

How Manufacturing Saved the Korean Economy during the COVID-19 Crisis

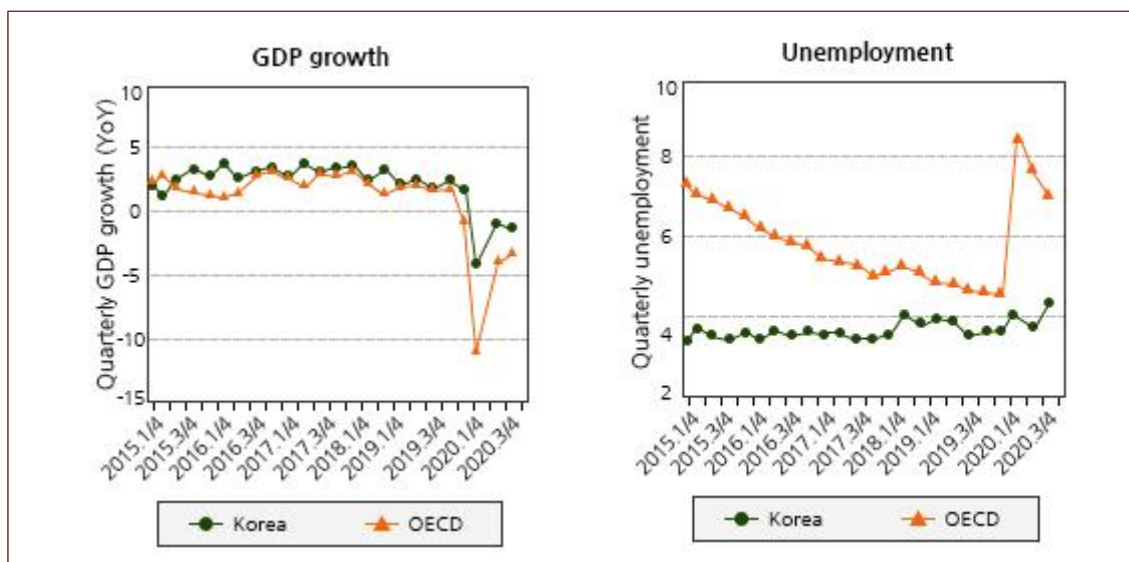
| Summary |

- Korea's manufacturing sector, the third most competitive in the world, has helped it weather the COVID-19 pandemic.
 - While the global economy shrank 3.3 percent in 2020, its worst slowdown since the 2008 global financial crisis, the Korean economy contracted by just one percent thanks to its manufacturing sector.
 - Korea's success in stabilizing its economy faster than other major economies stemmed from its highly competitive manufacturing industry, which is the world's third most competitive per the United Nations Industrial Development Organization's (UNIDO) Competitive Industrial Performance (CIP) index.
- Amid depressed domestic demand, manufacturing's resilience as seen in its export recovery ensured economic stabilization in Korea.
 - Contrary to initial fears, Korea's export growth has exhibited a V-shaped recovery after falling to its lowest point in April 2020, when overseas shipments had fallen by 25.6 percent.
 - Domestic demand was unlikely to stimulate economic growth due to the pandemic, but the Korean economy made a rapid recovery thanks to manufacturing's solid competitiveness and export growth.
 - The drivers of Korean exports have been leading items such as semiconductors, displays, and petrochemicals, showing how resilient the nation's industrial structure is against crisis.
- Despite this result, the country's industrial innovation strategy is in need of an upgrade for the post-pandemic era.
 - As global competition in the transition to a digital and sustainable economy accelerates amid the ongoing COVID-19 pandemic, Korea should upgrade its industrial structure to ensure resilience against crisis but also to prepare to lead the global innovation competition in the post-pandemic era.
 - The rise in the U.S.-China rivalry over technological hegemony is likely to reshape global supply chains, which underlines the importance of enhancing allied collaboration in industry and commerce, diversifying export markets, and stimulating business activity.

■ **The Korean economy has fared relatively well despite the impact of COVID-19.**

- While the world economy contracted by 3.3 percent in 2020, its worst drop since the 2008 global financial crisis, the Korean economy fared relatively well, shrinking just one percent.¹⁾
 - The country's GDP growth, which was on par with the OECD average, began to stand out from the first quarter of 2020, when the COVID-19 outbreak began. (See Figure 1.)
 - Both advanced (-4.7 percent) and developing economies (-2.2 percent) contracted in 2020, whereas the Korean economy saw relative success in reining in negative growth.
- In jobs, Korea maintained a modest unemployment rate in 2020 compared to its global peers.
 - Figure 1 shows that the OECD jobless rate surged to an average of seven to eight percent from the second quarter of 2020, whereas Korea's remained steady at around four percent, or near pre-crisis levels.

〈Figure 1〉 Rates of GDP Growth (YoY) and Unemployment by Quarter: Korea vs. OECD



Source: OECD (<http://data.oecd.org>).

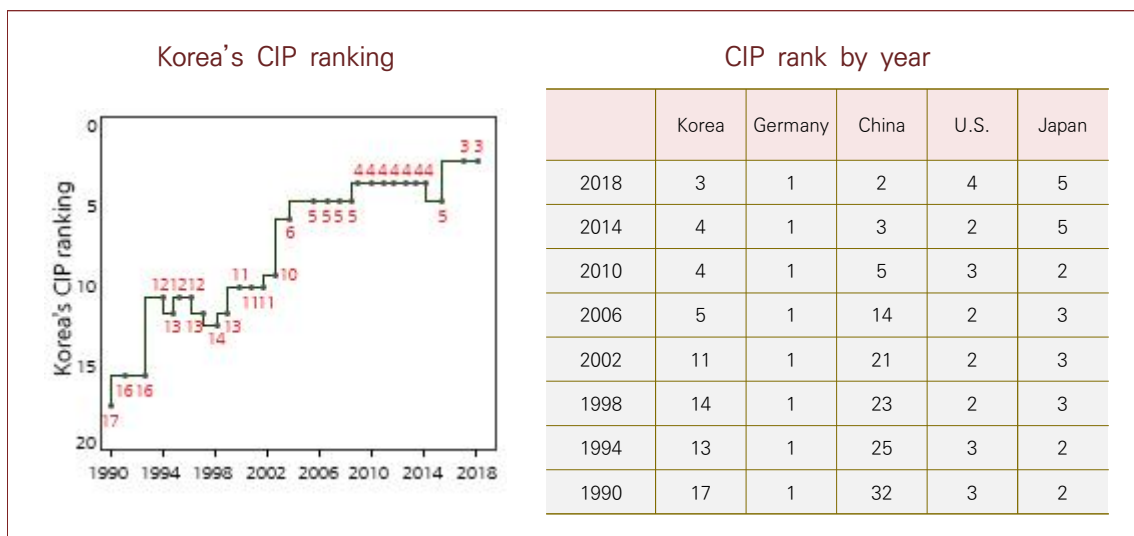
1) IMF, World Economic Outlook (April 2021), Bank of Korea, National Account

- **The Korean manufacturing sector, the third most competitive in the world, helped stabilize the economy after the COVID-19 crisis broke out.**
- UNIDO ranked Korea third behind No. 1 Germany and No. 2 China in industrial competitiveness.
 - UNIDO's Competitive Industrial Performance Index placed Korea third out of 152 countries in 2020.

Competitive Industrial Performance Index

- ◆ The Competitive Industrial Performance (CIP) index, released every year by UNIDO, is a quantitative metric of a country's industrial competitiveness.
- ◆ The index aggregates eight indicators, including manufacturing added value per capita, manufacturing exports per capita, and medium and high-tech added value share in the total added value of manufacturing into a single standardized measure for a given country.
- ◆ The indexes and the performance rankings of countries are computed every year and published in an annual report. The latest is the 2020 CIP Report, released in July 2020.
- ★ Yet a time lag exists between the release of the index and the reference period from when data is collected. For example, the 2020 CIP index is based on 2018 data, which is the latest available.

〈Figure 2〉 Changes in CIP Rankings: Korea vs. Major Economies

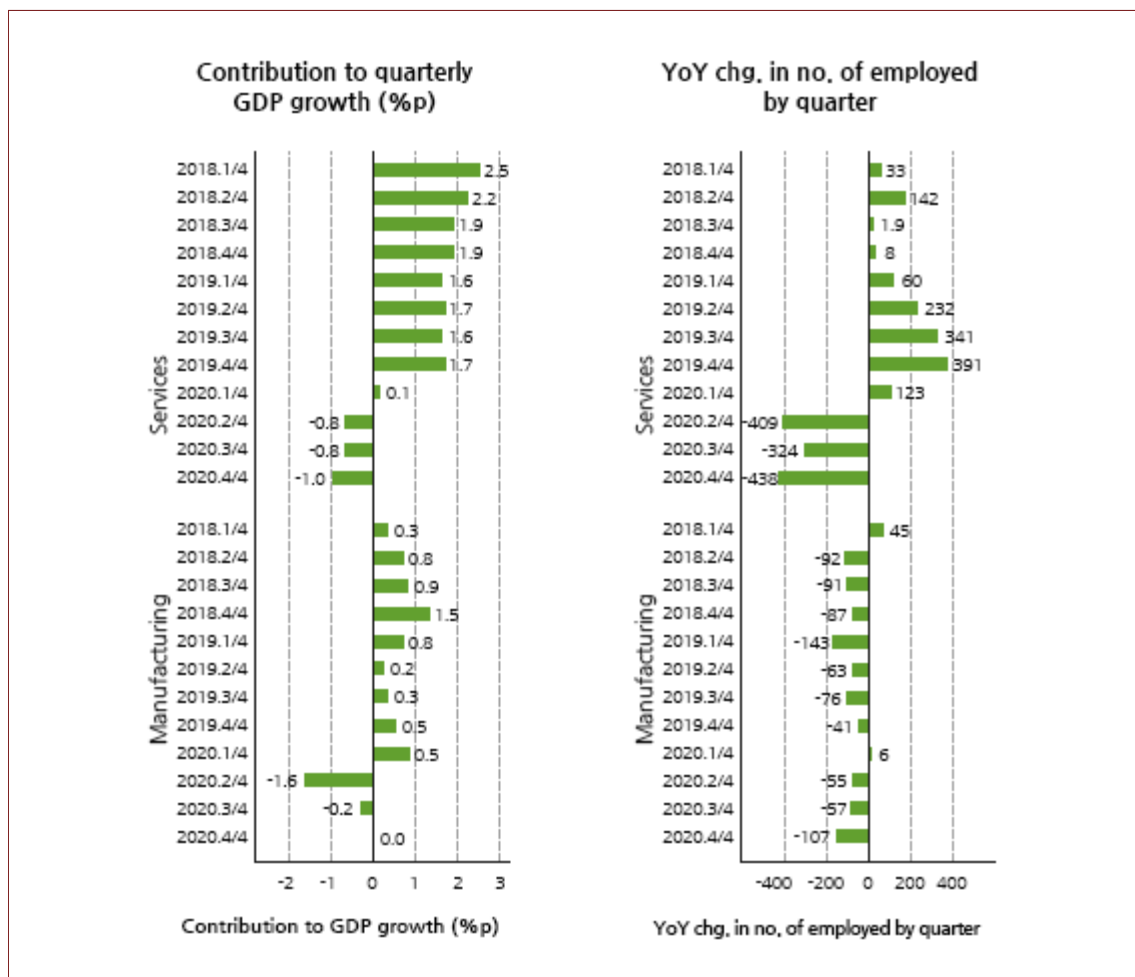


Source: UNIDO CIP database by year.

Note: The table and chart above are based on statistics collected up to 2018, the reference year for the 2020 CIP Report.

- Korea has climbed the rankings since the 1990s, overtaking the U.S. and Japan to reach No. 3 for the first time in the 2020 CIP Report. (See Figure 2.)
- Korean manufacturing, ranked third in terms of competitiveness worldwide, played a pivotal role in minimizing the economic downturn and stabilizing the job market amid COVID-19 in 2020.
- The sector's contribution to GDP growth fell 1.6 percentage points in the second quarter of 2020 but exceeded that of the service sector over the next two quarters. (See Figure 3.)

〈Figure 3〉 Contribution to GDP Growth and Job Creation: Manufacturing vs. Service Sector

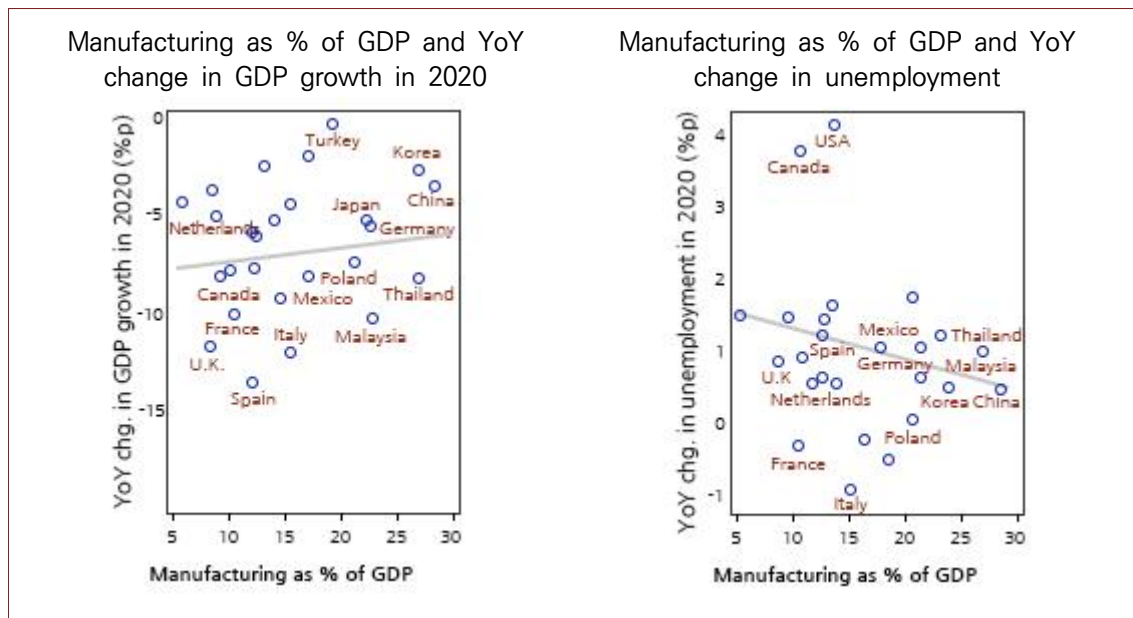


Source: Bank of Korea's National Account, contribution to real GDP growth by sector (original series data), Statistics Korea's Economically Active Population Survey: No. of Employed by Sector
 Note: GDP contribution (%p) = sector's growth rate × sector's share in total industrial output

- In contrast, the service sector made a greater contribution to GDP growth than manufacturing in the pre-pandemic years of 2018 and 2019.

- On the job front, the number of employed remained steady year on year in manufacturing but plummeted in the service sector after the outbreak of COVID-19.
- Accordingly, the role of manufacturing in helping weather COVID-19 was far more evident in Korea than in other major economies.
- Figure 4 is a scatter plot showing the correlation between the degree of development of manufacturing (measured as a share of GDP) and changes in GDP growth and unemployment rates in 2020 in 28 advanced and developing economies.

〈Figure 4〉 Correlation between Manufacturing as Share of GDP and Changes in GDP Growth and Unemployment in 2020



Note:

- (1) Calculation by author using IMF World Economic Outlook Database (GDP growth and unemployment rates announced in April 2021) and UNIDO data (manufacturing as % of GDP in 2018)
- (2) Change in GDP growth in 2020 (%p) = GDP growth rate in 2020 (%) – GDP growth rate in 2019 (%)
- (3) Change in unemployment in 2020 (%p) = Unemployment rate in 2020 (%) – Unemployment rate in 2019 (%)

- In 2020, Korea—where the manufacturing sector had the second-highest share of GDP among 28 countries—showed the fourth-lowest decline in GDP growth and the sixth-lowest rise in unemployment from the pre-pandemic year of 2019. Accordingly, the Korean manufacturing sector helped the country endure the COVID-19 crisis more than other economies.²⁾ (See Appendix for detailed figures.)

2) Korea in 2020 saw the fifth-highest GDP growth among 28 countries and sixth-lowest unemployment rate,

- Meanwhile, country-specific data in Figure 4 shows that manufacturing helps mitigate economic slowdown during a crisis (left-hand chart: positive correlation) and helps buttress employment (right-hand chart: negative correlation).
- The Korean economy posted better export performance than other major economies largely because of its competitive manufacturing industry.
 - While most major economies saw a sharp drop in exports in 2020 due to COVID-19, Korea saw such shipments grow 4.9 percentage points from 2019 (see Table 1)
 - This indicates that Korean exports are highly resilient in a crisis thanks to the country's highly competitive manufacturing.

<Table 1> Export Growth in Major Economies (G7 + Korea and China) in 2020 and YoY Change (in COVID-19 crisis)

	Export growth rate in 2020 (%)	YoY chg. in export growth rate (%p)	Manufacturing's share of exports (2018)	Manufacturing's share of GDP (2018)
Korea	-5.5	4.9	97.3	27.5
China	3.7	3.5	96.4	28.9
U.S.	-13	-11.7	72.1	11.4
U.K.	-14.2	-9.6	75.9	8.8
France	-14.2	-11.8	89	10.4
Germany	-7.3	-2.9	89.9	21.2
Italy	-6.9	-3.7	92.6	14.9
Canada	-12.5	-11.6	63.5	9.7
Japan	-9.1	-4.7	90.5	21.1

Source: ITC Trade Map (export by country) and UNIDO (manufacturing as % of exports and % of GDP).

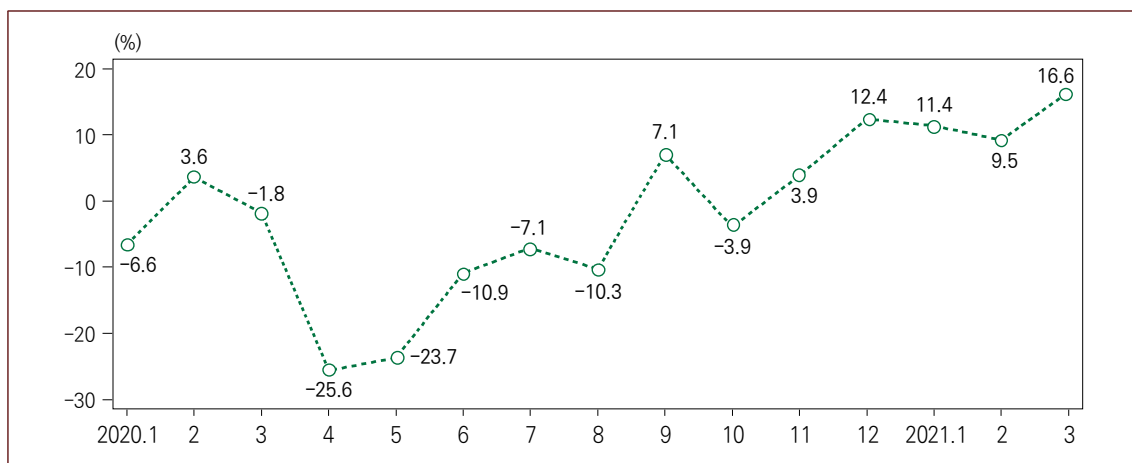
Note: YoY rate of change in export growth in 2020 (%p) = Export growth rate in 2020 (%) - export growth rate in 2019 (%)

■ Major sectors with a resilient export structure stabilized the Korean economy amid weak domestic demand.

performing well in both categories as well as in terms of the degree of change in both rates (see Appendix for more information, such as country rankings and figures). This study analyzed correlations between manufacturing as a share of GDP, slowdown in GDP growth, and increase in unemployment. This was because the rate of changes in GDP growth and unemployment, rather than the rates themselves, can better explain manufacturing's role in the pandemic.

- Korea's exports have displayed a sharp V-shaped recovery from the pandemic shock.
 - Given the direct impact of COVID-19 on the real economy, exports were expected to decline more sharply than they did in the Great Trade Collapse that followed the 2008 global financial crisis.
 - Contrary to initial fears, however, exports showed a sharp V-shaped recovery after bottoming out in April 2020 with a 25.6 percent drop.

〈Figure 5〉 Monthly Export Growth in 2020 (YoY)



Source: KITA trade statistics

- Domestic demand in the service sector plummeted due to strict social distancing measures, but the Korean economy recovered relatively fast thanks to manufacturing's strong competitiveness and robust exports.
 - * Change in GDP contribution in fourth quarter of 2020 (Bank of Korea): (exports) 2.1 percentage points, (domestic demand) -0.3 percentage points
- Because domestic demand was unlikely to provide much-needed support for economic growth due to the pandemic, Korea's manufacturing-centric economic structure and exports helped it overcome the crisis.
 - * Exports as share of GDP (based on 2019; KOSIS and IMF): 32.9 percent for Korea, 7.7 percent for U.S., 13.9 percent for Japan, 18.5 percent for China, 16.8 percent for U.K.
- The industrial structure of major sectors was a key factor in Korea's strong export resilience.
 - Table 2 shows the contribution of industries to the change in monthly average

export growth during the contractionary (April to July) and expansionary (September to December) periods of 2020.³⁾ The machinery, steel, and metals industries were the main culprits behind the export decline during the contractionary phase, whereas the electric, electronics, and petrochemicals sectors were the key drivers of exports in the recovery phase.

- Electric/electronics (e.g., semiconductors and displays) and petrochemicals are leading Korean industries highly reliant on exports but globally competitive. This indicates that the Korean economy has high export resilience in a crisis.

* Korea is the world's No. 2 semiconductor maker (based on output in 2018), largest display maker (based on market share in 2019), and fourth-largest petrochemical supplier (based on ethylene production volume in 2019).

<Table 2> Contribution of Major Industries to Changes in Monthly Average Export Growth

	Export contraction (April-July 2020)	Export recovery (Sept.-Dec. 2020)
Agriculture and fisheries	0.01	0.18
Mining	-3.75	-3.01
Petrochemicals	-1.3	1.49
Plastic and rubber	-0.59	0.21
Textile	-0.74	-0.06
Household goods	-0.22	0.12
Steel and metals	-1.84	0.17
Machinery	-7.16	0.78
Electric and electronic goods	-1.32	4.79
Other	0.06	0.2
Monthly average change in exports (%)	-16.86	4.88

Note: Based on industries in Group 1 as classified by Ministry of Trade, Industry and Energy
 Source: Calculation by author based on KITA trade statistics

3) Change in export growth is the sum of the contributions of industries (= change in exports for industries × industry weight) and can be expressed using the following formula:

$$\frac{(X_t - X_{t-1})}{X_{t-1}} = \sum_i \left\{ \frac{(x_t^i - x_{t-1}^i)}{x_{t-1}^i} \times \left\{ \frac{x_{t-1}^i}{X_{t-1}} \right\} \right\} \quad (X_t: \text{total exports during a given period } t, x_t^i: \text{exports of a given industry } i \text{ during period } t).$$

〈Table 3〉 Export Growth Rate and GVC Export Value by Major Exporting Country in 2020 (vs. 2018)

	China	U.S.	Vietnam	Japan	Taiwan	India	Germany	Worldwide
Korea's export growth rate (%) (export ranking)	-2.7 (1)	1.1 (2)	0.7 (3)	-11.7 (4)	5.1 (5)	-20.9 (6)	10.3 (7)	-5.5
GVC export as % of Korea's export value	49.4	39.9	68.7	54.0	80.1	47.1	58.6	54.1

Note:

(1) Change in export and export rankings based on KITA trade statistics

(2) The ranking of Korea's export markets excludes Hong Kong due to its high share of intermediary trade.

(3) GVC export value is based on calculations done by the author using the Asian Development Bank's multi-regional input-output tables (ADB-MRIO) in 2018 and Borin and Mancini's methodology (2019).

- The collapse of the global value chain due to the pandemic did not affect trade as seriously as initially feared.
 - Table 3 shows the share of global value chain (GVC) exports⁴⁾ in total exports by country derived by using Korea's export growth in major markets in 2020, the Asian Development Bank's multi-regional input-output tables (ADB-MRIO) in 2018, and input-output analysis (I-O) methodology.
 - Among Korea's major trade partners in 2020, Vietnam, Taiwan, and Germany—three countries where GVC exports account for a relatively high share of total exports—saw imports from Korea expand by 0.7, 5.1, and 10.3 percent year-on-year, respectively, above Korea's export decline of 5.5 percent in 2019.
- **The Korean economy is set to continue on a recovery path in 2021 backed by its manufacturing sector.**
 - Given healthy capital investment, sound facility utilization, and improving business sentiment, manufacturing is poised to see continued recovery in output for the time being.
 - The equipment investment index has increased despite COVID-19 without showing signs of decline, and the average utilization rate in the manufacturing sector has also neared pre-pandemic levels.

4) If Korea's exports of intermediate goods to Country A are processed by the latter and then exported to Country B as finished goods, they constitute trade related to the global value chain (GVC), or the international system of division of production. In contrast, when exports to Country A are absorbed by end users there, the exports are not part of GVC-related trade.

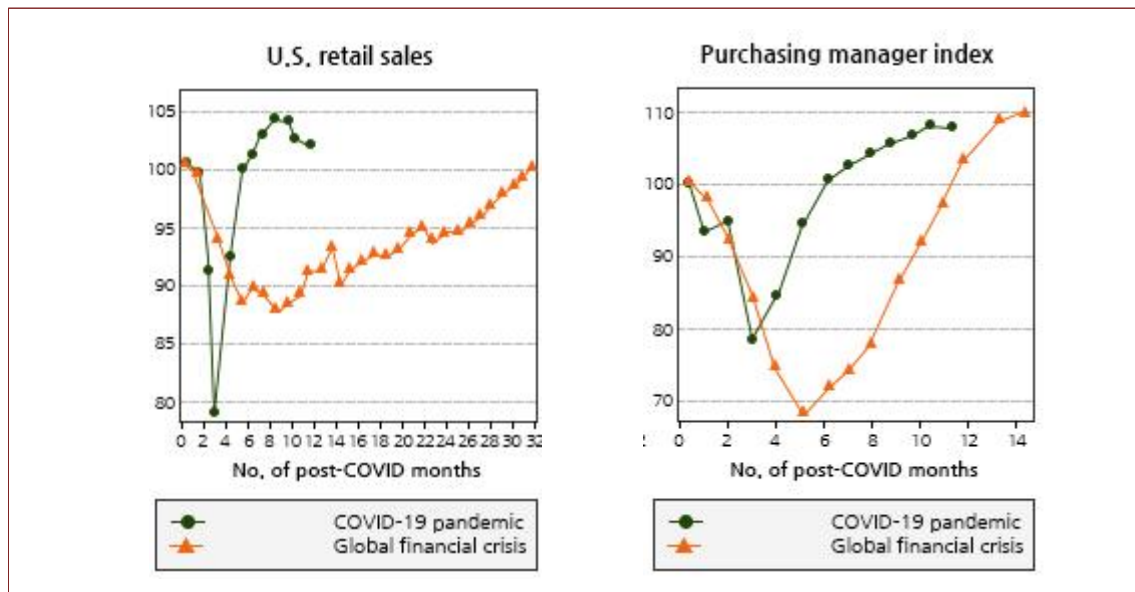
- The manufacturing business sentiment index (BSI) has steadily grown in part due to the rapid improvement of manufacturing business sentiment.

<Table 4> Equipment Investment Index, Average Utilization of Manufacturing, and Sectoral BSI

	Jan. 2020	March 2020	May 2020	July 2020	Sept. 2020	Nov. 2020	Nov. 2021
Equipment investment index (Seasonally adjusted, 2015 = 100)	110.7	111.9	107.4	112.9	118.1	115.2	124.8
Avg. utilization of manufacturing	74.2	74.1	63.2	70.2	73.5	73.4	73.2
Manufacturing's BSI	76	56	49	59	68	85	85

Source: Statistics Korea's Estimated Index of Equipment Investment and Mining and Manufacturing Survey (average manufacturing utilization) and Bank of Korea's Business Survey Index (manufacturing BSI).

<Figure 6> U.S. retail sales and PMI (July 2008 and November 2020 = 100)



Source: Calculation made by the author using the U.S. Commerce Department's retail sales (seasonally adjusted) and Markit Purchasing Manager Index

- The purchasing manager index (PMI) and U.S. retail sales have also recovered to pre-crisis levels, indicating substantial improvements to global demand and a bright outlook for Korean exports (see Figure 6)
 - U.S. retail sales needed just five months to recover to pre-COVID levels, versus 31

months from the 2008 global financial crisis. This rapid recovery has raised expectations of improvement in end-product segments such as cars and mobile devices.

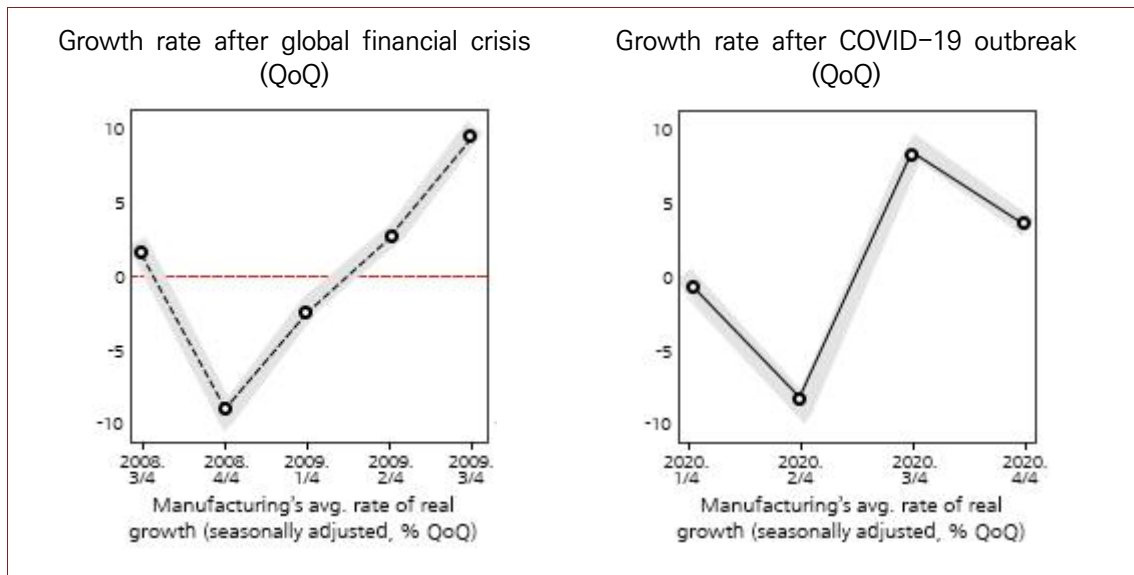
- The PMI needed just six months to recover from COVID-19, versus 12 months from the 2008 crisis, boosting expectations of improvement in B2B industries such as semiconductors and steel.

■ Post-pandemic direction of the industrial environment and policy implications

- Transition from a crisis-resilient to competition-ready structure in the post-pandemic innovation race
 - Korea's export-oriented economic structure based on the competitiveness of its manufacturing industry helped the economy fare relatively well during the COVID-19 crisis. Yet is this growth strategy sustainable in a new competitive environment in the post-pandemic period?
 - The transition to a contactless digital economy has accelerated amid growing interest in the environment and public safety since the COVID-19 outbreak. The global race to achieve a digital transformation and an environmentally sustainable economy is poised to gather momentum.
 - Korea lags behind advanced economies in technologies and in its response to climate change, making it difficult to compete in digital transformation and environmental sustainability.
 - * Korea ranks third in UNIDO's World Manufacturing Competitiveness Index (CIP), but ninth in terms of the percentage of exports in medium- and high-tech manufacturing industries
 - * Energy-intensive industries' share of GDP (2019): (Korea) 8.4, (EU) 5.0, (U.S.) 3.7
 - Under industrial blueprints such as its Manufacturing Renaissance Vision, Korea must upgrade its innovation strategies to secure global leadership in the post-pandemic era.
- The competition for technological hegemony between the U.S. and China is likely to reshape global supply chains, a trend to which Korea must respond.
 - On February 24, 2021, U.S. President Biden signed Executive Order 14017 (EO 14017), which mandated a 100-day review of supply chains in the semiconductor, pharmaceutical, battery, and critical minerals industries.

- The order not only sought to tackle issues caused by COVID-19 such as disruptions in the procurement of medical supplies and a semiconductor shortage but also to promote the U.S. government's bid to keep China in check given the latter's advancement in high-tech industries such as semiconductors. The U.S. is likely to act fast to reshape its global supply chains.
- * American businesses are taking a cue from the government's move to shore up supply chains. For instance, on March 23, 2021, Intel announced plans to become a major provider of foundry capacity and invest USD 20 billion to build two new semiconductor plants in Arizona.
- If the supply chain review leads to U.S. sanctions against China, Korean semiconductor manufacturers will suffer since they rely on China for exports.
- Korea's main industries are thoroughly integrated into global supply chains. It is thus crucial for Korea to assess possible changes in global supply chains and monitor directions taken by respective industries, enhance trade and commercial collaboration with allies, diversify export markets, streamline regulations, support expansion overseas, and stimulate of business activity.
- Given the sheer importance of public health measures in keeping production online, expanding vaccination efforts and preventing the resurgence of the pandemic are key tasks.
 - Figure 7 shows that after dropping sharply in the second quarter of 2020, manufacturing output made a strong recovery in the third quarter but declined in the fourth due to a resurgence in infections.
 - This is in contrast to the V-shaped recovery manufacturing saw after the 2008 global financial crisis. The difference indicates COVID-19 infections and a public vaccination campaign are key variables in determining whether the Korean economy can recover with help from manufacturing.
 - The outlook for an economic recovery remains uncertain due to the resurgence of COVID-19 caused by variants and slower-than-expected vaccination rates.
 - Assuming that Korea continues to contain the pandemic, the rollout of COVID-19 vaccines proceeds smoothly, and major economies achieve herd immunity, continuing facility investment and maintaining operational production are necessary to assist in the release of pent-up demand.

〈Figure 7〉 Manufacturing's Growth in Post-crisis Period: 2008 Global Financial Crisis vs. COVID-19



Source: Bank of Korea's National Account, Quarterly Real GDP by Economic Actors (seasonally adjusted).

Note: The dashed line represents the average growth rate of manufacturing; the area in gray represents a 95 percent confidence interval.

Hwang Kyung In | Center for Growth Engine Industries

Associate Research Fellow | kihwang@kiet.re.kr | 044-287-3081

〈Appendix〉 Changes in Rates of GDP Growth and Unemployment in Major Economies before and after COVID-19 (See Figure 4 for summary data.)

	Decline in GDP growth rate in 2020 (%p)	GDP growth in 2020 (%)	Rise in unemployment in 2020 (%p)	Unemployment in 2020 (%)	Manufacturing's share of GDP (2018)
Turkey	0.9	1.8	-0.6	13.1	17.1
Egypt	-2.0	3.6	-0.3	8.3	15.9
Pakistan	-2.3	-0.4	0.4	4.5	12.7
Korea	-3.0	-1.0	0.2	3.9	27.5
China	-3.6	2.3	0.2	3.8	28.9
Nigeria	-4.0	-1.8	-	-	9.1
Australia	-4.4	-2.4	1.4	6.5	5.4
Saudi Arabia	-4.5	-4.1	-	-	13.5
Russia	-5.1	-3.1	1.2	5.8	12.6
Japan	-5.1	-4.8	0.4	2.8	21.1
Germany	-5.5	-4.9	1.0	4.2	21.2
Brazil	-5.5	-4.1	1.3	13.2	9.4
Netherlands	-5.5	-3.8	0.4	3.8	9.4
U.S.	-5.7	-3.5	4.4	8.1	11.0
Indonesia	-7.1	-2.1	1.8	7.1	20.7
Kazakhstan	-7.1	-2.6	0.7	5.5	10.4
South Africa	-7.1	-7.0	0.5	29.2	11.7
Poland	-7.3	-2.7	-0.1	3.2	18.9
Canada	-7.3	-5.4	3.9	9.6	9.7
Argentina	-7.9	-10.0	1.5	11.4	13.4
Mexico	-8.2	-8.2	0.9	4.4	17.0
Thailand	-8.4	-6.1	1.0	2.0	26.7
Italy	-9.2	-8.9	-0.8	9.1	14.9
France	-9.7	-8.2	-0.3	8.2	10.4
Malaysia	-9.9	-5.6	1.3	4.5	22.7
U.K.	-11.4	-9.9	0.7	4.5	8.8
India	-12.0	-8.0	-	-	15.4
Spain	-12.9	-11.0	1.4	15.5	12.7

Note: (1) Calculation made by the author using IMF World Economic Outlook Database on GDP growth and unemployment (released in April 2021) and UNIDO data (manufacturing as % of GDP, 2018).

(2) Change in GDP growth in 2020 (%p) = GDP growth in 2020 (%) - GDP growth in 2019 (%)

(3) Change in unemployment in 2020 (%p) = Unemployment rate in 2020 (%) - Unemployment rate in 2019 (%)



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COPY EDITOR **Aaron Crossen**

370 Sicheong-daero, Sejong City, 30147, Republic of Korea

Tel. 044-287-3114 Fax. 044-287-3333 www.kiet.re.kr

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