

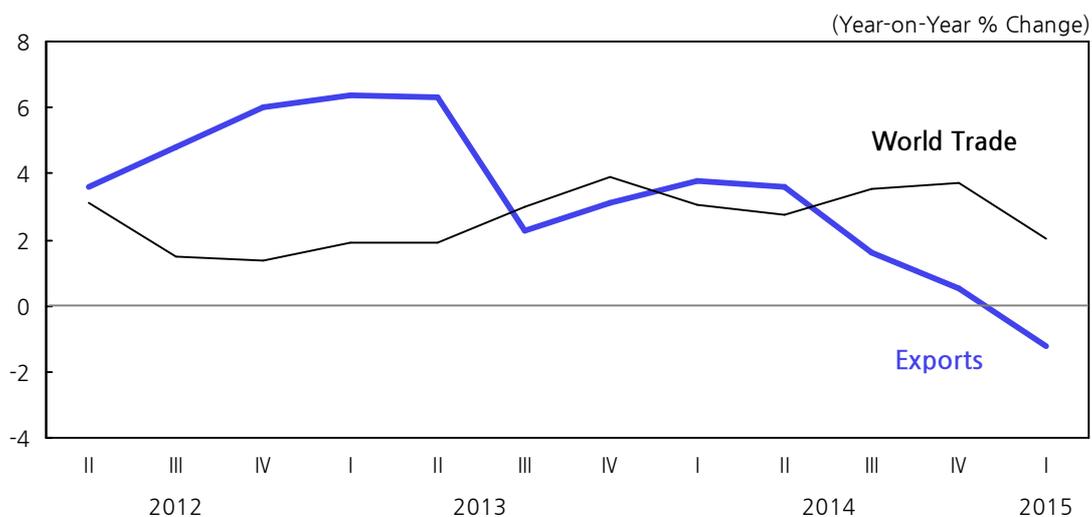
Changes in the Export Competitiveness of China, Japan, and Korea*

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1. Issues

- Concerns are growing in Korea that China may catch-up in the export industry, much like how Korea benchmarked Japan to do the same.
- Although the world trade volume has shown little change in its growth since the third quarter of 2014, Korea's export volume growth — excluding the impact of falling oil prices — has been subpar, giving way to concerns over Korea's export competitiveness.

Growth Rates of Korea's Exports and World Trade (Volume)



Note: Export data is based on the National Account real goods export. The world trade volume for the first quarter of 2015 is the average for the period from January to February.
Source: Bank of Korea, CPB.

* The main contents of this paper is based on Kyu-Chul Jung, "The Competition Structure of the Export Markets of Korea, Japan, and China: Centered on the Analysis of Dynamic Comparative Advantage," *Economic Dynamism of Korea: With the Focus on the Comparison with Japan*, 2014.

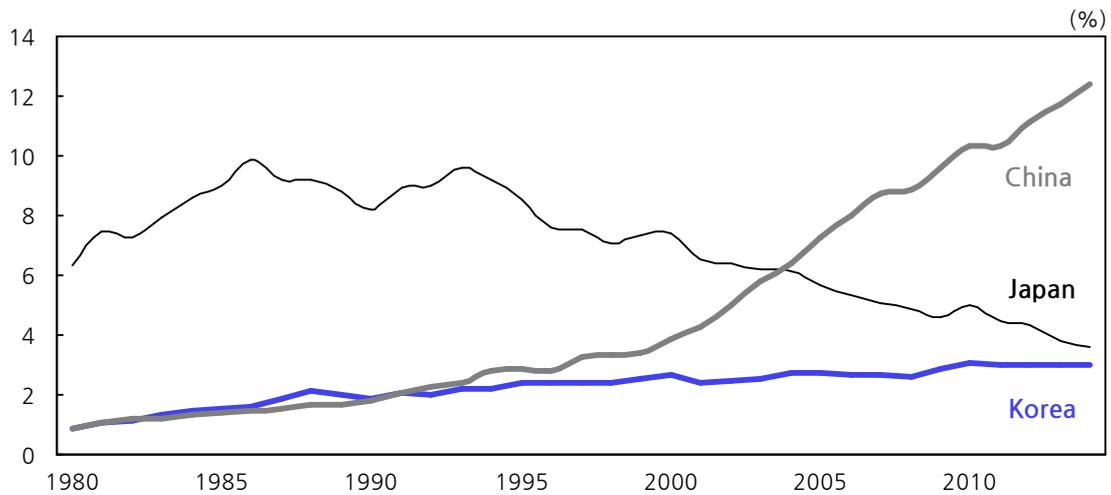
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- This paper intends to examine the competition among China, Japan, and Korea in the export industry and draw implications.
 - To that end, it first looks at Japan's dominance in the global export market in the 1990s, based on Korea's catch-up with Japan, and then with the same viewpoint, studies China's influence on Korea's dominance in the export market since 2000.

2. Changes in export market dominance and composition of exporting goods

- China's dominance began to soar in 1993, when Japan's dominance began to constantly decline. But, Korea has maintained a moderate pace of growth.
 - Japan remained the leading player in the global export market until the 1980s. After peaking to the 9% level in the early 1990s, its dominance declined to recently record the 3% level.
 - Japan's market share was 9.6% in 1993, following the US at 12.3% and Germany at 10.1%. However, it has since continued to fall, recording 3.6% in 2014.
 - China's market share has skyrocketed from about 2% to over 10%.
 - China's market share was merely around the 2% level in the early 1990s, similar to Korea, but exceeded to the 4% level in 2001 and the mid-12% level in 2014, quickening the pace of expansion.
 - Despite China's rapid rise, Korea's market share has grown at a comparatively steady pace.
 - Korea's market share was about 2% in the early 1990s, continuing to expand moderately to 3% in 2010, and has maintained the level since.

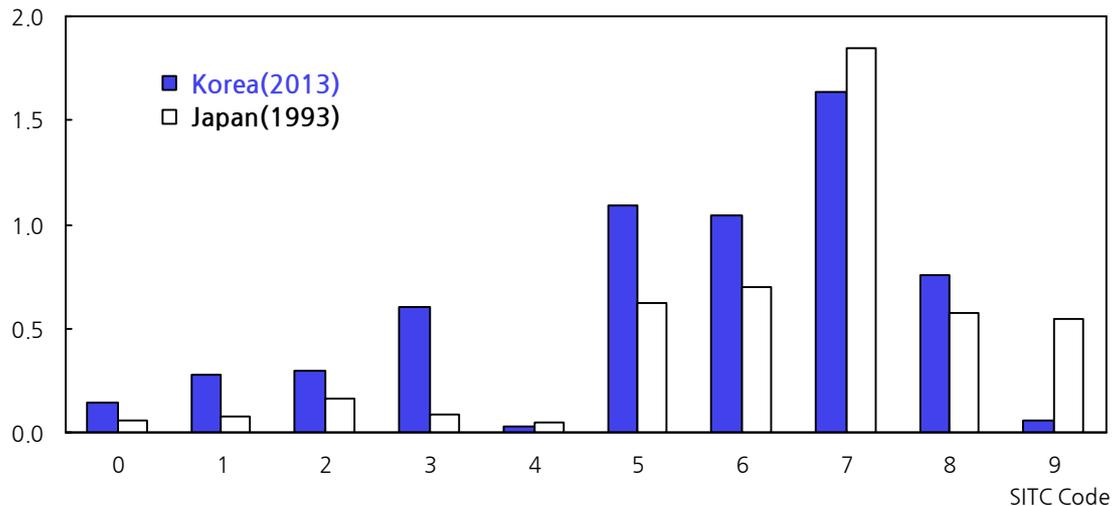
Global Export Market Shares of China, Japan, and Korea



Source: UNCTAD.

- However, **Korea's export product composition in recent times** has been mainly composed of machinery and transport equipment; **similar to Japan in 1993 when its market share started to dwindle.**
 - To compare the composition of export goods, the comparative advantage index — the market share of each item against that of the total — was adopted.
 - When the comparative advantage index of an item is higher than one, this means the country has a comparative advantage in this item, while a score of less than one implies the opposite.
 - The comparative advantage index can be used to deduce the export competitiveness for the item.
 - In 2013, Korea posted a particularly high market share in machinery and transport equipment (SITC #7), and showed relatively strong dominance in chemicals and related products (#5) and manufactured goods classified chiefly by material (#6). Japan experienced a similar phenomenon in 1993.

Comparison of Comparative Advantage Indexes of Export Items - Korea's Present Compared to Japan's Past



Note: Standard International Trade Classification (SITC) code:

- 0: Food and live stock.
- 1: Beverages and tobacco.
- 2: Crude materials, inedible, except fuels.
- 3: Mineral fuels, lubricants and related materials.
- 4: Animal and vegetable oils, fats and waxes.
- 5: Chemicals and related products, n.e.s..
- 6: Manufactured goods classified chiefly by material.
- 7: Machinery and transport equipment.
- 8: Miscellaneous manufactured articles.
- 9: Commodities and transactions not classified elsewhere in the SITC.

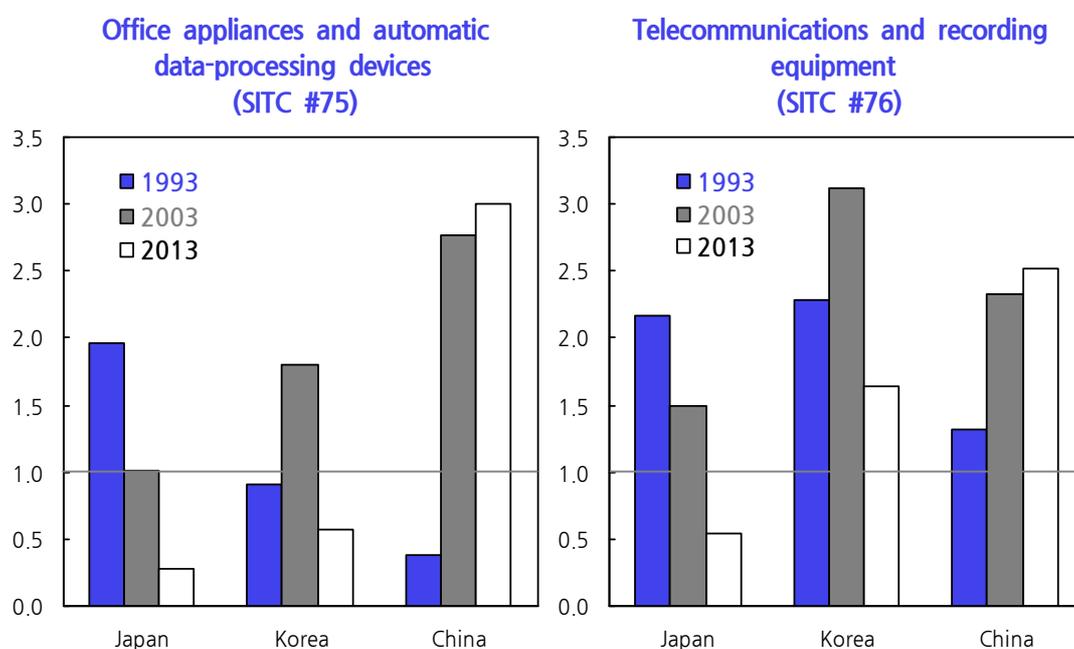
Source: Calculation using raw data from the UN Comtrade Database.

■ Korea's performance in sectors where Japan's performance weakened due to Korea's and China's catch-up, is also declining with China's fast approach.

- In 1993, Japan's market dominance in office appliances and automatic data-processing devices (SITC #75), and telecommunications and recording equipment (SITC #76) was almost double that of other sectors (comparative advantage of 2). However, the index has since continuously declined over the past two decades with the comparative advantage turning into a disadvantage.

- Meanwhile, China and Korea have continued to expand their market shares in the above two sectors; catching up with Japan for the first ten years and then, just China overtaking it for the remaining ten, during which Korea experienced a sharp drop in its global export market dominance.
 - Korea recorded a significant drop of nearly 70% in its comparative advantage in SITC #75 from a decade ago (now a disadvantage). Its advantage in SITC #76 has remained but is 50% lower, reflecting relative sluggishness.
 - Of the sectors that had a comparative advantage in 2003, the above two posted the largest decline during the past ten years.
- On the other hand, China has gradually expanded its dominance in the global export market, posting high comparative advantages.

Changes in the Comparative Advantage of Key Export Items: Comparison between China, Japan, and Korea



Source: Calculation using the raw data from the UN Comtrade Database.

3. Interaction between the export potential of China, Japan, and Korea

■ Applying the Hidalgo *et al.* (2007) methodology¹⁾, this section measures the potential of the export goods of China, Japan, and Korea. And using the results, it attempts to **analyze the degree of impact on each country's comparative advantage.**

- Take the apple industry; it is highly similar to the pear industry and very different to the copper wire industry. As such, when a country has comparative advantage in the apple industry, it is considered to have relatively higher export potential in the pear industry than in the copper wire industry.
 - Countries with a comparative advantage in the apple industry are relatively more likely to have not only the basics such as the soil, climate, packing technologies, and frigorific trucks, but also skilled agronomists, quarantine laws, and relevant trade agreements.
 - These favorable economic conditions for the apple industry also work for the pear industry and its exports. Specifically, a country which excels in apple export is likely to have a comparative advantage (export potential) in the export of pears.
 - However, capabilities accumulated in the apple industry would be useless in the copper wire industry, suggesting that the similarity and relevance of comparative advantages between the two is minimal.
- Therefore, the 'export potential' of a certain item (e.g. pear) is estimated in comparison with a similar item (e.g. apple).
 - This paper analyzed the statistical relevance of the comparative advantage indices in export data for the 1,301 export items (four-digit SITC) in 170 countries, and determined the level of similarity between two items as the conditional probability of a country having a comparative advantage in an item given that it has in the other item.

1) Hidalgo *et al.*, "The Product Space Conditions the Development of Nations," *Science*, 2007.

- Applying this, this paper defines the ‘export potential’ of a certain item from a certain country to be the weighted average of the comparative advantage indices of other items, setting the levels of similarity as the weights.
- The yearly export potential index of a country deduced from this methodology predict the country’s future market share, suggesting that the index could be used as an efficient means to measure export potential.
- The analysis of Japan’s export market share using the export potential index reveals that **in sectors where Korea’s potential was strong in the early 1990s, Japan’s market share diminished.** This implies that **Korea finally caught up with Japan, gnawing off Japan’s market share.**
- The changes in Japan’s dominance in the export market by item over a six-year period was included in an regressional analysis with the export potential for the corresponding items from China and Korea to estimate impact.
 - To find out the impact from China’s and Korea’s export potential at a certain point in time on Japan’s export market share after that point in time, the export potential index from the beginning of the year of the measured period was used.
 - In short, the dependent variable is the change rate of Japan’s market share in 1999 against that of 1993 for each item, and the explanatory variables are China’s and Korea’s potential for the corresponding items in 1993.
 - In addition, Japan’s potential in 1993 was controlled, and the constant term was added to the explanatory variable.
 - The six-year gap was intended to cover the period from 1993, when Japan’s market share started to decline, into the late 1990s. The analysis found that a shorter time gap leads to a smaller regression coefficient, meaning that it takes time for late comers to catch-up.

- The empirical analysis shows that for items in which Korea showed high export potential, Japan's market share decreased, indicating that a fall in Japan's market share of a certain item was contingent on the pace at which Korea caught up.
 - A significantly negative regression coefficient for Korea's export potential indicates that Japan's market share has dropped comparatively further in sectors where Korea's potential is high.
 - In items where Korea's export potential index was higher by one standard deviation (0.13) in 1993, Japan's market share dropped by nearly 14%, meaning that Korea's impact on the changes in Japan's market share was significant.
 - Take #7633 (turntables and record players); Korea's export potential index was higher by about 3 standard deviations than other items in 1993, and for the following six years, its market share dropped sharply by 77%, while Japan's overall share in the export market decreased by 30%.

Korea's and China's Impact on Japan's Export Market Share in the 1990s

Dependent variable	Explanatory variables	
Changes in Japan's export market share	Korea's potential	China's potential
1993 ⇒ 1999	-1.08** (-2.32)	0.00 (0.01)

Note: *t*-statistics are in parentheses. ***, **, * indicate significance levels at 1, 5, and 10 percent, respectively.

- The same analysis of Korea's export market shares since 2000 shows that **items in which China's export potential was high, Korea's market share declined comparatively (since 2010), and the negative impact appears to be growing.**
 - Until the early 2000s, the regression coefficient of China's potential remained insignificant, meaning that there were no noticeable inclinations at that time between the changes in Korea's market share and China's export potential.

- However, as the coefficient decreased gradually to show a statistically significant negative correlation in the mid-2000s, Korea's market share started to comparatively decrease in the sectors where China's export potential were high.
 - In the items where China's export potential index was higher by one standard deviation (0.11) in 2005, Korea's market share dropped by nearly 21% in 2011.
 - Take SITC #7932 (ships, boats, and other vessels); China's export potential index was higher by about 0.9 standard deviation than other items in 2005, and for the following six years, its market share dropped by 2%, while Korea's overall share in the export market increased by 18%.
- In particular, the fact that China's negative regression coefficient on export potential is gradually rising implies that the impact of its catch-up on Korea's market share is growing.
- Meanwhile, Japan's potential has a positive correlation with Korea's market share changes, indicating a continuation of Korea's catch-up with Japan. However, a decrease in the regression coefficient indicates a **gradual slowing of Korea's catch-up**.

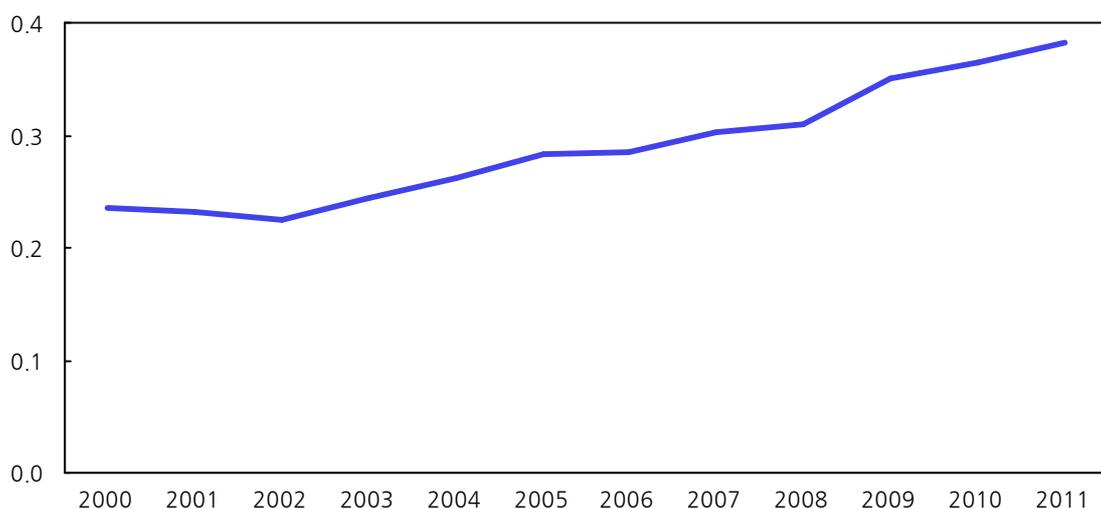
Impact of China and Japan on Korea's Export Market Share in the 2000s

Changes in Korea's export market share	China's potential	Japan's potential
2000 ⇒ 2006	1.12* (1.66)	2.28*** (6.66)
2001 ⇒ 2007	0.13 (0.19)	1.84*** (5.14)
2002 ⇒ 2008	-0.07 (-0.10)	1.83*** (4.39)
2003 ⇒ 2009	-0.93 (-1.34)	1.66*** (3.88)
2004 ⇒ 2010	-1.50** (-2.21)	1.57*** (3.50)
2005 ⇒ 2011	-1.96*** (-3.09)	1.27*** (2.75)

Note: *t*-statistics are in parentheses. ***, **, * indicate significance levels at 1, 5, and 10 percent, respectively.

- China's potential continues to grow in the items where Korea has high export market share, implying that **there could possibly be considerable burden on Korea to sustain export competitiveness in key export items in the future.**
 - The correlation coefficient between Korea's comparative advantage index and China's export potential index has gradually widened since 2003, reflecting China's intensifying catch-up with Korea in the items where Korea's market share is large.
 - Take #7643 (radio and television transmission equipment) and #7649 (parts and accessories suitable for use solely or principally with telecommunications); as of 2011, Korea's market shares in the above two are triple that of other items (comparative advantage index is 3).
 - However, China's export potential indices in the above items are 1.3~1.4 standard deviations higher than other items. As such, if the aforementioned regression analysis results for 2005 is mechanically applied, Korea's market shares in the two items will drop by nearly 30% in 2017.
 - If this trend continues, it is highly possible that much like Japan in the past, Korea could experience a decrease in its market dominance of key export items due to the competition from the late comers, including China.

Correlation between Korea's Comparative Advantage Index and China's Export Potential



Note: Yearly correlation between Korea's comparative advantage and China's export potential indices.

4. Summary and implications

- Korea faces a similar predicament to Japan in the early 1990s when its long-term slump in exports began in terms of the composition of export items and the catch-up of late comers.
 - Korea's export product composition in recent times has been mainly composed of machinery and transport equipment, showing similar characteristics to Japan in the early 1990s.
 - Moreover, Japan's falling export market share of its key products in the 1990s, driven by the catch-up of late comers, is being replayed in Korea since the 2000s.
- Empirical analysis shows that in items where China's export potential is high, Korea's market dominance has posted a relative decline, and the tendency is growing much larger, making it difficult to rule out the possibility that Korea's competitiveness in key export products will be hindered.
 - China's export potential continues to expand in the markets for Korea's key export products, implying that China's catch-up will likely negatively impact Korea's exports in the future. Meanwhile, Korea's catch-up with Japan is gradually slowing.
- To respond to these challenges, it is important for Korea to **continuously foster and enhance creative and core capabilities that late comers will not be able to easily emulate.**
 - Due to the catch-up of late comers, Japan's overall export market dominance has weakened, but its relative strength has been sustained in sectors that require sophisticated technology.
 - Sectors where Japan's export market dominance has been maintained are those that require (relatively) highly-advanced technology — specialized machinery for particular industries (#72), metalworking machinery (#73), road vehicles (#78), photographic apparatus, equipment and supplies and optical goods; watches and clocks (#88), etc.

- Rather than merely emulating strategy and catching up, Korea now needs to take the lead in technological development and strengthen its own unique competitiveness, differentiated from that of late comers.
- Furthermore, based on the recognition that the rapidly changing environment has left Korea with **no other alternative but to change its industrial structure, it should formulate an economic platform that could respond in a flexible and efficient manner.**
- If the Korean economy fails to promptly shift its limited production resources such as labor and capital from industries that have a comparative disadvantage to those that have a comparative advantage, it could lead to a decline in the overall productivity and further polarization of the industry.