic equipment sectors in the United States, although the added-value dependence in China is low, part of the processing of parts and other processes have been carried out in China due to the concentration of frequency, showing that they have been gone through Chinese industry at a very high frequency. Given the possibility of underestimating the risk of supply chains when viewed solely from the aspect of quantitative added-value concentration, it is meaningful to also look at the supply chain dependence of countries gone through in the global supply chain.

(4) Efforts by countries to strengthen supply chain resilience

Factors of supply chain disruptions are diversifying, including natural disasters, regional conflicts, pandemics, and political instability. In 2020, the spread of COVID-19 caused supply chain vulnerabilities to materialize in various parts of the world, such as supply disruptions for medical supplies, e.g., masks and vaccines. Supply chains are being strengthened by the establishment of domestic production bases, including reshoring (the practice of transferring a business operation that was moved overseas back to its original country), and by the diversification of overseas production bases, for important items that have high production base concentration and pose a high risk of supply chain disruption and items that are essential for people to live healthy lives.

Among important items, semiconductors, in particular, are used in various sectors such as automobiles, communications, and medical equipment, and support, as important bases, the digital society such as big data, AI, IoT, and robotics, and are also important strategic materials and technology directly linked to security. Therefore, countries around the world are strengthening their production bases with large-scale funds, and there is competition going on based on industrial policies.

In the United States, the National Defense Authorization Act for Fiscal Year 2019 (NDAA 2021) was passed to support the semiconductor industry, including up to 300 billion yen's worth of a subsidy per case and the establishment of a Multilateral Semiconductors Security Fund. The Senate passed the draft of the U.S. Innovation and Competition Act, which includes a \$52 billion budget for semiconductor production and R&D, in response to the "Creating Helpful Incentives for the Production of Semiconductors (CHIPS) for America Act," which aims to strengthen the U.S. semiconductor supply chain. The House of Representative passed the America Creating Opportunities for Manufacturing Pre-Eminence in Technology and Economic Strength (America COMPETES) Act, which includes the same details as the CHIPS for America Act. It is expected that a unified bill will be coordinated and approved by the Joint Committee of the U.S. Congress, and then will signed into law by the President.

In Europe, a digital strategy for 2030 was announced, including the investment of 144.7 billion euros (about 18.8 trillion yen) in digital transitions (logic semiconductors, HPC/quantum computers, quantum communication infrastructure, etc.) and the goal of increasing the global share of cutting-edge semiconductor manufacturing from the current 10% or so to 20% or more by 2030. Furthermore, in September 2021, the enactment of the New European Chips Act aimed at building an ecosystem that includes the production of cutting-edge chips in Europe was declared, and proposed rules were submitted in February 2022.

China established the China Integrated Circuit Industry Investment Fund in 2014 and 2019, totaling approximately 5 trillion yen. In addition, local governments have funds for the semiconductor industry totaling more than 5 trillion yen, and a total of more than 10 trillion yen is expected to be invested in semiconductor-related technologies.

In Japan, for important items with a high risk of supply chain disruption for semiconductors, etc., as well as all items that are essential for people to lead healthy lives, 220 billion yen and 210.8 billion yen were secured in the Supplementary Budget for FY2020 and the Third Supplementary Budget for FY2020 respectively as the Program for Promoting Investment in Japan to Strengthen Supply Chains. 23.5 billion yen and 11.67 billion yen were secured in the Supplementary Budget for FY2020 and the Third Supplementary Budget for FY2020 respectively as the Overseas Supply Chain Diversification Support Project. In the Supplementary Budget for FY2021, large-scale budgets have been secured, including 617 billion yen to secure domestic production bases for advanced semiconductors, and 47 billion yen to decarbonize and renovate semiconductor production facilities, which are highly essential in the supply chain. Domestic production bases are being developed so that economic activities and people's lives can continue smoothly even in the event of unforeseen circumstances. In the Supplementary Budget for FY2021, 250 billion yen's worth funds have been secured as a budget to promote rapid research, development, demonstration, and practical application of key technologies in advanced fields such as quantum and AI for the "Program for Developing Key Technologies for Economic Security" in order to secure and strengthen economic security.

In addition, the Economic Security Promotion Act (Act on Promotion of Ensuring Security by Taking Economic Measures in an Integrated Manner), which was enacted in May 2022, includes provisions for designating important goods, etc. that are essential for the survival of the people or whose lives and economic activities depend widely on them as specified important goods and ensuring a stable supply. With regard to goods designated as specified important goods, the Minister in charge of said goods will set action policies which specify the direction of measures for each piece of specific important goods and the details of

the measures to be supported in order to secure the stable supply of said goods through necessary measures such as the development of production bases, diversification of supply sources, and the introduction, development, and improvement, etc. of production technologies. After that, if a private business operator prepares a supply security plan based on the action policies, and receives certification from the competent Minister, the certified business operator will be able to receive support such as subsidies.

As a result of Russia's aggression against Ukraine, there has been a greater awareness of supply risks in the supply chain for strategic goods such as energy and resources, which are highly dependent on imports from Russia. Based on that, prompt actions are required such as the development of a domestic supply system for important goods and the diversification of supply sources in terms of economic security.

(5) Cooperation with like-minded countries to strengthen supply chain resilience

In order to diversify production bases for important items that have a large impact on economic activities and people's lives and are significantly vulnerable, it is important to cooperate with like-minded countries that share common values. In order to ensure high quality supply chains, each country is working to strengthen multilateral cooperation among the like-minded countries.

For example, in April 2021, the three trade ministers of Japan, Australia and India launched the SCRI (Supply Chain Resilience Initiative) to address supply chain disruptions in the Indo-Pacific region together through cooperation. The Second Australia-India-Japan Economic Ministers' Meeting on SCRI was held in March 2022. The importance of cooperation with industry and academia was confirmed, and it was agreed that Japan will promote the SCRI as the chair country for about a year to come in order to develop and promote supply chain principles for the Indo-Pacific region, to identify key industries where trilateral cooperation can contribute to supply chain resilience, to promote investment and business in these sectors, and to promote and facilitate best practices and joint projects for supply chain resilience.

It is necessary to develop an open supply system in cooperation with the like-minded countries, rather than moving toward a closed economic system or fencing areas in from which important items, etc. are supplied.

3. Development of sensitive and emerging technologies and promotion of economic security through export control and inward foreign direct investment control⁵³

Amid growing security risks due to the emergence of geopolitical risks such as the US-China conflict and Russia's aggression against Ukraine, in addition to the aforementioned efforts to secure important goods, including reducing the supply chain dependence, integrated efforts are becoming increasingly important to improve the autonomy of the economic structure, to secure technological superiority, and ultimately to acquire essentiality, through efforts to develop and maintain important technologies for security.

Sensitive technologies, especially dual-use technologies that can be used for both military and civilian purposes, pose a security threat due to the existence of civilian supply chains and the possibility of diversion to military use. In particular, technologies such as AI, quantum, and biotechnology may change the future military technology system even in the early stages of development. These emerging technologies and the

⁵³ Tsunoda, S. (2021)

fundamental technologies that support them have been diversified and complicated in recent years due to the rapid progress of these technologies and the diversification of the owners. The management in small- and medium-sized business operators, including academia and venture companies, and the agility of the management have become even more important.

Due to such economic security concerns, there is a growing movement around the world to strengthen export control and inward investment control regulations for sensitive and emerging technologies and products manufactured using these technologies (Table II-1-2-29).

	Japan	U.S.	Europe	China
Export control	 A basic framework is established in the Foreign Exchange and Foreign Trade Act (Foreign Exchange Law), and export control is carried out in accordance with list rules and catch-all rules. From May 2022, it has been clarified that the provision of regulated technology to residents who are strongly affected by non-residents would also be subject to regulation (clarification) 	 From August 2018, the Export Control Reform Act (ECRA) and its subordinate, the Export Administration Regulations (EAR), have controlled the export of military and commercial dual-use cargos and less sensitive weapons. In January 2020, "software specially designed to automate the analysis of geospatial imagery (AI-related)" was added to the list of regulated items in the EAR as an emerging technology. 	 The amended regulations of the European Council came into effect in September 2021. Export controls were tightened for expanding military and commercial dual-use cargos, software, and technologies. Regulations are scheduled to be introduced by adding those that have not been included in the current regulation list, from the viewpoint of consideration for human rights. 	 The Export Control Law came into effect in December 2020. Dual-use cargos, military supplies, and nuclear weapons were also listed to be regulated. In addition, catch-all rules were clearly stated to clarify that those not listed could be subject to the regulation if the exporter, etc. was aware that they would harm the national interest, etc.
	of the operation of deemed export control).			
Inward foreign direct invest- ment	 Regulated by the Foreign Exchange and Foreign Trade Act (Foreign Exchange Law). In the 2019 amendment, the threshold for the acquisition of shares of listed companies subject to prior notification was lowered from 10% to 1%, and the prior notification system and the prior notification exemption system were newly introduced. 	 In August 2018, the Foreign Investment Risk Review Modernization Act (FIRRMA) was enacted. Regarding inward foreign direct investment in emerging technologies and critical infrastructure, investments by investors under the influence of foreign governments that would have an impact on corporate management were newly added to the scope of the review. 	 In April 2019, the EU's first regulations for screening inward foreign direct investment came into force, and in October 2020, the following year, the regulations were fully applied. The scope of the regulations, standards for screening, and the policy of cooperation between the Member States and the European Commission and more were indicated. However, the introduction of a screening system common to the Member States is not compulsory, and the decision is entrusted to each member state 	 In December 2020, the Measures for the Security Review of Foreign Investment was promulgated. The measures regulate investment in important items and sensitive technologies, etc. The negative list on the entry of foreign companies into China is updated every year. It indicates sectors that restrict investment by foreign-affiliated companies. The January 2022 edition regulates 31 items in 12 sectors. Rare earth mining and atomic energy, etc. are subject to regulation.

Table II-1-2-29. Outline of export control systems and inward foreign direct investment systems in major countries and regions

Source: JETRO, Materials published by individual governments etc.

(1) Export control systems of major countries and regions

Since sensitive technologies and emerging technologies are important technologies that affect the future competitiveness of countries, various measures are being taken in each country, including strengthening export control systems, in order to prevent their outflows to countries and terrorists that may threaten international peace and to ensure economic security. This section provides an overview of the export control systems of the United States, Europe, China and Japan from the perspective of economic security.

In the United States, the Export Control Reform Act (hereinafter referred to as "ECRA"), enacted in August 2018, controls the export of military and commercial dual-use cargos, etc. The ECRA was passed as part of the National Defense Authorization Act for Fiscal Year 2019 (NDAA 2019), which gives the Department of Defense budgetary authority. The ECRA includes "emerging technologies" and "foundational technologies." In addition, the Export Administration Regulations (hereinafter referred to as "EAR"), which are subordinate regulations of the ECRA, include the Commerce Control List (CCL) and Entity List, etc. Exports and re-exports of U.S.-origin products, etc. are restricted. The ECRA requires the Department of Commerce to designate "emerging technologies" and "foundational technologies." However, there have been no clear listing after 14 sectors of emerging technologies⁵⁴ were exemplified in the public comments issued in 2018. In January 2020, the "software specially designed to automate the analysis of geospatial imagery (AI-related)" was newly added to the CCL as emerging technology⁵⁵, and in 2021, a public comment was carried out with regard to the addition of a "brain-computer interface (BCI)."

The Entity List contains persons (including companies, research institutes, organizations and individuals, etc.) who have engaged in activities that harm national security or foreign policy interests. In the case of export to a listed person, it is necessary to apply for and obtain permission from the U.S. Department of Commerce in advance.

In Europe, the export control system has been stipulated in the regulations, and the scope of the regulations have been listed in the appendix list of the regulations. In the amended Regulation No. 2021/821 (Export Control Regulation)⁵⁶, which came into effect in September 2021, the export control of military and commercial dual-use cargos, software, etc., was tightened in order to respond to security risks and emerging technologies. The list of the scope of the regulations is regularly reviewed in order to respond to the growing information security risks, the rapid development of technology, and other situations, and additional inclusion on the list is being considered from the perspective of consideration for human rights.

Europe and the United States will cooperate in addressing technological, economic, and trade issues. For that purpose, the US-EU Trade and Technology Council (TTC) was established, and issued a joint statement at its first meeting⁵⁷ in September 2021, including cooperation in critical technology and emerging technology sectors and export control.

 ⁽¹⁾ Biotechnology, (2) Artificial intelligence (AI) and machine learning techniques, (3) Positioning technology, (4) Microprocessor techniques, (5) Advanced computing technology, (6) Data analysis techniques, (7) Quantum information and quantum sensing technology, (8) Transportation technology, (9) Additive manufacturing technology (3D printers, etc.), (10) Robotics, (11) Brain-computer interface, (12) Hypersonic speed, (13) Advanced materials, and (14) Advanced monitoring techniques

⁵⁵ DOC added AI technology for geospatial image analysis to export control (JETRO, January 2020)

⁵⁶ Strengthened EU export control rules kick in (EU Commission, September 2021)

⁵⁷ EU-US Trade and Technology Council Inaugural Joint Statement (EU Commission, September 2021)

In China, the Export Control Law came into effect in December 2020. Dual-use cargos, military supplies, nuclear weapons, and the relevant technologies were also listed to be regulated. In addition, catch-all rules were clearly stated to clarify that those not listed could be subject to the regulation if the exporter, etc. was aware that they would harm the national interest, etc. In addition, it is planned to impose deemed export and re-export controls as in the United States. Although the list of export-prohibited and restricted technologies includes AI and software security-related items for the purpose of "national security and interests," concerns have been raised that the scope of regulated items is extremely unclear and the authorities' discretion is large.

In Japan, the Foreign Exchange and Foreign Trade Act provides a framework for export control. Specifically, there are two types of rules: List rules and catch-all rules. The export of cargos and the provision of technology, to which these rules are applicable, require prior application and approval from the Minister of Economy, Trade and Industry. The list rules reflect the contents agreed to be subject to export control in the international export control regime, and cover sensitive items, etc. that are highly likely to be diverted to military use, including advanced materials. Catch-all rules are applicable to the export of cargos or the provision of technology, even if the list rules are not applicable, when there is a risk that the use or user's intent is for the development of weapons of mass destruction or conventional weapons, or when a notice is received from the Minister of Economy, Trade and Industry, stating that a license application should be filed. The Ministry of Economy, Trade and Industry has published a list of foreign users as a material to determine whether or not they are users that may use cargos for the development of mass destruction, etc. Careful examination of, application for and acquisition of permission from the Minister of Economy, Trade and Industry will be required when an export destination or a destination of technology provision falls under the foreign user list. In addition, from the perspective of strengthening countermeasures against the outflow of sensitive security technologies through interaction of people and joint research, etc. at universities and research institutes as well as companies, the export control has been reviewed from May 2022, e.g., if residents who are strongly affected by non-residents, the residents will be subject to the regulations when regulated technologies are provided to the residents (so-called: Clarification of the operation of deemed export control).

(2) Inward foreign direct investment control systems in major countries and regions

Export control alone cannot prevent the outflow of sensitive technologies and emerging technologies. In recent years, inward foreign direct investment, such as acquisitions and mergers of companies for the purpose of acquiring sensitive technologies and emerging technologies, has been increasing, and inward foreign direct investment control systems are being strengthened in each country.

In the United States, the Committee on Foreign Investment in the United States (CFIUS), a crossministerial organization with the authority for screening of inward foreign direct investment, etc. by foreign nationals, determines the impact on U.S. economic security. The Foreign Investment Risk Review Modernization Act of 2018 (hereinafter referred to as "FIRRMA"), which was included as part of the aforementioned National Defense Authorization Act for Fiscal Year 2019 (NDAA 2019) (NDAA 2019) enacted in August 2018, strengthened the review authority of the CFIUS. Specifically, for inward foreign direct investment in emerging technologies and critical infrastructure, pre-screening of investments, which have an impact on corporate management, of investors under the influence of foreign governments has been newly made mandatory. The CFIUS annual report^{\$8} reported the number of inward foreign direct investment in U.S. companies⁵⁹ involved in the research, development and production of critical technologies by country. Critical technologies are defined as those regulated by the Export Administration Regulations (EAR) or the Commerce Control List (CCL), as well as those related to weapons, atomic energy, and specified poisonous substances. The total number of applications for acquisitions of critical technology companies was 76 in 2018, 92 in 2019, and 122 in 2020. Despite the spread of COVID-19, the number of acquisitions of critical technology companies is increasing. Looking at the number of acquisitions by country in 2020 (Figure II-1-2-30), Japan had the largest number of acquisitions, followed by Canada, Germany and the United Kingdom. Japan had the highest number of acquisitions in the three years since 2018. China was the third largest investor (8) after Japan and Canada in 2018, but fell sharply to only three investments in 2019. Although the number of acquisitions is small, it cannot be said sweepingly, but the impact of the strengthening of the review authority of the CFIUS can be seen.

Figure II-1-2-30. The number of acquisitions of critical technology companies in the United States by country of the top six countries (2018-2020)



Source: Annual Report to Congress - CY 2020 (CFIUS).

In Europe, the EU Regulation 2019/452 came into force with respect to the screening of foreign direct investments into the Union for the first time in April 2019, and was fully applied in October 2020. Although the regulations stipulate the scope of the regulations, standards for screening, the policy of cooperation among the Member States and the European Commission, etc., the introduction of a common screening

⁵⁸ CFIUS (2021)

⁵⁹ U.S. companies engaged in the research, development, and production of critical technologies, as defined in 31 C.F.R. §800.209, Regulations Pertaining to Mergers, Acquisitions, and Takeovers by Foreign Persons (CFIUS regulations), published in the Federal Register on November 21, 2008.

system is not compulsory for the Member States and is left to the discretion of each country. In November 2021, a report⁶⁰ on the results from October 2020, when full application began, to the end of June 2021 was released, and 265 notices on foreign direct investment screening were made from 11 Member States. More than 90% of notices are from Austria, France, Germany, Italy, and Spain. Of these, 36 notices (14% of the total number of the notices) were judged to have an impact, etc. on the Member States, and this led to the second stage. Looking at projects that have advanced to the second phase by sector, manufacturing accounted for 50%, followed by information and communication technology (ICT) (17%) and finance (8%) (Figure II-1-2-31). It is impossible to look at the trends because the full application was made in October 2020. However, when looking at the trend by country where the investment has been coming from, China shows its presence as the third-rank country (about 8%), following the United States (45%) and the United Kingdom (9%).



Source: First Annual Report on the screening of foreign direct investments into the Union (EU Commission).

In China, in December 2020, the National Development and Reform Commission and the Ministry of Commerce promulgated the "Measures for the Security Review of Foreign Investment" to examine the safety of foreign-affiliated companies investing in China under the "Foreign Investment Law" and the "State Security Law." Specifically provided as "military-related and national security-related important agricultural products, energy and resources, equipment manufacturing, infrastructure, transportation services, cultural products and services, information technology and Internet products and services, financial services, key technologies and other important sectors." Since sensitive technologies and emerging technologies are included in the scope of the regulations, it is intended to prevent the leakage of these technologies. In the case of falling under the categories, it is compulsory to apply to the National Development and Reform Commission in advance, and inward foreign direct investment in China is permitted if the screening has been carried out and there is no risk of affecting national security.

In addition, the negative list on the entry of foreign-affiliated companies is updated every year, indicating sectors where investment by foreign-affiliated companies is restricted or prohibited. The list came into effect in January 2022, and 31 items in 12 sectors are subject to the regulations. Compared to 2021, the market for

⁶⁰ EU Commission (2021)

the manufacture of finished cars has been opened, but the construction and management, etc. of nuclear power plants continue to be regulated.

In Japan, inward foreign direct investment is regulated by the Foreign Exchange and Foreign Trade Act. In response to the trend of tightening regulations in major countries, regulations have been appropriately reviewed in Japan for inward foreign direct investment, which may lead to the outflow of sensitive technologies and emerging technologies. Reviewing was made to include, in the 2017 Amendment, the introduction of an order to take retroactive measures that allows the government to issue, to foreign investors who have made inward foreign direct investment without notice, an administrative order to sell their shares and other orders, and the provision of prior notification on the acquisition of unlisted shares by foreign investors from other foreign investors with regard to industries that are likely to jeopardize national security. The 2019 Amendment lowers the threshold for the acquisition of shares of listed companies subject to prior notification (from 10% to 1%), and newly introduces a system for prior notification and an exemption system for prior notification, exempting foreign investors from prior notification at the time of share acquisition on the premise that they comply with certain standards, and enabling investment by expost fact reporting only. According to the "Number of Prior-notification under Foreign Exchange and Foreign Trade Act .⁶¹," published by the Ministry of Finance in July 2021, the number of prior notifications for inward foreign direct investment decreased in fiscal 2020 due to the 2019 Amendment, and the total number of prior notifications for inward foreign direct investment increased to 2,171, i.e., about a 11% increase from the previous year, including 731 prior notifications newly introduced (Figure II-1-2-32). Looking at them by sector, weapons, etc., infrastructure-related and other sectors accounted for about 30% of the total until fiscal 2018, but in fiscal 2020, cybersecurity-related industries (information processing services, software, integrated circuit manufacturing, semiconductor memory media manufacturing, etc.), which were newly added in the previous fiscal year, accounted for 66% of the total (Figure II-1-2-33).

⁶¹ Research Division, International Bureau, Ministry of Finance (2021)



Figure II-1-2-32. Trends in the number of prior notifications concerning the acquisition of shares of listed companies in Japan

Source: Number of Prior-notification under Foreign Exchange and Foreign Trade Act (Research Division, International Bureau, Ministry of Finance).





Source: *Number of prior-notification for foreign direct investments etc.* (Research Division, International Bureau, Ministry of Finance).

For example, as the case that a share acquisition suspension was recommended based on the Foreign Exchange Law, the Children's Investment Master Fund (TCI Fund), a British investment fund, acquired shares of Electric Power Development Co., Ltd. in 2008. In this case, the first recommendation was made based on the Foreign Exchange Law because the electric industry could affect the stable supply of electricity and Japan's nuclear power policy, and hinder the maintenance of public order, etc. This was the only one

recommendation made so far. However, it is important to be prepared to respond to such recommendation, if made, at any time because the establishment of a system for recommending the suspension in foreign direct investment regulations also leads to a deterrent.

From the standpoint of economic security, there is increasing movement to tighten regulations. However, attention should be paid to the development of regulations by governments in each country so that they do not have unfair effects on economic activities beyond economic security concerns.

(3) Comprehensive efforts to promote economic security

In the United States and other major countries, measures have been taken to prevent the emergence of concerns about the outflow of sensitive technologies and emerging technologies through interaction of people and joint research, etc. at universities and research institutes. In the United States, there have been many cases of prosecution one after another, for example, in 2019, a university professor was indicted for failing to report to authorities about contracts with several Chinese research institutes; another university professor was indicted for wrongly applying for and receiving a subsidy, concealing the fact of the participation in the "Thousand Talents Plan," with which the Chinese government invites excellent researchers. In response to this, the National Science Foundation (NSF) has revised its application documents and procedures to clarify the importance of transparency and information disclosure. In April 2021, even Japan published a policy aimed at securing "research integrity" that requires transparency and accountability from research institutes, etc., in order to build an internationally reliable research environment while responding to the new risks associated with such internationalization and openness of research, and emphasizing exchange and cooperation with other countries. Specifically, it has been indicated as a response policy that (A) appropriate information disclosure of research activities, etc. by researchers themselves, (B) strengthen management for personnel and risk management at universities and research institutes, (C) requiring the submission of information in research fund allocation organizations, etc. Securing economic security at research institutes, etc. have been strengthened, and the prevention of the outflow of sensitive technologies and emerging technologies have been promoted.

Furthermore, in May 2022, the Economic Security Promotion Act (Act on Promotion of Ensuring Security by Taking Economic Measures in an Integrated Manner) was passed and enacted. The purpose of this Act is to comprehensively and effectively promote economic policies for ensuring security. As economic policies for security, the following have been stipulated: (A) strengthening supply chains to ensure stable supply of important goods, (B) ensuring stable provision of fundamental infrastructure services, (C) supporting the development of important advanced technologies, and (D) not disclosing patent applications. In addition to promoting the research and development of leading-edge important technologies, this Act shall implement measures such as information provision, financial support, establishment of a council for public-private support, and entrustment of investigative research services. Moreover, for patent applications containing extremely sensitive inventions in terms of security, the Act prescribes a mechanism to reserve procedures such as laying open of application and restricting foreign applications by designating for maintenance in order to prevent disclosure or outflow, and to obtain rights under the Patent Act without compromising security. Furthermore, in addition to not only the aforementioned export control and foreign direct investment control but also measures under this Act, the promotion of research and development of advanced

and important technologies and the appropriate utilization of the results will further promote economic security.

4. Trends regarding trade, investment, and monetary measures

(1) Recent measures by major countries

Recently, globalization and the development of information and communication technology have created cross-border global supply chains as well as financial and telecommunications networks around the world. This has led to mutually dependent relationships among countries around the world that have helped keep international order stable. Meanwhile, various trade, investment and monetary measures have been taken in the network structure of growing mutually dependent relationships based on them.

In the U.S., former President Trump decided to impose additional tariff measures against China under Section 301 of the U.S. Trade Act of 1974 in March 2018. Section 301 of the U.S. Trade Act of 1974 provides a statutory means by which the United States imposes trade sanctions on foreign countries that violate U.S. trade agreements or engage in acts that are "unjustifiable" or "unreasonable" and burden U.S. commerce without needing to go through dispute settlement proceedings based on international rules such as the WTO rules. Additional tariffs on Chinese products were imposed due investigations revealing that the Chinese government was intervening in the transfer of China's technology and intellectual property. While trade sanctions have continued being imposed between the United States and China since then, the U.S. and China signed the US-China Economic and Trade Agreement (Phase 1) in January 2020. As the global economy plunged due to the spread of COVID-19, China has tried to stick to the agreement but the U.S claims that China has only purchased about 60% of the products covered in the agreement⁶². After taking office in January 2021, President Biden has signed an executive order banning Americans from investing in Chinese firms linked to the People's Liberation Army which, among other things, shows that the Biden Administration is maintaining strict measures against China.

The U.S. has imposed numerous unilateral measures up until now partly due to the fact that the country has been given powerful authority to swiftly respond to the damage inflicted on its domestic industries by the rapid increase in imports caused by trade liberalization.

The Marrakesh Agreement which established the World Trade Organization strictly prohibits the redress of a violation of obligations or other nullification or impairment of benefits under the covered agreements or an impediment to the attainment of any objective of the covered agreements without abiding to the rules and procedures of the Understanding in Article 23 (Strengthening of the Multilateral System) of ANNEX 2 (UNDERSTANDING ON RULES AND PROCEDURES GOVERNING THE SETTLEMENT OF DISPUTES). However, the WTO Appellate Body, an important element in the Dispute Settlement System of the World Trade Organization, ceased to function since 2019 as the terms of its members expired, leaving many appeals brought to the body undecided. If the Dispute Settlement System of the World Trade

⁶² US-China phase one tracker: China's purchases of US goods (Peterson Institute for International Economics, March 2022)

Organization continues to be dysfunctional, it is feared that it will not be able to adequately respond to measures that are consistent with rules, including unilateral measures.

In addition, the U.S. has shown a positive attitude toward extraterritorial application. The scope of legislative jurisdiction is based on the territorial principle where domestic laws usually only apply to persons within the country and not outside the country. In order to achieve fair and free competition, extraterritorial application has been pointed out in the effects doctrine within Competition Law which further expanded the original territorial principle. For example, the U.S.'s Export Administration Act of 1979⁶³ regulates not only the re-export of products made in the U.S. and products of U.S. origin, but also foreign products that use a certain amount of U.S.-made parts and the Export Control Reform Act of 2018 enacted in place of the same law also regulates, among other things, re-exports. The Foreign Corrupt Practices Act of 1977 regulates bribes made by foreign public officials but cases where it has regulated bribes even outside the U.S. that involve U.S. subsidiaries, bribes paid in U.S. dollars and other acts that are deemed to be related with the U.S. have been uncovered. This shows how the scope of extraterritorial application by the U.S. has increased, with statutes being more frequently applied.

(2) Legislation relating to countermeasures

China enacted a series of subordinate law like the provisions on the "Unreliable Entity List" in September 2020, the "Export Control Law of the People's Republic of China" in December 2020, and the "Rules on Counteracting Unjustified Extraterritorial Application of Foreign Legislation and Other Measures" in January 2021. The "Anti-Foreign Sanctions Act" was enacted by the Standing Committee of the National People's Congress of China in June 2021, a major law compared to others that were enacted up until then. The law has bought various countermeasures in response to foreign companies participating in sanctions against China.

The EU proposed a new legal instrument to counter the use of economic coercion by third countries in December 2021⁶⁴. This anti-coercion instrument's main purpose is to deter unilateral coercive measures by third countries and enables the EU to independently take countermeasures such as raising tariffs and suspending financial support without the approval of the WTO to protect the region's interests. It is designed to de-escalate and induce discontinuation of specific coercive measures through dialogue as a first step and any countermeasures would be applied only as a last resort. The proposal is to be discussed in the Council of the European Union and the European Parliament.

(3) How Japanese companies are affected

Under these circumstances the Japanese industry has voiced concerns. In November 2020, organizations such as the Center for Information on Security Trade Control (CISTEC), Japan Business Federation, and the Japan Chamber of Commerce and Industry submitted together requests to Ministry of Economy, Trade and Industry with regards to the extraterritorial application of Chinese and United States Regulations (Table II-1-2-34). The requests ask the Government of Japan to deal with the successive export control regulations of both the U.S. and China and reveal concerns that business activity will deteriorate due to the lacking predictability and legal stability.

⁶³ Yukiko Uehara (2022)

⁶⁴ EU strengthens protection against economic coercion (European Commission Press release, December 2021)

Hiroshi Kajiyama, the Minister of Economy Trade and Industry, at the time, stated that the Ministry of Economy, Trade and Industry will continue its discussions with industries and asked that companies identify the risks given the regulatory landscape while not doing more than that what is required by the regulations at a press conference held after a cabinet meeting on November 17, 2020. In addition, the Ministry of Economy, Trade and Industry announced that it would actively and timely communicate detailed information collected by the government, and that it would take the lead in providing support if there are any supply chains which are unjustifiably segmented in the United States, China, and other countries.

A survey⁶⁵ released in December 2021 by the Japan Business Council for Trade and Investment Facilitation, whose secretariat is the Japan Machinery Center for Trade and Investment, stated that problems with regard to trading with the U.S. and China are that "China's export control law is not transparent. It is necessary to have balanced systems and operations, including those for extraterritorial application, in accordance with the principles of Multilateral export control regimes." and "regulations such as the Export Control Reform Act (ECRA) and the Foreign Investment Risk Review Modernization Act (FIRRMA) also apply to Japanese companies that do business with both the U.S. and China." The survey showed that there were expressed concerns such as "the market is narrowing as the number of customers subject to the US Export Administration Regulations (EAR) is increasing day by day."

As sudden extraterritorial application is hard to predict and can restrict business activities by destabilizing companies' business environments, it is necessary to pay close attention to excessive extraterritorial application that can have a negative impact.

Table II-1-2-34. Outline of the "Requests with Regards to the Extraterritorial Application of China and United States Regulations"

With regards to the Extraterritorial Application of China and United States
Regulations
1. 1. China's Export Control Law and Related Regulations
(1) Curb on Extraterritorial Application
(A) Re-export Controls (Article 45)
(B) Investigations to Verify End-Users and End-Uses in Country of Export
(Article 17)
(C) Legal Accountability of Organizations and Individuals Outside of
China by Applying Law Extraterritorially (Article 44)
(2) Curb on Industrial Policy Controls
(A) Addition of the "National Interests" Viewpoint (Articles 2, 9, 10, and
12, etc.)
(B) Controlled Items Subject to Control Lists (Article 9)
(3) Curb on Retaliation Measures
(A) Reinstatement of the Retaliation Clause (Article 48)
(B) Introduction of the Unreliable Entity List
(4) Ensure Sufficient Time to Prepare
2. Expansion of the United States' Direct Product Rule
[Organizations who submitted the requests]
Center for Information on Security Trade Control (CISTEC), Japan Business
Federation, The Japan Chamber of Commerce and Industry (JCCI), Japan
Machinery Center for Trade and Investment (JMC), Japan Foreign Trade

⁶⁵ Issues and Requests for Improvements on Trade and Investment Barriers in 2021 (Japan Business Council for Trade and Investment Facilitation, 2021) (Secretariat: Japan Machinery Center for Trade and Investment)

Council, Inc. (JFTC), Japan Electronics and Information Technology Industries Association (JEITA), Japan Business Machine and Information System Industries Association

Japan Business Machine and Information System Industries Association (JBMIA), Communications and Information Network Association of Japan (CIAJ),

Japan Chemical Exporters and Importers Association (JCEIA), Japan Chemical Industry Association (JCIA)