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Trade Pattern of Production Network in East Asia

Based on the Analysis of China's Final Goods Exports

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Introduction

From 1982 to 2010, the share of East Asia in the world commodity export increased from 13 percent to 23 percent, among which China's share rose nearly 10 times (from 1% to 9.4%). During that period, East Asia's production network developed at a rapid pace. The appreciation of the yen in the mid-1980s to mid-1990s caused Japan to lose its cost advantage in domestic manufacturing and the transfer of the labor-intensive assemble cycle to the "Four-Dragon" Asian economies. However, the subsequent appreciation of those four economies' exchange rates also resulted in the transfer of the assembly process to developing countries such as China and the Southeast Asian countries.

Depending on the endogenous evolution of natural endowments and the effective policy orientation, China eventually established its core position in the Asian (mainly East Asian) manufacturing network. It introduced the "New Triangle"[1] trade mode: i.e., assemble and export to developed countries such as the United States, Japan and European economies, those products that have imported intermediate goods from ASEAN and advanced technology from Japan and South Korea.

With its rapidly developing Asian manufacturing network, which is mainly on component and parts, the service industry in the East Asian economies have changed significantly. The industry evolved from traditional labor-intensive to knowledge- and technology-intensive (mostly in producer services).

Today, developed economies in North America and West Europe, led by the United States and the United Kingdom, still possess a strong competitive advantage in producer services because of their strength in technology, capital, and labor. However, the rapid change in East Asian countries' industry structures and development of

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[1] Ng and Yeats (2001); Guillaume Gaulier, Francoise Lemoine and Deniz Ünal-Kesenci (2007); Thorbecke (2011).

component-and-parts trade brought with it much improvement in its own producer services, which are closely connected to the manufacturing industry. With such a scenario, the increasing trade and export of commodities requiring advanced technology levels have largely depended on the developed economies' capital and technology. This means that any large increase in China's exports would need large-scale importation of component and parts as well as producer services from these other economies[2].

According to Figure 1, 90 percent of China's final capital goods and 85 percent of its final consumer goods in 2000 were exported to developed economies (including the United States, EU 27 and Japan) and the East Asian region. Although China showed a continuous decline in final products export to these two areas[3] from 2000 to 2010, the percentages are still at 77 percent and 72 percent, respectively, by 2010. On the other hand, Figure 2 shows the percentage of China's imported intermediate goods from the United States, Japan, Europe, and East Asian[4] in 2000 at 91 percent, which then decreased to 81 percent by 2010. Components and parts (about 80%) comprised the highest percentage of China's imported intermediate goods in 2010. Semi-final products in 2010 was 70 percent, but raw material decreased from 30 percent in 2000 to 20 Percent in 2010. Therefore, the main intermediate goods imported from developed economies and the East Asian region are components and parts, and semi-final products.

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[2] Guillaume Gaulier, Francoise Lemoine 和 Deniz U¨nal-Kesenci, "China's Integration in East Asia: Production Sharing, FDI and High-Tech Trade". *Econ Change* (2007) 40:27–63.

[3] Here, the EU includes 27 countries; the East Asian region includes HK of China, Taiwan of China, South Korea, Singapore and the ASEAN member-countries.

[4] Here, the intermediate products are classified according to the BEC rule, including raw materials, semi-final products, and components and parts.

The ratio of China's intermediate products importing from region = (China's intermediate products imports/ China's total intermediate products imports).
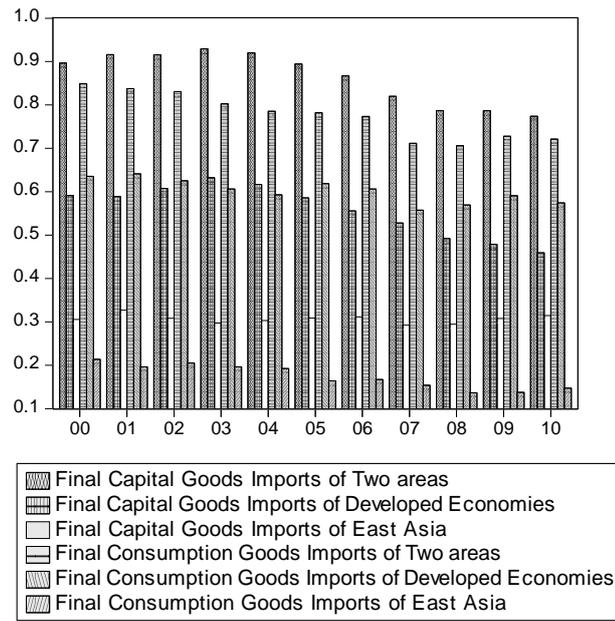
Figure 1: Final Goods Imports of Developed Economies and East Asia from China.

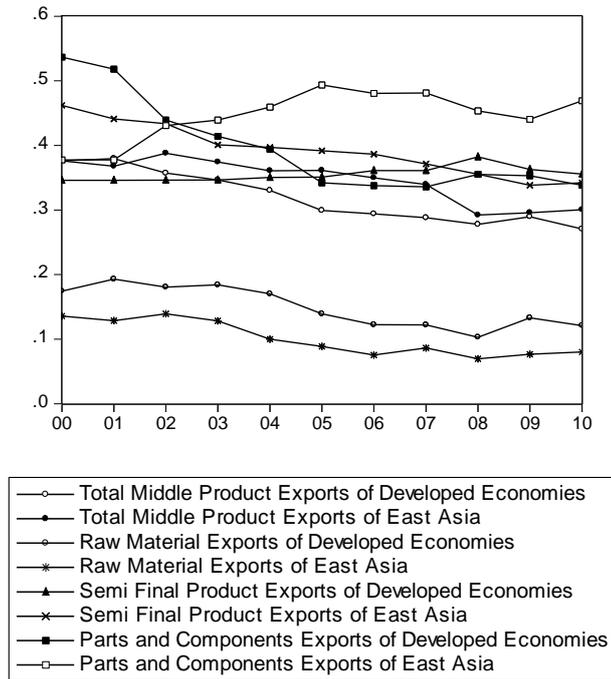Source：Author's calculation based on the data from UN Comtrade (BEC).

Figure 2: Middle Product Exports of Developed Economies and East Asia to China.

Source：Author's calculation based on the data from UN Comtrade (BEC)

The total service import of China from the United States, Japan, and Europe is much

higher than that from East Asia[5], with components and parts comprising 60 percent of the total services imported in 2010. Although the percentage of the imports of components and parts is slowly in the downtrend, there was no dramatic fluctuation even during the global financial crisis of 2007-2009, which to some extent implies a stable and continuous trade pattern for China.
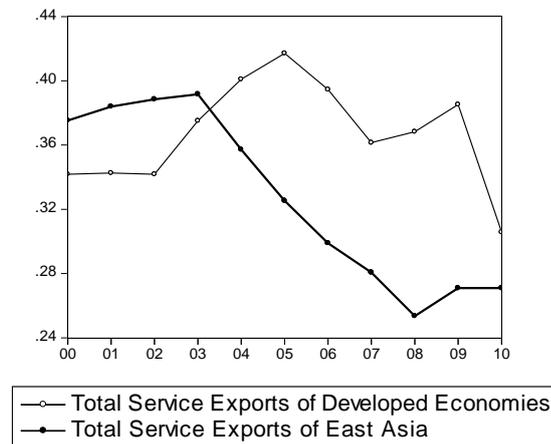

Figure 3:   Total Service Exports of Developed Economies and East Asia to China.
Source：Author's calculation based on the data from OECD database

Literature Review

Within the context of East Asia's new trade development after the 1980s, Jones and Kierzkowski (1990) bring forth the Fragmentation Production Theory, which expounded on the role intermediate goods played in the global production chain. Arndt (1997) uses the revised traditional model to analyze the welfare problems in the new production framework. Long et al. (2005) has incorporated the intermediate goods into the production structure so as to analyze the relations among final goods, intermediate goods, and producer services.

Meanwhile, there are many studies on the effect of trade in producer services on a country's trade pattern by treating services as an intermediate factor needed in production. Markusen (1989) emphasizes the internal specialization effect of trade in producer services and the complementarities between trade in services and commodities in his model. Francois (1990b) focuses on the external effect of producer services---i.e., how producer services link and coordinate different specialized production processes. In his study, the model proved that countries---especially

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[5] The services data of East Asia include that of South Korea, Hong Kong and Taiwan of China as well as that of ASEAN. The data of the ASEAN is represented by data from Singapore because of lack of data.

developing countries---would benefit from free trade in producer services such that it will result in a higher level of specialization and internationalization.

Marrewijk et al (1997) analyze the relations among producer services, economy of scale, and factor markets in the framework of monopolistic competition assumptions. In this model, new factors such as technological and intensity differences in services, were added into the traditional factor endowment theory. The authors point out that the backward development of producer services in a country can also result in its comparative disadvantage of commodities. Markusen，Rutherford, and Tarr (2005) analyze the relative theory from the micro-level angle and have proven that a country can lessen its comparative disadvantage in final goods brought by a lack of domestically advanced producer services factors, by importing more advanced services from foreign countries.

Deardorff (2001) also defines the East Asian structure as *vertical specialization*, which means that the parts and components of one final goods will be allocated to more than two regions during the whole process of production. Athukorala and Yamashita (2006), and Mitsuyo Aodo and Fukunari Kimura (2007) have studied the determinant factors on the trade pattern of the East Asian network. They established the econometric model by dividing trade into: parts and components, final goods, and total goods. Their conclusion proved that the first type of trade was much larger compared with the others, which was most evident in the East Asian region.

In summary, many scholars have made a conclusion about the production network in East Asia. At the same time, trade structures combining intermediate goods and producer services have been analyzed theoretically. Based on these, more questions---What's the trade pattern under the new production network? Have the relations among economies in East Asia changed compared with those during the Flying Geese phase? After demonstrating a strong growth since the 1990s, what is the function of producer services in this region's network?---should be answered.

This paper will investigate the relationships among final products exports from China to the world, and intermediate goods and service imports from developed economies and East Asia to China empirically by using panel data regression on a new method created by the author.

Empirical Analysis

Because of China's central status in the East Asian production network, this section will examine empirically China's "new triangle" export structure, which includes final capital and consumption goods exports from China to developed economies and East Asian region, and intermediate goods and service imports from developed economies and East Asia to China. Some scholars have explained this problem by using the Standard International Trade Classification (SITC) trade data. However, this method has some shortcoming as it cannot analyze the trade pattern from the macro level. This paper tries to use the Broad Economic Commodities (BEC) commodity classification and services plus some control variables to analyze the relations among different goods and services and elicit some conclusions about China's trade structure as a whole.

Method introduction

Graham (1996), Grufeld, and Moxnes (2003), and Kimura and Lee（2006）all explain the relations of complementarities and substitution among variables by finding out the common factors among such variables and regress these based on their common factors. This paper will use another way to determine the relationship among different variables and to ascertain the function of trade from different countries in China's trade structure.

This paper will use the gravity model to explain the trade pattern among China's exports of final capital goods and final consumption goods and its imports of intermediate goods and services. The gravity model is chosen as the main econometric model because this has been proven effective in explaining variables, especially after Anderson (1979) founded the systematic basis of analysis. Kimura and Lee（2006）use the gravity model to examine the determinants of trade in goods and services and prove that both the trade in goods and services can be well explained by this method. The main difference is that there are different coefficients between two regression results, which will not affect the explanatory capabilities of the gravity model.

Based on this, the gravity model this paper uses to regress is as followed:

$$\mathbf{ln TRADEFINAL}_{ijt} = \beta_1 \mathbf{ln}GDP_{jt} + \beta_2 \mathbf{ln CHINA}GDP_t + \beta_3 \mathbf{ln}DIS_{ij} + \beta_4 \mathbf{ln SERVICE}_{ijt} + \beta_5 \mathbf{ln INPUT}_{ijt} + a + \delta t + \varepsilon_{ijt}$$

where *i* represents China, *j* refers to other economies including the United States, Japan, EU27, the ASEAN[6], South Korea, Hong Kong of China , *t* is time in year.

TRADEFINAL$_{ijt}$ represents the exports of China's total final goods or final capital goods or consumption goods to developed countries and the East Asian economies mentioned above;

GDP$_{jt}$ refers to the domestic growth production of China's trade partners from developed and East Asian economies; **CHINAGDP**$_t$ means China's GDP in each sample year;

DIS$_{ij}$ refers to the distance among capitals of China and its trade partners;

SERVICE$_{ijt}$ and **INPUT**$_{ijt}$ means the imports of services and middle products from China's trade partners, including developed and East Asian economies;

α is the constant term, δ_t is the time fixed effect and ε_{ijt} is random disturbance term.

Based on this formulation, another regression model is set in order to test the function of China's import from different countries:

$$\ln\text{TRADEFINAL}_{ijt} = \beta_1 \ln\text{SERVICE}_{ijt} + \beta_2 \ln\text{INPUT}_{ijt} + \beta_3 \text{CDUM}_j*\ln\text{SERVICE}_{ijt} + \beta_4 \text{CDUM}_j*\ln\text{INPUT}_{ijt} + a_i + \delta_t + \varepsilon_{ijt}$$

To find out the exact function of imports of services and inputs from different countries, this paper set **CDUM**$_j$ as a country dummy variable that represents different countries, including Japan, the United States, EU27, South Korea, Hong Kong of China, and the ASEAN. **CDUM**$_j$***lnSERVICE**$_{ijt}$ and **CDUM**$_j$***lnINPUT**$_{ijt}$ refers to imports of services and inputs from each country dummy. In this way, this paper tries to ascertain China's new triangle trade pattern, where developed economies are still playing a very important role in creating high-technology parts and components as well as advanced services.

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[6] The EU27 refers to the 27 countries from EU, including Austria, Belgium, Bulgaria, Cyprus, Czech Rep, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the UK. The ASEAN included 10 countries.

Data resources

In this paper, the data on trade in services come mainly from the databases of the Bureau of Economic Analysis (BEA) and Organisation for Economic Co-operation and Development (OECD). Although the two sources are somewhat different in their classification of industries", we can still find the counterparts of both sources. The values of GDP are the PPP GDP from Penn World Tables. The index of DIST measures the distance between the capitals of any two countries. Other relevant data come from the website http://www.vulcansoft.com/city97.html. China's exports and imports of final goods and intermediate products are from COMTRADE. Data in this paper are for the period 2000 to 2010.

This paper classifies the intermediate products, final capital goods, and final consumption goods based on the BEC in the UN COMTRADE database. The intermediate products include 111 (Food and beverages, primary for industry), 121 (Food and beverages, processed mainly for industry), 21 (Industrial supplies not elsewhere specified, primary), 22 (Industrial supplies not elsewhere specified, processed), 31 (Fuels and lubricants, primary), 322 (Fuels and lubricants, processed [other than motor spirit]), 42 (Parts and accessories of capital goods [except transport equipment]), and 53 (Parts and accessories of transport equipment). This paper defines different kinds of intermediate products based on the following: Raw materials include 111, 21and 31; semi-final products include 121, 22 and 322; parts and components include 42 and 53.

Final capital goods include 41 (Capital goods [except transport equipment]), 521 (Industrial transport equipment). Consumption goods include 112 (Food and beverages, primary for household consumption), 122 (food and beverages, processed for household consumption), 522 (non-industrial transport equipment), 61 (durable consumer goods not elsewhere specified), 62 (semi-durable consumer goods not elsewhere specified), and 63 (non-durable consumer goods not elsewhere specified).

Empirical results analysis

In this section, China's new triangle model is examined by the two regression models earlier discussed. In addition, the final goods exports demonstrate some strong characteristics of endogeneity; therefore, the first-order difference general method of moments (GMM) is used to regress the model[7] (as seen in Table 1 to Table 4).

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[7] This study also tried the two-stage GMM and systematic GMM to regress, but the result of the first order in difference is the most

Result analysis of gravity model

The study regressed China's total final goods, final capital goods, and final consumption goods, respectively. Table 1 shows that on the total final goods level, the economic scale from China's partner, as represented by GDP, can explain significantly China's total final goods exports. That is, the growth of China's final goods export has a strong relationship with its trade partner's economic growth.

Table1　Regression Result of Final Goods Exports on Gravity Model

	Total Final Goods			Final Consumption Goods			Final Capital Goods			
	OLS	FE	FDGMM	OLS	FE	FDGMM	OLS	FE	FDGMM	
lngdp	2.486***	1.952**	1.825***	1.934***	0.949	3.029***	2.948***	3.132***	2.273*	
	(3.74)	(2.71)	(2.63)	(3.13)	(1.40)	(3.35)	(3.71)	(3.05)	(1.91)	
lnchinagdp	66.411***	35.138***	35.149***	0.155	24.174**	-0.874	0.086	56.872***	0.836	
	(3.25)	(3.80)	(3.41)	(0.16)	(2.07)	(-0.67)	(0.06)	(3.77)	(0.54)	
lndiscap	0.034	-	0.758*	0.020	-	0.259	0.025	-	-0.577*	
	(0.84)	-	(1.72)	(0.66)	-	(1.17)	(0.44)	-	(-1.79)	
L.ltotoalfinal	0.747***	0.327**	0.249**							
	(4.61)	(2.60)	(2.47)							
L.lcongoods				0.647***	0.367***	0.418***				
				(3.85)	(3.83)	(7.31)				
L.lcapgoods							1.002***	0.462***	0.491***	
							(10.85)	(5.53)	(3.88)	
ltotalservice	0.014	0.009	0.018	0.003	-0.014	-0.003	0.008	0.015	0.023*	
	(0.98)	(0.65)	(1.53)	(0.18)	(-1.37)	(-0.24)	(0.47)	(1.35)	(1.78)	
ltotalinput	-0.017	0.080	0.187	-0.081	-0.051	0.083	0.407***	0.310**	0.519***	
	(-0.12)	(0.46)	(1.06)	(-0.62)	(-0.32)	(0.57)	(2.93)	(2.52)	(5.84)	
_cons	4.915	1.973	0.000	4.775	1.937	0.000	6.568	3.865	0.000	
	(0.77)	(0.52)	-	(0.74)	(0.51)	-	(1.07)	(1.02)	-	
N	239	239	207	239	239	207	239	239	207	
N_g		32.000	32.000		32.000	32.000		32.000	32.000	

t statistics in parentheses,　* p<0.1, ** p<0.05, *** p<0.01

The coefficients of China's GDP also manifest a positive impact on the export of final goods. As for the distance between China and its trade partner, the coefficient of the distance variable shows contradicting results in its final consumption goods and capital goods export. That is, the distance variable does not manifest its normal negative relations with export. As proven by the traditional gravity model, the coefficients of distance on final goods export turned out to be significantly positive while that on final consumption goods export and final capital goods export are respectively negative and positive. This may indicate to a certain extent that the consumer products made and exported by China have more cost advantage[8], which can even offset the trade cost caused by the distance among countries.

significant one.

[8] This kind of cost reduction may probably be the labor cost or the trade convenience resulting from policy promotion.

Based on traditional gravity model variables, this study had also regressed the exports with China's imports of services and inputs from other countries. The result shows that both services and inputs from other countries have positive impact on the final good exports. Specifically, imports of services and inputs have strong positive relations with China's final capital goods exports compared with the final consumption goods exports.

Results analysis of country dummy model

By analyzing the general variables based on the gravity model, one can find that there are some strong relations among imports of services and inputs from other economies, and China's final goods exports. One can take this study on the relationships further by examining the countries' dummy cases so as to ascertain which of a country's services or inputs have significant effects on the final goods exports of China.

Table 2 shows that import of inputs from other countries has stronger positive effects on China's final goods export. According to the country dummy results, the imports of services from Japan, Korea, and Singapore[9] contributed much more than other economies. Meanwhile, the import of services from the United States is negatively related with China's final goods exports. Likewise, the imports of inputs from Japan, Hong Kong of China and the ASEAN show more negative relations compared with other countries.

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[9] In Table 2, the import of services from ASEAN is represented by data from Singapore.

Table2　Regression Result of Total Final Goods Export on Country Dummy Variables

	Total Final Goods			Country Dummy Results					
	OLS	FE	FDGMM	JAPAN	USA	EU	KOREA	HK	ASEAN
ltotalservice	0.007	0.004	0.016	0.006	0.008	0.051	0.007	0.006	0.007
	(0.54)	(0.27)	(1.23)	(0.51)	(0.61)	(0.29)	(0.56)	(0.51)	(0.53)
ltotalinput	0.089	0.254*	0.364***	0.091	0.088	−0.128	0.096	0.102	0.090
	(0.64)	(1.76)	(2.61)	(0.64)	(0.63)	(−0.49)	(0.67)	(0.70)	(0.63)
L.ltotoalfinal	0.777***	0.383***	0.252**	0.778***	0.769***	0.771***	0.775***	0.774***	0.777***
	(4.89)	(2.76)	(2.17)	(4.83)	(4.82)	(4.82)	(4.84)	(4.83)	(4.84)
JAPAN* ltotalservice				0.747*					
				(1.8)					
JAPAN* ltotalinput				−1.643**					
				(−2.11)					
USA* ltotalservice					−0.909**				
					(−2.36)				
USA* ltotalinput					0.091				
					(0.38)				
EU* ltotalservice						−0.045			
						(−0.26)			
EU* ltotalinput						0.239			
						(0.83)			
KOREA* ltotalservice							0.343*		
							(1.79)		
KOREA* ltotalinput							−0.088		
							(−0.32)		
HK* ltotalservice								−0.615	
								(−0.98)	
HK* Ltotalinput								−0.114	
								(−0.28)	
ASEAN* ltotalservice									0.540**
									(2.49)
ASEAN* ltotalinput									−0.766
									(−0.95)
_cons	1.509***	9.826***	6.208**	1.479***	1.662***	1.660***	1.506***	1.578***	1.514***
	(3.89)	(4.74)	(2.47)	(3.66)	(3.77)	(3.62)	(3.87)	(3.81)	(3.88)
N	239	239	207	239	239	239	239	239	239
N_g		32.000	32.000						
R2	0.972	0.825		0.972	0.972	0.973	0.972	0.972	0.972
F	804.397	94.968		787.792	1196.931	965.974	751.251	2559.342	1090.845

t statistics in parentheses,　* p<0.1, ** p<0.05, *** p<0.01

Table 3 shows the final consumption goods export regression results. The imports of services from Japan and Singapore have positive relations with China's final consumption goods exports, while services from the United States show significantly negative relations. This means that the United States' services exports are not mainly for China's final consumption goods exports. Meanwhile, the import of inputs from Japan and the ASEAN have stronger negative coefficients, which may means that these countries have transferred most of the production of inputs to China. The same description also holds true for the EU and US inputs cases.

Table3　Regression Result of Final Consumption Goods Export on Country Dummy Variables

	Final Consumption Goods			Country Dummy Results						
	OLS	FE	FDGMM	JAPAN	USA	EU	KOREA	HK	ASEAN	
ltotalservice	-0.002	-0.014	-0.005	-0.002	-0.001	0.040	-0.001	-0.001	-0.002	
	(-0.12)	(-1.27)	(-0.40)	(-0.15)	(-0.11)	(0.21)	(-0.11)	(-0.07)	(-0.13)	
ltotalinput	-0.129	0.039	0.083	-0.126	-0.131	-0.236	-0.128	-0.137	-0.129	
	(-1.01)	(0.29)	(0.57)	(-0.98)	(-1.01)	(-1.07)	(-0.98)	(-1.04)	(-1.00)	
L.1consfinal	0.693***	0.374***	0.348***	0.693***	0.692***	0.692***	0.692***	0.693***	0.693***	
	(4.10)	(3.85)	(7.39)	(4.06)	(4.06)	(4.05)	(4.05)	(4.05)	(4.06)	
JAPAN* ltotalservice				0.627						
				(-1.24)						
JAPAN* ltotalinput				-1.533*						
				(-1.91)						
USA* ltotalservice					-1.034**					
					(-2.47)					
USA* ltotalinput					0.081					
					(-0.46)					
EU* ltotalservice						-0.042				
						(-0.22)				
EU* ltotalinput						0.109				
						(-0.45)				
KOREA* ltotalservice							-0.294			
							(-1.19)			
KOREA* ltotalinput							0.356			
							(-1.17)			
HK* ltotalservice								-0.320		
								(-0.41)		
HK* Ltotalinput								0.197		
								(-0.5)		
ASEAN* ltotalservice									0.864***	
									(3.57)	
ASEAN* ltotalinput									-2.251**	
									(-2.38)	
_cons	0.697**	10.408***	5.306*	0.647**	0.730**	0.574	0.687**	0.667**	0.704**	
	(2.27)	(4.47)	(1.77)	(1.98)	(2.12)	(1.57)	(2.25)	(2.12)	(2.29)	
N	239	239	207	239	239	239	239	239	239	
N_g		32.000	32.000							
R2	0.976	0.690		0.977	0.977	0.977	0.977	0.977	0.977	
F	1424.195	115.574		1416.892	3164.513	1771.266	1138.336	2719.051	1181.570	

t statistics in parentheses,　* p<0.1, ** p<0.05, *** p<0.01

Unlike the case with the final consumption goods exports, China's final capital goods exports' regression shows some interesting results in Table 4. According to the general regression results, the import of services and inputs has significant positive relations with final capital goods exports. While the services from Korea, Japan, and Singapore are much more active in promoting the final capital goods exports, the inputs from most of the sample economies, except for the European Union and the ASEAN, are all negatively related with the exports of final capital goods. This means that many economies have transferred their inputs production needed for the capital goods to China.

Table4   Regression Result of Final Capital Goods Export on Country Dummy Variables

	Final Capital Goods			Country Dummy Results						
	OLS	FE	FDGMM	JAPAN	USA	EU	KOREA	HK	ASEAN	
ltotalservice	-0.001	0.006	0.022**	-0.002	-0.001	0.040	-0.001	-0.001	-0.002	
	(-0.07)	(0.54)	(2.31)	(-0.15)	(-0.11)	(0.21)	(-0.11)	(-0.07)	(-0.13)	
ltotalinput	0.384***	0.549***	0.620***	-0.126	-0.131	-0.236	-0.128	-0.137	-0.129	
	(2.62)	(4.41)	(4.93)	(-0.98)	(-1.01)	(-1.07)	(-0.98)	(-1.04)	(-1.00)	
L.lcapfinal	1.054***	0.564***	0.588***	0.693***	0.692***	0.692***	0.692***	0.693***	0.693***	
	(8.97)	(5.95)	(3.91)	(4.06)	(4.06)	(4.05)	(4.05)	(4.05)	(4.06)	
JAPAN* ltotalservice				0.490						
				(1.32)						
JAPAN* ltotalinput				-1.417**						
				(-2.50)						
USA* ltotalservice					-0.738					
					(-1.29)					
USA* ltotalinput					-0.160					
					(-0.51)					
EU* ltotalservice						-0.188				
						(-0.81)				
EU* ltotalinput						0.522				
						(1.43)				
KOREA* ltotalservice							1.320***			
							(3.63)			
KOREA* ltotalinput							-0.665			
							(-1.46)			
HK* ltotalservice								-1.277**		
								(-1.99)		
HK* Ltotalinput								-0.608**		
								(-2.04)		
ASEAN* ltotalservice									0.261	
									(1.43)	
ASEAN* ltotalinput									0.157	
									(0.16)	
_cons	1.498***	4.567	1.183	1.469***	1.643***	1.729***	1.477***	1.616***	1.496***	
	(4.17)	(1.62)	(0.54)	(3.95)	(4.17)	(4.06)	(4.13)	(4.31)	(4.06)	
N	239	239	207	239	239	239	239	239	239	
N_g		32.000	32.000							
R2	0.967	0.868		0.967	0.968	0.968	0.968	0.968	0.967	
F	537.621	199.120		1079.002	780.109	730.227	671.376	2202.695	910.779	

t statistics in parentheses,   * p<0.1, ** p<0.05, *** p<0.01

Summary and Policy Implication

As technological progress and trade liberalization accelerate, the international division of labor as characterized by fragmentation develops faster. Given this background, the

East Asian production network has taken on more momentum, which is mainly evidenced by the considerable increase in intermediate goods trade such as components and parts. At the same time, the final products made in this region have been exported in large volume to developed countries such as the United States, Japan, and the European nations. Due attention should be paid to trade in producer services that plays a linking role in this trade pattern. Jones (1990) states that increasing production fragmentation gives rise to greater demand for producer services linkages. Given this, it is important to make the relationships among trades in producer services, intermediate goods, and final capital goods clearer. These relationships can help guide a nation on what best trade policies to adopt and on how to promote trade in producer services so as to elevate the nation's position in the international division of labor.

Analytical results of this paper indicate that under the framework of fragmentation in the manufacturing field, East Asian's trade in producer services, intermediate goods trade, and final capital goods manifest the following trade pattern: As China has become an assembly center in East Asia, the country's final goods exports have strong relations with the imports of services and intermediate goods from other economies. According to this paper's empirical results, China's final consumption goods exports have significantly positive relations with services from Japan, Korea, and Singapore and inputs from Korea. At the same time, China's final capital goods exports are mainly motivated by services from Japan, Korea, and Singapore as well as the inputs from the European Union and ASEAN.

These findings mean that in the final consumption goods export, more and more economies make full use of China's assembly-center status to produce both intermediate goods and final goods while keeping some important technology-intensive services at home. On the other hand, in the final capital goods exports, China is still in the process of undertaking low value added parts by importing many inputs and services from developed economies.

In terms of its policy implications, this trade pattern indicates that East Asian countries should give substantial support to industries closely connected to the importation of intermediate goods if they expect a faster development of producer service industries. One thing that merits due attention is that despite the lack of a complementary relation between import of producer service and export of intermediate goods, East Asia's increasing producer service import can boost the size of their producer service export due to bilateral trade in producer service industries.

Therefore, there are two options that can help enhance the competitiveness of East Asian economies' producer service exports. One is by increasing producer service import; the other is by developing the leading effect of intermediate goods export on producer service export.

These two options can not only ease the enormous trade surplus of East Asia---including China---against the United States, Japan and Europe, but also ultimately enhance each country's competitiveness in producer service exports. This paper demonstrates that there are ways countries can tackle their trade balance problems under the current fragmentation framework.

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