

Intra-Regional Trade in East Asia: An Empirical Study on Intra-Industry Trade of Food Industry and Foreign Direct Investment

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Summary

Intra-regional trade has increased rapidly in East Asia countries over the past decades. Many studies find that it has significant linkages with foreign direct investment (FDI). This paper aims to analyze both qualitative and quantitative aspects of intra-regional trade in East Asia and to clarify the linkages between FDI and intra-industry trade (IIT) in this region. One of the main findings is that the characterized of vertical IIT has grown become importance in food industry trade among East Asia region and bilateral trade between Japan and East Asia countries. Another main finding is that, the positive correlation between Japanese FDI and food industry trade in East Asia, indicating FDI was mainly the vertical type that promoted bilateral trade, even the financial crisis that erupted in mid 1997 led to sharp declines in FDI to East Asia countries.

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Key words : Asian international input-output table, East Asia, food industry, foreign direct investment, Intra-industry trade

Since the introduction of the concept of IIT in 1960s, a large number of theoretical and empirical studies have investigated the determinants of this trade. IIT is defined as the simultaneous export and import of commodities of the same industry group. IIT describes trade in similar, but slightly differentiated products. This is based on imperfect competition, or trade in close substitutes demanded by consumers in different countries which may have distinct tastes of preferences. The majority of empirical studies have tried to explain the IIT of developed countries is due to the availability of detailed trade data. Since IIT tend to take place between developed and developing countries, some recent studies have also attempted to estimate the extent of horizontal or vertical IIT. Some previous studies on the East Asia IIT include Kiminami and Kiminami (1995), Ng and Yeasts (2003), and Kyoji Fukao et al. (2003).

In the past three decades, there has been the expansion of trade into East Asia countries because of the investment atmosphere of East Asia has been increasingly attractive. Asia's share of total FDI inflows doubled from 1985 to 1995 and has continued to increase (WTO-JETRO, 2011). The theoretical literature demonstrates that, depending on the circumstances, the relationship between FDI and trade is positive (i.e. complementary) as well as negative (i.e. substitution). Kiminami and Kiminami (1999) point out, that the correlation between trade and FDI is complementary in East Asia by 1980s. However, since the beginning of the 1990s, FDI began to shift to China because of the wage

differential between China and the other East Asian Countries. This led to fierce competition between these countries, with each country rushing to obtain capital and financial resources from all over the world. Furthermore, Sattaphon and Kiminami (2006) suggested that relationship between FDI and trade are both complementary and substitute in East Asia. On the other hand, Kiminami (2007) point out that when observing the effects of FDI spillover, we must not only consider the existence of intra- and inter-industry spillovers but also of intra- and inter-regional effects due to FDI can contribute to or detract from the growth and welfare of developing countries.

Therefore, this paper aims to clarify the changes of the relationship between FDI and intra-regional trade after 1995 by using Asian International input-output table 2000 following the methodology of Kiminami and Kiminami (2000), especially focusing on the food industry of East Asia countries. It will draw some policy implication from the analytical results.

Intra-Regional Trade of Manufacturing Industry

The flow of imports and exports between East Asian economies has increased, reflecting the rising interdependence among these economies. Together with the expansion of inter-regional trade with advanced economies, intra-regional trade among Japan, the Newly Industrializing Economies (NIEs), Association of Southeast Asian Nations (ASEAN) and China, are also rapidly expanded. By using Asian International Input-output table, it could be clarified that the

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average share of intra-regional trade among East Asian economies, as a proportion of their total respective trade was 37.78 % in 2000. Malaysia was the most dependent on intra-regional trade, where the share of intra-regional trade reached 49.12% in its total amount of trade. In contrast, Thailand was least dependent on intra-regional trade, with its share of Asian trade as proportion of its total trade being 29.24%. It is clear that intra-regional trade was important among ASEAN countries than among NIEs countries (table 1).

Japanese FDI in East Asia

Since Japan and East Asia are among the major traders in the world, and the linkages of Japan with East Asia are growing, the accurate understand of the impact Japanese FDI actually has on trade in East Asia becomes an interesting issue. According to Ministry of Finance Japan, the share of FDI from Japan into East Asian countries in total Japanese FDI was around 17.30 % during 1990 to 2010, which was higher than Latin American countries which was 13.38% during the same period. Although the inflow of Japanese FDI to East Asia is higher than Latin American, but there have been big changes in the flow of FDI within East Asia countries. For NIEs countries the share of Japanese FDI was increased from 23.06% to 27.12%, whereas the total of Japanese FDI inflow to Singapore is higher than Korea and Taiwan. In the same period, inflows of Japanese FDI to ASEAN countries have decreased from 52.07% to 30.32%.

Furthermore, Japanese FDI to China was increased from 24.87% to 42.55% during the same period (table 2).

This situation shows the difference fluctuations of Japanese FDI to East Asia countries have been widened and the allocations of FDI have been shifted. This change reflect the fact that the position of ASEAN countries were replaced by China and NIEs countries and have become the new preferred FDI destination for Japanese firms. The main reason, at least initially, is to take advantage of the lower wages in other countries and to improve their competitiveness in international market.

Importance of Processed Food and Food Manufacturing

Recently, food manufacturing sector has become important in international trade systems. This is not only because the ratio of processed food exports from East Asia to total world processed food exports has grown quickly but also because the share of intra-Asia trade in the total world processed food trade also has increased (Kiminami and Kiminami, 2000). The Production Index for food manufacturing confirms the food manufacturings grow fast and demonstrates an industry that is reliable and capable in growth in adverse conditions (table 3).

Materials and Methods

The study conducted for nine East Asia economies. These economies are: Japan, ASEAN (Indonesia, Malaysia,

Table 1 Intra-Asia Trade: Manufacturing sector (2000)

	Total	Total Asian Countries	Asian Countries									U	H	E	R
			I	M	P	S	T	C	N	K	J				
I	69,113,641 100.00	27,721,809 40.11		2,650,342 3.83	606,533 0.88	2,811,563 4.07	1,834,461 2.65	3,230,752 4.67	2,618,427 3.79	3,386,286 4.90	10,583,445 15.31	8,974,916 12.99	1,503,731 2.18	10,640,164 15.40	20,273,021 29.33
M	156,474,371 100.00	76,853,684 49.12	2,650,342 1.69		2,678,298 1.71	19,523,935 12.48	6,041,324 3.86	6,874,951 4.39	8,415,172 5.38	6,272,921 4.01	24,396,741 15.59	30,944,224 19.78	6,895,117 4.41	20,394,182 13.03	21,387,164 13.67
P	58,310,729 100.00	24,681,016 42.33	606,533 1.04	2,678,298 4.59		2,527,390 4.33	1,344,836 2.31	1,541,834 2.64	3,329,023 5.71	3,281,018 5.63	9,372,084 16.07	13,871,807 23.79	2,962,844 5.08	8,447,485 14.49	8,347,577 14.32
S	143,964,778 100.00	66,848,272 46.43	2,811,563 1.95	19,523,935 13.56	2,527,390 1.76		5,418,460 3.76	7,371,967 5.12	5,953,689 4.14	5,344,871 3.71	17,896,397 12.43	24,002,024 16.67	6,826,386 4.74	17,139,726 11.91	29,148,370 20.25
I	171,713,291 100.00	50,209,353 29.24	1,834,461 1.07	6,041,324 3.52	1,344,836 0.78	5,418,460 3.16		5,704,731 3.32	4,604,089 2.68	3,421,412 1.99	21,840,040 12.72	19,259,577 11.22	5,261,982 3.06	16,106,689 9.38	80,875,690 47.10
C	424,116,868 100.00	143,437,639 33.82	3,230,752 0.76	6,874,951 1.62	1,541,834 0.36	7,371,967 1.74	5,704,731 1.35		24,630,379 5.81	27,819,906 6.56	66,263,119 15.62	76,607,446 18.06	52,904,928 12.47	62,949,934 14.84	88,216,921 20.80
N	270,462,591 100.00	112,977,924 41.77	2,618,427 0.97	8,415,172 3.11	3,329,023 1.23	5,953,689 2.20	4,604,089 1.70	24,630,379 9.11		17,297,423 6.40	46,129,722 17.06	51,916,085 19.20	18,069,127 6.68	36,739,782 13.58	50,759,673 18.77
K	275,009,939 100.00	109,244,179 39.72	3,386,286 1.23	6,272,921 2.28	3,281,018 1.19	5,344,871 1.94	3,421,412 1.24	27,819,906 10.12	17,297,423 6.29		42,420,342 15.43	57,611,658 20.95	12,573,838 4.57	39,816,816 14.48	55,763,448 20.28
J	682,727,305 100.00	238,901,890 34.99	10,583,445 1.55	14,396,741 3.57	9,372,084 1.37	17,896,397 2.62	21,840,040 3.20	66,263,119 9.71	46,129,722 6.76	42,420,342 6.21		168,351,851 24.66	29,836,020 4.37	112,862,881 16.53	132,774,663 19.45
Average		37.78													

Source: Trade data is according to Asian International Input-Output Table 2000, IDE 2006, Tokyo.

I: Indonesia, M: Malaysia, P: Philippines, S: Singapore, T: Thailand, C: China, N: Taiwan, K: Korea, J: Japan, U: USA, H: HongKong, E: UK, R: rest of the world

Table 2 Japan FDI in East Asia

Country	Year								Total	
	1990 – 1995		1996 – 2000		2001 – 2005		2006 – 2010		value	%
	value	%	value	%	value	%	value	%		
World	318,592	100	302,596	100	214,807	100	396,670	100	1,232,665	100
Asia	56,443	17.72	51,426	16.99	50,521	23.52	105,083	26.49	263,473	21.18
East Asia	46,789	14.69	42,676	14.10	43,597	20.30	79,793	20.12	212,855	17.30
ASEAN	24,365	52.07	22,679	53.14	12,762	29.27	24,197	30.32	84,003	41.20
Indonesia	9,693	20.72	8,767	20.54	3,836	8.80	3,678	4.61	25,974	13.67
Malaysia	5,407	11.56	3,127	7.33	1,670	3.83	5,936	7.44	16,140	7.54
Thailand	6,784	14.50	7,800	18.28	4,734	10.86	10,969	13.75	30,287	14.35
Philippines	2,481	5.30	2,985	6.99	2,522	5.78	3,614	4.53	11,602	5.65
NIEs	10,789	23.06	11,702	27.42	11,140	25.55	21,643	27.12	55,274	25.79
Singapore	5,923	12.66	5,996	14.05	4,018	9.22	10,217	12.80	26,154	12.18
Korea	2,209	4.72	3,396	7.96	4,662	10.69	7,698	9.65	17,965	8.25
Taiwan	2,657	5.68	2,310	5.41	2,460	5.64	3,728	4.67	11,155	5.35
China	11,635	24.87	8,295	19.44	19,695	45.18	33,953	42.55	73,578	33.01
Latin American	19,503	6.12	15,783	5.22	23,880	11.12	123,215	31.06	182,381	13.38

Source : Ministry of Finance Japan Website

Philippines, and Thailand), NIEs (Singapore, Taiwan, and Korea), and China. For the analysis of the trade patterns in East Asia we used data from the Asian International Input-Output Table, Institute of Developing Economies in Tokyo. The classification of industry was based on sector classification of Asian International Input-Output Table, Institute of Developing Economies, Tokyo (2006). And for the calculation of the IIT measures we used data provided by the Ministry of Finance Japan website (2008).

In order to distinguish between the two types of intermediate product trade, Kiminami and Kiminami (1995) introduced the rate of intermediate input (IM) and the index of intra-industry trade of intermediate products (IIM), in considering jointly with the intra-industry trade (IIT) index as proposed by Grubel and Lloyd (1975). The index is defined by the formulas shown below:

$$\text{IIT}_{\text{ABk}} = \frac{(X_{\text{ABk}} + X_{\text{BAk}} - |X_{\text{ABk}} - X_{\text{BAk}}|)}{(X_{\text{ABk}} + X_{\text{BAk}})} \times 100 \quad (1)$$

$$\text{IM}_{\text{ABk}} = \frac{(XI_{\text{ABk}} + XI_{\text{BAk}})}{(|X_{\text{ABk}} - X_{\text{BAk}}|)} \times 100 \quad (2)$$

$$\text{IIM}_{\text{ABk}} = \frac{(XI_{\text{ABk}} + XI_{\text{BAk}} - |XI_{\text{ABk}} - XI_{\text{BAk}}|)}{(XI_{\text{ABk}} + XI_{\text{BAk}})} \times 100 \quad (3)$$

Where X_{ABk} : imports of country A from country B's k th industry ; X_{BAk} : imports of country B from country A's k th industry ; XI_{ABk} : imports of country A's k th industry from country B's k th industry ; XI_{BAk} : imports of country B's k th

industry from country A's k th industry; $X_{\text{ABk}} + X_{\text{BAk}}$: total trade between countries A and B in the k th industry's products; $|X_{\text{ABk}} - X_{\text{BAk}}|$: inter-industry trade between countries A and B in the k th industry's products ; $X_{\text{ABk}} + X_{\text{BAk}} - |X_{\text{ABk}} - X_{\text{BAk}}|$: intra-industry trade between countries A and B in the k th industry's products ; $XI_{\text{ABk}} + XI_{\text{BAk}}$: total trade between countries A and B in the k th industry's intermediate products ; $|XI_{\text{ABk}} - XI_{\text{BAk}}|$: inter-industry trade between countries A and B in the k th industry's intermediate products ; $XI_{\text{ABk}} + XI_{\text{BAk}} - |XI_{\text{ABk}} - XI_{\text{BAk}}|$: intra-industry trade between countries A and B in the k th industry's intermediate products.

By given equations (1), (2), and (3), international trade can be categorized into different types as (table 4).

Specifically, the judgment of high or low level of IIT and IIM is made by comparison with the index of intra-industry trade between Japan and the USA in 1985 which was 29.9 %. A high and low of IM index is above or below 50 %, respectively.

Results and Discussion

During the period of 1985 to 2000, the dependence on international trade in East Asian economies was increased at an amazing speed for manufacturing. The average of IIT and IIM index for all manufacturing industries among Asian Economies was increased. The average IIT index was raised from 34.95 % in the 1985 to 50.23 % in 2000. Furthermore, IIM index was also increased from 29.77% to 43.93%. In contrast, the IM index was decreased from 34.75% to 27.28% in the same period. This evidence shows that the increase in East Asia was dependent on IIT, suggesting that during this

Table 3 Production Index of Food Manufacturing
(1980 = 100)

Country	Year					
	1985	1990	1995	2000	2005	2009
Japan	101	108	105	109	104	102
Indonesia	116	204	310	285	368	429
Malaysia	123	175	212	319	338	386
Singapore	90	132	172	138	143	177
Korea	150	232	283	296	272	287
USA	111	121	131	138	142	153

Source : United Nations Statistical Yearbook, various issues

Table 4 Types of International Trade

Types of Trade		IIT	IM	IIM
Intra-Industry Trade				
Intermediate Product Trade				
Differentiation of Intermediate Product	: a	High	High	High
Inter-processed Specialization	: b	High	High	Low
Differentiation of Final Products	: c	High	Low	—
Inter-Industry Trade				
One-way Intermediate Product Trade	: d	Low	High	
One-way Final Product Trade	: e	Low	Low	

period the countries intended to follow the same economic growth pattern as NIEs, in order to achieve export-oriented economic growth.

(1) The Indexes of IIT between Japan and East Asia Countries

Table 5 shows that the average IIT index of manufacturing industries between Japan and East Asian countries was raised from 34.31 % in the 1985 to 49.28 % in 2000. However, it seems that fluctuations of IIT indexes within industries have been widen. Although, the IIT value of food, beverage and tobacco; timber and wood products; petroleum and petro chemical products; and transport equipment industry were lower than the manufacturing average but their IIT index value had increased throughout the period of 1985 to 2000.

(2) The Pattern of Food Industry Trade in East Asia

Table 6 shows the average of IIT and IIM index has been increased and the changes in the type of IIT happened. From 1985 to 1995 the food industry trade pattern within group of region were type (c) and type (e), while between ASEAN-Japan the characteristic of the one-way trade of final product (type e) was the most dominant. The situation in 2000 shows different pattern where type (c) became the most popular trading among East Asia countries, especially within

Table 5 Indexes of IIT between Japan and East Asia Countries

No.	Industry	1985	1990	1995	2000
1	Food, beverage and tobacco	42.46	22.03	20.67	23.77
2	Textile, leather and related products	45.41	54.78	59.24	52.78
3	Timber and wood products	22.20	9.82	11.73	20.08
4	Pulp, paper and printing	22.78	28.31	49.70	50.21
5	Chemical products	42.43	36.44	36.33	40.81
6	Petroleum and petro chemical products	28.73	23.34	34.62	39.79
7	Rubber products	49.04	39.73	40.90	58.19
8	Non metallic products	46.06	54.80	38.99	64.32
9	Metal products	40.57	60.70	56.27	61.82
10	Machinery	14.65	25.93	44.31	72.74
11	Transport equipment	12.02	6.28	16.50	34.71
12	Other manufacturing products	45.37	61.00	61.32	72.09
Average		34.31	35.26	39.21	49.28

Source: Estimated based on Asian International Input-Output Table, Institute of Developing Economies, Tokyo

Note: Calculation index of IIT for period 1985-1995 adopted from Kiminami and Kiminami (2002)

Table 6. Types of International Trade of Food Industry in East Asia

	Types			
	1985	1990	1995	2000
ASEAN-Japan				
I J	b	e	e	e
M J	b	e	e	e
P J	a	c	c	e
T J	e	e	e	e
NIEs-Japan				
S J	c	c	c	c
N J	e	e	e	c
K J	e	e	c	c
China-Japan				
C J	e	e	e	c

Source : Estimates based on Asian International Input-Output Table 2000, Institute of Developing Economies 2006.

However, the results of 1985, 1990, and 1995 adopted from Table 7-3 in Kiminami and Kiminami (2002), pp.105.

Note: I: Indonesia, M: Malaysia, P: Philippines, T: Thailand, S: Singapore, N: Taiwan, K: Korea, C: China

Table 7 The Pattern of Food Industry Trade between Japan and East Asia Countries

		IIT	IM	IIM	Types of Trade
Japan	1985	42.87	53.48	11.48	b
Indonesia	1990	5.99	18.03	7.29	e
	1995	5.81	30.29	1.82	e
	2000	10.01	23.48	6.77	e
Japan	1985	45.68	76.67	10.46	b
Malaysia	1990	24.70	39.18	14.79	e
	1995	12.71	39.07	9.85	e
	2000	15.63	32.32	13.26	e
Japan	1985	68.34	66.84	35.49	a
	1990	32.12	49.03	4.82	c
Philippines	1995	36.29	34.74	1.69	c
	2000	5.23	31.85	6.03	e
Japan	1985	96.83	49.86	54.97	c
	1990	52.00	42.54	30.05	c
Singapore	1995	40.72	47.67	19.41	c
	2000	52.98	44.95	31.99	c
Japan	1985	22.13	47.89	3.28	e
Thailand	1990	14.92	31.72	29.32	e
	1995	8.7	30.37	15.16	e
	2000	7.55	23.69	14.68	e
Japan	1985	19.33	36.49	8.06	e
China	1990	9.12	28.62	18.96	e
	1995	8.74	20.99	22.4	e
	2000	6.02	20.98	8.73	e
Japan	1985	27.76	42.88	33.32	e
Taiwan	1990	26.82	28.87	33.05	e
	1995	18.88	27.24	15.17	e
	2000	62.33	21.57	53.7	e
Japan	1985	16.74	45.65	9.26	e
Korea	1990	10.55	37.72	7.50	e
	1995	33.51	28.11	25.53	c
	2000	30.43	26.24	32.29	c

ASEAN and NIEs, between ASEAN-NIEs, ASEAN-China, NIEs-Japan. Otherwise, trading between ASEAN-Japan and China-Japan were type (e). This confirms that the trading pattern among Asia countries were vertical IIT.

(3) The Pattern of Food Industry Trade between Japan and East Asia Countries

Table 7 shows the trade types for Japan's trade in food

Table 8 The Correlation of FDI on Food Industry Trade between Japan and East Asia Countries

Dependent Variables	Coefficient
Total Trade	19712.189 (0.545)*
Export	17890.6 (0.013)
Import	23027.135 (0.636)*
IIT	0.064 (0.099)**

Note: * and ** indicates the sig. at 1% and 5%. Numbers in parentheses are R square

manufacturing industry by partner economy from 1985 to 2000. The trade pattern of Japan food industry trade in 1985 was actualized by differentiation of final product (type c) with Singapore, differentiation of intermediate product (type a) with Philippines, and inter-processed specialization (type b) with Indonesia and Malaysia. On the other hand, the trade pattern of inter-industry trade of one way final product trade (type e) was happened with China, Taiwan, Korea and Thailand.

By comparing the situation with 1985, the trade pattern of 1990 is different. There were two types of trade pattern as intra-industry trade by the differentiation of the final product (type c) and Inter-industry trade of the final product (type e). The situation of 1995 and 2000 shows almost the same with 1990 where the Inter-industry trade of the final product (type e) became the most popular pattern trading between Japan and selected Asia countries. This confirms the characteristic of food manufacturing industry's trade between Japan and East Asia countries has changed to being competitive.

(4) The Correlation between FDI and Trade

The correlation of FDI with trade between Japan and East Asia countries in food industry trade as shown that FDI have strong correlation for both total trade and import ($R^2=0.545$ and $R^2 = 0.636$, respectively). On the other hand, there is a significant correlation between FDI on export and IIT, with t-value 1.17 and 2.41, respectively (table 8).

This result confirms similar results with previous study even though there was Asian Financial Crisis in 1997. It is clear that there exists a positive relationship between Japanese FDI and East Asia's food industry trade. Since FDI has significant correlation on IIT, it can be suggested that Japanese food industry FDI complemented to its trade with East Asia countries.

However, the correlation between Japanese FDI and IIT in selected East Asian countries is indicated by Figure 1, which shows positive correlation (figure 1.1-1.2), negative correlation (figure 1.3-1.4), and not conclusive correlation (figure 1.5-1.8) during the period of 1990-2000.

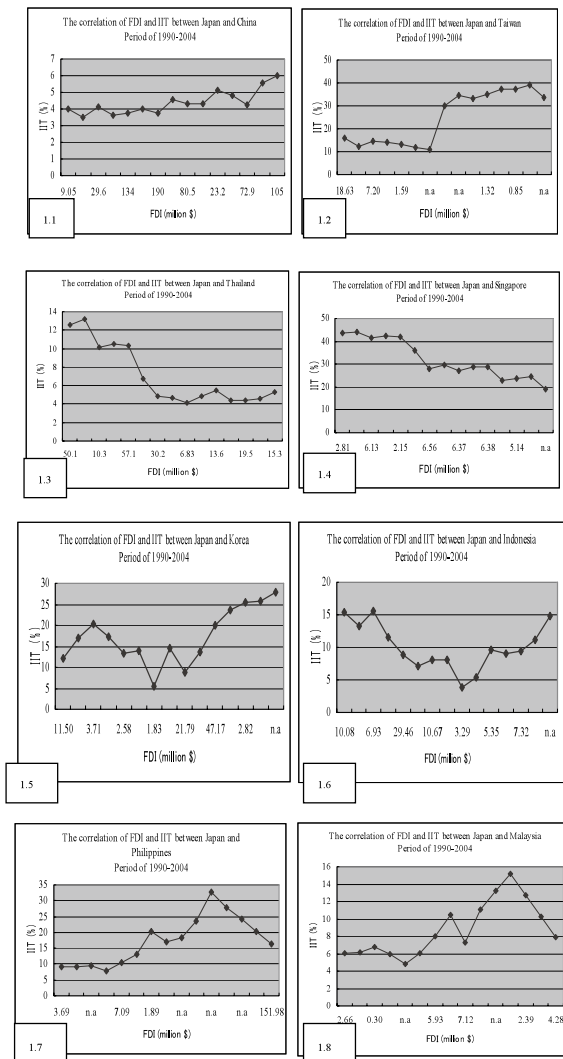


Fig 1. The Correlation Japanese FDI and IIT in Selected East Asia Countries.

Conclusions

Based on the brief analysis given above, the conclusions of the study are as follows: During the period of 1985 to 2000 the increase in East Asian economic dependence on IIT has occurred mainly in ASEAN countries and China, suggesting that during this period the countries intended to follow the same economic growth pattern as that of NIEs in order to achieve export-oriented economic growth. In the case of food trade, there were two types of trade in East Asia : intra-industry trade and inter-industry trade, where intra-industry trade expanded faster than inter-industry trade. In contrast, inter-industry trade expanded faster than intra-industry trade between Japan and East Asia countries.

The changing nature of the intra-industry trade and inter-industry trade in East Asia, especially between Japan and East Asian countries was caused by the increase in FDI by Japanese MNEs into East Asian countries, such as in food

industry. However, the situation has changed since 1997 within East Asian countries. In order to improve their competitiveness in international market, Japanese FDI through Multi National Enterprises (MNEs) has further shifted to China from other East Asian countries.

Finally, since regional distribution of FDI impacts industrial agglomeration which in turn has the potential of causing innovation through the formation of industrial clusters, FDI policies of each country should embody industry-promoting measures in particular those that must be formulated from the perspective of an industrial cluster policy.

This is worth to note that the research work can be extended in more detailed case studies at industry level. And since the estimation model of correlation between Trade and FDI has some limitations, it is important to account for various new explanatory variables theoretically which give impact on trade.

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東アジアにおける城内貿易 —食品産業の産業内貿易と海外直接投資に関する実証研究—

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要 約

過去数十年の間で東アジアにおける城内の貿易は急速に増加してきた。多くの既存研究はこれらの城内貿易の増加は海外直接投資との密接な関係を有していることを明らかにした。本文は量的・質的な側面から東アジアにおける産業内貿易と海外直接投資との関係を論じることを目的とする。そして本研究から得られた知見は主に以下の2点である。すなわち、日本と東アジアの食品産業において垂直的分業による産業内貿易が進んでおり、その背景には日本企業のこれらの地域に対する海外直接投資が重要な役割を果たしている。それが、1997年に同地域で起きた通貨危機の後も、海外直接投資そのものが減少したにもかかわらず、日本の食品企業の海外直接投資は2国間の貿易に強い影響を与えているのである。

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