East Asian Value Chains and Economic Effects of Free Trade Agreements

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The rise of global value chains has changed the trade patterns in East Asia. The share of intra-regional trade in East Asia increased from 33.0% in 1990 to 43.8% in 2011 while it remained fairly stationary (around 65%) in the case of the EU during the same period; the share increased from 37.2% to 39.9% during the same period for NAFTA.

When we compare the trend of trade in intermediate goods by region in order to understand the changes in trade patterns, the export of intermediate goods in East Asia tripled from 653.3 billion dollars in 1996 to 2,195 billion dollars in 2009, but the share of exports of intermediate goods to total exports decreased marginally from 60.9% to 60.7%. The share of im-

ports of intermediate goods to total imports increased sharply from 65.8% to 76.1% during the same period which is shown in Table 1. On the contrary, the shares of exports of intermediate goods to total exports increased from 58.3% and 66.5% to 62.4% and 69.9%, respectively in case of the EU and NAFTA. Their shares of imports of intermediate goods to total import decreased during the period.

Notably, East Asia shows increasing share of intra-regional exports of intermediate goods while the EU and the US reveal an opposite trend, a decreasing share of intra-regional exports of intermediate goods. The share of East Asian intra-regional imports of intermediate goods decreased slightly from 29.6% in

Table 1. Intra-regional Trade in Intermediate Goods

(Unit: Billion Dollars, %)

Year	Region	Export of Intermediate Goods		Intra-regional Export of Intermediate Goods		Import of Inter-mediate Goods		Intra-regional Import of Intermediate Goods	
		Amount	Share[1]	Amount	Share[1]	Amount	Share[1]	Amount	Share[1]
1996	East Asia	653.3	60.9	168.6	26.5	570.4	65.8	168.6	29.6
	EU	1525.1	58.3	926.9	60.8	1,438.9	61.1	926.9	64.4
	NAFTA	757.7	66.5	241.5	31.9	677.6	57.1	241.5	35.6
	ROW	724.9	68.3	103.0	14.2	956.1	66.0	103.0	10.8
2009	East Asia	2,195.0	60.7	664.5	30.3	2,287.5	76.1	664.5	29.1
	EU	3,718.4	62.4	2,050.9	55.2	3,477.7	63.7	2,050.9	59.0
	NAFTA	1,540.5	69.9	468.3	30.4	1,456.6	58.3	468.3	32.2
	ROW	2,539.3	77.4	380.4	15.0	2,771.3	67.6	380.4	13.7

Note: The shares in the Table are calculated by dividing the export/import of intermediate goods by the total export/import.
Source: Author's calculation.

1996 to 29.1% in 2009. In case of the EU and NAFTA, also, the shares of intra-regional imports of intermediate goods decreased from 64.4% and 35.6% to 59.0% and 32.2%, respectively. This result indicates that intra-regional trade of intermediate goods in East Asia has increased compared to the EU and the US, and East Asian value chains have grown more rapidly in recent years.

This paper calculates the indicators to show how global value chains have risen in each region by using the World Input-Output Tables which cover 41 countries and 35 sectors during 1996~2009. The indexes of global value chains have been proposed by Fally (2011), Fally (2012), Antras and Chor (2011), Antras et al. (2012), OECD (2012). The first index is to reflect "how many stages on average enter the production of i. This corresponds to a weighted-average of plants involved sequentially in the production of i."[1] It can be called an index of the length of global value chains

(GVCs). The second indicator is an index of distance to final demand which reflects "how many plants on average a product will go through before reaching final demand."[2]

We calculated an index of the length of GVCs and index of distance to final demand based on the international input-output tables. The index of the length of GVCs in case of East Asia (EAS) turned out to be relatively high compared to the EU (EUN) and NAFTA (NAF). (Refer to Figure 1) The index in case of East Asia and the rest of the world increased from 1.99 and 1.83 in 1996 to 2.35 and 2.02 in 2009 respectively, while the indexes of the EU(1.91→1.99) and NAFTA (1.84→1.80) have stayed around 1.8~1.9.

High indexes of the length of GVCs shown in case of East Asian countries reveal export competitiveness, if all else are equal. It is because the technology and value-added manufacturing are associated with competitive edge

[1]Refer to Fally (2012), p. 6.

[2]Refer to Fally (2012), p. 6.

and length of GVCs. It is notable that the East Asian index of distance to final demand also increased substantially during the same period

which reveals that East Asian countries are located more upstream in a chain.

Figure 1. Index of the length of GVCs and index of distance to final demand by Economic Region

< Index of the length of GVCs >
Source: Authors calculation.

< Index of distance to final demand >
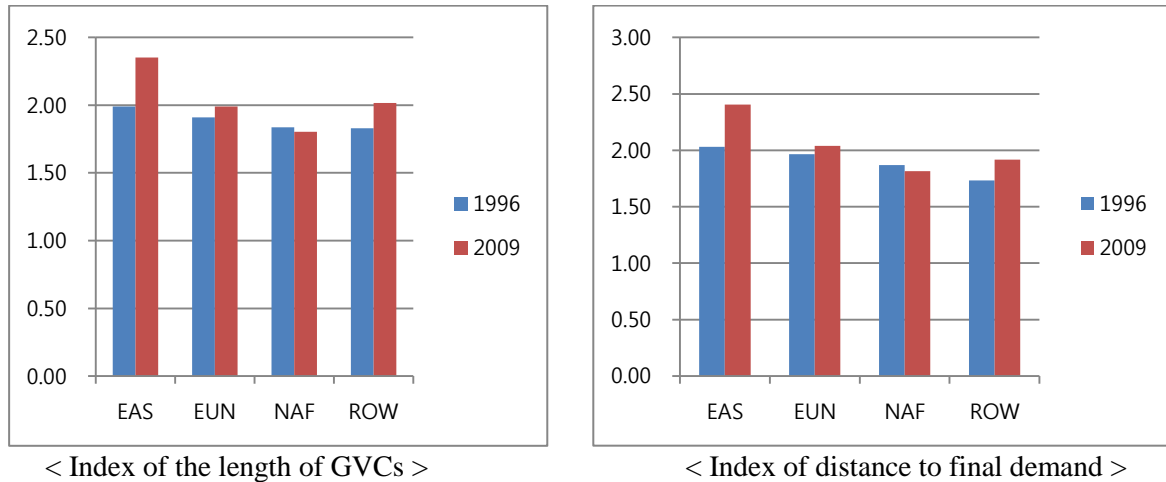
This study also decomposes the trade in value added to domestic and foreign contributions in order to analyze the effects of global value chains on the East Asian intra-regional value added. Based on the decomposition, this study investigates the shares of intra-regional value added for the East Asian countries by FTA scenarios, applying the methodologies developed by Koopman et al. (2010) and Hummels et al.(2001)

The shares of intra-regional value added turn out to be dependent on the number of countries joining FTAs, which implies that the positive effects of global value chains will be magnified with the deepening regional integration. The numerical results also show that the shares of intra-regional value added for Korean exports to China in most manufacturing sectors rose from 1996 to 2000 but have decreased since 2000. That implies that the trading partners for the intermediate goods such as parts and semi-finished goods have been diversified as many countries are integrated into

the international production networks, resulting in decreased shares of intra-regional value added induced by Korean exports to China.

In the case of Korean exports to Japan, there is no significant change in the structure of value added. It is partly because division of labor between the two countries has been stabilized due to the differences in technological development and economic growth rates, and the trade structure of intermediate goods between Korea and Japan did not change to a substantial degree. When we compare the two shares of intra-regional value added including and excluding the ASEAN economies, there were no significant differences. That means that the Korean industries have not created the additional value added from exports to the ASEAN countries from 1996 to 2009.

Table 2. The shares of intra-regional value added in Korean exports to China and Japan

(Unit: %)

	Korean Exports to China			Korean Exports to Japan		
	1996	2000	2009	1996	2000	2009
Agriculture, Fishery, and Forestry	76.3	75.7	72.2	82.1	82.3	73.6
Food and Beverage	50.9	75.5	68.4	20.6	32.5	17.9
Textile and Clothing	39.3	45.8	48.4	38.8	44.6	37.7
Petroleum	3.9	0.0	71.5	3.6	0.0	45.0
Chemical, Rubber and Plastic	55.7	46.3	45.7	92.2	75.3	52.4
Non-Metal Mineral	0.0	79.3	81.4	85.9	83.6	94.3
Metal	54.7	61.8	82.2	58.6	64.9	47.3
Machinery	43.6	50.9	35.4	63.1	54.7	34.2
Electronics	41.6	43.1	38.8	46.1	47.0	40.3
Transport Equipment	52.0	72.3	35.1	72.7	62.6	36.2
Other Manufacturing	66.6	74.3	52.0	38.8	44.0	30.1
Services	69.4	62.1	67.9	83.4	76.4	70.0

Source: Author's calculation.

This study also analyzed the economic effects of various East Asian FTAs based on value added structure in East Asia and rules of origin scenarios. Specifically, we investigated the validity of the argument that regional economic integration provides opportunity for utilizing production networks more efficiently.

We used the recursive dynamic computable general equilibrium (CGE) model to consider the value chain structure in trade and industrial linkages. The policy simulations based on rules of origin are expected to provide more realistic results and meaningful implications consistent with previous research. In this study, the policy simulation consists of 1 concession scenario (90% tariff reduction) and 2 rules of origin scenarios (40% and 50%) for Korea-China (KC) FTA, Korea-Japan (KJ) FTA, China-Japan-Korea (CJK) FTA, and the Regional Comprehensive Economic Partnership (RCEP).

According to the results, the economic growth effect of a KC FTA is greater than other FTAs regardless of strictness of rules of origin. Korea can improve market access to the emerging Chinese economy through the KC FTA, while Korea is expected to compete with Japan in the Chinese market with the CJK FTA. Any additional liberalization of ASEAN through the RCEP would be limited.

The simulation results also indicate that the effects of FTAs decrease as rules of origin become stricter. When we look into the results of industrial impacts, FTAs turn out to facilitate international division of production processes through channels of comparative advantages. Also, as the number of member countries joining regional integration increases, the import from a specific partner decreases because of diversification of trade.

The value added structures in East Asia turn out to magnify the effects of KC FTA and RCEP, but decreases those of the KJ FTA because Korea's trade dependency on China and ASEAN are relatively intense. The negative effects of strict rules of origin turn out to increase with the development of value chains.

Table 3. Policy simulations on effects of rules of origin by FTAs

FTA	Rules of Origin	Value added structure in 1996			Value added structure in 2009		
		5 years after FTAs	10 years after FTAs		5 years after FTAs	10 years after FTAs	
		Growth rates (%)	Growth rates (%)	(B-A)/Ax100	Growth rates (%)	Growth rates (%)	(B-A)/Ax100
KC	Local contents 40% (A)	1.53	3.57		1.65	3.70	
	Local contents 50% (B)	1.47	3.39	-5.04	1.57	3.45	-6.76
KJ	Local contents 40% (A)	0.15	0.35		0.14	0.33	
	Local contents 50% (B)	0.14	0.34	-2.86	0.12	0.29	-12.12
CJK	Local contents 40% (A)	1.43	3.52		1.45	3.53	
	Local contents 50% (B)	1.39	3.40	-3.41	1.48	3.42	-3.12
RCEP	Local contents 40% (A)	1.45	3.31		1.57	3.45	
	Local contents 50% (B)	1.41	3.19	-3.63	1.49	3.22	-6.67

Source: Author's calculation.

The results from this study provide some policy recommendations as follows. Global trade liberalization is needed to maximize the positive effects expected from global value chains. The length of global value chains in East Asia turned out to be increasing and East Asian industries turned out to be located in the upstream of the value chains. East Asian countries need to harmonize the border measures including standards, SPS, and TBT which are expected to facilitate global value chains in the region. The liberalization of services such as distribution, finance, and business services among others are also expected to contribute to efficient movement of goods and materials in the intra- and inter-regional trade.

Specifically, the East Asian countries need to harmonize the intra-regional bilateral FTAs to reduce the so-called noodle bowl effects. East Asian countries also need to introduce the accumulation of origin and pursue plurilateral Free Trade Agreements, considering the trend of lowered shares of value added created by each FTA member due to deepened global value chains. **KIEP**