

# BOK Issue Note

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## Recent Features and Implications of Korea's Exports

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① **Amidst the increased uncertainty in the global trade environment following the pandemic, our exports have been sluggish, much like other Asian countries with a high reliance on IT and China. However, as we entered the second quarter this year, there were signs of easing in the downturn.** Furthermore, while exports used to show similar trends by product and region they recently have been displaying heterogeneous patterns. Looking at specific product categories, IT-related items, especially semiconductors, have continued to decline significantly, whereas sectors like automobiles and shipbuilding have shown positive growth. Regionally, exports to China and ASEAN countries have been lackluster, but the situation is relatively favorable for exports to the US and the EU.

② **The fluctuation in exports appears to have been influenced by a combination of cyclical and structural factors.** An analysis using the Constant Market Share (CMS) method to explain export variations indicates that for exports to China, 65% of the decrease in exports from January to April 2023 compared to the period from April to December 2022 can be attributed to cyclical factors primarily stemming from a reduction in China's own demand following their lockdown in 2022. The remaining 35% is attributed to competitive factors related to a decline in our market share within China. On the other hand, in the case of exports to the US, competitiveness has actually acted as a factor that has increased exports.

③ **As the IT industry's downturn is expected to gradually ease in the future, exports are anticipated to improve, and the differentiation in exports by product and region is expected to decrease.** Taking our export structure into consideration, it is expected that if there is a recovery in the global IT industry, it will positively impact exports to China and ASEAN, where the IT sector holds a significant share. Despite reduced domestic demand, the automotive sector is expected to continue its modest growth trajectory, primarily driven by exports to the US and the EU.

④ **However, even if the downturn in the IT industry eases in the latter half of the year, it is anticipated that exports may not rebound significantly as they did in the past due to structural changes in the Chinese economy.** Despite this process, the recent increase in exports to the US indicates that the impact of structural factors can be positive based on the effective response to global supply chain reorganization. Therefore, it is essential to continue efforts aimed at diversifying export structures and securing technological competitiveness, as these efforts will be crucial in determining the extent of the influence of these structural factors.

■ Disclaimer: The views expressed herein are those of the authors, and do not necessarily reflect the official views of the Bank of Korea. When reporting or citing this paper, the authors' names should always be explicitly stated.

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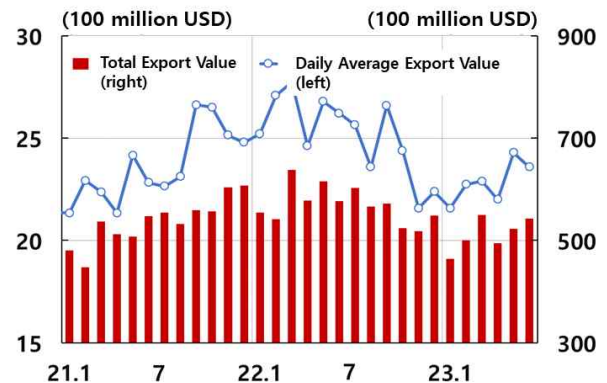
## Introduction

1. Our exports initially showed positive growth, particularly in IT-related products, during the pandemic period. However, they rapidly weakened after the second half of last year due to the influence of global high interest rates and a shift in consumer spending towards services. In the current year's second quarter, there has been some alleviation of the downturn. Customs-cleared exports, which had been experiencing double-digit declines(yoy, %) since October of the previous year, reduced their decrease to -6.0% in June of this year. Export volumes have also shown a slight increase in the second quarter of this year. However, the export value remains at a low level, and the pace of improvement is sluggish.

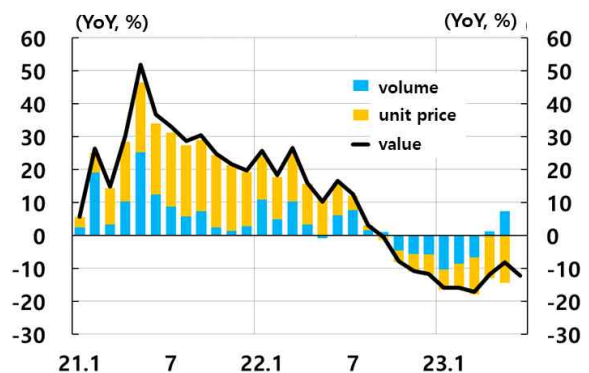
2. Despite an overall sluggishness in recent exports, certain products and regions have shown positive trends, indicating differentiation by product and region. Thus, we have examined the recent characteristics of our exports and derived insights for future prospects.

## Export value and volume on steady recovery course since Q2 2023

[Figure 1] Monthly Exports Value



[Figure 2] Daily Average Exports Value, Volume, Unit Price<sup>1)</sup> by Month



Note: 1) Excludes ships.

Source: Korea Customs Service, BOK.

## Recent Korea's Export Features

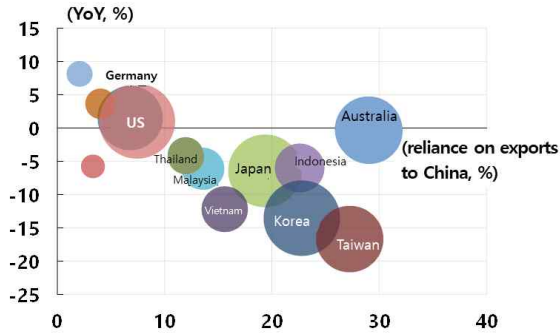
### ① Export slump deeper due to high reliance on China and IT

3. The recent export downturn is a global phenomenon caused by the contraction of the global manufacturing industry. However, it is particularly prominent in countries with high dependence on China and the IT sector, including Korea. These countries seem to have been significantly affected by

the weaker-than-expected China reopening effect and the downturn in the global IT industry. When observing a scatter plot of the share of exports to China and the IT sector against recent export growth rates, a clear negative linear relationship is evident. Especially in cases where there is a high dependence on China or semiconductors, the exports have been more sluggish. This trend can be found in countries like South Korea, Taiwan, and Vietnam.

**The higher reliance on China, the weaker the exports**

**[Figure 3] Reliance on exports to China (2022) and Export Growth Rate<sup>1)2)</sup>**

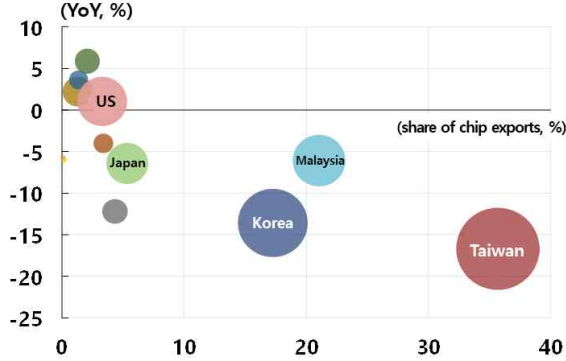


Note: 1) YoY growth rate for Jan-April 2023 basis.  
 2) The size of the circle reflects value of exports to China in USD.

Source: CEIC.

**The greater semiconductor reliance, the weaker the exports**

**[Figure 4] Reliance on semiconductor exports (2021) and Export Growth Rate<sup>1)2)</sup>**



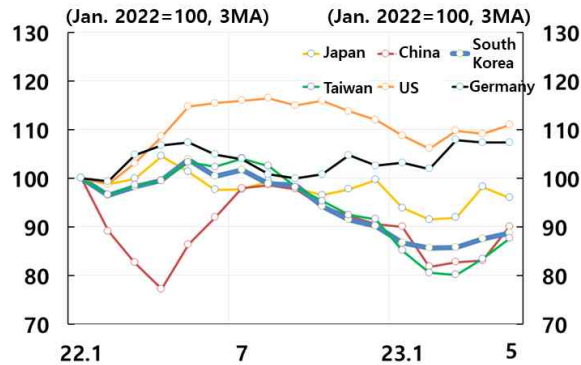
Note: 1) YoY growth rate for Jan-April 2023 basis.  
 2) The size of the circle reflects value of semiconductor exports in USD.

Source: CEIC, UN Comtrade.

**4. However, there have been signs of a slight alleviation in export downturn in the second quarter.** Deeper contraction in the global manufacturing industry and the IT sector seems to be somewhat constrained. Looking ahead, it is anticipated that our exports will show a gradual improvement, driven by factors such as the normalization of semiconductor downstream industries' inventory levels and increased demand for AI servers, leading to the easing of the IT industry's downturn.

Signs of easing in export sluggishness from Q2 2023

[Figure 5] Value of Exports<sup>1)</sup> by Key Exporters

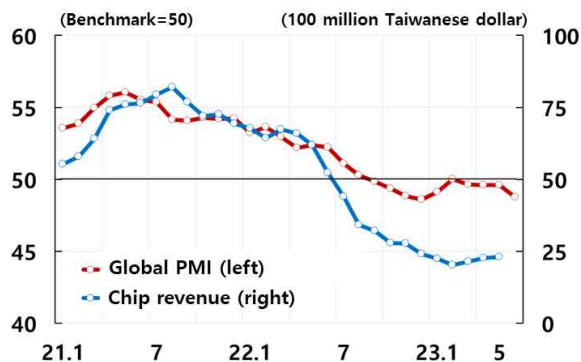


Note: 1) Three-month moving average, Jan. 2022 value =100.

Source: CEIC.

Global manufacturing PMI shows a stable trend, and chip revenue on mild recovery

[Figure 6] Global PMI and Chip Revenue<sup>1)</sup>



Note: 1) Semiconductor revenue based on sales of Nanya Technology.

Source: S&P, Nanya.

② Heterogeneity across Export Items: IT sector weak, Automobile and Shipbuilding on smooth sailing

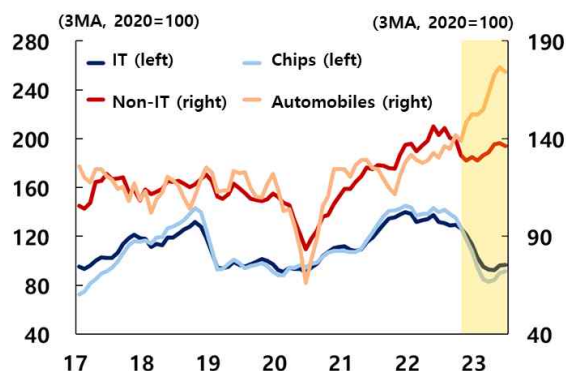
5. Looking at exports by product category, while IT products, especially semiconductor-related items, have experienced a downturn, certain non-IT products like automobiles and ships have shown positive trends. As a result, the leading export product has transitioned from semiconductors to automobiles (including automobile parts)<sup>1)</sup>. In the first half of this year, when examining the year-on-year growth rates of key product exports, semiconductor (-37.4%) and display (-29.0%) exports in the IT category significantly declined<sup>2)</sup>. Among non-IT products, chemical products (-13.6%), petroleum products (-19.5%), and iron and steel products (-13.5%) also experienced significant declines. On the other hand, automobiles (+30.9%), ships (+11.8%), and machinery products continued to perform well. The contribution to the overall decline in exports, particularly for semiconductors (-12.3%), was significant at -7.4 percentage points (contributing 60%), while automobiles contributed positively at +3.2 percentage points, mitigating the impact of the semiconductor downturn.

1) The export share of semiconductors decreased from 19.3% in 2022 to 14.1% in the first half of 2023, while the export share of automobiles (including parts) increased from 11.4% in 2022 to 15.4% in the same period.

2) This resulted in a substantial decrease in the overall export share of IT products, dropping from 35.1% in 2022 to 29.1% in the first half of 2023.

## Non-IT segment holds up to mitigate losses in IT sector

[Figure 7] IT-non-IT Export Value



Source: Korea Customs Service.

## Semiconductor-Chemicals-Petroleum sector sluggish, while Automobile-Ships upbeat

[Table 1] Export Growth Rate and contribution to Total Exports by Item

			Growth rate(%)	Contributing rate (%p)
IT	Semi-conductor	<29.1>	-28.6	-10.2
	Wireless communication devices	<14.1>	<b>-37.4</b>	<b>-7.4</b>
	Display	<2.3>	-16.6	-0.4
	Display	<2.5>	-29.0	-0.9
Non-IT	Chemicals	<70.9>	-3.3	-2.1
	Automobile	<16.0>	<b>-13.6</b>	<b>-2.2</b>
	Machinery	<15.4>	<b>30.9</b>	<b>3.2</b>
	Iron and Steel	<10.8>	-0.2	0.0
	Petroleum products	<8.6>	-13.5	-1.2
	Ships	<8.0>	<b>-19.5</b>	<b>-1.7</b>
<b>Total</b>		<100.0>	-12.3	-12.3

Note: The number in parenthesis is the share against total exports in Jan.-June 2023.

Source: Korea Customs Service, BOK calculation.

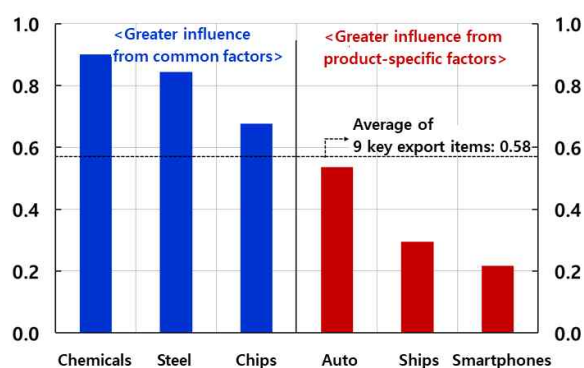
6. The differentiation by product is due to the fact that products that are sensitive to the global economy are sluggish, while those affected by individual factors, such as improved supply of parts and eco-friendly transformation, are strong. According to the principal component analysis (PCA)<sup>3)</sup> on the export by product, semiconductors, chemicals, petroleum products, and steel and metals on average have a high explanatory power of common factors such as the global economy, while automobiles and ships are estimated to have a relatively high explanatory power of product-specific factors. In light of this, semiconductors have been sluggish recently as inventories have piled up and the export unit price has declined sharply due to the disappearance of special demand for remote goods amid re-opening. In the case of non-IT products, chemicals, petroleum products, and steel and metals have also experienced significant declines due to the global economic slowdown and the decrease in international commodity prices. In contrast, the strong export of automobiles is attributed to the increasing trend<sup>4)</sup> in demand for eco-friendly vehicles and the improvement in the supply of parts such as automobile semiconductors. The export of ships is expanding due to the strengthening of environmental regulations and the increased demand for LNG ships due to the Russia-Ukrainian War.

3) Principal component analysis (PCA) is a methodology that extracts the main factors that best explain the variation of multiple variables in a data set. In this paper, we decompose the 3-month moving average series of export growth rates of 9 product categories into common and product-specific factors using the common factor decomposition method of C.Hale (1971), K.Tian et al. (2019), and Kim Sunjin- Lee Yoonjung (2021).

4) The share of electric vehicles in Korea's automobile exports was only 0.7% in 2017, but it grew rapidly to 3.6% in 2019 and 8.1% in 2021, and recently exceeded 15% (15.9%) in June 2023.

The export of semiconductors is sluggish mainly due to common factors while automobiles are strong by product-specific factors

[Figure 8] PCA Results<sup>1)</sup>

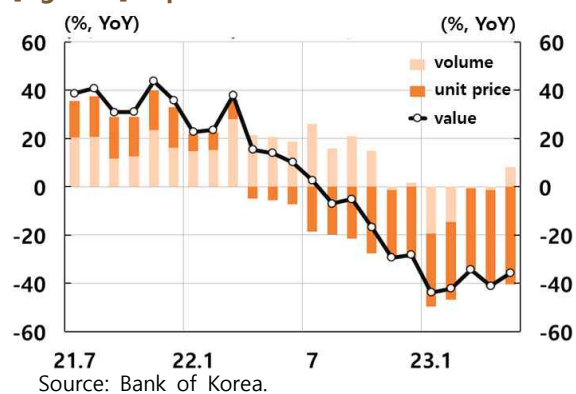


Note: 1) Extract the principal components of Korea's 9 key export products (2004-present) and calculate the explanatory power of common and product-specific factors.

Source: Korea Customs Service, BOK staff calculations.

The export of semiconductors is sluggish due to the decrease in the export unit price

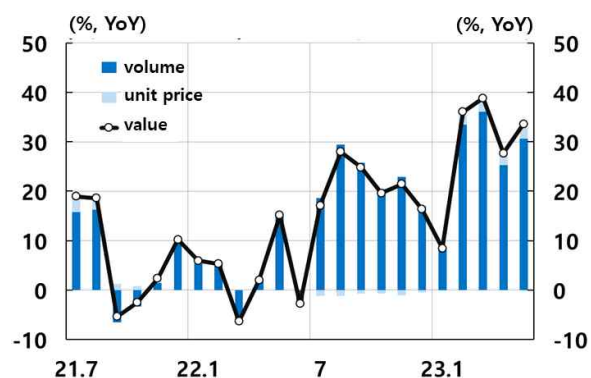
[Figure 9] Export of semiconductors



Source: Bank of Korea.

The export of automobiles surges on strong demand

[Figure 10] Export of automobiles



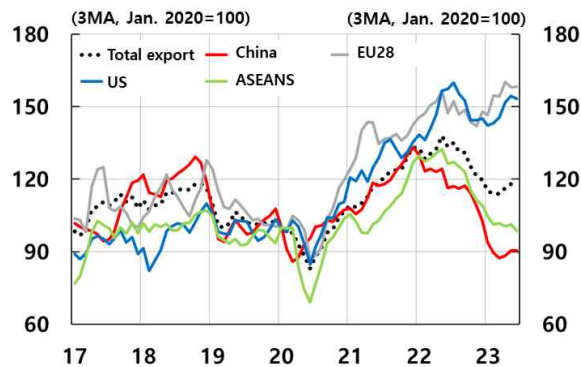
Source: Bank of Korea.

③ Differentiation by region : Exports to China and ASEAN are sluggish, Exports to US, EU, and Middle East are positive

7. By region, exports to China and ASEAN are sluggish, while exports to the United States and EU maintain relatively positive growth, significantly narrowing the gap in the share of exports between China and the United States. In the past, Korea's exports to major regions have generally followed each other closely, but have diverged since last year. In the first half of this year, the year-on-year growth rate of exports to China (-26.0%), ASEAN5 (-21.4%), and Japan (-10.7%) showed significant declines, while the United States (+0.3%), EU (+4.9%), and Middle East (+14.0%) continued to recover. As this trend continued for more than a year, the share of exports to the United States expanded to 17.9% in the first half of the year, the highest level since 2002 (20.2%), narrowing the gap with China (19.6%) by 1.7 percentage points.

**Decoupling of exports to the U.S.-EU and China-ASEAN since 2022**

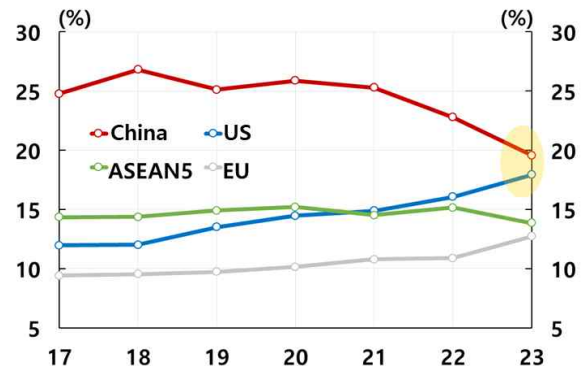
**[Figure 11] Exports to key regions**



Source: Korea Customs Service.

**The gap between the share of exports to China and the U.S. significantly narrows**

**[Figure 12] Shares of exports to key regions**



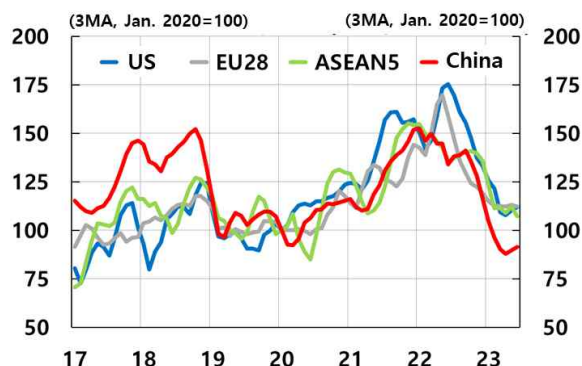
Source: Korea Customs Service.

**8. The recent differentiation in exports by region largely reflects the differences in export products by region.** The recent contraction in the global IT industry has led to a significant decline in IT exports to almost all regions, and the shares of IT products in exports to China and ASEAN in 2022 are 51.0% and 46.3%, respectively, significantly higher than in the United States (28.2%) and EU (21.8%). On the other hand, in the case of automobiles, which are experiencing strong global demand, the

shares of automobile exports in the United States and EU are 27.6% and 19.5%, respectively, which is significantly higher than in China (1.0%) and ASEAN (2.7%). In other words, exports to China and ASEAN are sensitive to the IT industry, whereas exports to the United States and EU respond more significantly to the automobile industry.

**The exports of IT products to almost all regions contracted.**

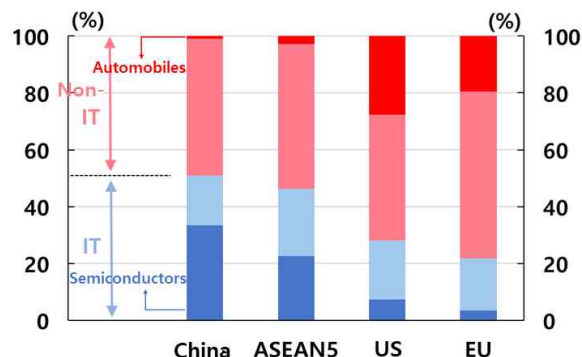
**[Figure 13] Exports of IT products to Key regions**



Source: Korea Customs Service.

**High IT share in exports to China-ASEAN and high automobile share in exports to US-EU**

**[Figure 14] Structure of export products by key region<sup>1)</sup>**



Note: 1) As of 2022.

Source: Korea Customs Service.



9. It is believed that the differentiation in exports by region has been influenced by the changes in the competitiveness of Korean companies in each region and their efforts to diversify the exports, together with the differences in economic conditions and industrial policies across countries. In China, in addition to economic conditions such as high inventory levels in the manufacturing industry and contraction in real estate investment,<sup>5)</sup> structural factors like strengthening of domestic companies' competitiveness have also contributed to the overall sluggish import demand for both IT and non-IT products. When the competitiveness of Korea and China is evaluated from various aspects such as global market share and comparative advantage in exports, it is found that the gap between the two countries has narrowed significantly between 2010 and 2021.

### The exports of IT and non-IT to China and ASEAN are sluggish

[Table 2] Exports to China and ASEAN

(%)	China	ASEAN
▶ I T	-35.0	-21.9
▶ Non I T	-16.7	-21.1
- Chemicals	-16.2	-25.9
- Automobiles	-1.2	-5.3
- Machinery	-22.1	-2.9
- Steel and Metals	-24.4	-22.8
- Petroleum products	-10.4	-34.0
- Ships	-2.1	-70.1

Note: 1) YoY rate for Jan.-June 2023.

Source: Korea Customs Service.

### China's real estate investment slump is closely related to the Asian countries' exports to China

[Table 3] Correlation Coefficient on China's Sectoral Cycle and Exports to China<sup>1)</sup>

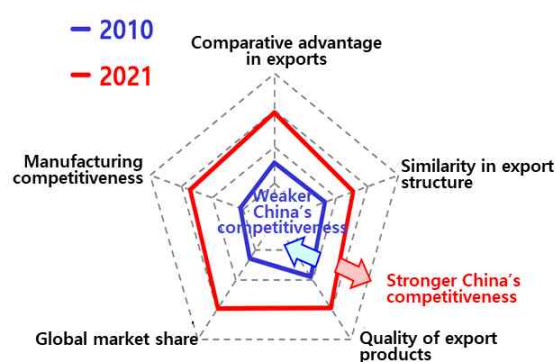
	REI	Capex	Retail Sales
▶ Korea	0.69	0.47	0.23
▶ India	0.60	0.33	0.27
▶ Malaysia	0.52	0.21	0.17
▶ Thailand	0.66	0.39	0.26
▶ Taiwan	0.54	0.21	0.14
▶ Japan	0.65	0.31	0.24
▶ Vietnam	0.44	0.23	0.15

Note: 1) Measured from Jan. 2004 to May 2023.

Source: BOK staff calculations.

### Korea-China export competitiveness gap has narrowed rapidly over the past decade

[Figure 15] Korea-China export competitiveness gap



Source: BOK staff calculations.

On the other hand, the United States has experienced relatively modest economic slowdown compared to other countries due to its robust labor market, and factory construction has surged following the implementation of the Inflation Reduction Act (IRA) and the Chips & Science Act. These have resulted in positive import

5) Real estate investment in China is highly correlated with exports of Asian countries compared to capital investment and retail sales (Table 3).

demand for mobile phones and machinery. In the EU and the Middle East, the import demand for non-IT products such as machinery, chemicals, and petroleum products is expanding due to the construction of local factories (such as battery factories) and the expansion of infrastructure investment (such as Neom City).<sup>6)</sup> In addition, the enhanced brand preference for Korean companies in the automobile market of the United States, EU, and the Middle East is also considered a factor in the expansion of Korea's exports to these regions.<sup>7)</sup>

**The exports of several non-IT products to US and EU are positive**

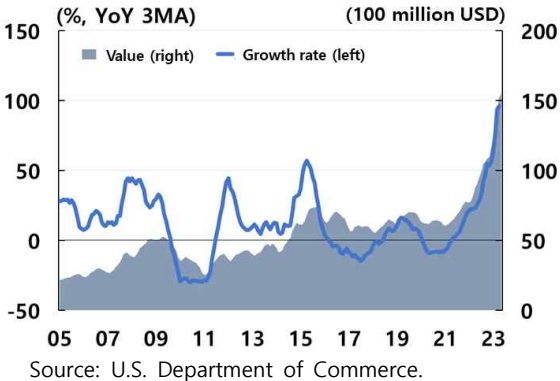
[Table 4] Exports to US and EU

(%)	US	EU
▶ Non- I T	11.0	13.8
- Chemicals	11.7	15.2
- Automobiles	37.7	35.6
- Machinery	5.3	10.7
- Steel and Metals	-18.3	-3.0
- Petroleum products	-9.3	36.5
- Ships	-9.8	-26.8

Note: 1) YoY rate for Jan-June 2023.  
Source: Korea Customs Service.

**The export of machinery to the U.S. expanded due to a surge in local factory construction**

[Figure 16] Factory construction investment and growth rate in the U.S



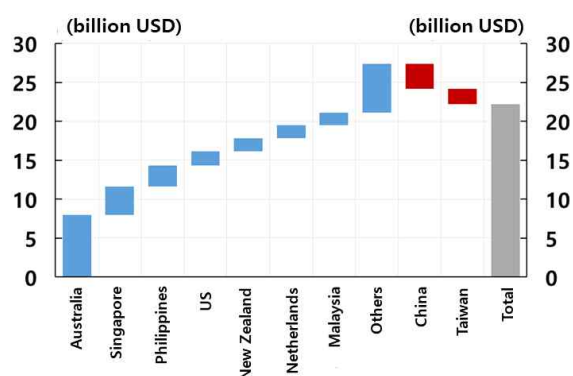
10. Regarding export diversification, there has been a trend where exports to countries other than China have increased, particularly in certain product categories. In response to China's strengthening self-sufficiency, our exports to China have decreased, and this reduction has been offset by increased exports to countries like Australia, the United States, and Singapore, especially in sectors like petrochemicals and batteries. Although chipmaking equipment suffered from the technology contest between the U.S. and China, exports to Singapore, Taiwan, and U.S. spiked. Market diversification are expected to continue amid prolonged U.S.-China conflict and weakening momentum in Chinese economy.

6) The industrial policies of major countries such as the United States and EU focus on semiconductors, secondary batteries, and electric vehicles, which are emerging as core industries in the future, with the aim of increasing self-sufficiency and reducing dependence on China by inducing the relocation of factories in these industries.

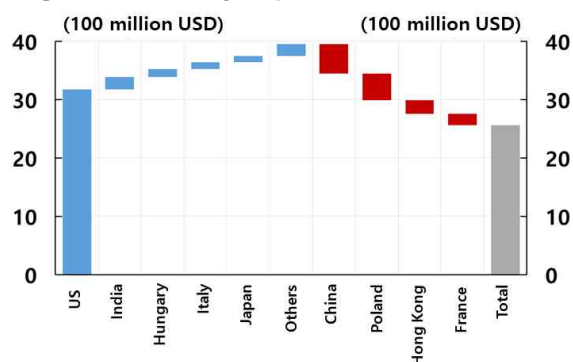
7) Refer to "Export and import trends of June 2023" of the Ministry of Trade, Industry and Energy.

## Petrochemical-Battery exports increase to Non-China Markets

[Figure 17] Petrochemical Exports Value<sup>1)</sup>



[Figure 18] Battery Exports Value<sup>1)</sup>

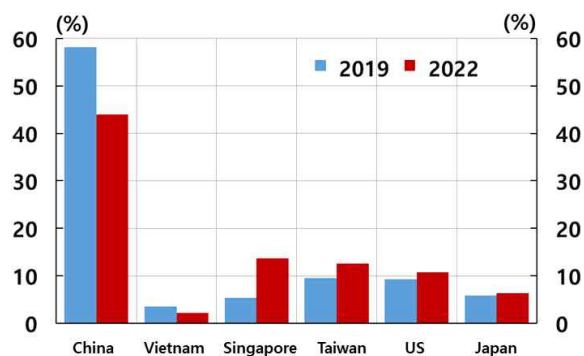


Note: 1) Value of exports from 2020 to 2022. Blue column refers to the increased amount and the red the decreased amount.

Sources: Korea Customs Service, Authors' calculations.

## Diversification in chip-making equipment

[Figure 19] Share of Chip-making Equipment Exports



Source: Korea Customs Service

11. To quantify the factors behind cross-market export heterogeneity, we employ constant market shares (CMS) analysis<sup>8)</sup>. The results of the analysis suggest that recent regional export diversification is influenced by a combination of economic and structural factors.<sup>9)</sup> In the case of China's exports, during the analyzed period, 35.3% of the export decline was attributed to competitiveness factors related to the decrease in China's market share, while 64.7% was attributed to economic factors related to China's reduced domestic demand. Conversely, for exports to the USA and EU, demand factors had a slight negative influence, but competitiveness factors acted as drivers for export expansion. This phenomenon of the divergent role of competitiveness factors, with them being a decreasing factor in China and an increasing

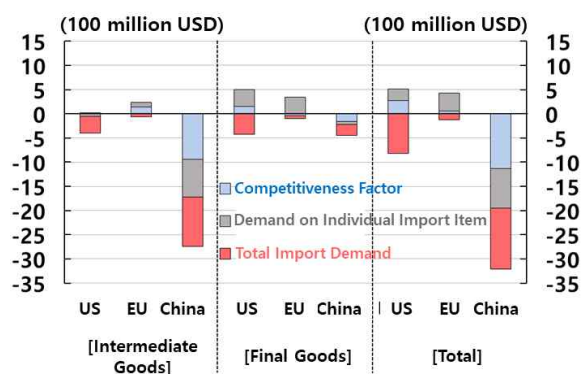
8) This paper compared Jan.-April 2023 data against April-Dec. 2022 when cross-market diversion picked up.

9) Based on CMS analysis on annual exports to China and the U.S. over the past 10 years (BOX 2), sharp fluctuation in import demand largely affected total exports, and competitiveness played to cut exports to China while boosting those to the U.S. Short-term fluctuation in import demand mostly comes under cyclical influence whereas the long-term dynamics can be affected by structural competitiveness factor.

factor in the USA, has been observed even before the pandemic era. This trend has been consistent for both intermediate and final goods. (Box 2)

**Competitiveness and cyclical factors act both negatively on exports to China, while competitiveness effect aids exports to US-EU**

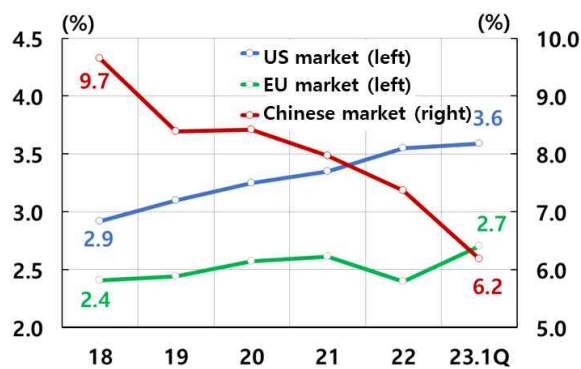
[Figure 20] CMS Analysis on Export Performance to the US-EU-China<sup>1)</sup>



Note: 1) CMS analysis on exports of April-Dec. 2022 versus Jan.-April 2023.  
Source: CEIC, Authors' calculations.

**Market share of Korean products on the rise in US and EU, while on the decline in China**

[Figure 21] Korea's Import Share in US-Chinese Markets



Source: Korea International Trade Association.

**Conclusion and Implications**

**12. A mix of cyclical and structural factors has been influencing recent Korean export trend.** Exports of Korea and other Asian countries with high reliance on China and IT demand have been hurt by weaker-than-expected effect from Chinese reopening and contraction of the global IT industry. Additionally, Heterogeneous sensitivity to global business cycle, and variations in country-specific economic trends and industrial policies and changes in competitiveness in Korean products in specific markets generated mixed results by export item and market.

**13. As the downturn in the IT industry gradually alleviates, exports are expected to improve, and the differentiation of exports by product and region is anticipated to diminish.** Considering our export structure, a recovery in the global IT sector would likely lead to an improvement in exports to China and ASEAN, where the IT sector holds a significant share. Additionally, despite the contraction in domestic demand for automobiles, it is expected that exports, primarily to the US and EU, will continue to see a moderate increase.

**14. However, even with the expected improvement in the IT sector from the second half of the year, Korean exports won't likely see strong rebound as in the past due to structural factors like country-specific industrial structures and changes in competitiveness.** In this process,

the impact of structural factors could vary depending on the effective response to the reshaping of global supply chains, as evidenced by the recent increase in exports to the United States.

**15. In this situation, economies and businesses heavily reliant on specific regions or products would inevitably be vulnerable to changes in external conditions. Therefore, the incentive for diversifying exports is likely to become even stronger.** For instance, given China's increasing significance as a future consumer market, there may be a need for China to diversify its export structure from intermediate goods to final goods. The strengthening in domestic supply capacity in the U.S. and EU calls for heightened efforts to enhance competitiveness in advanced technology.



## <Box 1>

### Constant Market Shares (CMS) Analysis Method

In CMS metrics, competitiveness factor is gauged by the change in the exporter's share ( $i$ ) in the importing market ( $j$ ), the demand factor on individual item by the changes in exports according to the adaption degree in the exporter's export structure to the changes in the import structure of the importer, and total import demand factor by the impact on exports according to the change in demand of the importer.

$$\begin{aligned} & \sum (X_{g,t_1} - X_{g,t_0}) \\ &= \sum (M_{g,t_1} \theta_{g,t_1} - M_{g,t_0} \theta_{g,t_0}) \\ &= \sum M_{g,t_1} (\theta_{g,t_1} - \theta_{g,t_0}) + \sum \theta_{g,t_0} (M_{g,t_1} - M_{g,t_0}) \\ &= \sum M_{g,t_1} (\theta_{g,t_1} - \theta_{g,t_0}) + \sum \theta_{g,t_0} (M_{t_1} \alpha_{g,t_1} - M_{t_0} \alpha_{g,t_0}) \\ &= \sum M_{g,t_1} (\theta_{g,t_1} - \theta_{g,t_0}) + \sum \theta_{g,t_0} [M_{t_1} (\alpha_{g,t_1} - \alpha_{g,t_0}) + \alpha_{g,t_0} (M_{t_1} - M_{t_0})] \\ &= \underbrace{\sum M_{g,t_1} (\theta_{g,t_1} - \theta_{g,t_0})}_g + \underbrace{\sum \theta_{jg,t_0} M_{t_1} (\alpha_{g,t_1} - \alpha_{g,t_0})}_g + \underbrace{\sum \theta_{g,t_0} \alpha_{g,t_0} (M_{t_1} - M_{t_0})}_g \end{aligned}$$

<b>(Competitiveness Factor)</b>	<b>(Individual Import Demand Factor)</b>	<b>(Total Import Demand Factor)</b>
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$X_{g,t}$ : Export value to country  $j$  of item  $g$  from country  $i$  during period  $t$

$M_{g,t}$ : Import value to country  $i$  of item  $g$  from country  $j$  during period  $t$

$M_t$ : Value of total imports by country  $j$  during period  $t$

$\theta_{g,t}$ : Share of item  $g$  from country  $i$  in import market of  $j$  during period  $t$

$\alpha_{g,t}$ : Share of item  $g$  in total imports of country  $j$

<Box 2>

## Constant Market Shares (CMS) Analysis on Exports to China and US

We employ CMS analysis to identify factors behind the performance of exports to China and the U.S. over the last 10 years to discover import demand played the largest growth driver in both the Chinese and U.S. markets. Exports to China over the last decade were propelled by enlarged demand from the country while waned demand for individual items and competitiveness acted as setback factors. Total import demand increase and improved competitiveness of Korean products drove growth in exports to the U.S.

[Table 5] CMS Analysis on Annual<sup>1)</sup> Exports to China and US (100 million USD)

Year	Exports to China				Exports to US			
	(Competitiveness)	(Demand on Individual Item)	(Total Import Demand)	Value of growth or decline	(Competitiveness)	(Demand on Individual Item)	(Total Import Demand)	Value of growth or decline
2013	3	-2	8	10	3	0	-0	3
2014	0	-1	1	0	4	1	2	7
2015	4	7	-17	-7	-1	3	-3	-0
2016	-5	1	-6	-11	-1	-0	-2	-3
2017	0	-2	17	15	-2	0	4	2
2018	-1	-1	19	17	-1	-1	5	3
2019	-15	-3	-3	-22	2	-0	-1	1
2020	-7	4	-1	-3	7	-2	-4	1
2021	0	-8	33	25	5	-0	13	18
2022	-1	-6	2	-6	-1	1	12	11
Total	-23	-10	51	18	15	2	26	42

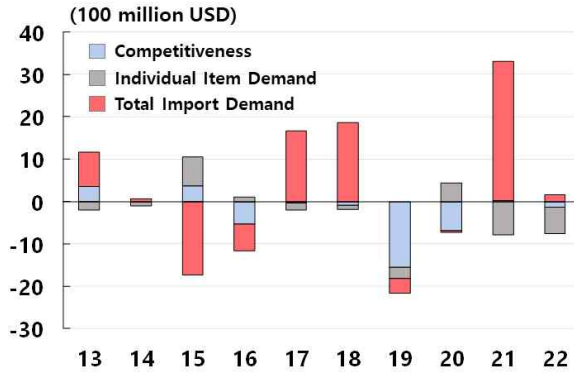
Note: 1) YoY monthly average of rise or decline in exports.

Source: General Administration of Customs of China (GACC), Korea Customs Service, Authors' calculations.



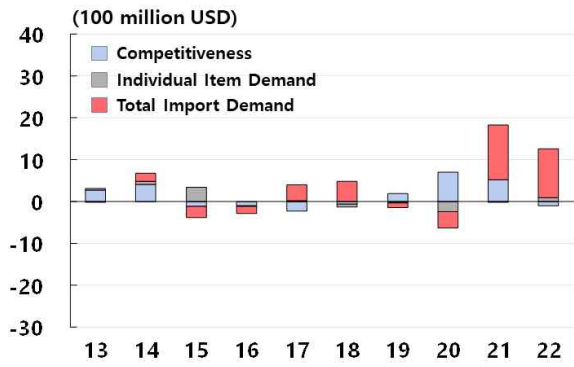
Exports to China and U.S. both impacted by total demand surge in the markets  
 Competitiveness effect increased in the U.S. while diminishing in China

[Figure 22] CMS Analysis Results on Exports to China



Source: GSCC, Korea Customs Service, Authors' calculations.

[Figure 23] CMS Analysis Results on US Exports



Source: Korea Customs Service, Authors' calculations.

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