Chapter 1

Major Issues in the Asia-Pacific Region in 2022–2023

Section 1
The Destabilization of the Global Economy

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Some Destabilizing Factors

Many research papers analyzing the equality of income distribution have shown that the income distribution in many developed countries became more polarized in the 1990s and the first decade of the 21st century. Milanovic (2016), who published collective research results, examined the changes in the global income distribution over a 20-year period through painstaking statistical work and pointed out the following noticeable phenomenon regarding each country's income distribution and income growth rate. That is, globally, the world has become divided into two groups in the past approximately 20 years: those who experienced income growth and those who experienced almost no income growth. The former, of people who enjoyed a dramatic increase in incomes, are the middle classes in developing countries (e.g., Southeast Asian countries) and the wealthy in developed countries, while the latter, of those who saw almost no increase in their incomes, are the middle classes of developed countries. Japan belongs to the latter group.

The shrinking of the middle classes in developed countries, especially after the increase in the degree of inequality of income distribution in the two major economic powers of the US and China, shows no sign of improvement, and people belonging to the poor segment increased due to intensifying economic competition. It is undeniable that these are factors contributing to social instability in the global economy. It goes without saying that the above-mentioned progress of inequality and shrinking of the middle classes have a great impact on politics. Other than the above, we cannot underestimate the fragile nature hidden in the trade structure called the "global supply chain" due to the cross-national spread of advanced technologies, especially IT, into production activities. Furthermore, we must pay close attention to several important risk factors and destabilizing factors, such as the geopolitical changes taking place in the global energy supply system due to Russia's invasion of Ukraine.

1. Inequality of Income Distribution

There is no great difference among the world's major countries in that economic activities are basically carried out under the so-called capitalist system based on market economies. Even while capitalism can take different forms, widening income disparities, poverty, and political corruption are factors causing instability both domestically and internationally under any form of capitalism. Milanovic (2019) discussed this point by classifying capitalism broadly into the US style and the Chinese style as follows.

The reason why the US-style liberal meritocratic capitalism has shown stability so far at any rate is that labor unions have had a certain amount of power and contributed to the equalization of income, and that fiscal policies have contributed to economic and political order and stability by redistributing income through a highly progressive tax burden and an income transfer policy.

But nowadays, this environment has changed significantly. For example, the labor union membership rate has declined significantly in developed countries (with the exception of Scandinavia countries), and unionized workers account for only about 10% of workers in the US and France. Although Japan boasted a labor union organization rate of around 50% when the Labor Union Act was enacted after World War Ⅱ, it has now fallen to 16%. The organization rate for part-time workers, whose number continues to rise, has not yet reached 10%.

The wealthy in developed countries, who did not like the conditions that had supported the global economic system after the Cold War, disliked the high burden and the influx of immigrants and proceeded to withdraw from the system by transferring their income and assets to other countries.

The reason why the US-style liberal meritocratic capitalism has just about prevented political corruption from becoming as severe as in China is because the self-purification effects of freedom of speech and the press work in liberal democracies.

(1) Background of China's "Common Prosperity" Policy

In the Chinese-style political capitalism, an efficient technocratic-bureaucratic system controls the private sector under the one-party autocratic state with lax legal restrictions. Here, the mechanism that rapidly expands income disparities is also activated, creating a maldistribution of wealth and political corruption.

China's rapid economic growth has created an expansion of income disparities, which has forced the government to launch the slogan of "common prosperity" out of a dire need to narrow the gap between the rich and the poor as much as possible and pursue common prosperity for society as a whole. It can be said that the fact that the world's second largest economic power has caused the same maldistribution of income and wealth as the US, the world's largest economic power, is evidence for the validity of Milanovic's discussion that such maldistribution is due to the capitalist system that is common to both countries. It is easy to infer that this slogan comes from President Xi Jinping's strong will for political power as he sought a third term in office at the party congress in the fall of 2022. In analyzing the true aim of this aggressive redistribution policy under the slogan of "common prosperity," Chapter 1, Section 3 of this Economic Outlook points out that the target is successful IT companies and their managers by overlapping this campaign with the anti-corruption campaign of 10 years ago.

A survey paper by Junsen Zhang (2021) is helpful to understand the changes in China's income distribution since 1978, and we will briefly introduce part of it (especially, by social group and by region). Zhang (mainly using income distribution figures at the household level as data) emphasizes the following stylized facts.

1) For the past 40 years, the Gini coefficient, which indicates the degree of inequality (the greater the coefficient, the less even the income distribution), for households has risen at the regional level as well as the urban and rural levels.
2) For the past 10 years, income inequality has remained high, with only a slight decline observed. This phenomenon can be seen in both official statistics and informal estimates.
3) The gaps between urban and rural incomes and inequality in regional distribution were extremely closely correlated with the rise in inequality in China as a whole in the 1980s, 1990s, and early 2000s. However, no such correlation has been observed in the most recent 10 years.
4) The contribution of the gap between urban and rural incomes and regional inequality to national-level inequality has been less important in the most recent decade than in the three decades up to the early 2000s.
5) As a new trend, the contribution of capital income inequality to national-level inequality is found to be increasing, albeit not dramatically.

The following points should be noted. There is a clear negative correlation between the index of the degree of income inequality and the intergenerational income mobility (the degree of movement between income brackets). The so-called Great Gatsby Curve, which illustrates the transmission of income inequality across generations, was observed, indicating an increase in class stratification by assets and income in Chinese society. In the first 30 years of observations, the gaps in incomes between urban and rural areas and between regions were large, but the income inequality stabilized in recent years is no longer a regional problem. The main cause for the overall income disparities is the rise in the income of the highly educated, prime-age male labor force. Privatization, trade and investment liberalization, and technological progress with a bias toward high technologies have widened the wage and salary gap in the labor force. Income disparities arising from these causes will not be resolved spontaneously. Social discontent will continue to accumulate, leading to social instability. This is why economic policies need to be carried out under the slogan of “common prosperity” to improve income disparities.

(2) Political Destabilization

Studies to confirm from data the fact that the US and Chinese socioeconomic systems no longer provide the basis for daily life for ‘good citizens,’ let alone those with a low level of education, are helpful in considering how the existence of such income disparities and the poor leads to political instability. (Case and Deaton (2021))

For example, among white non-Hispanics (WNHs) in the US between the ages of 45 and 54, the three causes of death that were rising most rapidly were suicide, drug overdose, and alcoholic liver disease (the mortality from these three causes was 34–37 per 100,000). These three causes were also rising quickly for WNHs in every 5-year age group from 30–34 to 60–64.

In the US, while the suicide rate almost doubled from 1992 to 2019 among WNHs aged 25–74 (without an undergraduate degree), increasing from 17.6 to 31.1 per 100,000, there was almost no increase among those with a degree.

If the majority of Americans are failing to thrive while a minority prospers, why does the democratic process not work to improve their material and health outcomes?

Less-educated whites see policies such as safety nets and health provision as favoring minorities at their expense and vote for conservative candidates who oppose such welfare programs. In contrast, blacks and more educated whites react in the opposite direction, widening political polarization, which on net favors the right and provides an opening for populist politicians. (Woolhandler et al. (2021))

Until around 1970, the Democratic Party supported many of the workers’ demands. The rate of organization of private-sector unions declined, but even so, with the support of the Democratic Party, the unions had political power, such as raising real wages. However, since 1970, a split has occurred between Democrats and the white working class. Especially after the 1968 Democratic Party Convention, the Party slowly oriented itself away from its traditional working-class and union base toward what it is today, a coalition of minorities and educated professionals.

For example, the voters in Pennsylvania, Michigan, and Wisconsin who voted for Trump in the 2016 presidential election had already moved away from Obama of the Democratic Party in the 2012 election. The trend that average life expectancy at age 25 is lower in states with a higher percentage of voters for Republican candidates has become increasingly clear since 2000. (Case and Deaton (2021) Figure 2)

The interstate correlation was +0.42 when Gerald Ford was the Republican candidate in 1976, and the healthier states voted for Ford of the Republican Party, but it changed to high negative correlations of −0.69 and −0.64 in the 2016 and 2020 presidential elections, respectively. The least healthy states voted for Trump and against Biden.

These recent votes were surely not made for a president who will dismantle safety nets, but rather show that working-class whites are against a Democratic Party that previously supported their rights but now represents an alliance between minorities and an educated elite that has benefited from globalization and from the soaring stock prices of firms that have increasingly denied jobs to working-class whites. In other words, the political structure of the US is changing dramatically because the white middle class, which has fallen into a difficult economic situation, has changed its party affiliation.

2. Vulnerabilities in the Technological Structure—Global Supply Chains

The second destabilizing factor lies in changes in the technological system. Advances in IT have enabled the separation of production and management. Changes in capital movements and the trade structure that have become conspicuous in recent years do not mean the relocation of companies themselves, but rather a shift to a thorough subdivision of production processes within a company, both from operational and management perspectives, as well as a shift to a division of labor on an international scale. Production processes are scattered geographically according to the expertise level, low wages, and other factors, which has given rise to the formation of so-called global supply chains. It goes without saying that changes in production technologies and advances in data analysis technologies and information and communication technologies in the manufacturing industry have made these major changes possible. In fact, the semiconductors that work as the brains of Apple's iPhones are designed in the US, but its semiconductor factory is not located in the US and the manufacturing is outsourced mainly to Taiwan Semiconductor Manufacturing Company (TSMC), a major semiconductor manufacturer in Taiwan.

The basis that has enabled this technological shift lies in the technology and production capacity for semiconductor manufacturing. Therefore, the US and China, as well as many other countries including emerging Asian countries, are developing strategies for how to support and foster the semiconductor industry as a key challenge for their national economic policies.

How to deal with the vulnerabilities hidden in the global trading system based on the global supply chain structure will be one of the central issues of each country's economic policy in the future. This is a typical example of the so-called "economic security" issue. It is a noticeable phenomenon that Taiwan's TSMC is said to be a key strategic item for East Asian security.

In the past, security was a concept covered by foreign policy centered on military and diplomacy, but in recent years, the focus of security has shifted to the relationship with national security, being regarded as an issue of vulnerability in the economic and technological fields (especially in infrastructure). In short, when considering economic sanctions as a means of conflict resolution, economic measures can serve as a kind of weapon. This is also clearly shown in the economic sanctions imposed by the countries that are aiding Ukraine, including Europe and the US, following Russia's recent invasion of Ukraine.

What does this situation mean? Russia's invasion of Ukraine shows once again that "war potential" is no longer limited to traditional military means such as missiles, other weapons, and military force, as well as economic sanctions. Cyber-attacks, including virus attacks, on computer systems, may expose global supply chains to the risk of damage.

The COVID-19 pandemic has severely impacted the structure of production, consumption, and trade, resulting in the shortage of supply of semiconductors in many countries. To analyze the cause of such a situation, we would like to discuss the technological nature of semiconductors, their production and distribution structures, and shortage status, while showing the structure of supply chains and their inherent vulnerabilities.

(1) Semiconductor Shortage Problem

Semiconductors are used as core components for a vast array of electronic devices devices—everything from smartphones and cloud servers to automobiles, industrial automation, critical infrastructure, and defense systems. The global structure of the semiconductor supply chain developed over the past three decades has enabled the industry to deliver continual leaps in cost savings and performance enhancements, which made possible the explosive spread of information technologies and digital services. In the past few years, however, several new factors have emerged that could put the successful continuation of this global model at risk.

In the automotive industry, the shortage of semiconductors has caused serious delays of from six months to a year in the deliveries of some new cars[1]. Toyota Motor Corporation's domestic production in September 2021 fell to 136,750 vehicles, down 44.7% year-on-year (Figures 1-1-1 and 1-1-2). The impact of the semiconductor shortage has not yet been fully resolved, and on May 24, 2022, Toyota announced that it would cut its global production plan by 100,000 to roughly 850,000 vehicles in June.

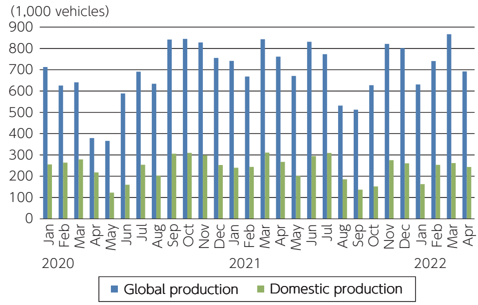

Figure 1-1-1 Changes in Toyota Motor Cooperation's production volume (January 2020 to April 2022)

Source: Created by the author based on Toyota's Sales, Production, and Export Results for April 2022 (May 30, 2022)

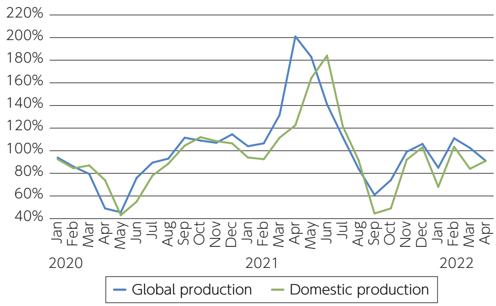

Figure 1-1-2 Year-on-year changes in Toyota Motor Cooperation's production volume (January 2020 to April 2022)

Source: Created by the author based on Toyota's Sales, Production, and Export Results for April 2022 (May 30, 2022)

1) Nihon Keizai Shimbun (October 30, 2021)

The impact of the semiconductor shortage has not been limited to the automobile industry, but has spread to companies in many other industries (Table 1-1-1). According to Fujitsu's financial results briefing on January 27, 2022, delays in the supply of parts and materials due to semiconductor shortages resulted in a sales decline of JPY 39.7 billion and a negative impact on operating income of JPY 19 billion for the first nine months from April to December 2021. For the third quarter alone (October to December 2021), sales decreased by JPY 24.8 billion and the negative impact on operating income was JPY 11.9 billion on a non-consolidated basis[2].

Table 1-1-1 Questionnaire on the impact of the semiconductor shortage

Company name	Impact
NEC	Delays in the supply of parts and materials due to semiconductor shortages resulted in a sales decline of JPY 16 billion and a negative impact on operating income of JPY 7 billion for the first nine months from April to December 2021. The negative impact on operating income is expected to expand to JPY 8 billion for the full year.
ITOCHU Techno-Solutions	There is a risk that approximately JPY 10 billion in sales will slide into the next fiscal year (fiscal year ending March 31, 2023) due to delays in delivery and construction.
BIPROGY(former Nihon Unisys)	The impact on sales amounted to more than JPY 1 billion.
Fujitsu	Delays in the supply of parts and materials resulted in a sales decline of JPY 39.7 billion and a negative impact on operating income of JPY 19 billion for the first nine months from April to December 2021. For the third quarter alone, sales decreased by JPY 24.8 billion and the negative impact on operating income was JPY 11.9 billion on a non-consolidated basis.

Source: Excerpts from Nikkei CrossTech (xTECH) (March 4, 2022)

(2) The Global Supply Chain for the Semiconductor Industry[3]

Semiconductors are products that are highly complex to design and manufacture. The need for deep technical know-how and production scale has resulted in a highly specialized global supply chain, in which regions perform different roles according to their comparative advantages. The US leads in the most R&D-intensive activities—electronic design automation (EDA), core intellectual property (IP), chip design, and advanced manufacturing equipment—thanks to its world-class universities, vast pool of engineering talent and market-driven innovation ecosystem. East Asia is at the forefront of wafer fabrication, which requires massive capital investment supported by government incentives, as

2) Nikkei CrossTech (xTECH) (March 4, 2022)
3) This subsection relies primarily on Varas et al. (2021).

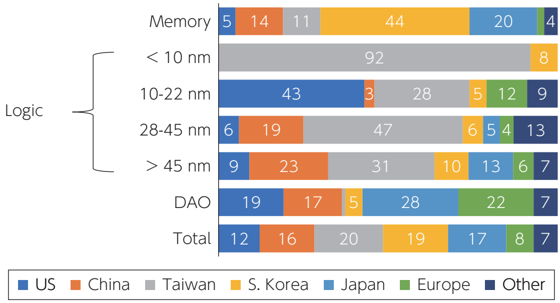

Figure 1-1-3 **Breakdown of the global wafer fabrication capacity by region, 2019 (%)**

Note: DAO means discretes, analog and others (including optoelectronics and sensors)
Source: Varas et al. (2021)

well as access to a robust infrastructure and skilled workforce. China is the leader in assembly, packaging and testing, which is relatively less skill- and capital-intensive. All countries are interdependent in this integrated global supply chain, relying on free trade to move each manufacturing process around the world to the optimal location for performing each activity.

The establishment of a global supply chain by locating the right processes in the right places, based on such comparative advantages, has promoted productivity improvements in the semiconductor market, leading to continued cost reductions and performance improvements. For example, according to Varas et al. (2021), many suppliers of key materials, such as silicon wafers, photoresist, and other specialty chemicals, which account for about 75% of semiconductor manufacturing capacity, are concentrated in China and East Asia. Furthermore, all of the world's semiconductor manufacturing capacity for nodes below 10 nanometers is currently located in South Korea (8%) and Taiwan (92%) (Figure 1-1-3). However, by building a production system where specific production processes are limited to specific regions, such regions may be single points of failure.

If such single points of failure are disrupted by natural disasters, infrastructure shutdowns, or international conflicts, severe interruptions may arise in the supply of semiconductors. Table 1-1-2 shows historical examples of disruptions to semiconductor supply.

Such single points of failure are not limited to manufacturing facilities, but the same can be said for raw materials. As an example, C4F6 is a critical process gas used to make 3D NAND memory and some advanced logic chips. It is essential for the etching process during chip fabrication, allowing etching to be completed 30% faster than the next fastest alternative. Furthermore, once a

Table 1-1-2 Historical examples of disruption to semiconductor supply

Date	Case	Outline and Impact
July 4, 1993	An explosion at Sumitomo Chemical's Ehime plant	This explosion impacted 60% of the global supply of epoxy resin, and spot prices for DRAM memory chips in the US market spiked from an average of USD 30/megabyte to around USD 80/megabyte.
September 21, 1999	A strong earthquake in the center of Taiwan	This earthquake caused a six-day shut-down of the Hsinchu Science Park due to power outages. As a result, memory-chip prices tripled and shares of electronics companies around the world fell sharply, with IBM, Hewlett Packard, Intel, and Xerox, all part of the Fortune 100 at that time, losing 18 to 40% of their value in the month after the earthquake.
March 11, 2011	The Great East Japan Earthquake	A major earthquake struck Japan, followed by a tsunami and nuclear power-plant melt down. 25% of the global production of silicon wafers and 75% of the global supply of hydrogen peroxide was affected by the disaster. Several plants were shut down for several months.
July 1, 2019	Japan's export controls on semiconductor materials against South Korea	The export controls impacted approximately USD 7 billion in semiconductor exports per month.
December 3, 2020	A power outage at a memory plant in Taiwan	This power outage impacted 10% of global DRAM supply.
October 28, 2020 February 4, 2021	Two fires at a package substrate plant in Taiwan	These fires aggravated the global capacity shortage for assembly, packaging and testing services, making it impossible to meet the surge in semiconductor demand in the last few months of 2020.
February 15, 2021	Widespread power failures following a polar vortex in Texas	The global chip supply shortage, especially for the automotive market, was further exacerbated.
March 19, 2021	A fire at a plant of a subsidiary of Renesas in Japan	The global chip supply shortage, especially for the automotive market, was further exacerbated.

Source: Prepared based on Varas et al. (2021) and materials from relevant sources

manufacturing plant is calibrated to use C4F6, it cannot be substituted. Sales of C4F6 were approximately USD 250 million in 2019, with the top three suppliers located in Japan (40% of the global supply), Russia (25%), and South Korea (23%). Varas et al. (2021) predicts that if any of these top three producers are severely disrupted, the loss of USD 60–100 million in C4F6 supplies could lead to about USD 10 to 18 billion in lost revenue for NAND alone downstream in the semiconductor chain, an amount almost 175 times higher than the direct impact. It also speculates that if such disruption in a portion of the C4F6 supply were to become permanent, NAND production levels would potentially be constrained for 2 to 3 years until alternative locations could introduce new capacity ready for mass production. There is no doubt that the impact of Russia's invasion of Ukraine, which began on February 24, 2022, has added pressure on the semiconductor industry to address this challenge.

(3) Risk Response Scenarios

To address these risks, the concepts of semiconductor "self-sufficiency" are being discussed as potential desirable national policy goals. It is helpful to understand what level of investment would be needed if most countries or regions were to re-shore or nearshore production capacity to reduce exposure to these risks and to protect their national interests. Varas et al. (2021) analyzes the following two scenarios.

i) A scenario where each region pursues complete semiconductor self-sufficiency

Figure 1-1-4 presents a hypothetical extreme scenario, where each major region in the world looks to construct their semiconductor "self-sufficiency" in a strict sense, across all layers of the supply chain. Aside from any considerations of execution feasibility, such an extreme scenario of regional independence would require a staggering amount of upfront investment totaling of USD 900 to 1,225 billion in order to cover each region's 2019 consumption levels, while any future growth in domestic consumption would require further investment in additional capacity in each region. This amount is equivalent to about six times the combined R&D investment and capital expenditure of the total semiconductor value chain in 2019. In addition, even assuming that semiconductor companies across the supply chain could maintain their current cost structure despite the loss of global scale, the industry is estimated to incur USD 45 to 125 billion in incremental recurrent annual operational costs (Figure 1-1-5).

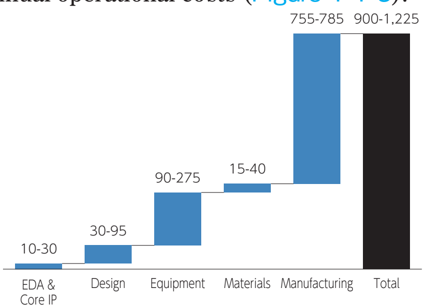

Figure 1-1-4 Scenario of complete semiconductor self-sufficiency: Upfront investment (USD 1 billion)

Source: Varas et al. (2021)

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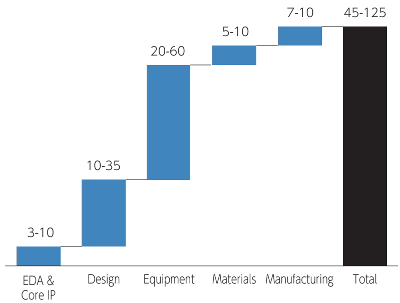

Figure 1-1-5 Scenario of complete semiconductor self-sufficiency: Operational costs (USD 1 billion)

Source: Varas et al. (2021)

At least a portion of this total estimated USD 900 to 1,225 billion in upfront investment and USD 45 to 125 billion in incremental annual operating costs would necessarily have to be passed on to device makers in the form of higher prices for the semiconductors they purchase. If fully charged to customers, it would amount to an average increase of 35 to 65% in the price of semiconductors. This may result in higher prices of the electronic devices for end users. Furthermore, it is also likely that siloed domestic industries shielded from foreign competition and deprived of global scale would suffer a loss of efficiency and ability to innovate. In conclusion, full semiconductor self-sufficiency appears to be more of a theoretical concept than an attainable policy goal.

ii) Market-driven alternative approach scenario focused on key strategic risks

As shown in Figure 1-1-3 above, all of the world's manufacturing capacity of chips for nodes below 10 nanometers is currently located in South Korea (8%) and Taiwan (92%). The US has identified chips as a vulnerability that could pose a national security risk. Advanced logic chips account for about 34% of US total semiconductor consumption. A significant portion of that figure actually comes from consumer-driven applications, such as smartphones, PCs, consumer electronics, and automobiles.

However, merely 9% of the US consumption of advanced logic chips is associated with critical infrastructure applications, including aerospace and defense systems, core telecommunications networks, supercomputers and data centers for essential sectors such as government, energy, transportation, healthcare and financial services. A hypothetical disruption in the supply of these chips could have a severe impact on the economy and national security, so maintaining at least a minimum viable manufacturing capacity located onshore could significantly enhance the resilience of the US electronics supply chain.

Varas et al. (2021) estimates that covering the expected domestic consumption of advanced logic chips for critical infrastructure applications by 2030 would require building just two or three new state-of-the-art plants in the US[4]. This additional new capacity is less than 5% of the new advance logic capacity that needs to be added globally to keep up with the expected demand growth in the next 10 years.

(4) Japan's Semiconductor Strategy

Against the backdrop of the US-China trade friction and Russia's invasion of Ukraine, and also from the perspective of strengthening competitiveness and economic security in the semiconductor industry, countries around the world are promoting industrial policies, including attracting production bases to their home nations using huge subsidies (Table 1-1-3).

The Japanese government allocated JPY 617 billion for the FY 2021 supplementary budget for the purpose of securing domestic production bases for advanced semiconductors. In addition, on March 1, 2022, the amended act to encourage the establishment of domestic production facilities for advanced semiconductors came into effect. If a company's plan to develop a production facility in Japan meets particular requirements, it can receive subsidies covering half of the necessary construction costs. The TSMC plant will be the first to receive support under the Act. TSMC is constructing a new production plant in Kumamoto Prefecture, with shipments scheduled to begin in December 2024. Attracting production plants for future growth industries to Japan will lead to the creation of jobs and have a positive effect on the economy. However, as mentioned above, from the standpoint of economic security and market competitiveness, the construction of production facilities alone is not enough, and it is also necessary to strengthen research and development facilities. In 2021, TSMC established a research and development facility in Tsukuba, Ibaraki Prefecture.

In addition to government subsidies, the National Institute of Advanced Industrial Science and Technology (AIST) played a central role in attracting companies by establishing a framework for collaboration between Japanese companies and universities. In order for Japan to survive in this unstable semiconductor industry supply chain in the future, industry-government-academia collaboration will be essential.

4) The new plants are assumed to have a production capacity between 20,000 and 35,000 wafers per month.

Table 1-1-3 Trends in the semiconductor industry policies of major countries and regions

Country/Region	Major Trends in Industrial Policies
US	• The National Defense Authorization Act (NDAA 2021), which includes subsidies of up to JPY 300 billion per project and the establishment of the Multilateral Semiconductors Security Fund, was passed. • The House and Senate are in session on the America COMPETES Act (China Competition Bill) including a budget of USD 52 billion (approx. JPY 6 trillion) to subsidize semiconductor industry. (April 2022)
China	• The National Integrated Circuit Industry Investment Fund was established (2014, 2019) and made major investments totaling over JPY 5 trillion in semiconductor-related technologies. • In addition, local governments have funds totaling over JPY 5 trillion for the semiconductor industry (total fund amount: over JPY 10 trillion).
Europe	• Digital strategy for 2030 was announced, including an investment of €134.5 billion (approx. JPY 17.5 trillion) in digital transition (logistic semiconductors, HPC, quantum computers, quantum communication infrastructure, etc.) • The European Commission announced the European Chips Act, which aims to make €43 billion of investments by 2030. (February 2022)”
Taiwan	• Subsidies and other preferential measures were launched to attract investments back to Taiwan. A total of JPY 2.7 trillion investment applications were approved, mainly in the high-tech sector. (January 2019) • A plan was announced to inject a total of JPY 30 billion in subsidies to the semiconductor sector by 2021. (July 2020) • Prospects for Semiconductor R&D and Talent Deployment under the US-China Science and Technology War were announced, which includes human resource development and factory area expansion (NT$27.3 billion). (April 2022)
South Korea	• An investment of JPY 100 billion was approved for AI semiconductor technology development. (December 2019) • An investment plan was announced to intensively inject more than JPY 500 billion in technological development in the materials, parts, and equipment industries, including semiconductors, by 2022. (July 2020) • The K-Semiconductor Strategy was formulated to turn South Korea into a comprehensive semiconductor powerhouse. (May 2021)

Source: Prepared based on “Semiconductor and Digital Industry Strategy” formulated by the Ministry of Economy, Trade and Industry (METI) and other media sources

3. Situation of Interdependence in the Energy Markets

The war in Ukraine has dragged on longer than Russia expected as the Ukrainian army has fought hard against its invasion and Western powers have provided Ukraine with effective military support. As long as Ukraine’s war potential depends on Western military support, the West’s economic relations with Russia will undoubtedly be a major factor in determining the course of the war. The most important factor in the economic relations would be the degree of energy dependence of the West (especially Europe) on Russia.

Figure 1-1-6 shows the changes in the energy import dependency of major countries from 1990 to 2019. Negative values indicate that energy production exceeds domestic energy supply, i.e., exports exceed imports. Japan’s import dependence reached 83% in 1990 and increased to 88% in 2019, while Russia increased its share of exports in production from −47% in 1990 to 2000 (−58%), 2010 (−85%), and 2019 (−98%).

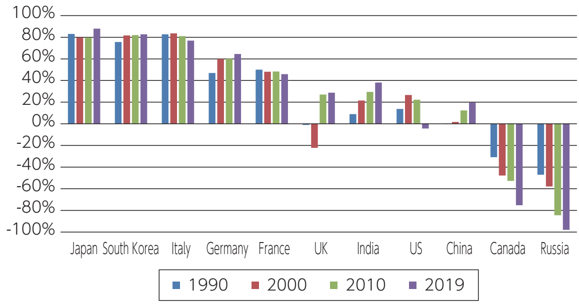

Figure 1-1-6 Changes in the energy import dependency of major countries (1990 to 2019)

Source: Prepared based on the IEA Data and Statistics

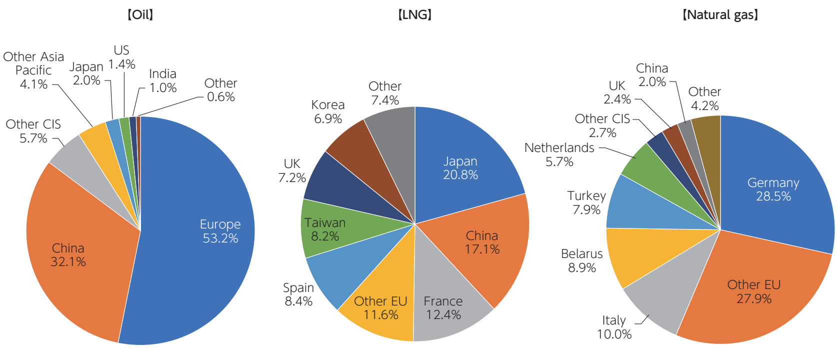

Figure 1-1-7 Share of Russian energy importers: Crude oil, LNG, and natural gas

Source: Prepared by the author based on the BP Statistical Review of World Energy (2021)

Looking at the shares of the major energy importers from Russia (in 2020), Europe and China account for 53.2% and 32.1% of crude oil, respectively. Japan (20.8%) accounts for the largest share of liquefied natural gas (LNG), followed by China (17.1%) and France (12.4%). It can be seen that the majority of natural gas exports via direct pipelines are to Europe, mainly due to geographical factors (Figure 1-1-7). Among others, exports to Germany account for 28.5%, indicating that exports to Europe generally account for a major proportion.

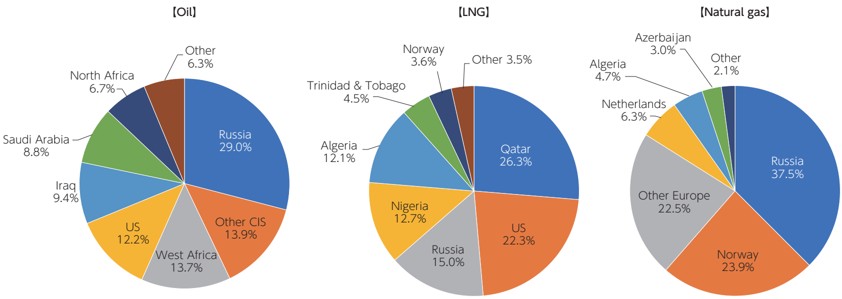

Figure 1-1-8 Share of energy exporters to EU: Crude oil, LNG, and natural gas

Source: Prepared by the author based on the BP Statistical Review of World Energy (2021)

Changing the perspective, looking at the share of energy exporters to the European region (in 2020), Russia ranks first for crude oil and natural gas, with 29% and 37.5% of the totals, respectively. As for LNG, 15% is imported from Russia, despite the fact that abundant natural gas supply networks are available through pipelines (Figure 1-1-8). In particular, Germany's share of natural gas imports from Russia via pipelines is as high as 55.2%. As can be seen from these data, it will be extremely difficult for Europe to replace natural gas from Russia in the short term. However, even if zero dependence cannot be achieved immediately, it would be possible to gradually reduce the dependence towards zero over three to four years. If such a policy continues in the medium term, it is expected that Russia will suffer significant economic damage.

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