Analysis on South Korea's Competition with China and Japan in the ASEAN Market

아세안(ASEAN) 시장에서의 한중일 경쟁관계 분석

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Abstract

As of 2019, South Korea(hereinafter Korea) ranked 9th largest country in total trade and was 7th largest exporter of goods in the world. Korea has a high trade dependency ratio, which recorded 70.4% for merchandise trade in GDP ratio in 2018. Korea's economy depends largely on trade, so that expanding its exporting markets throughout the globe is one of the most important strategies for its future economic growth.

However, Korea's export is too much concentrated on the Chinese market, accounting for 26.8% in 2018 among the total export to the world. Therefore, Korea may reduce risks by diversifying its trading partners.

China's emergence in the world market has been an alert to many developing countries including neighboring Korea. Risks of economic instability are much tied to China's performance. Korea, as one of the countries whose economic growth largely depends on export is facing a task for diversification of risks through branching out into the other promising markets such as the ASEAN market.

However, China, is aggressively expanding its overseas market and now is

turning its eye to the ASEAN countries. This phenomenon is an urgent alert to Korea in a sense that Korea's export market may be threatened by China and be facing increasing ASEAN market losses in future. To ASEAN market, China is the largest exporting country now, followed by Japan, who used to be the largest exporter until the early 2000s.

This paper is probing into two main questions. First, whether China's threat and Korea's losses are in fact happening in the ASEAN market due to China's rise. Secondly it will examine what led to its relative collapse of Japan.

Through calculating China's threat to Korea by applying KEVIN P.GALLAGHER AND ROBERTO PORZECANSKI(2011)'s methodology, it is found out that Korea's ASEAN export market is threatened by China. By applying MAURICIO(2006)'s methodology, it is found out that Korea's losses to China is more apparent in low and medium tech products than high-tech products. It implies that Korea should be prepared for a further loss in the market by enlarging the gains of the products which Korea has advantages and reduce the losses of those being threatened industries.

The result of threat calculation also showed that Japan was threatened by China even strong than Korea was. There are three main reasons for this phenomenon of Japan's collapse in the market : China's rise as a strong

competitor; Japan's strategic transition; Japanese companies' localization and new business model.

However, RCA of Japan compared with China and Korea shows that Japan is still having comparative advantages in low-tech manufactures excluding textile, garment and footwear, and all medium technology manufactures. China has a higher RCA in all of low technology manufactures than Japan, and Korea has a higher RCA in all of high-tech products than Japan. Thus, it implies that in general Japan is indeed losing its market in the ASEAN market except for automotive products.

Another interesting result accompanied was that Japan, who is known as possessing high advantage in high-tech electronics, has been losing this market to Korea in terms of its export. They are some hypothesis possibly explaining this phenomenon. However, it is remained to be further studied in future.

Therefore, Korea has to keep its competitiveness in product groups which already have comparative advantage and compete for low and mid-tech manufactures with China. Besides, the Korean companies should also keep eyes on ASEAN's domestic market and prepare for the local competition with the Japanese company especially in the automotive industry.

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I. Introduction

As of 2019, South Korea(hereinafter Korea) ranked 9th largest country in trade and 7th largest exporter of goods in the world, following China, the United States, Germany, Netherlands, Japan and France. Compared to other Northeast Asian countries, Korea has a high trade dependency ratio, which recorded 70.4% for merchandise trade in GDP ratio in 2018, overwhelmingly higher than China's 34% and Japan's 29.9% (World Bank). It means Korea's economy depends largely on trade, and that expanding its exporting markets throughout the globe is one the most important strategies for its future economic growth.

China's emergence in the world market has been an alert to many developing countries including Korea. A wide array of literature (Cheong Young-rok(2009), Nicholas R,Lardy(2003), Vicent Cable(1994)) referred to the issue of China's threat to the world economy, and risks of other countries economic instability which are tied to China's performance. Korea, as one of the countries whose economic growth largely depends on export, is exporting more than 25 percent to China since 2010 (Appendix_Graph1), thus facing a task for diversification of risks through branching out into the other promising markets such as the ASEAN market.

However, China, is aggressively expanding its overseas market and adjusted its trade structure to reduce risks of reliance on advanced economies

including the United States and the European countries, and now is turning its eye to the ASEAN countries(Appendix_Graph2) by reinforcing bilateral and multilateral trade and economic relationship through a series of open-door policy and market expanding strategies. For the recent years, some initiatives including “One Belt, One Road” and “Made in China 2025” served as tools for tightening the economic and political ties between China and the ASEAN countries.

This phenomenon is an urgent alert to Korea in a sense that Korea’s export market may be threatened by China and be facing increasing Korea’s ASEAN market losses in future. China is the largest exporting country to ASEAN at the moment, followed by Japan, once the largest exporter until the early 2000s. Despite of Japan-ASEAN’s long history of bilateral political and economic ties, the share of Japan in the ASEAN market started to decrease after 2000 and overpassed by that of China in 2005(Graph2).

This paper is probing into two main questions. First, whether China’s threat and Korea’s losses are in fact happening in the ASEAN market due to China’s rise. Considering market position transition between Japan and China in ASEAN’s import market after the early 2000s, it raises another important question that whether China’s export is boosted by Japan’s collapse in the market, therefore Secondly explore that if there can be witnessed Japan’s market share falling in the ASEAN import market, then it will examine what led to its relative collapse of Japan.

II. Methodology

This paper is taking both quantitative and qualitative approaches to measure Korea's competition with China and Japan in the ASEAN market. It is using trade data in 1990s and 2000s as a main source for the analysis, and is also looking into some other data such as FDI inflow and outflow.

The ASEAN countries considered in this paper is 10 country members as of 2020. They are Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. Although there were seven members before 1995 and Vietnam, Laos and Cambodia joined after, for a consistent data analysis, all data related to ASEAN in this paper refers to all these 10 countries, if no any extra annotation.

The trade data is basically analyzed by 3-digit SITC(S3) level, and most of the products(codes between 001~971) are classified into 11 product groups, of which classification is suggested by Lall(2000) and provided as "STANDARD INTERNATIONAL TRADE CLASSIFICATION (SITC) REVISION 3" by the UNCTAD in an official manner as follows :

Table1. Export Product Groups (SITC 3-digit)

LDC01	Primary products
LDC02	Resource-based manufactures: agro-based
LDC03	Resource-based manufactures: other
LDC04	Low technology manufactures: textile, garment and footwear
LDC05	Low technology manufactures: other products

LDC06	Medium technology manufactures: automotive
LDC07	Medium technology manufactures: process
LDC08	Medium technology manufactures: engineering
LDC09	High technology manufactures: electronic and electrical
LDC10	High technology manufactures: other
LDC99	Unclassified products

Source : UNCTAD

Firstly, the paper is adopting a methodology for measuring "direct threat" and "partial threat" of China, developed by KEVIN P.GALLAGHER AND ROBERTO PORZECANSKI(2011) on the basis of Lall and Weiss(2005)'s threat approach(Table2).

Table2. Matrix of Competitive Interactions between China and Another Country in Export Market(Lall&Weiss, 2005)

<table>
<tr><td></td><td colspan="3">Chinese export market shares</td></tr>
<tr><td rowspan="3">Other country's export market shares</td><td></td><td>Rising</td><td>Falling</td></tr>
<tr><td>Rising</td><td>A. No threat
Both China and the other country have rising market shares and the latter is gaining more than China

B. Partial Threat
Both are gaining market share but China is gaining faster than the other country</td><td>B. Reverse threat
No competitive threat from China. The threat is the reverse, from the other country to China</td></tr>
<tr><td>Falling</td><td>D. Direct threat
China gains market share and the other country loses; this may indicate causal connection unless the other country was losing market share in the absence of Chinese entry</td><td>E. Mutual withdrawal No threat
Both parties lose shares in export markets to other competitors</td></tr>
</table>

While Lall and Weiss focused on China and LACs competition in the US market, P.GALLAGHER and PORZECANSKI applied it to the world market. This paper basically follows their methodology which is using "difference in market share", or "DCRP[1]" of China and another targeted country between two periods of time, but applies DCRP method not to LACs but to Korea and Japan for calculating how much percentage of products could be considered as being threatened by China between two periods of time, 2010 and 2018.

$DCRP_i$: $[(X_i/M)^{2018} - (X_i/M)^{2010}]*100$, i=c(China), k(Korea), j(Japan)

Direct threat : $(\sum_{a=1}^{n} X_{ia}/X_i)*100$, when $DCRP_{ca}>0$ & $DCRP_{ka}<0$

Potential threat : $(\sum_{a=1}^{n} X_{ia}/X_i)*100$, when $DCRP_{ca}> DCRP_{ka}>0$

DCRP is country i's difference in market share between two periods of time where Xi means total export of country i to ASEAN, M means the total import of 10 ASEAN countries, and X_{ia} means country i's annual export of product a, or a specific product group. When China's DCRP is larger than zero and Korea's DCRP is smaller than zero, it is said that that product (group) of Korea is directly threatened by China. With the same logic, when China's DCRP is larger than zero and Japan's DCRP is smaller than zero, it is said that that product (group) of Japan is directly threatened by China.

Then, the share of these directly affected products relative to Korea's total export will be China's "direct threat" to Korea measured by percentage.

[1] Dynamic Revealed Comparative Position

When both China and Korea's DCRP is larger than zero and Korea's DCRP is smaller than that of China, it is said that that product (group) of Korea is potentially threatened by China. Then, the share of these potentially affected products relative to Korea's total export will be China's "potential threat" to Korea measured by percentage.

The total threat will be a sum of direct and potential threat. Therefore, it can be derived how much the "direct threat", and "partial threat" of China to Korea or Japan based on the DCRP, by comparing two periods of time(2010 and 2018) . The paper is analyzing the results by each product group.

Secondly, in order to measure competition levels among China, Korea, and Japan, the paper is calculating both *ESI* and *losses or gains* of Korea. *Export Similarity Index(ESI),* suggested in *Finger-Kreinin(1979),* is to examine how much overlapping between subject countries for product level, and that is defined as $\boldsymbol{ESI = \Sigma_{a=1}^{n} Min[(X_k^a/X_k),(X_c^a/X_c)]}$, where $X_k{}^a$ means Korea's product *a* export to ASEAN, and X_k means Korea's total export to ASEAN. The value ranges between 0 to 1, and the higher the value implies the higher competition between Korea and China or between Korea and Japan.

To calculate Korea's losses to China, it is adopting a variation of the constant market approach. This approach is first suggested by Bastista(2005) in *Competition between Brazil and other exporting countries in the US market,* and modified by MAURICIO(2006). By applying MAURICIO's

method of measuring a country's gains or losses to China, Korea's ASEAN market losses to China or Korea's gains from Japan can be calculate through the following :

Percentage of Gains/Losses : $(X_c^t/X_w^t)*\{(1/(1+[(X_c^t-X_c^{t-1})/X_c^{t-1}]-(X_k^{t-1}/X_k^t)\}$

Amount of Gains/Losses : $(X_c^t/X_w^t)*\{(1/(1+[(X_c^t-X_c^{t-1})/X_c^{t-1}]-(X_k^{t-1}/X_k^t)\ \}*X_k^t$

X_c is China's annual export to ASEAN in the period of *t* or *(t-1),* X_k means Korea's annual export to ASEAN, X_w^t is world's annual export in t period. To apply this methodology, I acquired and re-organized data from UNCOMTRADE by SITC Revision3 3-digit level. The analysis is based on "STANDARD INTERNATIONAL TRADE CLASSIFICATION (SITC) REVISION 3" provided by UNCTAD. In the following section, it is calculated how much the threat was posed by China to Korea by looking at each product group, and it also explored whether Korea is benefitted from Japan's losses to China.

Finally, the paper is to verify the phenomenon of the sharp decrease in Japan's market share, for Japan's export accounted for more than 10% in 1990s and reached over 25% in 1999 in ASEAN import market, but it began to decline from the early 2000s. It will delve into backgrounds or reasons for the contraction. It will address some statistics such as FDI, the number or sales of oversees Japanese companies and goods exports in an attempt to support the argument.

III. Competition in the ASEAN Market

3.1 Importance of the ASEAN Market

With the rapid economic growth, ASEAN is expected to be a new “world market” in the upcoming “Post-China” era. ASEAN is a political, economic, and culturally integrated community consists of 10 member states. ASEAN was established in 1967 in Bangkok, Thailand with five initiating member states, which are Indonesia, Malaysia, Philippines, Singapore and Thailand. Afterwards, Brunei Darussalam joined the community in 1984 and Vietnam in 1995. In 1997, Lao PDR and Myanmar obtained membership, and Cambodia became the last member of ASEAN in the year of 1999.

Table3. Economic Indicators of ASEAN Member States

(unit : USD, %)

	Population (2018)	GDP(2018) (current USD)	2010-2018 Growth	Per Capita GDP	2010-2018 Growth
Brunei Darussalam	428,962	13,567,351,175	0.13	31,628	-1.10
Indonesia	267,663,435	1,042,173,300,626	5.46	3,894	4.12
Cambodia	16,249,798	24,542,474,061	7.05	1,510	5.37
Lao PDR	7,061,507	17,953,786,416	7.52	2,542	5.88
Myanmar	53,708,395	71,214,803,378	7.20	1,326	6.41
Malaysia	31,528,585	358,581,943,446	5.44	11,373	3.94
Philippines	106,651,922	330,910,343,611	6.34	3,103	4.66
Singapore	5,638,676	364,156,657,770	5.18	64,582	3.75
Thailand	69,428,524	504,992,757,705	3.77	7,274	3.34
Vietnam	95,540,395	245,213,686,369	6.23	2,567	5.15
Total	653,900,199	2,973,307,104,557			

Data Source : World Bank, IMF

ASEAN is one big single market with 653 million population and with total GDP of 2,973 billion US dollars in 2018. Amongst 10 members, Indonesia is the largest economy with 1,042 billion dollars' worth of GDP, followed by Thailand(504 billion USD). Singapore ranks the first in terms of per capita GDP with 64,582 US dollars, followed by Brunei, Malaysia, and Thailand.

During 2010 to 2018, the real GDP growth rate of Cambodia, Laos, and Myanmar was higher than 7% CAGR and that of Philippines, Vietnam was higher than 6%, Malaysia, Indonesia and Singapore also recorded more than 5% during this time period. Per Capita GDP of Myanmar, Cambodia, Laos, Vietnam and Philippines are growing faster as the annual growth rate is maintaining at 5~6% level for the recent eight years.

Although there are some discrepancies among the region, the ASEAN countries are boasting their economic potential with their increasing trade volume as well. Among 10 ASEAN countries, Singapore has the largest trade volume of 782,247 million US dollars, followed by Thailand and Vietnam.

Table4. Trade Volume of ASEAN(2010~2018)

(unit : million USD)

	2010	2015	2016	2017	2018
ASEAN	2,007,300	2,272,957	2,235,874	2,573,644	2,869,214
Singapore	666,311	666,063	629,990	700,964	782,247
Thailand	377,705	416,952	409,578	458,148	501,659
Viet Nam	157,075	327,793	351,559	428,334	480,568
Malaysia	363,377	376,385	357,789	412,443	464,682
Indonesia	293,442	293,061	280,143	325,735	368,926
Philippines	109,965	128,802	142,221	170,602	182,526
Myanmar	13,739	28,345	27,368	33,132	36,017
Cambodia	10,493	19,211	22,440	25,562	30,189
Lao PDR	3,745	6,763	7,231	10,069	11,663
Brunei	11,447	9,582	7,554	8,655	10,738

Data Source : UNCOMTRADE

The largest importing product of ASEAN countries is cathode valves and tubes which include memories, processors and controllers, electronic integrated circuits, semiconductor devices, and etc. Petroleum oils and parts, accessories for machines are also the main importing products. The top10 importing products mostly consist of mid and high-tech manufactures.

Table5. ASEAN's Top10 Importing Products to the World(1990~2018)

(unit : million USD)

Products	1990	2000	2010	2018
Cathode valves & tubes	9,769	75,022	118,296	175,457
Petroleum oils or bituminous minerals > 70 % oil	5,902	16,929	95,671	117,753
Petroleum oils, oils from bitumin. materials, crude	9,777	21,858	68,057	78,691
Parts, accessories for machines of groups 751,752	3,767	18,984	26,241	48,857
Gold, non-monetary (excluding gold ores and concentrates)	1,792	2,041	17,682	31,840

Telecommunication equipment, n.e.s.; & parts	4,703	12,091	31,382	30,853
Apparatus for electrical circuits; board, panels	2,836	10,231	19,493	30,065
Aircraft & associated equipment; spacecraft, etc.	2,965	2,689	12,295	23,544
Other machinery for particular industries, n.e.s.	3,209	8,635	14,188	21,885
Electrical machinery & apparatus, n.e.s.	2,174	8,753	15,609	21,548
Top10 Products	46,894	177,232	418,913	580,492
All Products	145,244	366,022	953,164	1,424,500

Data Source : UNCOMTRADE

Korea's Top 10 exporting products to the world show that Korea's largest and second largest exporting products to the world match with ASEAN's Top 2 importing products. Besides, it shows that Korea has relatively high share of mid and high-tech manufacturing products in its exports. As Korea's Top 10 exporting products account for more than half of its total exports, if Korea's exporting strategy meets ASEAN's importing needs, it will bring about larger opportunity for Korea's future export to the ASEAN countries.

For example, Korea is exporting more than 124 billion dollars of cathode valves and tubes to the world and it accounts for more than 20% of Korea's total export. ASEAN's annual import of cathode valves and tubes is more than 175 billion US dollars, which is larger than Korea's export to the world. However, Korea's cathode valves and tubes export to ASEAN countries is less than 20 billion dollars. It implies that there is much room for expanding the product's export to the region by taking strategic expanding measures, especially through competition and cooperation with China and Japan.

Table6. Korea's Top10 Exporting Products to the World(2018)

(unit : million USD, %)

	Products	Export	Share
776	Cathode valves & tubes	124,978	20.66
334	Petroleum oils or bituminous minerals > 70 % oil	44,715	7.39
781	Motor vehicles for the transport of persons	38,248	6.32
759	Parts, accessories for machines of groups 751, 752	26,599	4.40
793	Ships, boats & floating structures	20,334	3.36
784	Parts & accessories of vehicles of 722, 781, 782, 783	19,544	3.23
728	Other machinery for particular industries, n.e.s.	16,959	2.80
511	Hydrocarbons, n.e.s., & halogenated, nitr. derivative	14,813	2.45
871	Optical instruments & apparatus, n.e.s.	13,529	2.24
778	Electrical machinery & apparatus, n.e.s.	12,456	2.06
	Top10 Products	332,177	54.92
	All Products	604,807	100.00

Data Source : UNCOMTRADE

3.2 Korea's Export Similarity with Rising China

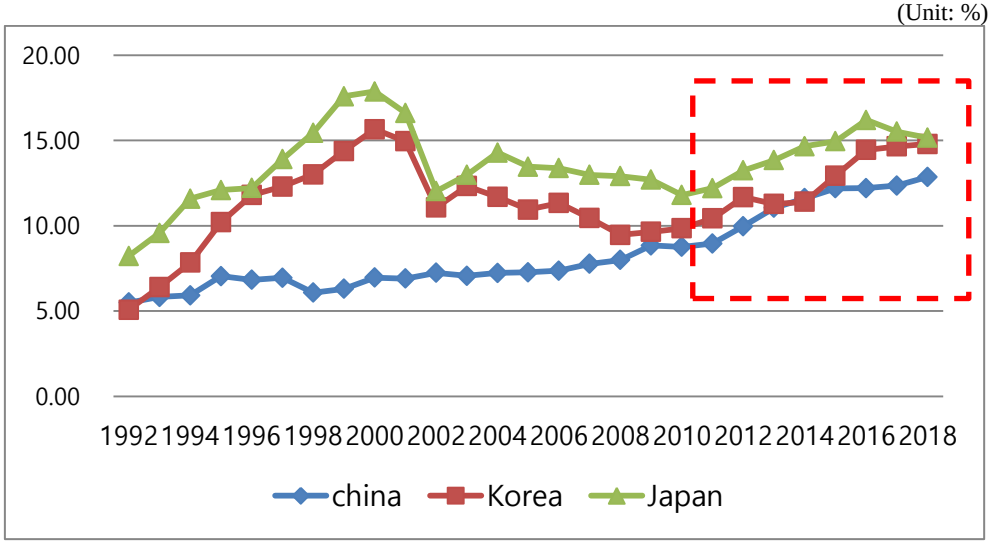
3.2.1 Rising China in the ASEAN Market

The share of China's export to the ASEAN countries relative to total has been consistently rising for decades, chasing Japan and Korea. The share of Japan's or Korea's export to the ASEAN countries relative to total rapidly mounted to more than 15 % in the late 1990s but started to fall from the early 2000s and began to recover to some extent .

In recent years, China and Korea are both showing increasing trends in the share, reaching approximately 15% of the total. It implies that they are expanding their overseas markets in ASEAN rather than in other region.

Graph1. China/Korea/Japan's Export Proportion to ASEAN in Total Export

(Unit: %)



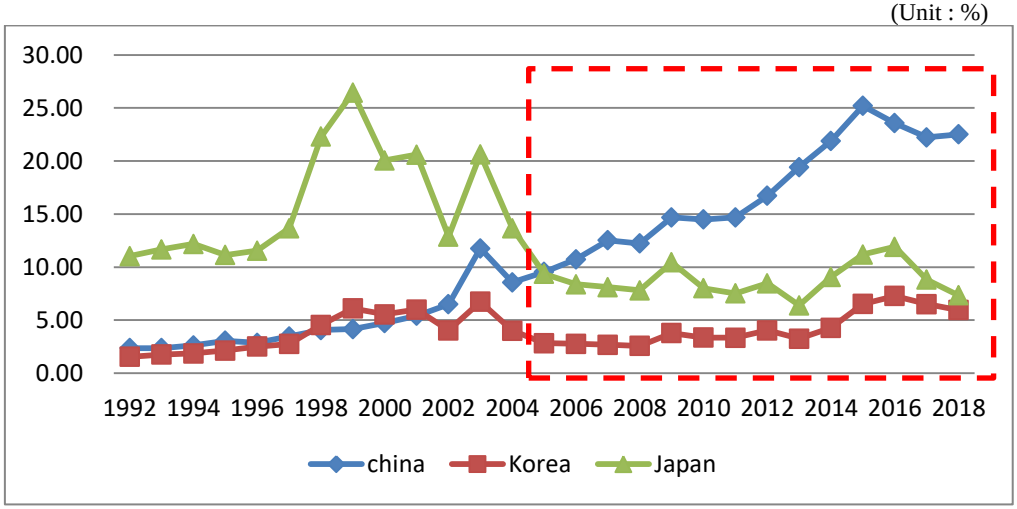
Data Source : UNCOMTRADE

Therefore, in the ASEAN import market, Korea is facing intensified competition. Putting aside the United States, Korea will be still competing with China and Japan. Although Japan is losing its market share and giving some space to Korea, China is aggressively rising as a strong competitor to Korea. China's ASEAN market share has been increasing since 1990s and started to soar in 2000s to reach 25% in 2015. The share of Korea's export to ASEAN was at the similar level as that of China in 1990s, but with a sharp decrease during the early 2000s lasting to the early 2010s, it is keeping at 10% level in the recent years. While Korea and Japan's market

share dropped in 2018, China witnessed an increase in its share to 22.5%, consolidating its market position.

Graph2. Market Share of China, Korea and Japan in ASEAN(1992-2018)

(Unit : %)

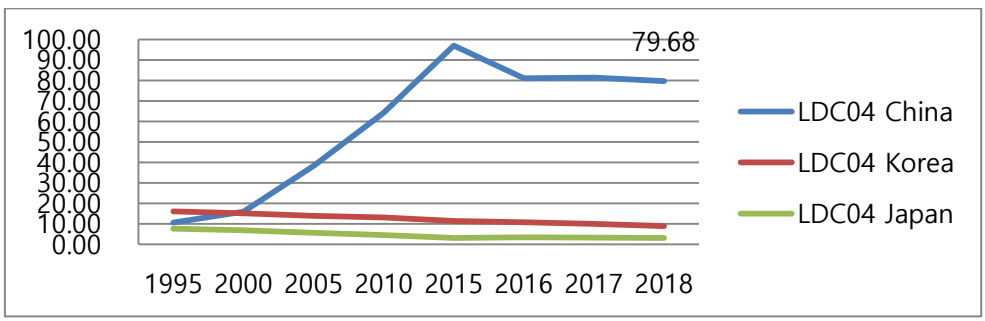


Data Source : UNCOMTRADE

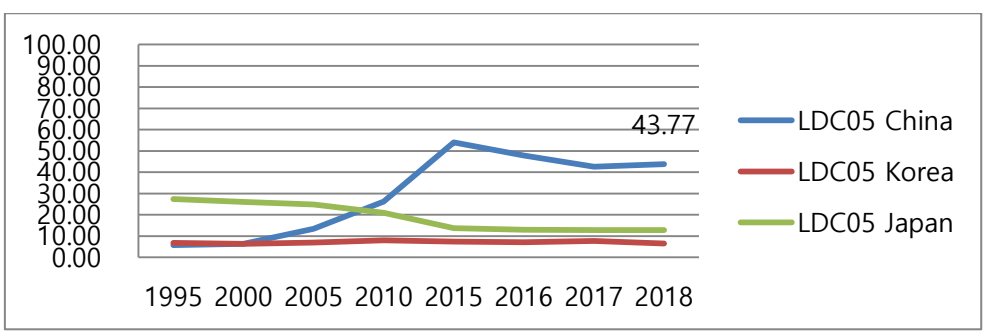
By breaking down all products into 11 product groups, the result shows that China is losing no any market to Japan and Korea except for automotive product of medium-tech manufactures. With abundant natural resources, it is not surprising that China has strength at primary products, resource-based agro and non-agro manufactures. However, both in medium-tech and high-tech manufacturing products, China is aggressively expanding its market share. Moreover, only except for agro-based manufacturers, China's market share gap with Korea or Japan in medium and high technology manufactures market is, in general, much larger than primary products, non-agro resource based manufactures, or unclassified products.

China's low technology manufactures including textiles, garments and footwear account for 80% in the market during the recent years, which soared from 10 percent level in 2000s. The market share of the other low technology products is also high, keeping more than 40%, while Korea and Japan's share is at more or less than 10% level.

Graph3. Low technology manufactures: textile, garment and footwear



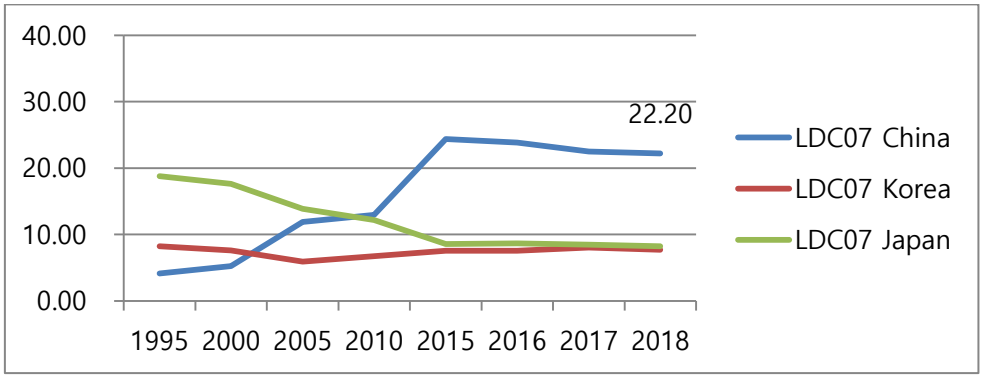
Graph4. Low technology manufactures: other products



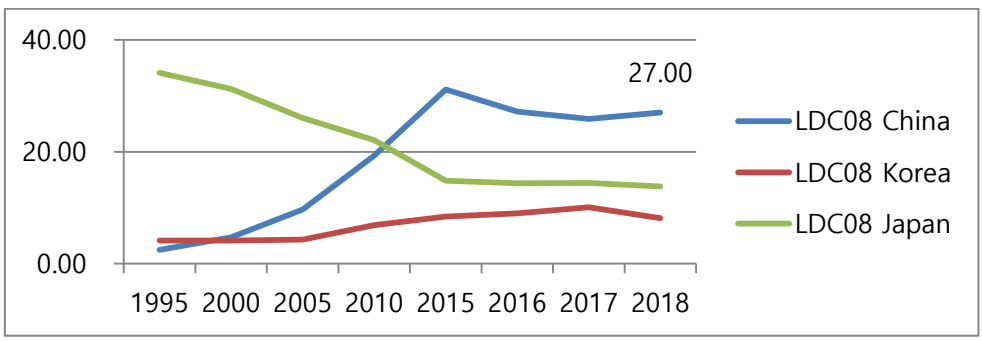
Data Source : : Own calculation based on UNCOMTRADE

For Medium technology manufactures, China's share in 2018 ranges between 20 ~ 30% for process, engineering, and automotive products, while Korea's share is remaining at more or less than 10% level.

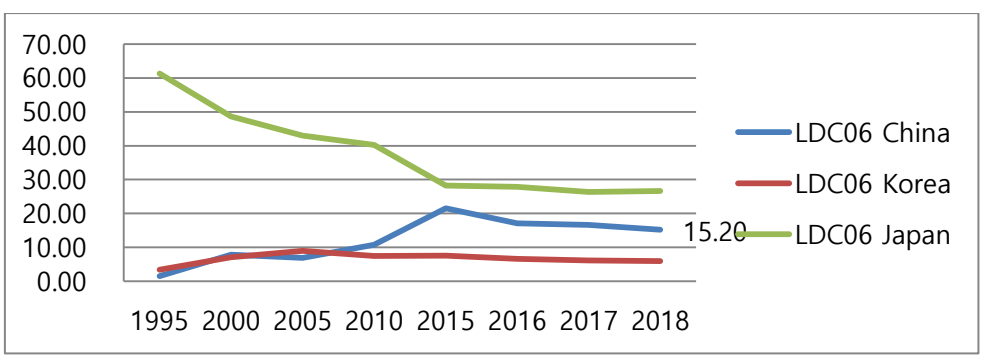
Graph5. Medium technology manufactures: process



Graph6. Medium technology manufactures: engineering



Graph7. Medium technology manufactures: automotive

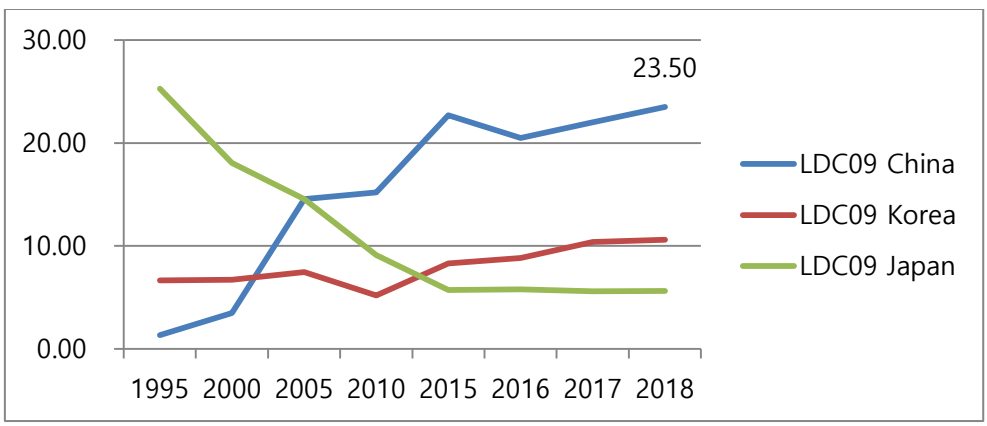


Data Source : : Own calculation based on UNCOMTRADE

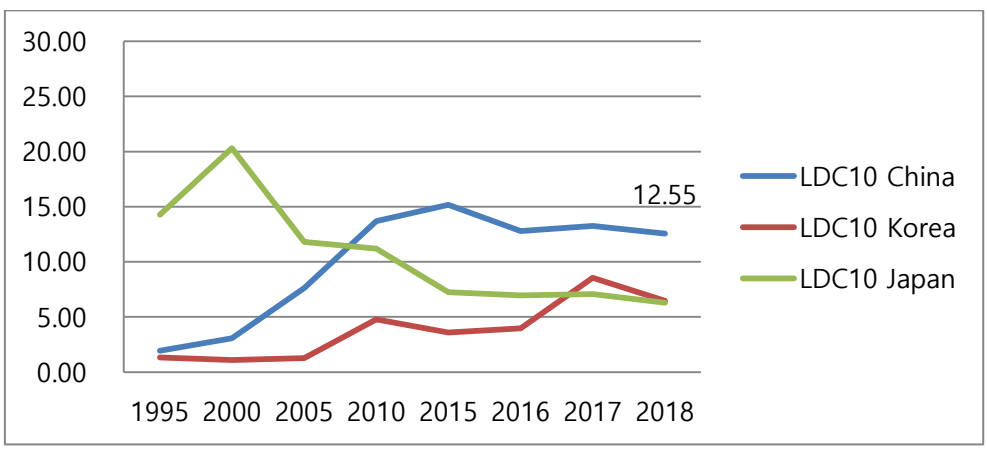
Undeniably, China is also outperforming Japan and Korea in high tech manufactures. China's product market share of electronic and electrical

products surpassed Korea in the year of 2000 and exceeded Japan in 2005, and now it is accounting for nearly 25% in the ASEAN market. For non-electronic and electrical high-tech manufactures such as Optical instruments & apparatus(71.4%), Medicinal and pharmaceutical products, excluding Medicaments(22.7%), it accounts for 12.6%, about two times higher than Korea's 6.4%, and Japan's 6.3%.

Graph8. High technology manufactures: electronic and electrical



Graph9. High technology manufactures: other

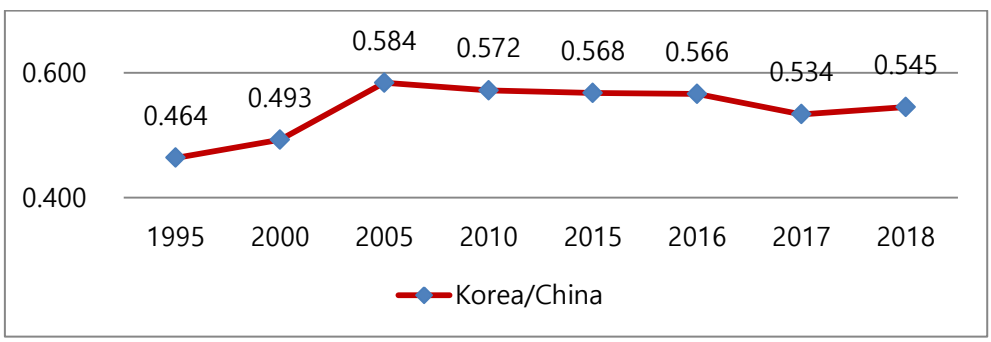


Data Source : : Own calculation based on UNCOMTRADE

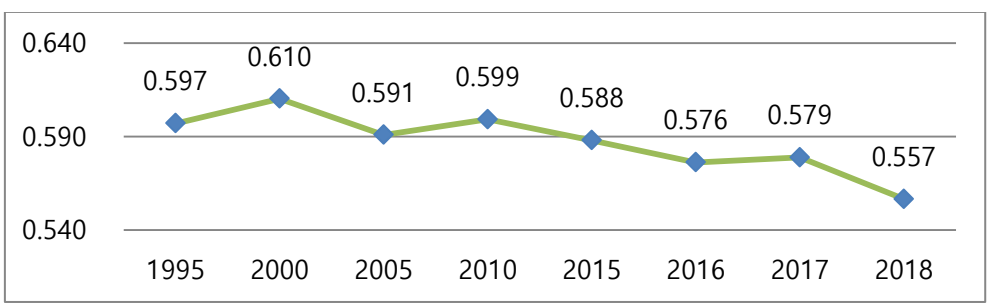
3.2.2 Korea's Export Similarity with China, Japan

Against this backdrop of China's encroachment of the ASEAN market, high export similarity, which serves as an indicator for the level of countries competition, between China and Korea, and between Japan and Korea is sending a serious alarm for Korea's ASEAN market exportation. In 2018, the Export Similarity Index(ESI) in the ASEAN market between Korea and China recorded 0.545, which increased from 0.534 of the previous year. In the meanwhile, the ESI between Korea with Japan was 0.557, which is mostly decreasing after 2010.

Gragh10. ESI between Korea and China during 1995~2018



Gragh11. ESI Between Korea and Japan during 1995~2018



Data Source : : Own calculation based on UNCOMTRADE

3.3 China's Threat to Korea

3.3.1 Market Share Changes and *DCRP*

China's rise in the ASEAN import market is growing more and more obvious and significant. China has been enhancing partnership with ASEAN by signing framework agreement on *Comprehensive Economic Co-operation ASEAN and China* in 2002 and established the Free Trade Zone in 2010.

As recently China is experiencing trade disputes with its main trading partner, the United States, it is more aggressive in pushing forward its One Belt One Road initiative and Made in China 2025 to raise the competitiveness of Chinese products and to advance into the newly emerging markets.

It is important to assess whether China is in fact threatening Korea's exportation to the destination. To evaluate China's threat in a more quantitative manner, the *DCRP(Dynamic Revealed Comparative Position)* for 2010 and 2018 of China, Korea and Japan is calculated based on KEVIN P.GALLAGHER AND ROBERTO PORZECANSK(2011)'s threat evaluation methodology.

By All Product Groups

The result shows that the *DCRP*s of China in all product groups are mostly larger than zero, only except for non-electronic and electrical high-tech manufactures(-1.13) especially radio–actives and associated materials(-16.3)and unclassified products(-0.54) including electric current(-27.07).

For Korea, low-tech manufactures and automotive shows a minus speed of growth. Japan has lost the entire market share in all product groups.

Table7. DCRP of China, Korea and Japan in ASEAN (2018/2010)

By All Product Groups

Products, by technological categories	China	Korea	Japan
Primary products	2.56	0.49	-0.64
Resource-based manufactures: agro-based	7.96	1.11	-1.70
Resource-based manufactures: other	6.44	0.27	-2.11
Low technology manufactures: textile, garment and footwear	15.39	-4.34	-1.43
Low technology manufactures: other products	17.54	-1.54	-8.06
Medium technology manufactures: automotive	4.41	-1.52	-13.54
Medium technology manufactures: process	9.27	0.97	-3.94
Medium technology manufactures: engineering	7.68	1.30	-8.32
High technology manufactures: electronic and electrical	8.29	5.41	-3.50
High technology manufactures: other	-1.13	1.69	-4.89
Unclassified products	-0.54	0.00	0.00

Source : : Own calculation based on UNCOMTRADE, UNCTAD

By Manufacturing Product Groups

Similarly, the results presented by degree of manufacturing group also demonstrate that most of the manufacturing products except for high-skill electronics are displaying positive *DCRP*s, which means China's market share in most product groups are improved in 2018 compared to 2010, regardless of labor or skills degree of manufacture groups. In the case of Korea, half of the product groups show market losses in 2018 compared to 2010, especially for labor-intensive and resource-intensive manufactures, and low-skill and technology-intensive manufactures. Relatively, medium-skill(9.20) and high-skill(6.99) products such as parts and components for electrical and electronical goods performed better. Japan has lost the entire market share except for medium-skill electronics, with a mere 0.8 increase in the market share.

Table8. DCRP of China, Korea and Japan in ASEAN (2018/2010)

By Degree of Manufacturing Groups (Unit : %)

Degree of Manufacturing Groups	China	Korea	Japan
Labor-intensive and resource-intensive manufactures	13.53	-1.16	-1.61
Low-skill and technology-intensive manufactures	13.62	-2.98	-6.38
Medium-skill : Electronics	16.21	-0.40	0.80
Medium-skill : parts and components for electrical and electronical goods	9.04	9.20	-6.71
Medium-skill : Other, Excluding electronics	**11.64**	**1.09**	-7.69
High-skill:electronics	-1.37	-0.35	-2.04
High-skill:Parts and components for electrcal and electronic goods)	**9.70**	**6.99**	-5.32
High-skill:Other, excluding electronics	**5.47**	**1.78**	-3.66

Source : : Own calculation based on UNCOMTRADE, UNCTAD

3.3.2 China's Threat to Korea

China's threat to Korea can be measured by "direct threat" and "partial threat". Applying Lall&Weiss(2005)'s theory, while China gains market share and Korea loses, it says this indicates causal connection between two countries. Therefore, while DCRP of China is larger than zero and that of Korea is smaller than zero, the corresponding product group is deemed to be "directly" threatened by China, according to the theory. In like manner, while China and Korea are gaining market share but China is gaining faster than the other country, in other words, while *DCRP*s of China and Korea are both larger than zero and China has a higher value than the other, the corresponding product group is regarded to be "partially" threatened by China. Therefore, the total threat of China to Korea will be a sum of "direct threat" and "partial threat".

By All Product Groups

By categorizing products into 10 groups by technical levels, three out of ten categories of Korea's export products are found out to be directly threatened by China, and six out of ten categories are partially threatened by China.

The share of directly threatened export is found out to be 16.56%, and the share of partially threatened export is about 77.06%, and thus the total threat percentae, which is adding direct and partial threat's export share, is about 93.62% of the total export of Korea to the ASEAN market. Still, direct threat was found in low-tech manufactures and automotive that is categorized to mid-tech manufactures. "High technology manufactures : other" product group is not categorized into one being threatened by China, but the amount and share(4.86%) of its export is almost the smallest.

Thus, almost all the product groups by technical categories are mostly threatened by China. It supports the previous argument that Korea should be prepared for the fierce competition with China in the whole factor-intensity spectrum, from high-tech to natural resource based manufactured goods[2].

[2] Mesquita Moreira(2007)

Table9. China's Threat to Korea(2018)

By Technical Categories

(unit : million USD, %)

Products, by technical categories		2010	2018	
		Export	Export	Share
1	Primary products	2,200	4,227	4.99
2	Resource-based manufactures: agro-based	1,498	3,237	3.82
3	Resource-based manufactures: other	9,972	13,924	16.42
4	Low technology manufactures: textile, garment and footwear	3,122	4,345	5.12
5	Low technology manufactures: other products	5,573	6,980	8.23
6	Medium technology manufactures: automotive	2,159	2,712	3.20
7	Medium technology manufactures: process	5,241	9,835	11.60
8	Medium technology manufactures: engineering	9,279	16,270	19.19
9	High technology manufactures: electronic and electrical	11,634	34,115	40.24
10	High technology manufactures: other	1,727	4,119	4.86
	Total	32,063	84,787	100.00

Source : Own calculation based on UNCOMTRADE data and UNCTAD

By Manufacturing Product Groups

By categorizing products into 8 groups by degree of manufacturing, three(Group 1,2,3) out of ten categories of Korea's export products are found out to be directly threatened by China, and other three out of ten categories are partially threatened by China(Group 5, 7, 8).

The share of directly threatened export is found out to be 19.41%, and the share of partially threatened export is about 71.90%, and thus the total threat, which is adding direct and partial threat's export share, is about 91.31% of the total export of Korea to the ASEAN market. Similar to the above analysis on product groups by technical categories, in product groups by degree of manufacturing groups, direct threat was found in labor-intensive and resource-intensive manufactures, low-skill and technology intensive manufactures, and medium skill electronics. Except for high-skill electronics and medium skill parts and components of electrical and electronical goods, the other medium and high skill products are all partially threatened by China in the ASEAN market.

Table10. China's Threat to Korea(2018)

By Degree of Manufacturing Groups

(unit : million USD, %)

	Products, by degree of Manufacturing	2010	2018	
		Export	Export	Share
1	labor-intensive and resource-intensive manufactures	4,105	6,536	7.71
2	low-skill and technology-intensive manufactures	9,861	9,818	11.58
3	Medium-skill : Electronics	78	107	0.13
4	Medium-skill : parts&components for electrical,electronical goods	758	3,645	4.30
5	Medium-skill : Other, Excluding electronics	7,763	13,800	16.28
6	High-skill: electronics	423	419	0.49
7	High-skill:Parts&components for electrical and electronic goods)	10,182	31,566	37.23
8	High-skill: Other, excluding electronics	7,614	15,594	18.39
	Total	32,063	84,787	100.0

Source : Own calculation based on UNCOMTRADE data and UNCTAD

The result shows that based on either product category over 90% of Korea's total export is directly or partially threatened by China. On one hand, it presents that low-skill products are more directly threatened than medium or high technology products during 2010 and 2018. Low-skill and technology –intensive manufactures are most directly threatened in terms of its export share relative to total, followed by labor-intensive and resource intensive manufactures.

On the other hand, most of the medium and high technology products are also directly or partially being threatened. However, by degree of manufacturing groups, electronic goods including medium-skill parts and components and high-skill electronics of Korea are not found to be threatened by China yet. The largest export share of potential threat is on high-skill parts and components for electrical and electronics goods.

3.4 Korea's Losses to China

Through measuring the threat of China to Korea, it has been clear that China has, indeed, been threatening Korea's export into the ASEAN market, regardless of factor intensity. The share of threatened products reached more than 90%, which means that almost all the product groups are being directly or indirectly threatened by China.

However, it is unclear that whether this threat brings about any actual or tangible percentage or amount of losses to China. Also, it is necessary to clarify that in which product groups Korea has lost and in which product groups it gained from China if there are any. Therefore, Korea's losses and gains are calculated by applying MAURICIO(2006)'s methodology to figure out this question, as follows :

Table11. Korea's Losses/Gains to China in the ASEAN Market during 2010 and 2018

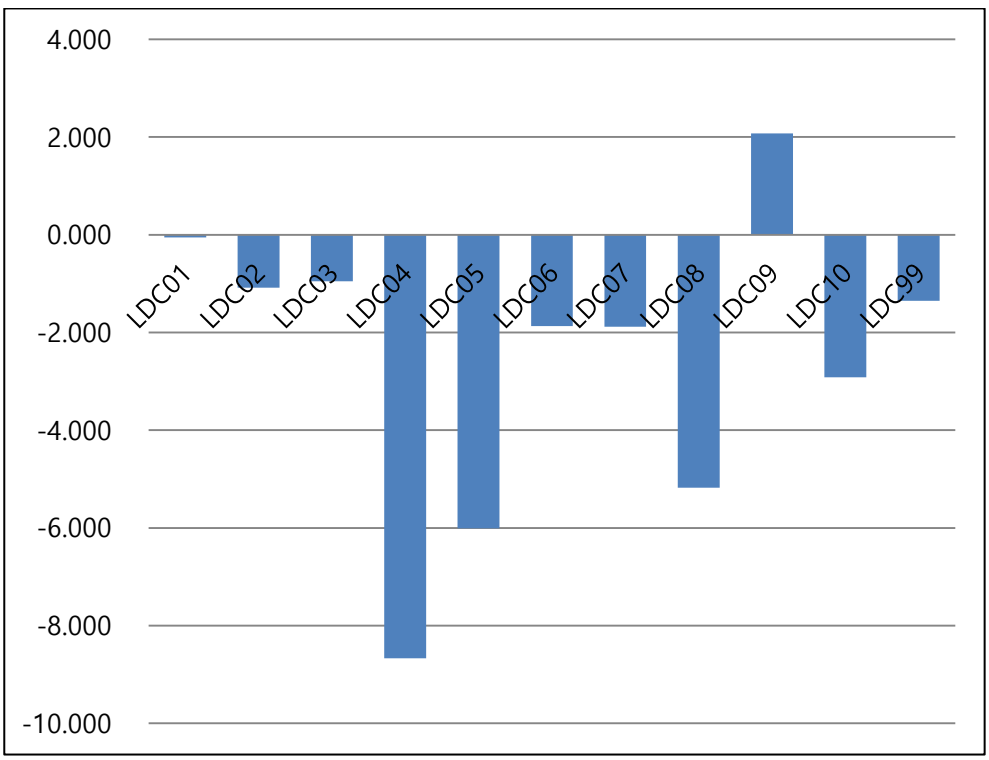
(unit : %, million USD)

	Classification	Percentage	Amount
LDC01	Primary products	-0.056	-1,090
LDC02	Resource-based manufactures: agro-based	-1.084	-21,491
LDC03	Resource-based manufactures: other	-0.951	-86,935
LDC04	Low technology manufactures: textile, garment and footwear	-8.672	-134,100
LDC05	Low technology manufactures: other products	-6.010	-305,707
LDC06	Medium technology manufactures: automotive	-1.867	-117,838
LDC07	Medium technology manufactures: process	-1.885	-133,534
LDC08	Medium technology manufactures: engineering	-5.179	-623,313
LDC09	High technology manufactures: electronic and electrical	2.072	458,977
LDC10	High technology manufactures: other	-2.919	-89,653
LDC99	Unclassified products	-1.354	-732

Source : Own calculation based on UNCOMTRADE data and UNCTAD

The result shows that Korea has lost in nine product groups out of ten in total. The percentage of each product group ranges between - 0.056% up to -8.7%. The highest percentage of losses happens in low-tech manufactures. This outcome is consistent with threat measurement results. Besides, 5.179% of medium technology manufactures on engineering experienced losses.

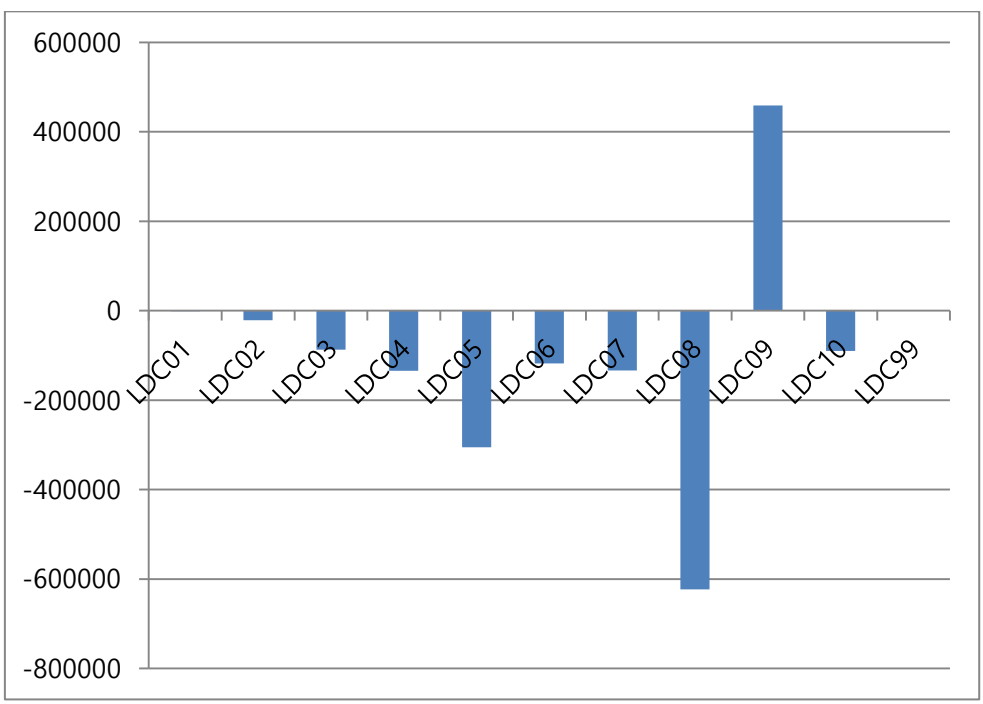
Graph12. Korea's ASEAN Market Gains/Losses to China by percentage during 2018/2010 (unit : %,)



Data Source : UNCOMTRADE

By looking at the amount of losses in US dollars, it is found that this engineering products' losses reached 623,323 million dollars. Medium technology manufactures on process and experienced more than 100 billion losses to China during 2010 and 2018. However, in high technology manufactures: electronic and electrical, whose export share is above 40% of Korea's total export to the ASEAN market, there are some gains from China, worth of 458,997 million dollars. This is the only product group which gained but not lost to China during 2010 and 2018.

Graph13. Korea's ASEAN Market Gains/Losses to China by Amount (million USD,2018/2010)



Data Source : UNCOMTRADE

IV. China's Rise and Japan's Falling?

4.1 Japan's Falling in the ASEAN Market

As mentioned in the introduction, Japan's market share in the ASEAN market dropped sharply in the early 2000s(Graph2). In contrast, China's market share in the ASEAN market started to soar after then. This is one of preliminary observations upon China's rise and Japan's falling in the market. In previous chapters, further observations are made through conducting some data analysis.

Through calculating China's threat to Korea and Korea's losses to China, it became clear that Korea's export to the ASEAN countries has been threatened by China and indeed lost to it in all spectrums of product groups. As seen in the introduction part and the calculation results of China's threat in previous chapters, Japan is significantly losing its share in the market. Korea's being threatened level and losses to China might have been relatively reduced because Japan lost more to China than did Korea. Japan's market share in the ASEAN market sharply decreased after the early 2000s, and it was outpaced just after several years by China in 2005.

Japan's export structure shows that the share of ASEAN market export is kept stagnant at about 15%. Moreover, Japan's main exporting market such

as the United States or European Union became no longer the major ones. While looking at the export data between 2000 and 2018, it can be found out that the share of Japan's export the United States was almost 30 percent in the early 2000s, but it decreased to only 20% in 2018. Similarly, the share of Japan's export to the European Union was about 13% but it dropped to only 6%. Overall, Japan's exports to main importing markets such as ASEAN, the United States, EU were decreased, while its export to China increased from 10.9% in 2000 to 24.9% in 2018.

This phenomenon suggests a hypothesis that on one hand, Japan lost its ASEAN market to China, and on the other hand, it chose the Chinese market to be an alternative oversees market replacing ASEAN.

Notwithstanding, it is still questionable that why Japan's ASEAN exports share is decreasing rapidly in 2000s. Also, does it mean that Japan has lost its competitiveness in the ASEAN market? This chapter is analyzing on the backgrounds and answers for these queries.

4.2 Plausible Reasons for Japan's Loss in Export

Some external reasons such as the rise of competitors can be imputed to Japan's crumbling, while the high-elated atmosphere is epitomized by China's rise in the world export market along with its accession to the WTO. Also, internal factors including Japan's change of national trade policy as an

intentional and strategic transition led to Japan's diminishing position in the ASEAN import market on the surface. Broadly, plausible reasons for Japan's loss in its market dominance in ASEAN can be categorized into three perspectives: Rising competition, strategic transition, localization and introduction of new business model.

4.2.1 Rising Competition

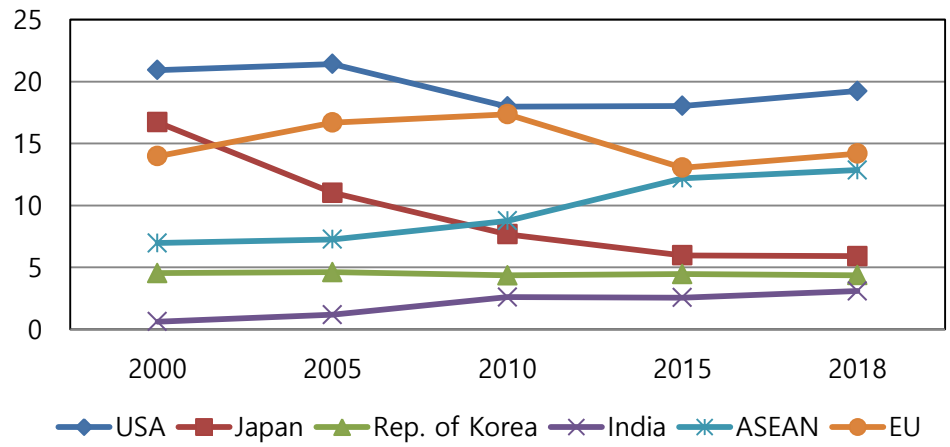
Japan's collapse in the ASEAN market is contributable to the relative rise of China. According to the analysis on China by the Bank of Korea, the share of labor-intensive final products including furniture and textile decreased after 2001, while the share of high value-added final products including tele-communication devices and semiconductors is increasing fast. The BOK pointed out that in terms of China's export, after 2010, the growth of technology-intensive products outpaced that of labor-intensive products, leading its total export growth. In addition, the result of China's RCA shows that China's global competitiveness of high technology product groups significantly enhanced in 2017(1.8) , compared to 2001(1.3).[3]

While China's economic structure shifted from low value-added industries into high technology products and intermediary products, its dependency on ASEAN increased as well. China's export to the United States and Japan

[3] 한국은행(BOK)(2018.11.29)

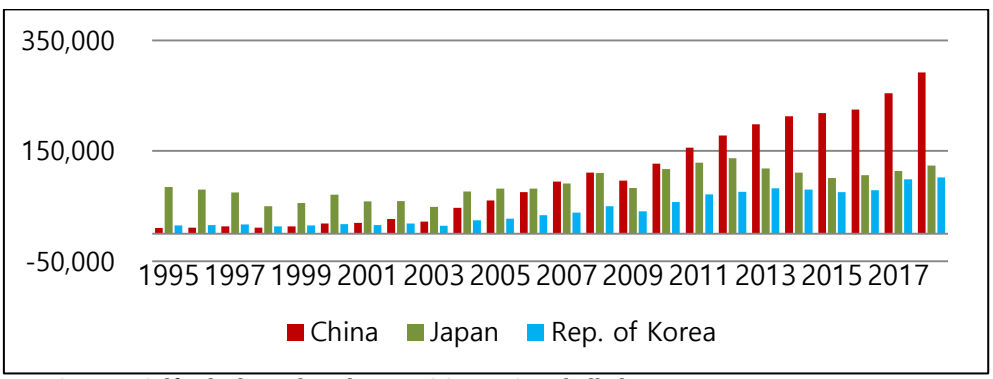
decreased drastically from the early 2000, while its direct export to ASEAN increased. It can be inferred that as China's direct export to ASEAN increases, it replaced Japan's product export to ASEAN. While looking at ASEAN's import amount, its import from China outpaced that from Japan in 2007, China emerging as Japan's largest competitor in the ASEAN market.

Graph14. China's Export Structure(2000~2018)



Data Source : Self-calculation based on UNCOMTRADE bulk data

Graph15. ASEAN's Annual Import from China, Japan, Korea(1995-2018)



Data Source : Self-calculation based on UNCOMTRADE bulk data

ASEAN's import from Japan was 78 billion US dollars in 1998 and increased to 423 billion dollars in 2018, which is 5.1 times larger than 20 years ago. During the same period, the import from China increased 16.1 times and Korea increased 7.6 times. Now the amount imported from China by the ASEAN countries is almost three times larger than that from Japan.

4.2.2 Japan's Strategic Transition

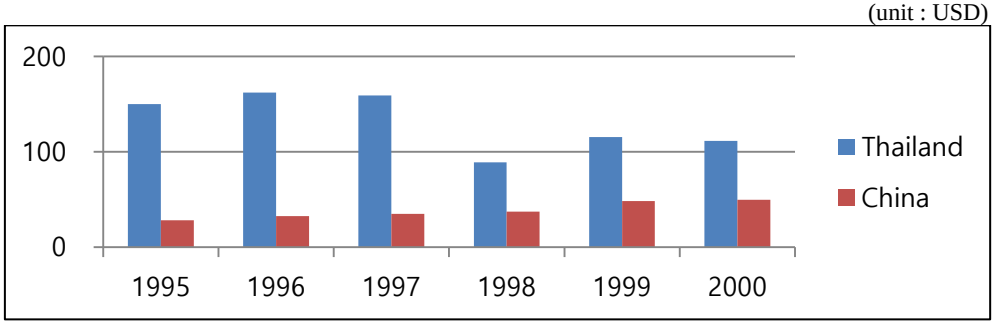
Japan's strategic shifting of main export destination from the ASEAN countries to China is one of the main reasons for the sharp decrease of Japan's export share to ASEAN. According to the argument made by Ministry of Economy, Trade and Industry of Japan, in the past, Japan chose ASEAN countries for exporting its products especially those of intermediary products for the ASEAN countries' relatively cheap labor and for good geographical location of some ASEAN countries for decades.

However, China's successful accession to the WTO in 2001 brought Japan a new promising market—the emerging giant East Asian neighbor, with a cheap and abundant labor and a big consumer market as well. For instance, the minimum wage of Thailand, which was one of the most popular investment destinations for Japanese companies in 1990s, was three times higher than that of China in 1990s. Therefore, as China joined the WTO, a more favorable trade conditions were offered to Japanese companies. Much cheaper minimum wage in China served as a big merit for building factories

in China or assembling parts and components in China rather than in ASEAN.

Graph16. Minimum Wages of Thailand vs. China(1995~2000)

(unit : USD)



Data Source : https://countryeconomy.com/

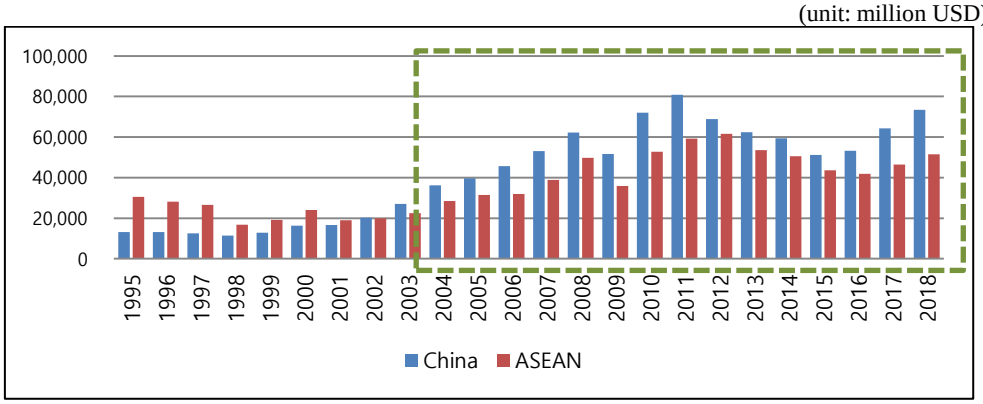
Therefore, Japan started to shift its export destination to China from the early 2000s and this trend is still lasting until today. Japan's export to China has been always surpassed its export to the ASEAN countries between 2003 and 2018. Japan's export amount to China was smaller than that to ASEAN before 2002, but it has become much larger since 2003, recording more than 20 billion USD. In 2018, the amount recorded more than 70 billion USD, which tripled more than the value exported in 2003, while the export amount to ASEAN was only about 50 billion dollars during the same period.

Similarly, Japan's export share to China consistently increased, reaching 25% of Japan's total export in 2018. The share of Japan's export to China was less than 10% in 1995 and was much lower than the share of its export to ASEAN in 2001. Although China had a cheap labor and big market, the relatively closed economy and high barriers stopped it from venturing out into the Chinese market.

However, Japan started to strategically export more to China than to ASEAN after 2003. The share of its export to China is keeping at an increasing trend in the recent years and recorded 25% relative to Japan's total export in 2018. In contrast, it is showing a decreasing trend in the share of Japan's ASEAN export.

Graph17. Japan′s Export Amount to China and ASEAN(1995~2018)

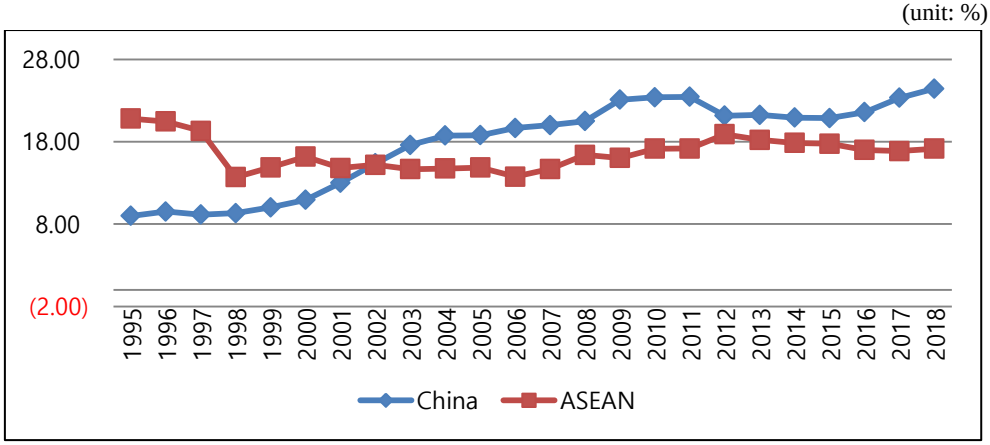
(unit: million USD)



Data Source : Self-calculation based on UNCOMTRADE data

Graph18. Japan's Export Share to China and ASEAN(1995~2018)

(unit: %)

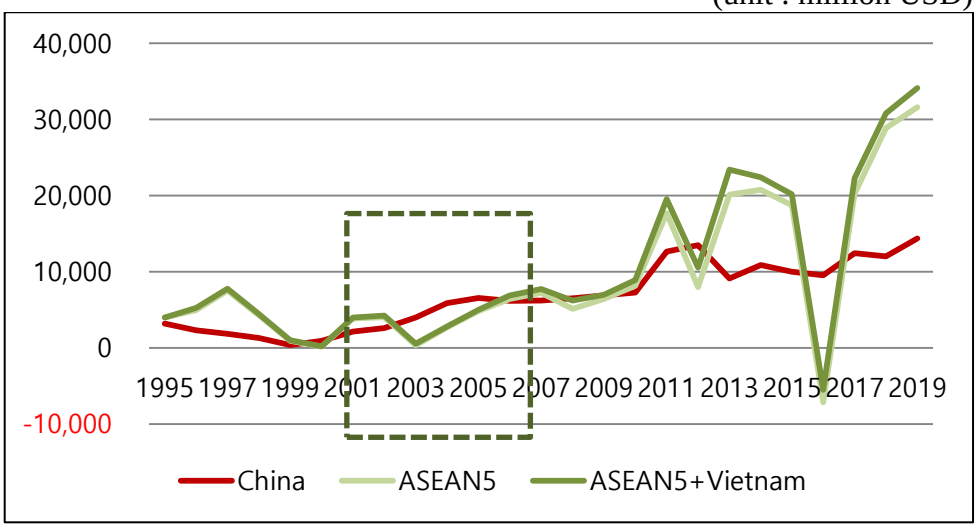


Data Source : Self-calculation based on UNCOMTRADE data

Japan's strategic transition is also shown in its FDI outflow. Japan's FDI to China increased from the early 2000 and surpassed its FDI outflow to ASEAN5 countries. According to Ministry of Economy, Trade and Industry of Japan, it can be explained as Japan's shifting production base to China.

Graph19. Japan FDI outflow to ASEAN by Country(1995-2019)

(unit : million USD)

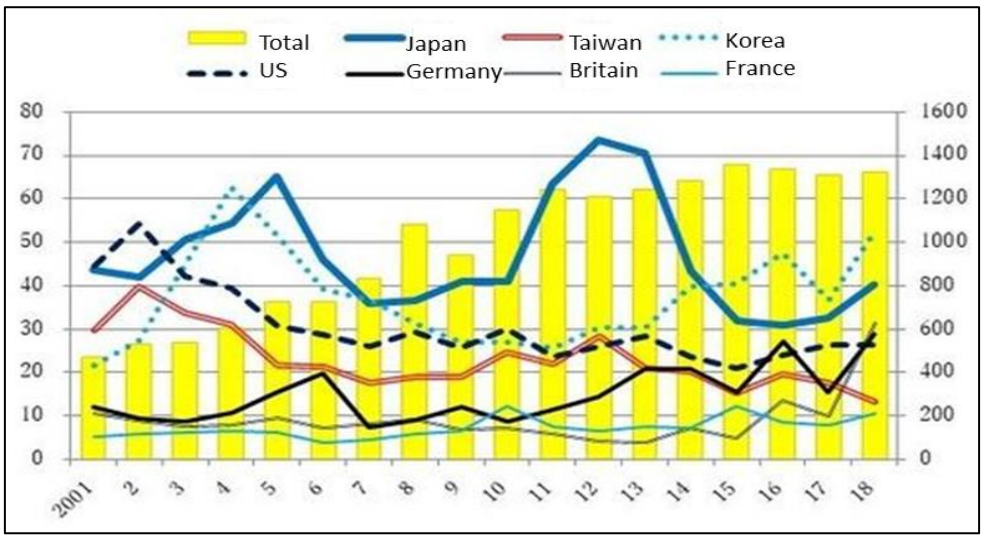


Data Source : Ministry of Economy, Trade and Industry of Japan(METI)

Besides, the FDI inflow structure of China also shows that Japan performed an aggressive investment in China relative to other countries including the United States and Korea. The following figure published by Ministry of Economy, Trade and Industry of Japan shows that Japan is the most active investor during 2005 to 2014. Although Korea became the largest investor after 2015, China's FDI inflow from Japan is still being maintained as a high level just second to Korea.

Graph20. FDI inflow toward China by Country(2001-~2018)

(unit: 100 million dollars)



Data Source : CEIC

4.2.3 Localization & New Business Model in ASEAN

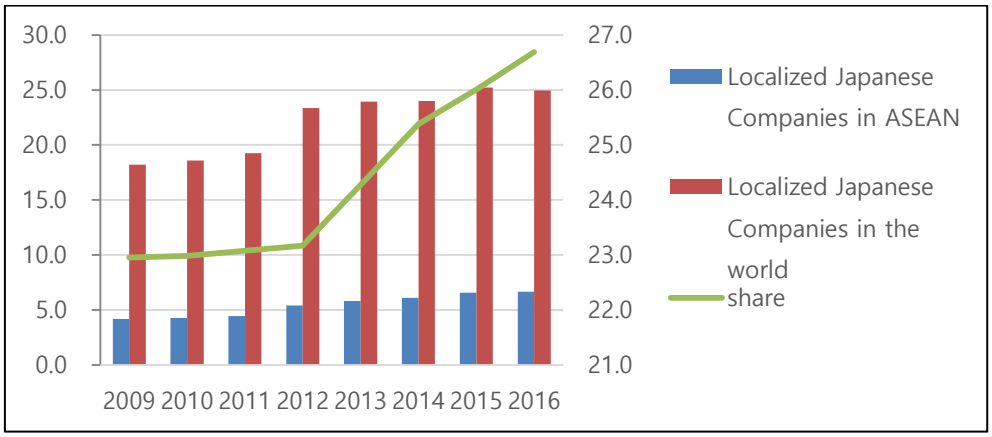
In addition to the previous backgrounds and reasons of Japan's falling in the ASEAN market, localization of Japanese companies in the ASEAN countries and adoption of new business model can be another possible reason for the declining position of Japan.

Some says that the number of Japanese local companies in ASEAN is not showing a significant increase, but considering the stagnant growth of number of Japanese local companies in the world as total, it can be evaluated that localization of Japanese companies in ASEAN is still performing relatively well compared to other regions. As it is shown in the

following graph, the share of localized Japanese companies in ASEAN is constantly growing.

Graph21. The Number and Share of Localized Japanese Companies in ASEAN(2009~2016)

(unit : companies, %)



Source : METI, 経済産業省「海外事業活動基本調査」の調査票情報

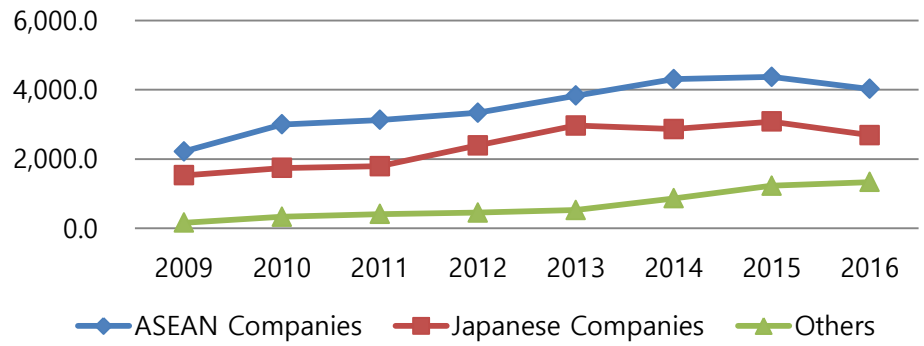
Japan's trade policies experienced a shift and the Japanese companies adjusted their strategies as well. Japanese companies' business model transited from enhancing direct trade value by exporting more goods into focusing on generation of profit in dividends and royalties. Accordingly, the new business model accompanies expanded local procurement in ASEAN countries and aggressive M&As with ASEAN local companies.

As seen in the following Graph22 and Graph23, it is highly convincing that Japan has been localizing its companies in the ASEAN market, with the

related imports coming from ASEAN companies or the 3rd country's local companies in ASEAN. Thus it reduces ASEAN's direct import from Japan.

Graph22. Changes in the Amount of Local Sales of Japanese Companies in ASEAN

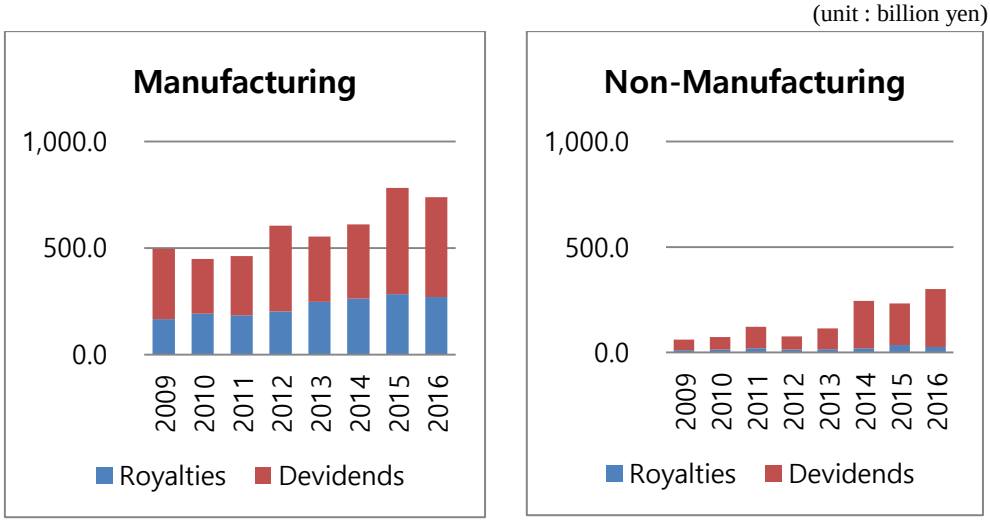
(unit : billion yen)



Data Source : Ministry of Economy, Trade and Industry of Japan

Graph23. Changes in Payments (royalties and dividends) to Japanese Investors of Japanese Companies in ASEAN

(unit : billion yen)



Data Source : Ministry of Economy, Trade and Industry of Japan(METI)

Both the manufacturing and non-manufacturing industry show that royalties and dividends are increasing in recent years. Dividends based payments are higher than royalty based ones. This phenomenon is more obvious in the non-manufacturing industry, in which dividends are several times larger than royalties. Overall, these trends can be regarded as signals for transition of Japanese companies' business model.

4.2.4. Others

The defeat of Japan to China and Korea in ASEAN market in terms of market share loss may also be attributable to Japan's failure of catching ASEAN's evolving or changing needs. ASEAN's needs for capital goods including electronic devices and the parts and components are mainly from China and Korea. For home appliances, Korea's share in the market is significantly large, boosting related companies such as Samsung and LG's export. For general machinery, the needs from China is prominent. However, in terms of transporting machinery, Japan has an advantage than the others. It implies that Japan seems to still have slight advantage in high quality and high value-added products, but is seriously lack of catching the domestic demand of the medium income class.

4.3. Japan's Still Favorable Comparative Advantage

Despite of the fact that Japan is witnessing irreversible market share losses and the corresponding threat from China and Korea, Japan is still having comparative advantage in the ASEAN market. Especially in medium technology manufactures on automotive. In some low-tech manufactures, Japan's RCA is lower than China and in some high technology areas, such as electronics, Japan does not have comparative advantage.

Table12. Japan's RCA in the ASEAN Market(2010-2018)

Classification	2010	2011	2012	2013	2014	2015	2016	2017	2018
Primary products	0.29	0.26	0.29	0.33	0.29	0.34	0.30	0.31	0.32
Resource-based manufactures: agro-based	0.50	0.48	0.50	0.56	0.58	0.54	0.52	0.55	0.58
Resource-based manufactures: other	0.50	0.49	0.37	0.44	0.45	0.53	0.49	0.47	0.45
Low technology manufactures: textile, garment and footwear	0.26	0.29	0.26	0.24	0.25	0.23	0.27	0.27	0.27
Low technology manufactures: other products	1.64	1.66	1.59	1.68	1.55	1.38	1.36	1.45	1.48
Medium technology manufactures: automotive	2.73	2.80	3.05	3.36	3.08	2.94	3.03	3.02	3.07
Medium technology manufactures: process	1.03	1.02	0.99	1.09	1.13	1.05	1.04	1.06	1.07
Medium technology manufactures: engineering	1.63	1.66	1.73	1.70	1.68	1.58	1.56	1.63	1.62
High technology manufactures: electronic and electrical	0.88	0.86	0.83	0.81	0.83	0.75	0.75	0.73	0.75
High technology manufactures: other	0.90	1.06	0.91	0.88	0.96	0.93	0.85	0.88	0.85
Unclassified products	1.34	1.14	0.78	0.46	0.85	0.98	1.17	1.00	0.82

Data Source : own calculation based on UNCOMTRADE data

4.4. How Korea defeated High-tech Intensive Japan?

Through the above analysis, it is found that Korea is still securing its relatively strong position in high-tech products, compared to China and even to Japan. As Japan is known for high-tech-intensive industry advantage, Korea is surprisingly performing better. Further analysis for this unexpected result remains for future studies. However, preliminarily, I suggest three hypotheses for Korea's victory in ASEAN over Japan, especially in high-tech areas.

Firstly, Korea companies implemented good strategy for capturing the new demand of ASEAN. From the early 2000s, ASEAN started to replace Japan with China or Korea in the source of its imports, in particular, electrical machinery, general machinery, and precision machinery(especially parts). In contrast, Japan nothing but just maintained its market share on transport equipment and failed or was not willing to expand product categories.

Secondly, Korea regarded ASEAN not only as another emerging world factory but also another new world market with high potential for the consumption. This attitude led Korean companies to be targeting this large consumer market. By taking advantage of K-wave in the ASEAN Market, Korea's food, beauty, and IT products successfully entered the local market.
Increase of Korea companies(ex.Samsung)'s Local Production in ASEAN.

Thirdly, Korea companies are aggressive on localization in various industries. Korea's parts & components and material export increased sharply in 2000s reaching 47% in 2009. Besides, production of Korea's main exporting products including computer and automobiles transferred to ASEAN local production.

V. Conclusion

In conclusion, it becomes clear that China's expansion in the ASEAN market is threatening Korea's export to the region. As China's economic strategy is to shift its overseas market from advanced countries to newly emerging markets involving ASEAN, this phenomenon will be more intensified in future. From the market share changes and by comparing export structures of China, Korea and Japan, it was preliminarily shown that China's market power in the ASEAN is increasing throughout the decades.

Then the calculation of China's threat and Korea's losses in the market, it was proved that Korea is definitely losing its ASEAN market to the rising China. It implies that Korea should be prepared for a further loss in the market by enlarging the gains of the products which Korea has advantages and reduce the losses of being threatened industries.

On the other hand, with the rise of China, Japan, who was once the largest exporting country to ASEAN was falling. The result of threat calculation

also showed that Japan was threatened by China even stronger than Korea was. There are three main reasons for this phenomenon of Japan's collapse in the market : China's rise as a strong competitor; Japan's strategic transition; Japanese companies' localization and new business model.

RCA of Japan compared with China and Korea shows that Japan is still having comparative advantages in low-tech manufactures excluding textile, garment and footwear, and all medium technology manufactures including automotive, process and engineering. China has a higher RCA in all of low technology manufactures than Japan, and Korea has a higher RCA in all of high-tech products than Japan.

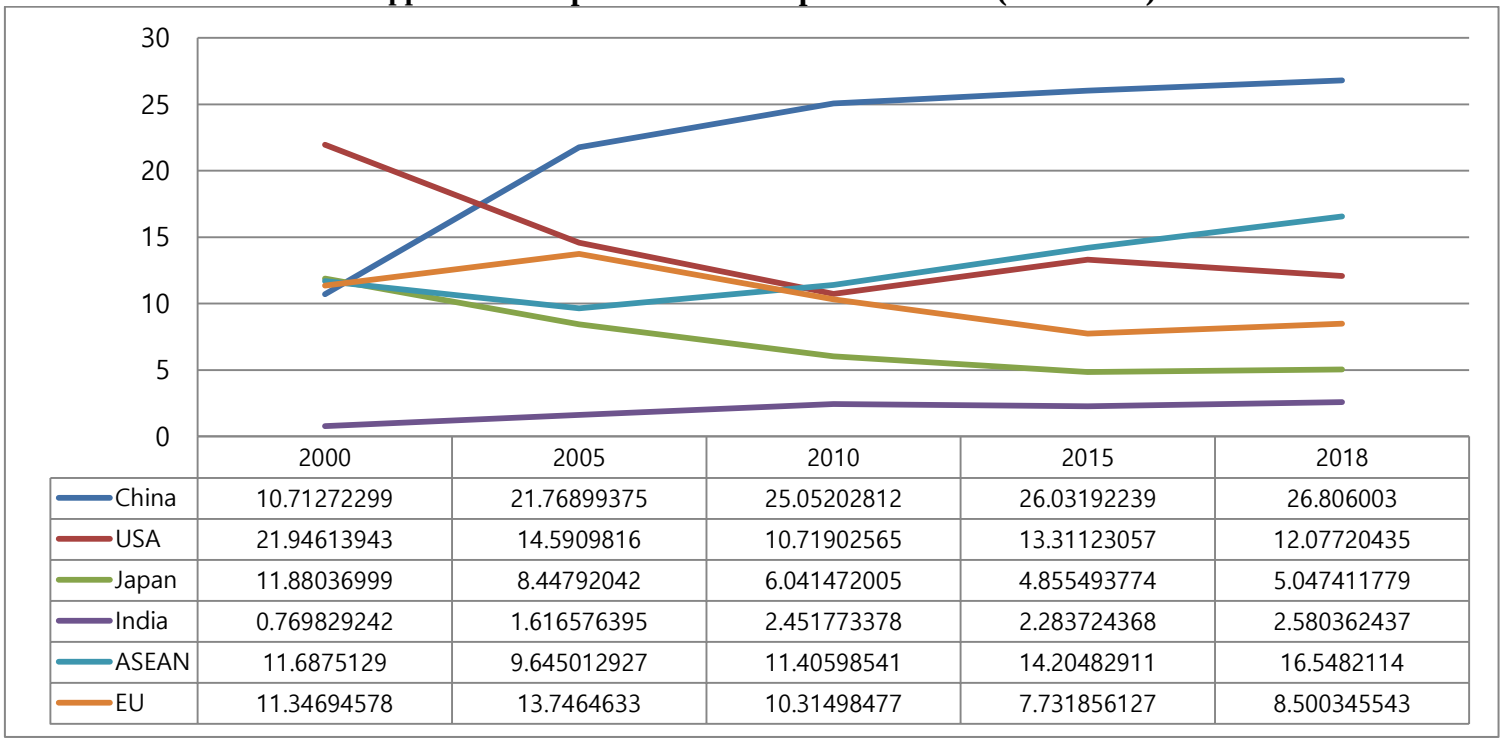
Thus, it implies that in general Japan is indeed losing its market in the ASEAN market except for automotive products, no matter it is analyzed on a quantitative basis or on a qualitative basis. Not only the threat theory and the loss calculation, but also RCA review show that Japan is losing its export market in the ASEAN import market by the rising China and the chasing Korea. Korea is losing to China at all spectrums of product groups except for high-tech electronic and electrical products.

Another interesting result accompanied was that Japan, who is known as possessing high advantage in high-tech electronics, has been losing this market to Korea in terms of its export. They are some hypothesis possibly

explaining this phenomenon. However, it is remained to be further studied in future.

In order to increase Korea's market share in the ASEAN market, Korea has to keep its competitiveness in product groups which already have comparative advantage and compete for low and mid-tech manufactures with China. Besides, the Korean companies should also keep eyes on ASEAN's domestic market and prepare for the local competition with the Japanese company especially in the automotive industry.

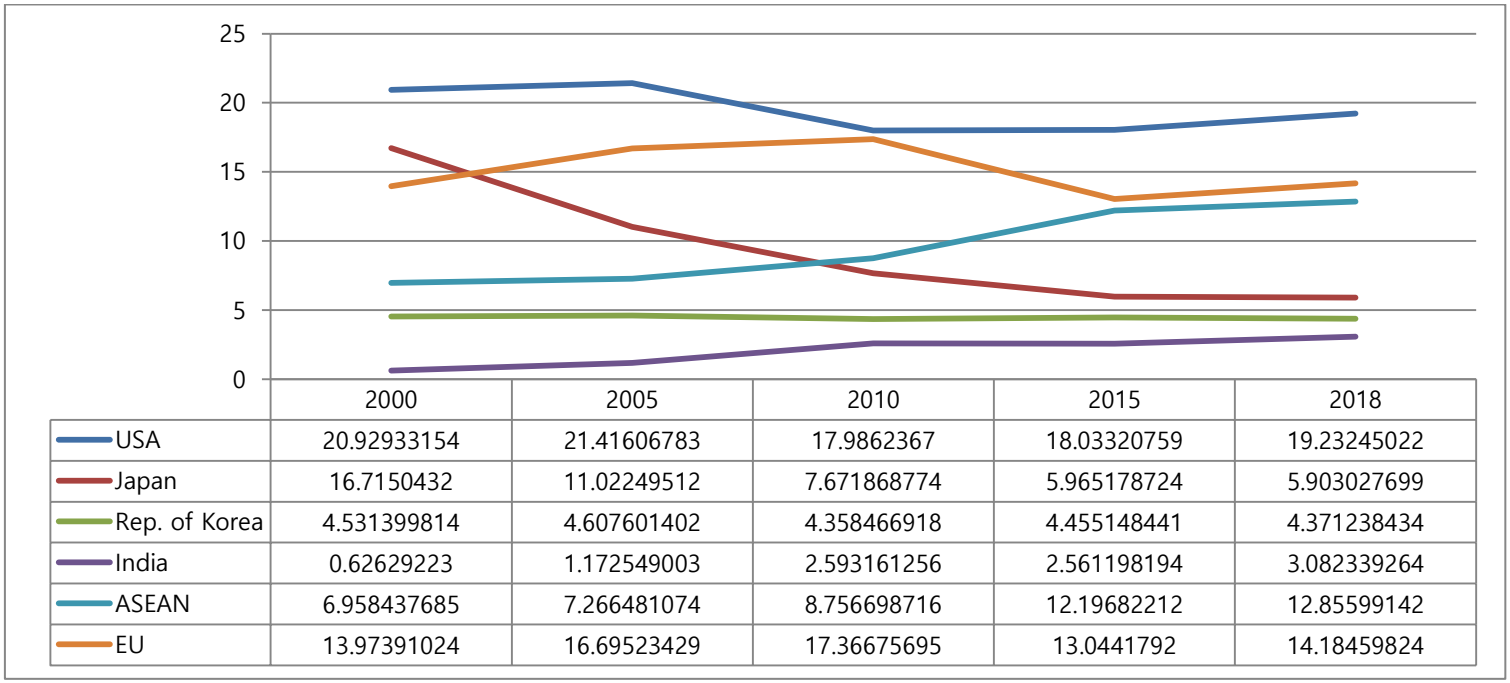
<Appendix> Graph 1. Korea's Export Structure(2000-2018)



	2000	2005	2010	2015	2018
China	10.71272299	21.76899375	25.05202812	26.03192239	26.806003
USA	21.94613943	14.5909816	10.71902565	13.31123057	12.07720435
Japan	11.88036999	8.44792042	6.041472005	4.855493774	5.047411779
India	0.769829242	1.616576395	2.451773378	2.283724368	2.580362437
ASEAN	11.6875129	9.645012927	11.40598541	14.20482911	16.5482114
EU	11.34694578	13.7464633	10.31498477	7.731856127	8.500345543

Data Source : own calculation based on UNCOMTRADE data

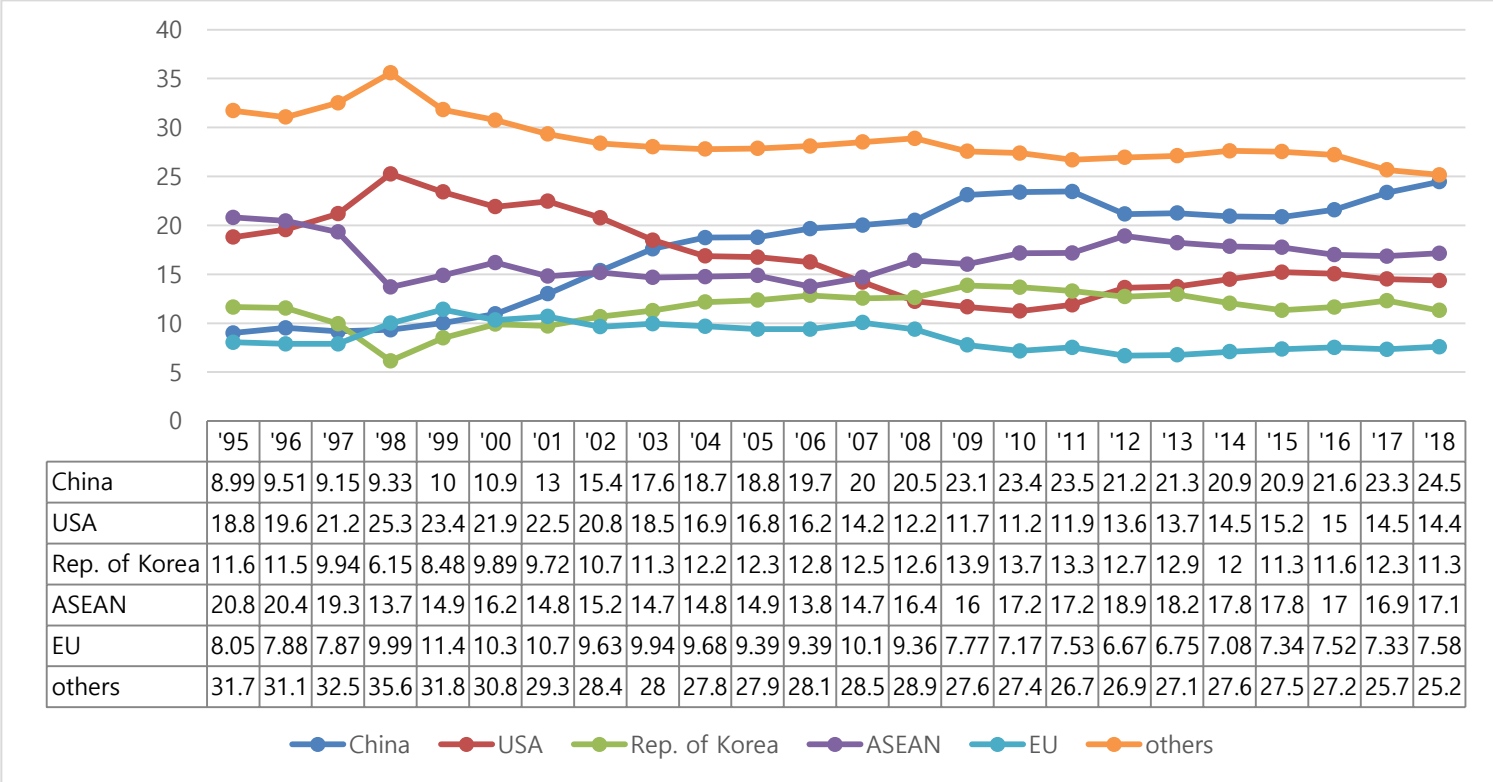
<Appendix> Graph2. China's Export Structure(2000-2018)



	2000	2005	2010	2015	2018
USA	20.92933154	21.41606783	17.9862367	18.03320759	19.23245022
Japan	16.7150432	11.02249512	7.671868774	5.965178724	5.903027699
Rep. of Korea	4.531399814	4.607601402	4.358466918	4.455148441	4.371238434
India	0.62629223	1.172549003	2.593161256	2.561198194	3.082339264
ASEAN	6.958437685	7.266481074	8.756698716	12.19682212	12.85599142
EU	13.97391024	16.69523429	17.36675695	13.0441792	14.18459824

Data Source : own calculation based on UNCOMTRADE data

<Appendix> Graph3. Japan's Export Structure(1995-2018)



	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18
China	8.99	9.51	9.15	9.33	10	10.9	13	15.4	17.6	18.7	18.8	19.7	20	20.5	23.1	23.4	23.5	21.2	21.3	20.9	20.9	21.6	23.3	24.5
USA	18.8	19.6	21.2	25.3	23.4	21.9	22.5	20.8	18.5	16.9	16.8	16.2	14.2	12.2	11.7	11.2	11.9	13.6	13.7	14.5	15.2	15	14.5	14.4
Rep. of Korea	11.6	11.5	9.94	6.15	8.48	9.89	9.72	10.7	11.3	12.2	12.3	12.8	12.5	12.6	13.9	13.7	13.3	12.7	12.9	12	11.3	11.6	12.3	11.3
ASEAN	20.8	20.4	19.3	13.7	14.9	16.2	14.8	15.2	14.7	14.8	14.9	13.8	14.7	16.4	16	17.2	17.2	18.9	18.2	17.8	17.8	17	16.9	17.1
EU	8.05	7.88	7.87	9.99	11.4	10.3	10.7	9.63	9.94	9.68	9.39	9.39	10.1	9.36	7.77	7.17	7.53	6.67	6.75	7.08	7.34	7.52	7.33	7.58
others	31.7	31.1	32.5	35.6	31.8	30.8	29.3	28.4	28	27.8	27.9	28.1	28.5	28.9	27.6	27.4	26.7	26.9	27.1	27.6	27.5	27.2	25.7	25.2

Source : own calculation based on UNCOMTRADE data

<Appendix> Table1. RCA of Korea, China(2010-2018)

Classification		RCA(Korea)									RCA(China)								
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2010	2011	2012	2013	2014	2015	2016	2017	2018
LDC01	Primary products	0.33	0.30	0.32	0.32	0.32	0.40	0.39	0.35	0.35	0.46	0.45	0.47	0.45	0.45	0.52	0.55	0.47	0.44
LDC02	Resource-based manufactures: agro-based	0.58	0.59	0.61	0.57	0.55	0.57	0.58	0.59	0.62	0.69	0.77	0.71	0.78	0.72	0.69	0.71	0.74	0.78
LDC03	Resource-based manufactures: other	1.37	1.56	1.67	1.53	1.64	1.39	1.07	0.98	1.12	0.70	0.56	0.49	0.56	0.57	0.64	0.69	0.71	0.75
LDC04	Low technology manufactures: textile, garment and footwear	1.59	1.38	1.14	1.07	1.07	1.04	1.11	0.92	0.89	2.99	3.08	3.18	3.04	2.73	2.41	2.43	2.55	2.49
LDC05	Low technology manufactures: other products	1.34	1.45	1.29	1.07	0.96	0.94	0.96	0.96	0.85	1.69	1.73	1.88	1.92	1.95	1.86	1.87	1.81	1.81
LDC06	Medium technology manufactures: automotive	1.08	0.99	0.79	0.90	0.89	1.00	0.92	0.78	0.79	0.60	0.69	0.62	0.73	0.77	0.77	0.69	0.72	0.63
LDC07	Medium technology manufactures: process	1.21	1.14	1.13	1.21	1.14	1.18	1.16	1.11	1.15	0.89	1.01	0.98	0.94	1.00	1.03	1.07	1.07	1.03
LDC08	Medium technology manufactures: engineering	1.08	1.09	1.08	1.15	1.17	1.14	1.25	1.26	1.10	1.16	1.19	1.17	1.20	1.16	1.14	1.10	1.11	1.13
LDC09	High technology manufactures: electronic and electrical	1.06	1.02	1.07	1.27	1.21	1.38	1.47	1.51	1.62	1.20	1.21	1.16	1.13	1.09	1.01	0.99	1.09	1.12
LDC10	High technology manufactures: other	0.82	0.46	0.37	0.62	0.55	0.58	0.62	1.19	1.00	0.90	0.96	0.84	0.78	0.74	0.67	0.58	0.63	0.61
LDC99	Unclassified products	0.99	0.66	0.53	0.18	0.16	0.13	0.10	0.10	0.11	0.19	0.12	0.08	0.05	0.08	0.06	0.06	0.05	0.05

Source : own calculation based on UNCOMTRADE data

<Appendix> Table.2 Korea's Losses/Gains to China in the ASEAN Market by Product(SITC Rev3)

LDC01	Primary products (Lall classification)	
1	Live animals other than animals of division 03	-0.027887318
11	Meat of bovine animals, fresh, chilled or frozen	-0.0018648
12	Other meat and edible meat offal	-0.011416635
22	Milk, cream and milk products (excluding butter, cheese)	-0.001907557
25	Birds' eggs, and eggs' yolks; egg albumin	-0.087614636
34	Fish, fresh (live or dead), chilled or frozen	-0.096362867
36	Crustaceans, mollusks and aquatic invertebrates	-0.07782696
41	Wheat (including spelt) and meslin, unmilled	-2.08077E-05
42	Rice	-0.014154041
43	Barley, unmilled	-0.000262476
44	Maize (not including sweet corn), unmilled	-0.00146204
45	Cereals, unmilled (excluding wheat, rice, barley, maize)	-0.016031994
54	Vegetables	-0.11059488
57	Fruits and nuts (excluding oil nuts), fresh or dried	-0.056499897
71	Coffee and coffee substitutes	-0.003378519
72	Cocoa	-0.003118502
74	Tea and mate	-0.151461701
75	Spices	-0.105906194
81	Feeding stuff for animals (no unmilled cereals)	-0.023538535
91	Margarine and shortening	-0.001100055
121	Tobacco, unmanufactured; tobacco refuse	-0.012263857
211	Hides and skins (except furskins), raw	-0.000784288
212	Furskins, raw, other than hides & skins of group 211	-0.000660582
222	Oil seeds and oleaginous fruits (excluding flour)	-0.027002527
223	Oil seeds & oleaginous fruits (incl. flour, n.e.s.)	-0.000281943
231	Natural rubber & similar gums, in primary forms	-0.004933433
244	Cork, natural, raw & waste (incl. blocks, sheets)	-0.000878294
245	Fuel wood (excluding wood waste) and wood charcoal	-0.029044833

246	Wood in chips or particles and wood waste	-0.001957353
261	Silk	0.082791236
263	Cotton	-0.002704527
268	Wool and other animal hair (incl. wool tops)	-0.285112814
272	Crude fertilizers (excluding those of division 56)	-0.020467226
273	Stone, sand and gravel	-0.001488483
274	Sulphur and unroasted iron pyrites	-0.001164862
277	Natural abrasives, n.e.s. (incl. industri. diamonds)	-0.052637365
278	Other crude minerals	-0.095135684
291	Crude animal materials, n.e.s.	-0.076388514
292	Crude vegetable materials, n.e.s.	-0.050571002
321	Coal, whether or not pulverized, not agglomerated	-0.001322448
333	Petroleum oils, oils from bitumin. materials, crude	-0.00013263
342	Liquefied propane and butane	-0.028340546
344	Petroleum gases, other gaseous hydrocarbons, n.e.s.	-0.001243877
681	Silver, platinum, other metals of the platinum group	-0.008464563
682	Copper	-0.038978744
683	Nickel	-0.072397052
684	Aluminium	-0.091693304
685	Lead	-0.0160084
686	Zinc	-0.008732415
687	Tin	-0.006077367
LDC02	Resource-based manufactures: agro-based (Lall classification)	
16	Meat, edible meat offal, salted, dried; flours, meals	-0.00162807
17	Meat, edible meat offal, prepared, preserved, n.e.s.	-0.060674016
23	Butter and other fats and oils derived from milk	-3.26159E-05
24	Cheese and curd	-5.12823E-05
35	Fish, dried, salted or in brine; smoked fish	-0.051912392
37	Fish, aqua. invertebrates, prepared, preserved, n.e.s.	-0.205543946
46	Meal and flour of wheat and flour of meslin	-0.019048
47	Other cereal meals and flour	-0.000809859
48	Cereal preparations, flour of fruits or vegetables	-0.017418895

56	Vegetables, roots, tubers, prepared, preserved, n.e.s.	-0.210790372
58	Fruit, preserved, and fruit preparations (no juice)	-0.119216989
59	Fruit and vegetable juices, unfermented, no spirit	-0.117158147
61	Sugar, molasses and honey	-0.021515157
62	Sugar confectionery	-0.060447697
73	Chocolate, food preparations with cocoa, n.e.s.	-0.007535415
98	Edible products and preparations, n.e.s.	-0.034485631
111	Non-alcoholic beverages, n.e.s.	-0.018986599
112	Alcoholic beverages	-0.005940404
122	Tobacco, manufactured	-0.017829849
232	Synthetic rubber	-0.025949652
247	Wood in the rough or roughly squared	-0.00102178
248	Wood simply worked, and railway sleepers of wood	0.054758528
251	Pulp and waste paper	-0.006545086
264	Jute, other textile bast fibre, n.e.s., not spun; tow	-5.40665E-05
265	Vegetable textile fibres, not spun; waste of them	-0.019628639
269	Worn clothing and other worn textile articles	-0.007396197
421	Fixed vegetable fats & oils, crude, refined, fractio.	-0.00291654
422	Fixed vegetable fats & oils, crude, refined, fract.	-0.000852758
431	Animal or veg. oils & fats, processed, n.e.s.; mixt.	-0.012502214
621	Materials of rubber (pastes, plates, sheets, etc.)	-0.035080877
625	Rubber tyres, tyre treads or flaps & inner tubes	-0.133039995
629	Articles of rubber, n.e.s.	-0.065941411
633	Cork manufactures	-0.012384863
634	Veneers, plywood, and other wood, worked, n.e.s.	-0.125055287
635	Wood manufacture, n.e.s.	-0.111878569
641	Paper and paperboard	-0.038421518
LDC03	Resource-based manufactures: other (Lall classification)	
281	Iron ore and concentrates	-4.69451E-06
282	Ferrous waste, scrape; remelting ingots, iron, steel	-0.000240488
283	Copper ores and concentrates; copper mattes, cemen	-2.72838E-07
284	Nickel ores & concentrates; nickel mattes, etc.	-1.12462E-07

285	Aluminium ores and concentrates (incl. alumina)	-0.002626468
287	Ores and concentrates of base metals, n.e.s.	-0.022027791
288	Non-ferrous base metal waste and scrap, n.e.s.	-0.000710041
289	Ores & concentrates of precious metals; waste, scrap	-0.000404276
322	Briquettes, lignites and peat	-0.005495973
325	Coke & semi-cokes of coal, lign., peat; retort carbon	0.005535366
334	Petroleum oils or bituminous minerals > 70 % oil	-0.013532215
335	Residual petroleum products, n.e.s., related mater.	-0.041243709
411	Animals oils and fats	-0.017459518
511	Hydrocarbons, n.e.s., & halogenated, nitr. derivative	-0.030382719
514	Nitrogen-function compounds	-0.122918151
515	Organo-inorganic, heterocycl. compounds, nucl. acids	-0.090854117
516	Other organic chemicals	-0.063835727
522	Inorganic chemical elements, oxides & halogen salts	-0.093638926
523	Metallic salts & peroxysalts, of inorganic acids	-0.202900457
524	Other inorganic chemicals	-0.085362864
531	Synth. organic colouring matter & colouring lakes	-0.200550744
532	Dyeing & tanning extracts, synth. tanning materials	-0.021905546
551	Essential oils, perfume & flavour materials	-0.019398835
592	Starche, wheat gluten; albuminoidal substances; glues	-0.064218306
661	Lime, cement, fabrica. constr. mat. (excludingglass, clay)	-0.134834715
662	Clay construction, refracto. construction materials	-0.217765578
663	Mineral manufactures, n.e.s.	-0.098768571
664	Glass	-0.139461579
667	Pearls, precious & semi-precious stones	-0.010284504
689	Miscellaneous no-ferrous base metals for metallur.	-0.133536636
LDC04	Low technology manufactures: textile, garment and footwear	
611	Leather	-0.017292945
612	Manufactures of leather, n.e.s.; saddlery & harness	-0.14767381
613	Furskins, tanned or dressed, excluding those of 8483	-0.248159491
651	Textile yarn	-0.179717092
652	Cotton fabrics, woven	-0.360658318

654	Other textile fabrics, woven	-0.22057308
655	Knitted or crocheted fabrics, n.e.s.	-0.285135742
656	Tulles, trimmings, lace, ribbons & other small wares	-0.298559978
657	Special yarn, special textile fabrics & related	-0.209547257
658	Made-up articles, of textile materials, n.e.s.	-0.468526562
659	Floor coverings, etc.	-0.132137903
831	Travel goods, handbags & similar containers	-0.2770283
841	Men's clothing of textile fabrics, not knitted	-0.267953134
842	Women's clothing, of textile fabrics	-0.276213543
843	Men's or boy's clothing, of textile, knitted, croche.	-0.429102998
844	Women's clothing, of textile, knitted or crocheted	-0.447754677
845	Articles of apparel, of textile fabrics, n.e.s.	-0.289247657
846	Clothing accessories, of textile fabrics	-0.304774873
848	Articles of apparel, clothing access., excluding textile	-0.261684633
851	Footwear	-0.322620656
LDC05	Low technology manufactures: other products (Lall classification)	
642	Paper & paperboard, cut to shape or size, articles	-0.108999683
665	Glassware	-0.18014265
666	Pottery	-0.484398571
673	Flat-rolled prod., iron, non-alloy steel, not coated	-0.029774186
674	Flat-rolled prod., iron, non-alloy steel, coated, clad	-0.17039092
675	Flat-rolled products of alloy steel	-0.127370382
676	Iron & steel bars, rods, angles, shapes & sections	-0.081527789
677	Rails & railway track construction mat., iron, steel	-0.115132292
678	Wire of iron or steel	-0.145069799
691	Structures & parts, n.e.s., of iron, steel, aluminium	-0.071759676
692	Metal containers for storage or transport	-0.058048145
693	Wire products (excluding electrical) and fencing grills	-0.142320365
694	Nails, screws, nuts, bolts, rivets & the like, of metal	-0.107793451
695	Tools for use in the hand or in machine	-0.111417386
696	Cutlery	-0.306070524
697	Household equipment of base metal, n.e.s.	-0.342442655

699	Manufactures of base metal, n.e.s.	-0.124087842
821	Furniture & parts	-0.220422078
893	Articles, n.e.s., of plastics	-0.141299849
894	Baby carriages, toys, games & sporting goods	-0.36006339
895	Office & stationery supplies, n.e.s.	-0.181154609
897	Jewellery & articles of precious materia., n.e.s.	-0.19168648
898	Musical instruments, parts; records, tapes & similar	-0.08468107
899	Miscellaneous manufactured articles, n.e.s.	-0.177477295
LDC06	Medium technology manufactures: automotive (Lall classification)	
781	Motor vehicles for the transport of persons	-0.004484151
782	Motor vehic. for transport of goods, special purpo.	-0.038446288
783	Road motor vehicles, n.e.s.	-0.044606665
784	Parts & accessories of vehicles of 722, 781, 782, 783	-0.046218238
785	Motorcycles & cycles	-0.267799462
LDC07	Medium technology manufactures: process (Lall classification)	
266	Synthetic fibres suitable for spinning	-0.135357949
267	Other man-made fibres suitable for spinning	-0.041894603
512	Alcohols, phenols, halogenat., sulfonat., nitrat. der.	-0.021808524
513	Carboxylic acids, anhydrides, halides, per.; derivati.	-0.088329733
533	Pigments, paints, varnishes and related materials	-0.038489025
553	Perfumery, cosmetics or toilet prepar. (excluding soaps)	-0.030244981
554	Soaps, cleansing and polishing preparations	-0.037918412
562	Fertilizers (other than those of group 272)	-0.081472337
571	Polymers of ethylene, in primary forms	-0.011692305
572	Polymers of styrene, in primary forms	-0.024535108
573	Polymers of vinyl chloride or halogenated olefins	-0.045167557
574	Polyethers, epoxide resins; polycarbonat., polyesters	-0.059275347
575	Other plastics, in primary forms	-0.032376823
579	Waste, parings and scrap, of plastics	-0.003442193
581	Tubes, pipes and hoses of plastics	-0.05597287
582	Plates, sheets, films, foil & strip, of plastics	-0.063721353
583	Monofilaments, of plastics, cross-section > 1mm	-0.061611523

591	Insectides & similar products, for retail sale	-0.073946094
593	Explosives and pyrotechnic products	-0.213388165
597	Prepared addit. for miner. oils; lubricat., de-icing	-0.007554761
598	Miscellaneous chemical products, n.e.s.	-0.056397871
653	Fabrics, woven, of man-made fabrics	-0.319990009
671	Pig iron & spiegeleisen, sponge iron, powder & granu	-0.070617271
672	Ingots, primary forms, of iron or steel; semi-finis.	-9.29704E-05
679	Tubes, pipes & hollow profiles, fittings, iron, steel	-0.106776114
786	Trailers & semi-trailers	-0.228392214
791	Railway vehicles & associated equipment	-0.098830974
882	Cinematographic & photographic supplies	-0.051959882
LDC08	Medium technology manufactures: engineering (Lall classification)	
711	Vapour generating boilers, auxiliary plant; parts	-0.442136294
713	Internal combustion piston engines, parts, n.e.s.	-0.033073041
714	Engines & motors, non-electric; parts, n.e.s.	-0.017177937
721	Agricultural machinery (excluding tractors) & parts	-0.056981053
722	Tractors (excluding those of 71414 & 74415)	-0.014097746
723	Civil engineering & contractors' plant & equipment	-0.065071415
724	Textile & leather machinery, & parts thereof, n.e.s.	-0.138376943
725	Paper mill, pulp mill machinery; paper articles man.	-0.06065123
726	Printing & bookbinding machinery, & parts thereof	-0.022935469
727	Food-processing machines (excluding domestic)	-0.041962499
728	Other machinery for particular industries, n.e.s.	-0.047097333
731	Machine-tools working by removing material	-0.034057544
733	Mach.-tools for working metal, excluding removing mate.	-0.04071272
735	Parts, n.e.s., & accessories for machines of 731, 733	-0.037929812
737	Metalworking machinery (excludingmachine-tools) & parts	-0.093216894
741	Heating & cooling equipment & parts thereof, n.e.s.	-0.14161125
742	Pumps for liquids	-0.075331878
743	Pumps (excluding liquid), gas compressors & fans; centr.	-0.079599985
744	Mechanical handling equipment, & parts, n.e.s.	-0.099987613
745	Other non-electr. machinery, tools & mechan. appar.	-0.087730205

746	Ball or roller bearings	-0.098004844
747	Appliances for pipes, boiler shells, tanks, vats, etc.	-0.108035109
748	Transmis. shafts	-0.077123319
749	Non-electric parts & accessor. of machinery, n.e.s.	-0.091372765
762	Radio-broadcast receivers, whether or not combined	-0.112119429
763	Sound recorders or reproducers	-0.488337867
772	Apparatus for electrical circuits; board, panels	-0.096676368
773	Equipment for distributing electricity, n.e.s.	-0.122657287
775	Household type equipment, electrical or not, n.e.s.	-0.287403765
793	Ships, boats & floating structures	-0.173694037
811	Prefabricated buildings	-0.189404228
812	Sanitary, plumbing, heating fixtures, fittings, n.e.s.	-0.051932517
813	Lighting fixtures & fittings, n.e.s.	-0.12959727
872	Instruments & appliances, n.e.s., for medical, etc.	-0.043841026
873	Meters & counters, n.e.s.	-0.089909848
884	Optical goods, n.e.s.	-0.142211895
885	Watches & clocks	-0.06780721
891	Arms & ammunition	-0.008417732
LDC09	High technology manufactures: electronic and electrical	
716	Rotating electric plant & parts thereof, n.e.s.	-0.145758978
718	Other power generating machinery & parts, n.e.s.	-0.038628166
751	Office machines	-0.282339928
752	Automatic data processing machines, n.e.s.	-0.40397735
759	Parts, accessories for machines of groups 751, 752	0.780909373
761	Television receivers, whether or not combined	-0.114643226
764	Telecommunication equipment, n.e.s.; & parts, n.e.s.	-0.296619117
771	Electric power machinery, and parts thereof	-0.242762223
774	Electro-diagnostic appa. for medical sciences, etc.	-0.051140699
776	Cathode valves & tubes	-0.10143988
778	Electrical machinery & apparatus, n.e.s.	-0.147019066
LDC10	High technology manufactures: other	
525	Radio-actives and associated materials	-0.045545172

541	Medicinal and pharmaceutical products, excluding 542	-0.043843015
542	Medicaments (incl. veterinary medicaments)	-0.006668133
712	Steam turbines & other vapour turbin., parts, n.e.s.	-0.251301102
792	Aircraft & associated equipment; spacecraft, etc.	-0.014371336
871	Optical instruments & apparatus, n.e.s.	-0.341630355
874	Measuring, analysing & controlling apparatus, n.e.s.	-0.039242
881	Photographic apparatus & equipment, n.e.s.	-0.124200725
LDC99	Unclassified products	
883	Cinematograph films, exposed & developed	-0.000196464
892	Printed matter	-0.090525764
896	Works of art, collectors' pieces & antiques	-0.024180325

Source : Own Calculation Using UNCOMTRADE, UNCTAD data and classification

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