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An Analysis of the Economic Effects of Japan-Korea FTA

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1. Preceding analyses

The Institute of Developing Economics (IDE), of the Japan External Trade Organization and the Korea Institute for International Economic Policy (KIEP) released reports on the economic effects of Japan-Korea FTA in May 2000. Both of them applied CGE models, which used the database of the Global Trade Analysis Program (GTAP) [1]for quantitative analysis on the economic effects of FTA. Here, we introduce their results and examine differences between them.

(1)Outlines of models

There are some variations between the two models, even though both of them applied the GTAP database. We summarized them below.

①Structure of models

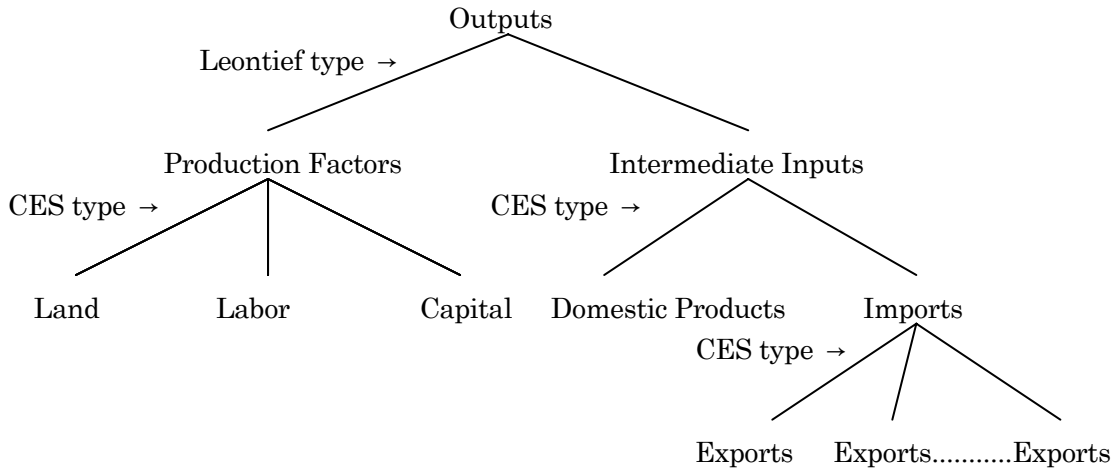
GTAP database is available with a standard model for public use. Users can apply the model or modify it for their own analytical purposes.

In these analyses, the IDE made an original modification on production structure in their model. We can see this in Figure 1. A standard model has a Leontief type function that combines production factors and intermediate inputs on the last stage of hierarchical production structure. On the contrary, the IDE model has a CES type function. There was no notation about a production function in KIEP's report. Thus, we assume they applied a standard type.

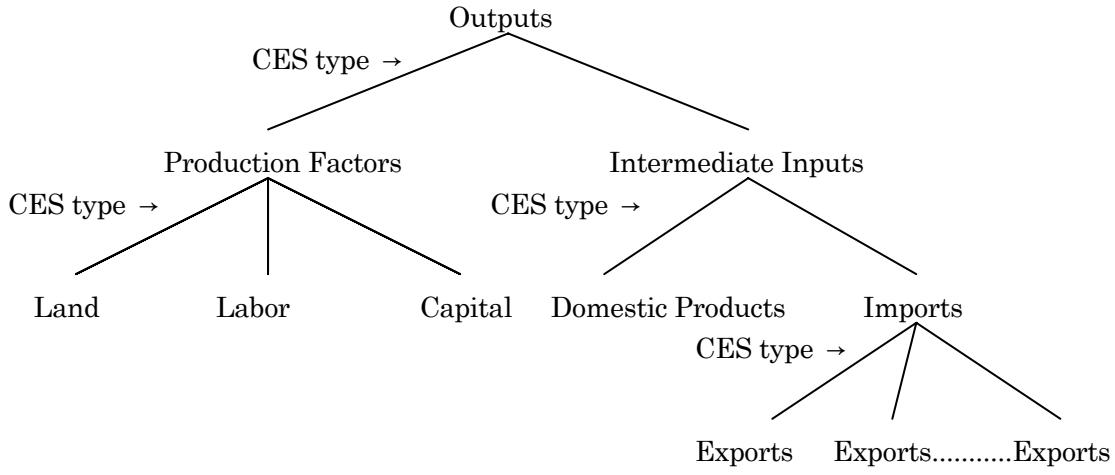
[1] See Hertel(1997)

Figure 1: Production Structures of GTAP models

A. Standard model



B. IDE's model



Source: Kawasaki(1999), IDE(2000)

②Aggregation of regions and commodities

There are 45 regions and 50 commodities available in the GTAP database. It is possible to aggregate them according to users needs. We have aggregations applied in two reports in Table 1.

Table 1: Aggregation of Regions and Commodities in IDE's and KIEP's Models

IDE	KIEP
7 regions: Japan, ROK, Mexico, USA, Canada, Rest of Asia, Rest of World 11 commodities: Vegetables and fruits, Oil, Other primary products, Foods, Textiles and wearing apparel, Metal products, Transport equipment, Electronic equipment, Other machinery and equipment, Other manufactures, Services	Number of regions is not noted. 21 commodities: Agriculture, Food processing, Forestry, Fisheries, Mineral Resources, Non-ferrous metals, Beverages & Tobacco, Textiles, Apparel, Leather goods, Automobiles, Other Transportation, Electric & electronic products, Machinery, Other Manufacturing, Services

(2) Assumptions and results of analyses

Both reports made analyses on short-run effects that contains only effects of trade increase by the removal of tariffs and long-run effects that contains effects of total factor productivity (TFP) growth by Japan-Korea FTA[2].

①Assumptions

Both reports assume a total removal of tariff between Japan and ROK in an analysis on short-run effects. There are tariff rates between Japan and ROK according to IDE's commodity aggregation in Table 2. They assumed these rates equal 0 on their simulations.

On analyses of long-run effects, they assume growth of TFP by increase of direct investments, which were enlarged by FTA, other than short-run effects. They manipulate TFP that is an exogenous valuable in models on simulations. The growth rates that they assumed are in Table 3.

[2] IDE's short-run effects are from "simulation 1", long-run effects are from "simulation 3" in IDE (2000).
KIEP's short-run effects are from "static effect", long-run effects are from "dynamic effect" in KIEP (2000).

Table 2: Tariff Rates between Japan and ROK

(%)

	Japan	ROK
Vegetables and fruits	3.72	32.83
Oil	0.00	5.38
Other primary products	4.79	5.65
Foods	13.91	27.83
Textiles, wearing apparel	5.01	8.09
Metal products	0.13	8.94
Transport equipment	1.20	8.43
Electronic equipment	0.80	10.59
Other machinery and equipment	0.00	8.64
Other manufactures	2.16	7.97
Services	3.23	0.32

Source: IDE (2000)

Table 3: Assumptions on TFP Growth Rate by Sector

IDE	KIEP
10% in 10 years (1% annual) for both countries: Textiles and wearing apparel, Other manufactures, Services 30% in 10 years (3% annual) for both countries: Metal products, Transport equipment, Electronic equipment, Other machinery and equipment,	10% in 10 years (1% annual) for ROK: Heavy and chemical industries

②Results

The results of the simulations are in Table 4 and 5.

In short-run effects, IDE's results show improvement in Japan's trade balance and aggravation in ROK's. In trade balance between Japan and ROK, Japan's surplus increased. On the contrary, KIEP's results tell aggravation in Japan's trade balance. In any case, the aggravation of trade balance occurred because the increase of imports exceeds that of exports and total volume of trade increased. IDE's results show almost no change in Japan and a slight increase (0.37%) in ROK in real GDP. KIEP's results show almost no change in both countries.

In long-run effects, IDE's results show a large-scale improvement in both countries. KIEP's results mention only about ROK and also show large-scale improvement. IDE's results show a large increase in real GDP, of 10.45% in Japan and 9.11% in ROK. KIEP's results show a

2.81% increase in ROK.

From these results in general, long-run effects caused by TFP growth is larger than short-run effects caused by the removal of tariffs. We can see this tendency especially in real GDP. Long-run effects in IDE's results, which are with higher TFP growth rates in assumption, are larger than them in KIEP's.

Table 4: Change in Trade Balance

Millions of U.S. Dollars

		IDE	KIEP	ERINA
Short run	Japan	5,479	▲ 756	▲ 700
	ROK	▲ 1,711	▲ 1,534	▲ 1,525
	Japan- ROK	4,185	6,090	7,255
Long run	Japan	188,211	-	211
	ROK	41,834	1,480	▲ 1,303
	Japan- ROK	2,460	6,530	7,496

Note: Japan- ROK is from the Japanese perspective

Table 5: Change in Real GDP

(%)

		IDE	KIEP	ERINA
Short run	Japan	0.00	▲ 0.04	0.00
	ROK	0.37	▲ 0.07	0.02
Long run	Japan	10.45	-	0.01
	ROK	9.11	2.81	1.19

Table 6: Base Data (1995)

Millions of U.S. Dollars

	GDP	Exports	Imports	Trade Balance
Japan	5,091,655	506,955	▲ 439,817	67,138
ROK	451,163	151,183	▲ 159,249	▲ 8,066

Source: GTAP database Ver.4

(3) TFP growth rate

As we mentioned above, it is important to see long-run effects in the analysis of the economic effects of FTA. Therefore, the assumption on TFP growth rate is a crucial factor.

Two institutes explain about their assumption on TFP growth rates as below.

KIEP assumes FTA increases foreign direct investment (FDI) to ROK. It will be mainly in high productivity sectors. Then, ROK's TFP will improve. They estimated the expected volume of FDI by a regression analysis, which depend on data of countries that belong to any FTA. Expected FDI will be 2.55-3.53 billion US dollars. The conclusion is that 1% annual growth for 10 years in heavy and chemical manufacturing sectors is possible by the increase of FDI.

On the other hand, IDE also assumes growth of TFP caused by FDI, but they do not show any quantitative reasons.

Here we made a survey for analyses on the growth rate of ROK's TFP in manufacturing sectors. The results are in Table 7 and 8. We can see that an additional 1% growth in TFP is relatively large scale compare to estimated previous growth rates. And it seems difficult to rationalize additional 3% growth in particular sectors only by the effects of FTA like IDE did.

On same time, we must say IDE's assumption that Japan and ROK will have same growth rate in TFP is lacking persuasive power, since there must be a difference in the potential growth rate of two countries.

Table 7: TFP Growth Rate in Korean Manufacturing Industry

Annual Increase (%)

Value Added Base			Gross Product Base		
Papers	Estimation Period & Data source	Growth Rate	Papers	Estimation Period & Data source	Growth Rate
Nam (1999)	(1971-1996) National Income Account	▲ 0.30	Nam (1999)	(1971-1996) Report on Mining and Manufacturing Survey	1.67
Kwack (1997)	(1971-1993) National Income Account	3.2	Kwack (1997)	(1971-1993) National Income Account	0.8
Pyo (1995)	(1970-1992) National Income Account	1.09	Nadiri and Kim (1996)	(1975-1990) Report on Mining and Manufacturing Survey	1.26
Young (1995)	(1966-1990) National Income Account	3.00	Yang (1996)	(1976-1991) Report on Mining and Manufacturing Survey	0.64
Pilat (1995)	(1967-1987) Report on Mining and Manufacturing Survey	4.3	Hong and Kim (1996)	(1967-1993) Report on Mining and Manufacturing Survey	1.71
Cho (1991)	(1971-1990) National Income Account	2.1	Park and Kwon (1995)	(1967-1989) Report on Mining and Manufacturing Survey	▲ 1.6
Moon et al. (1991)	(1971-1989) National Income Account	3.66	World Bank (1993)	(1968-1988) unknown	8.8

Source: Nam (1999)

Table 8: TFP Growth Rate in Korean Manufacturing Industry by Sector

Annual Increase (%)

		Value Added Base	Gross Product Base	
		Kwack (1997)	Nam(1999)	Kwack (1997)
Sectors	Food and Beverages, Tobacco	0.6	▲ 0.64	0.2
	Textiles & Wearing apparel, Leathers	0.9	2.45	0.2
	Wood & Wood products	▲ 2.0	▲ 1.09	▲ 0.4
	Pulp, Paper products, Publishing	3.0	2.58	0.9
	Chemical products, Rubber, Plastic products, Oil, Coal	4.4	1.21	1.0
	Nonferrous metals	3.8		1.3
	Primary metals	3.8	3.23	0.6
	Metal products, Machinery, Office machinery, Electric equipment, Telecommunication Instrument, Transport equipment, Medical & Optical instrument	5.0		1.5
	Manufactures nec	3.0		0.8
	Metal products.		5.18	
	Electric & Electronic equipment		7.24	
	Transport equipment		5.02	
Estimation Period		1971-1993	1971-1996	1971-1993
Data Source		National Income Account (The Bank of Korea)	Report on Mining and manufacturing Survey (National Statistical Office)	National Income Account (The Bank of Korea)

2. An analysis by CGE model with capital mobility

As we summarized above, IDE and KIEP pointed out the growth of TFP caused by FDI in the analysis of long-run effects. This route is important, while we can also assume the impact of capital stock accumulation. We made an analysis on the effects of capital accumulation by CGE model below.

(1) Outlines of models

We applied two types of model for our analysis. One is a model for short-run analysis. This is basically equal to the standard GTAP model. And we assume it is also equal to KIEP's model. The other is a model for long-run analysis. Here we have capital stock as an endogenous variable for an analysis on effects of capital accumulation[3]. On the other hand, it is an exogenous variable in the standard GTAP model.

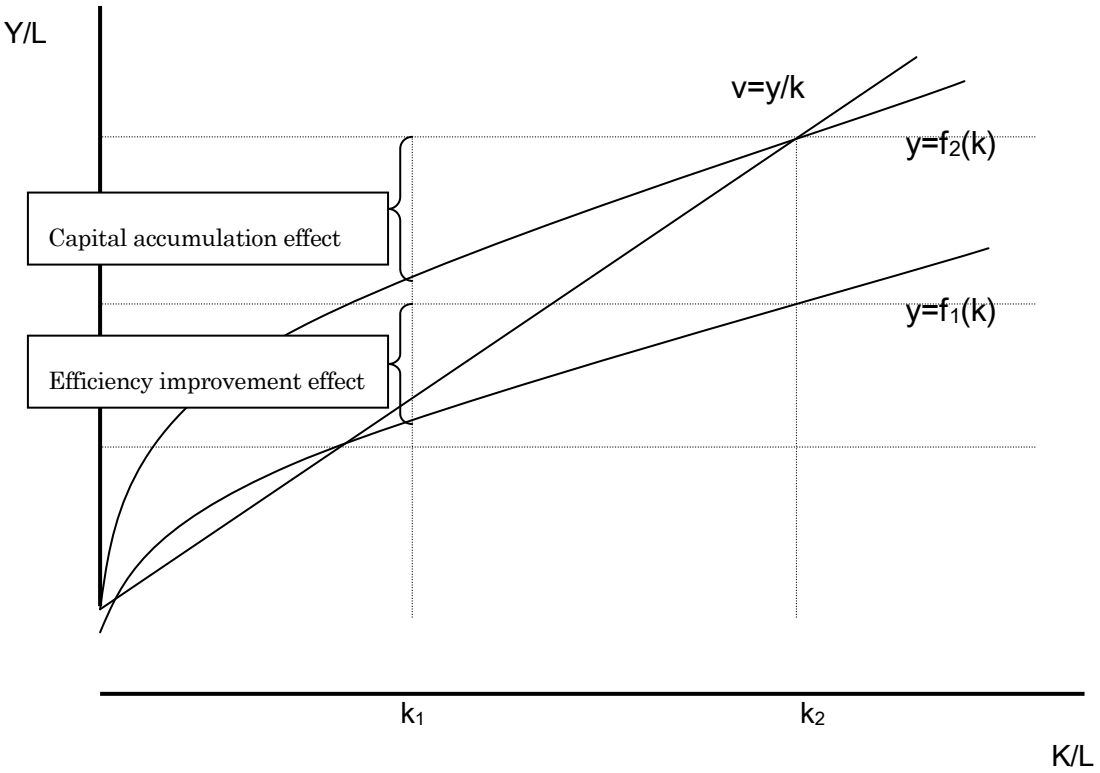
In Figure 2, we can illustrate the effects of FTA on real GDP. One is the efficiency improvement effect by the removal of tariffs, the other is the capital accumulation effect. Short-run effects include only the efficiency improvement effect. Long-run effects include both of them.

Table 9: Aggregation of Regions and Commodities in ERINA's Model

Regions	Commodities
9 regions: Japan, ROK, Asian NIES, China, USA, Latin America, EU, Rest of Asia, Rest of World	10 commodities: Foods, Mineral products, Textiles and wearing apparel, Metal products, Automobile, Other transport equipment, Electric and electronic equipment, Other machinery and equipment, Other manufactures, Services

[3] Here, we applied a standard benchmark database and assumed no risk premia. See Walmsley (1998).

Figure 2: Illustration of Effects on GDP



Source: Tsutsumi (2000)

(2) Results

Results of our simulation are in Tables 5 and 6. Results on short-run effects are almost the same as KIEP's. They show an aggravation in trade balance in both countries. Changes in real GDP were negligible.

There is not much change in the trade balance between long and short-run effects. Then, we got a 1.19% increase in ROK's real GDP in long run. However, the increase in Japan's real GDP was negligible. We can summarize the details of this results like below.

First, the removal of tariffs causes an increase on rate of return on capital stock in both countries. We can see it from the short-run effects of Figure 3. In our log run model, capital stock is endogenous. If there are differences in the rate of return on capital stocks through regions there is interregional capital inflow. Therefore, finally rates of return become equal through regions as we can see in Figure 3.

The changes of capital stock are in Figure 4. The stock increases in large scale in ROK where rate of return increased. It caused an increase in real GDP.

Figure 3: Current Net Rate of Return on Capital Stock
(%change)

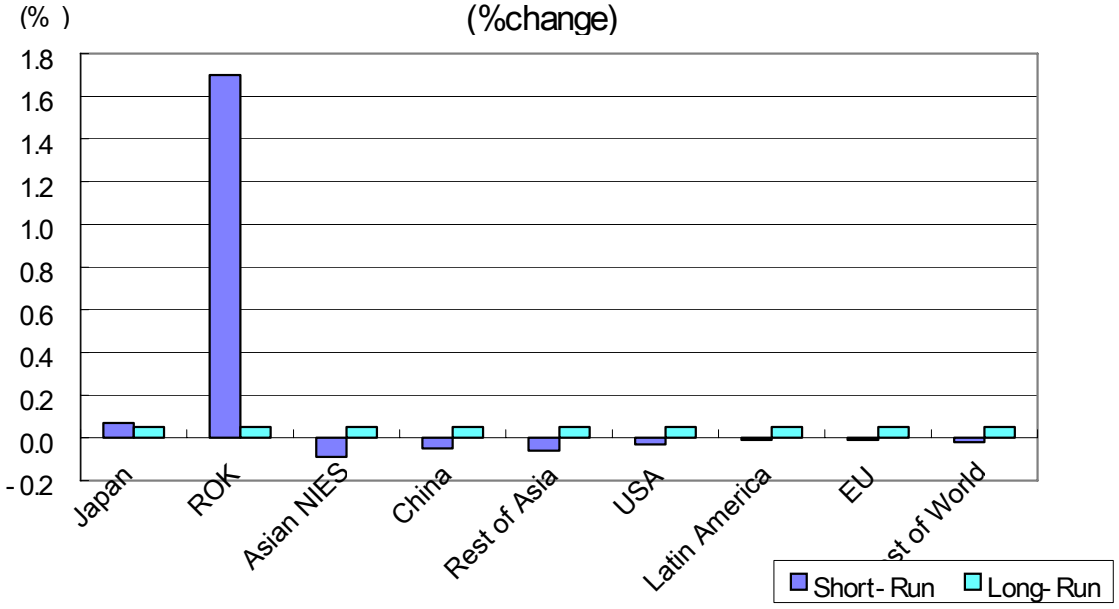


Figure 4: Beginning of Period Capital Stock
(%change)

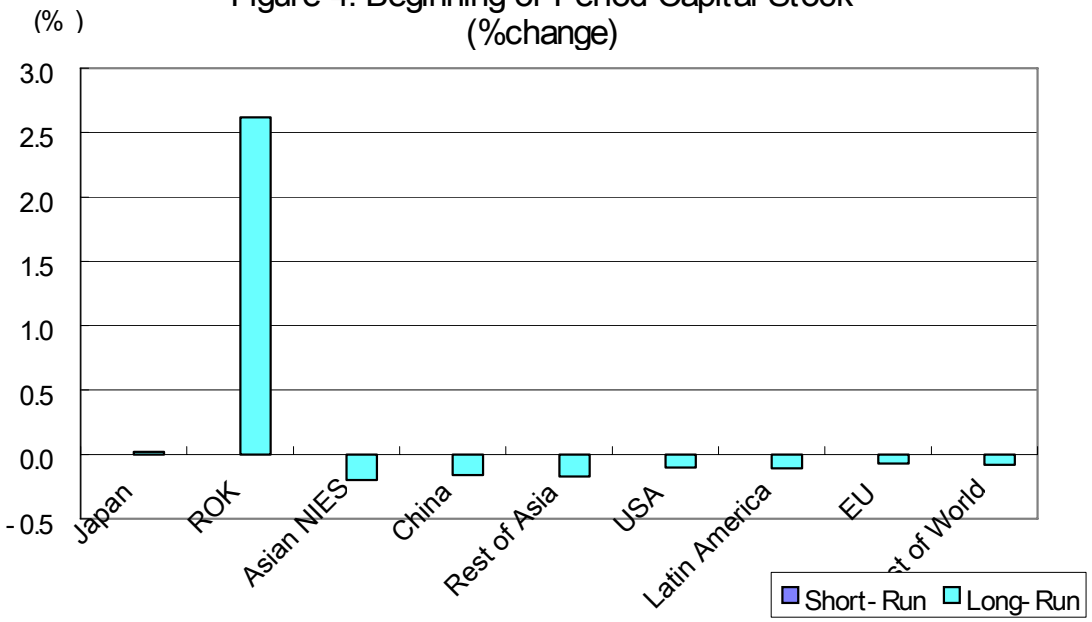
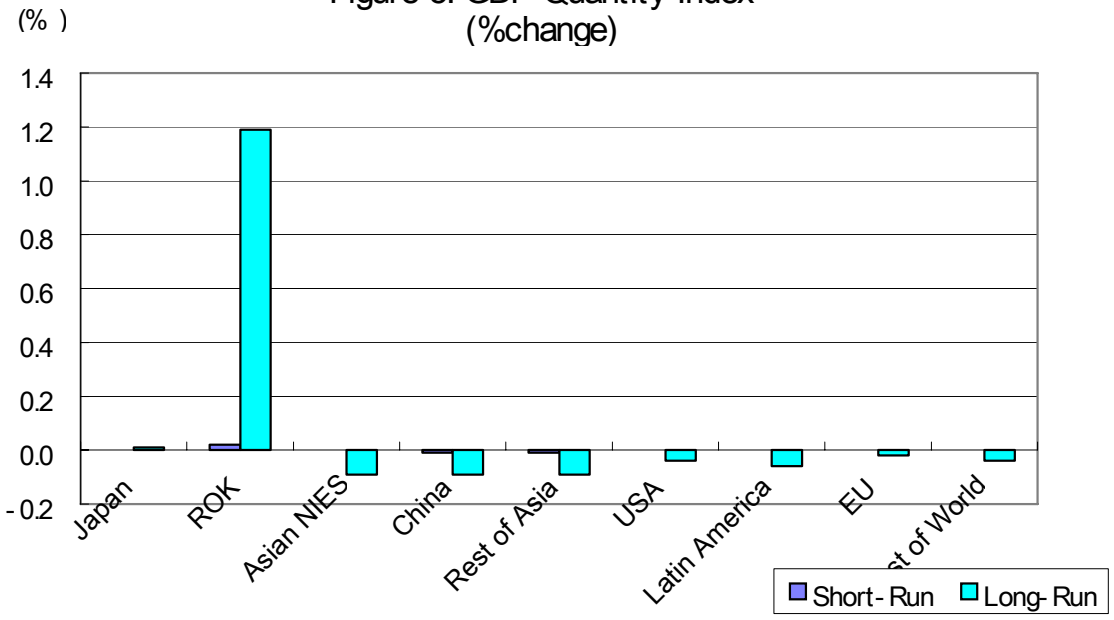


Figure 5: GDP Quantity Index
(%change)



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