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Shifting Economic Balance and Inter-Regional Linkages among Major Economic Regions of Northeast Asia[1]

Won Bae Kim

Korea Research Institute for Human Settlements

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Abstract

This paper examines the changing industrial landscape of northeast Asia by focusing on the eight economic regions (Kanto, Kinki and Chubu of Japan, Zhujang, Changjiang and Jing-Jin-Ji of China, and Korea's Capital and Yeongnam region). The three Japanese regions have been leading the formation of industrial geography of northeast and southeast Asia in the past three decades. Since the reform and opening of China in the 1980s, the industrial landscape has significantly changed from a unipolar structure to a multipolar structure. Three Chinese coastal regions advanced successfully in manufacturing production and they became a substantial force in shifting economic balance towards China away from Japan and Korea. Obviously, the rise of the three Chinese economic regions has expanded trade and investment relations among the eight economic regions of northeast Asia, which have been increasingly connected through logistics networks. Moreover, emerging relations among these eight core economic regions pose interesting questions of whether they are complementary or competitive and whether these relations suggest a formation of hierarchy.

Key words _ Economic geography, core economic regions, inter-regional linkages, Northeast Asia

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[1] This paper is derived from the KRIHS Report, Development Prospects for and Collaborative Development of the Core Economic Regions in Northeast Asia (I): Development Prospects and Inter-Regional Linkages written by the author in Korean (2007).

Introduction

The industrial landscape of East Asia has changed considerably over the past twenty years. The flying geese pattern of development centered on the single head goose, Japan, is no longer relevant (MacIntyre and Naughton 2005). East Asia including northeast Asia can be better characterized by multiple industrial cores rather than a single core with a number of peripheral areas. Increased economic interdependence among these multiple cores of northeast Asia suggests the development of a new industrial geography, where the forces of competition and cooperation generate diverse patterns of relations between subnational regions across the border (Park 2004 , Ash 2005).

This article attempts to investigate the evolving landscape of economic geography in northeast Asia. It, firstly, surveys the relative standing of eight core economic regions and their industrial specialization by using a simple location quotient analysis. The paper briefly explores industrial futures of the eight core regions by profiling industrial cluster strategy of them. Secondly, the paper looks at inter-regional linkages by analyzing trade, investment and logistics data. Thirdly, the development prospects of the eight regions for 2020 and their shifting ranks are examined together with a preliminary analysis on inter-regional economic relations. Finally, the paper discusses future research agenda.

Relative Standing, Industrial Specialization and Cluster Strategy of the Eight Core Regions

Changing industrial geography

The eight regions selected for analysis are: Zhujiang delta, Changjiang delta and Jing-Jin-Ji region of China, Kanto, Kinki and Chubu region of Japan, and Seoul and

Yeongnam region of Korea. In terms of GRDP (gross regional domestic product) measured by international exchange rate, the Kanto region is ahead of all other regions. Next follows Kinki, Chubu region of Japan and the Seoul region of Korea. China's Changjiang region and Zhujiang delta including Hong Kong are still behind the three core regions of Japan. The Yeongnam region of Korea and the Jing-Jing-Ji region of China reveal the smallest size of GRDP.
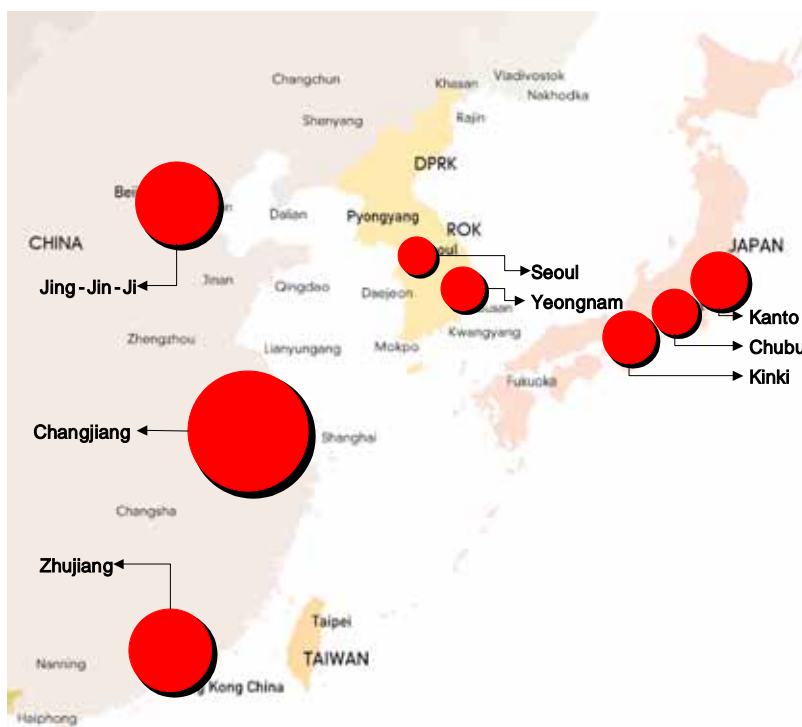

Figure 1. Eight Core Economic Regions of Northeast Asia

The picture changes, however, when GRDP is measured in terms of PPP (purchasing power parity), the Kanto region is closely followed by the Changjiang delta. With some distance, follows Zhujiang delta. All the other regions are behind those three core regions. Changjiang and Zhujiang delta register themselves clearly in the leader's club in northeast Asia, overwhelming the mature industrial regions of Kinki, Chubu and Seoul region.

Table 1. Basic Indicators of the Eight Core Regions

	PPP GDP 2005 (billions of international dollars)	GDP 2005 (billions of US dollars)	Population 2005 (thousands)
China	8,573	2,229	1,304,500
Changjiang delta	1,338	348	82,280
Jing-Jin-Ji	438	114	34,700
Guangdong	623	162	40,780
Hong Kong	214	178	6,944
Guangdong + Hong Kong	801	340	47,724
Japan	3,944	4,506	127,956
Kanto	1,444	1,650	42,370
Kinki	596	681	20,890
Chubu	574	656	17,220
Korea, Rep.	1,056	794	48,294
Seoul region	479	360	23,050
Yeongnam region	282	212	12,985

Source: Niu and Cheng (2006) for Chinese regions (figures are for 2004), Japan Statistical Yearbook for Japanese regions (figures are fiscal year 2003), Korea Statistical Office for Korean regions (figures are for 2004) and PPP GDP and GDP 2005 for the three countries are from World Bank (2006).

In the past decades, the three Japanese core regions have been leading the formation of industrial landscape of northeast and east Asia (Hisatake 2005). Since the reform and opening of China in the 1980s, the industrial landscape has changed. China's coastal regions have rapidly emerged and the industrial geography of northeast Asia has changed from a unipolar structure to a multipolar structure. This is evident in the results of location quotient analysis of the eight core regions.[2] The three Chinese regions

[2] The location quotient is basically a measure of showing the difference in terms of industrial structure between the larger region (here Northeast Asia) and the component regions (the eight core regions). It resembles revealed comparative advantage index used in international trade. Industrial classification employed in this exercise is as follows. First, certain categories of the manufacturing sector are selected, which can be regarded as knowledge-based manufacturing and to have potential or revealed competition among the three countries of China, Japan and Korea. They are then regrouped into transportation machineries/equipments, general machineries/equipments, electrical & electronic machineries/equipments,

advanced successfully in manufacturing production, which resulted in the relative decline of the three Japanese regions. Even though the two Korean regions did not experience decline of manufacturing production, they are soon to face stiff competition from the emergence of China's economic regions. The speed and scope of changes in the industrial geography of northeast Asia will be further accelerated when the three countries conclude free trade agreements under discussion between either pair of the two or among the three.

In comparison, the geography of the service economy is still dominated by the three Japanese regions. The Kanto region, in particular, holds top position in major service activities. The other two Japanese regions and the two Korean regions post slight advantage in transport and communication services. China's three regions, in spite of their structural changes, still lag behind Japanese and Korean regions in terms of service activities. In the financial services, the Kanto region of Japan and the Seoul region of Korea exhibit strong agglomeration. In competition with these two regions is the Zhujiang delta including Hong Kong.

Table 2. Industrial Specialization of Core Economic Regions
based on Location Quotient

Region Industry	Transport machinery	General machinery	Precision machinery	Electrical machinery	Transport & communication	Finance & insurance	Real estate & business
Jing-Jin-Ji							
1997	1.01	2.99	1.34	0.28	1.05	1.37	0.33
2005	1.04	2.40	1.59	0.43	0.81	1.01	0.55
Changjiang							

precision machineries/equipments. Second, three categories of the service sector are selected for comparison and they are transportation & communication, finance and insurance, and real estate & business services. Inaccuracy of the results may be possible due to different statistical system between countries and exchange rates.

1997	1.08	2.65	1.84	0.86	0.87	1.03	0.26
2005	1.10	3.49	2.27	1.13	0.86	0.62	0.38
Zhujiang							
1997	0.12	0.63	0.41	0.22	1.12	1.04	0.47
2005	0.44	1.98	1.54	0.84	1.01	1.06	0.44
Kanto							
1996	0.38	0.50	0.84	0.79	1.00	1.18	1.28
2004	0.27	0.24	0.46	0.36	1.03	1.22	1.41
Kinki							
1996	0.27	0.83	0.52	0.76	1.04	0.88	1.15
2004	0.25	0.43	0.46	0.51	1.07	0.82	1.25
Chubu							
1996	1.65	0.83	0.70	0.90	1.03	0.66	0.94
2004	1.42	0.42	0.60	0.70	1.03	0.69	1.05
Seoul							
1997	1.74	2.55	1.82	3.25	0.90	1.27	0.62
2005	1.28	1.26	1.87	3.85	1.13	1.48	0.63
Yeongnam							
1997	5.32	2.69	3.07	4.91	0.81	0.64	0.31
2005	4.91	1.97	3.13	4.55	0.92	0.72	0.28

Source: Calculated by the author.

Industrial Clusters in the Core Regions

The profile of core economic regions indicates a strong tendency of industrial agglomeration (Fan and Scott 2003, Histake 2005, Kim et al 2007). In fact, the central and regional governments associated with the eight core regions have been promoting industrial clusters. Individual regions, however, show slightly different emphases. For example, the Kanto region of Japan attempts to build a home for new industries utilizing its excellence in technology and innovation capacity (Kanto Bureau of Economy and Industry 2006). The Kinki region aims at establishing a bio-cluster and energy-environment cluster using its agglomeration in the pharmaceutical and home appliances

industries (Kinki Bureau of Economy and Industry 2006). The Chubu region, which has a strong base in the automobile industry, pursues an industrial transformation into high tech industries including robot, aero-space, and nano-technology (Chubu Bureau of Economy and Trade 2007).

The Seoul region of Korea, which has a significant agglomeration of information and technology industry, aims to develop a center of financial and logistics services (Mo 2004, Shin 2004). The Yeongnam region, which is renowned for its shipbuilding industries, strives for establishing mechatronics, automobiles and environment industry (Kwon and Choo 2005, Kang 2006, Yoon 2006, Lee 2006).

The Changjiang region of China with its vast area promotes eight industrial groups composed of automobile, petrochemical, machineries, electronics, steel, apparels, textiles and food (Tu 2007). There are numerous industrial parks and clusters scattered in and around major cities including Shanghai, Suzhou, Wuxi, Changzhou, Ningbo, and Hangzhou (Zuo 2006). The Guandong province, which has accumulated industrial capacity through foreign direct investment, aims at industrial upgrading by promoting high technology and automobile industries in Guangzhou (Jingji Rebao Feb 24, 2006), petrochemical industry in Zhuhai, and ambitious nine industrial clusters in Shenzhen. Zhongshan city attempts to build energy cluster, petrochemical cluster, and equipment manufacturing center, whereas Dongguan city tries to move away from low value-added industries to high technology industries (Chen 2005, Jingji Ribao December 30, March 18, and June 8, 2005).

The major industries of the Jing-Jin-Ji region are resource-intensive energy, heavy and chemical industries. The government of China pursues a policy of making Beijing a center of politics, finance and IT industries, building an advanced manufacturing and

logistics center in Tianjin, and constructing large-scale heavy and chemical industrial bases in Hebei (Xiao 2006).

It is apparent that all the major economic regions attempt to host knowledge-based manufacturing such as information technology, bio-technology, and environment technology. Inter-regional competition and cooperation is already evident in the electronics/electrical and automobile industries. As such, competition in the knowledge-based manufacturing among the major economic regions of northeast Asia is likely to grow in the coming years. Technology and innovation capacity will be the key in inter-regional competition and the fate of the regions will depend on how they secure core technologies and up-stream functions in the value chain of those knowledge-based industries.

Inter-Regional Linkages

Trade and investment figures, even though incomplete at the subnational level, indicate that trade and investment among China, Japan and Korea occurs primarily through the eight core economic regions. The three Chinese regions occupy a central position in trading and foreign direct investment.[3] The Changjiang region in particular has strengthened its position as the major trading region of China. And it is the major trading partner region of Japan and Korea.[4] Trade between Korea and Japan and between China and Japan is also primarily made through the core regions of both countries. Korea's investment data available at the subnational level present a strong

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[3] The three core regions took 74% of China's total export and 71% of total import in 2005 (calculated from Statistical Yearbook of relevant provinces 2006).
[4] Changjiang region's share of China's trade with Korea accounted for 39.7% in 2006, whereas Guangdong province accounted for 18.5% and the Jing-Jin-Ji region took 13.7% (caculated from China Customs Statistics).

regional concentration in China, namely the Changjiang delta and Jing-Jin-Ji region.[5] Among the three Chinese regions, the Changjiang delta, rather than the Zhujiang delta or the Jing-Jin-Ji region, has closer trade and investment linkages with the core regions of Japan and Korea.

The commodity composition of trade among the eight regions suggests that the electronics and electrical goods are the major trading item, which has also the largest volume of intra-industry trade (Yang 2006). Even though the core regions of northeast Asia have complementary relations among them in the above field at the moment, they are likely to face stiffer competition because of technological catching-up by the Chinese regions (Yang 2007).

On the whole, investment flows are from Japan and Korea to China. Available statistics of Korea on inter-regional investment flows provide a few important points. In the electronics and communication industry, the primary investment flows are from Seoul region into China's Changjiang and Jing-Jin-Ji region. Large investment flows are also seen from Korea's two core regions to China's Jing-Jin-Ji and Changjiang region in transportation machineries (Kim 2007). Such investment flows suggest that production networking between the core regions of Korea and China occurs in the above two industries involving the mix of vertical and horizontal division of labor.

Following the trade pattern, cargo flows are concentrated between core economic regions. Cargo flows by ship indicate a heavy concentration between Korea's Yeongnam/Seoul region and China's Changjiang/Jing-Jin-Ji region, whereas cargo flows between Korea's Yeongnam/Seoul region and China's Zhujiang region are not as

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[5] About 32% and 22% of Korean investment in China is concentrated in the Changjiang delta and the Jing-Jin-Ji region respectively as of the end of 2006 (calculated from Korea Export and Import Bank data base on overseas investment).

strong as the former pairs.[6] On the whole, Korea's two core regions have larger shipping volumes with the three Chinese regions than with Japan's three core regions. This may partially reflect differential commodity composition of trade between Korea and China, on the one hand, and between Korea and Japan, on the other hand. Among the twelve pairs of cargo flows, the largest volume is recorded between Changjiang and Yeongnam region, which is followed by the Yeongnam/Jing-Jin-Ji pair. As a matter of fact, the Yeongnam region reveals much higher volume of cargo both with Chinese and Japanese core regions. This certainly reflects the position of the Yeongnam region, which has a hub port of Busan.

In contrast, inter-regional logistics linkages reveal quite different configurations when one looks at air cargo and passenger flows.[7] The Seoul region has close links with Japan's Kanto region in terms of both air cargo and passenger flows. Next follows the link between Korea's Seoul region and Japan's Kinki region/China's Jing-Jin-Ji region.

In terms of air cargo, the largest two-way flows are registered between Seoul and Kanto region, followed by between Seoul and Kinki. Next comes the pair of Seoul/Jing-Jin-Ji and Seoul/Changjiang. The Seoul/Zhujiang (excluding Hong Kong) connection is weak. Based on these figures, one can assume than inter-regional air cargo networks are substantially different from inter-regional marine cargo networks. One can further speculate that such difference may result from the fact that high value items are shipped by air and that advanced regions trade more high value items than less advanced regions.

Passenger flows reveal slightly different configurations from cargo flows. The heaviest traffic is understandably seen between Seoul and Kanto region. It is surprising

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[6] Data for port to port shipping volumes are available at Korea's Customs Office (www.portal.customs.go.kr).
[7] Data for air cargo and passenger flows are available at Korea Aviation Promotion Association (www.airportal.co.kr).

to observe that next heaviest leg is between Seoul and Jing-Jin-Ji. Perhaps, a detailed information on travel purposes would add more useful results. Following the Seoul/Jing-Jin-Ji pair comes the Seoul/Kinki and the Seoul/Changjiang pairs. It is interesting to note that the Changjiang region recorded lesser air traffic with Korea's two core regions in spite of its largest trade volume with them.
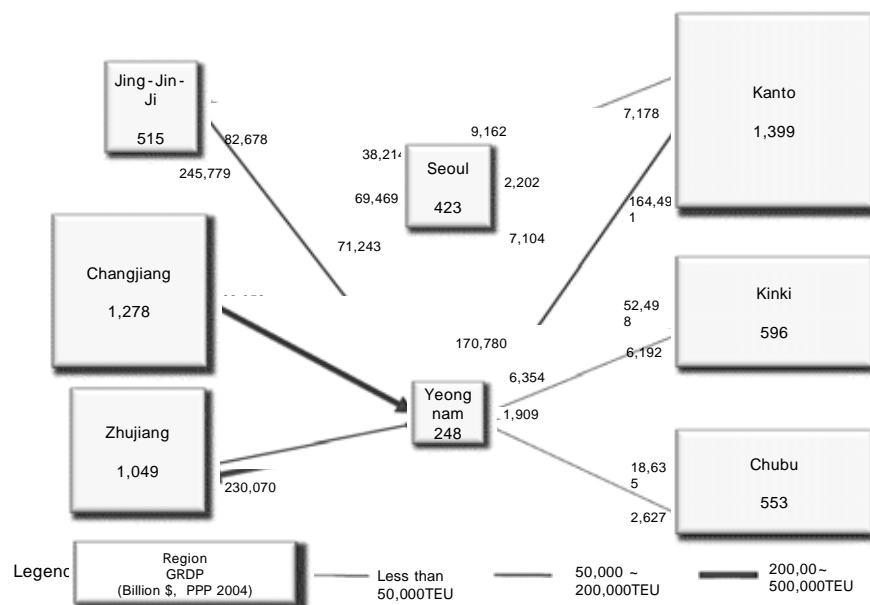

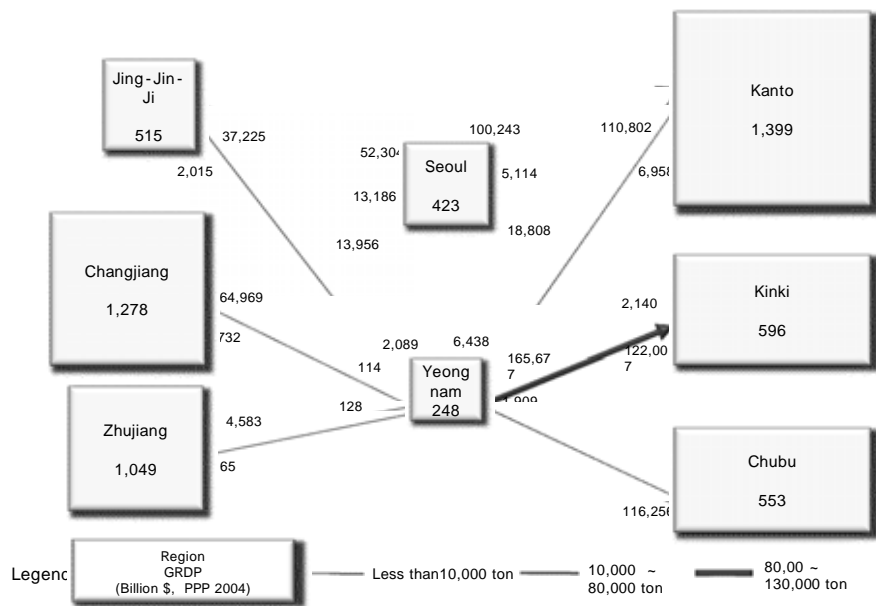Figure 2. Cargo Flows by Ship between the Core Regions of Korea/China and Korea/Japan (2005)

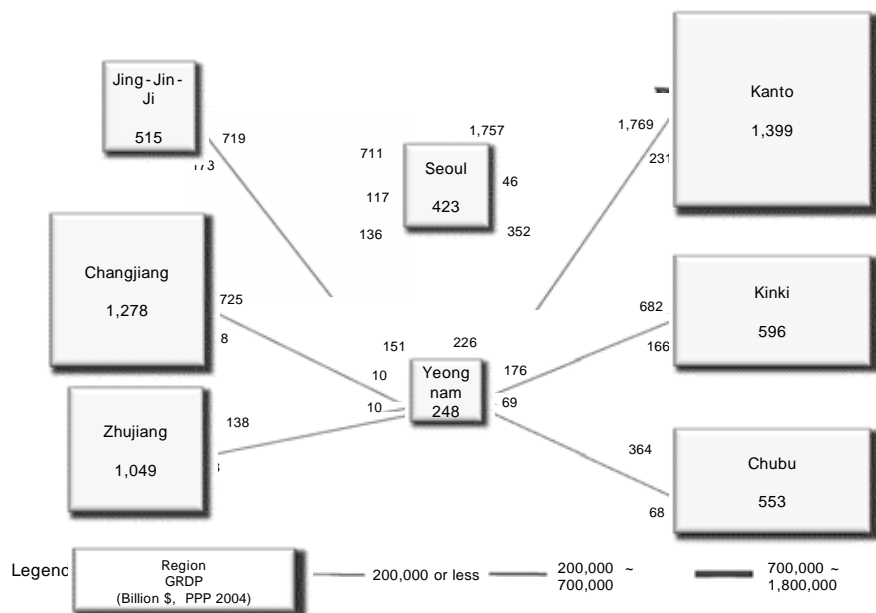Figure 3. Air Cargo Flows between the Core Regions of Korea/China and Korea/Japan (2005)

Figure 4. Air Passenger Flows between the Core Regions of Korea/China and Korea/Japan (2005)

Shifting Power Balance and Inter-Regional Relations

Shifting ranks of regions in terms of economy size

The analysis done in the study reveals interesting results. [8] As of 2004, the economic landscape of northeast Asia was characterized as two big (Kanto and Changjiang), one medium (Zhujiang), and 5 small regions (Japan's Kinki and Chubu region, Korea's Seoul and Yeongnam region, and China's Jing-Jin-Ji region) in terms of GRDP measured by purchasing power parity. However, it is predicted that, by the year 2020, there will be one strong (Changjiang), two medium (Kanto and Zhujiang), and five small regions. This implies that Chanjiang delta's influence in the economic geography of northeast Asia will be more significant than now and all other regions will have to readjust their relations with Changjiang delta in one way or another. Readjustment is sure to be tougher for such smaller regions as Korea's Seoul and Yeongnam region, and Japan's Kinki and Chubu region because it will involve restructuring as well as repositioning in a more interdependent transborder regional environment.

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[8] The GRDP of the regions in 2020 is estimated with logistic function of each region, due to data limitation. The typical type of the logistic function with s-shaped fits is shown as equation, $GRDP_t = (c + ab^t)^{-1}$, in which the parameter "1/c" is a kind of upper ceiling for the GRDP levels. The average levels of the GDP growth rate by 2020 are assumed to be 3.0-5.0% for the Korean economy, 1.0-1.6% for Japanese economy and 6.0～9.5% for Chinese economy for the estimation of the GRDP of the eight core regions.
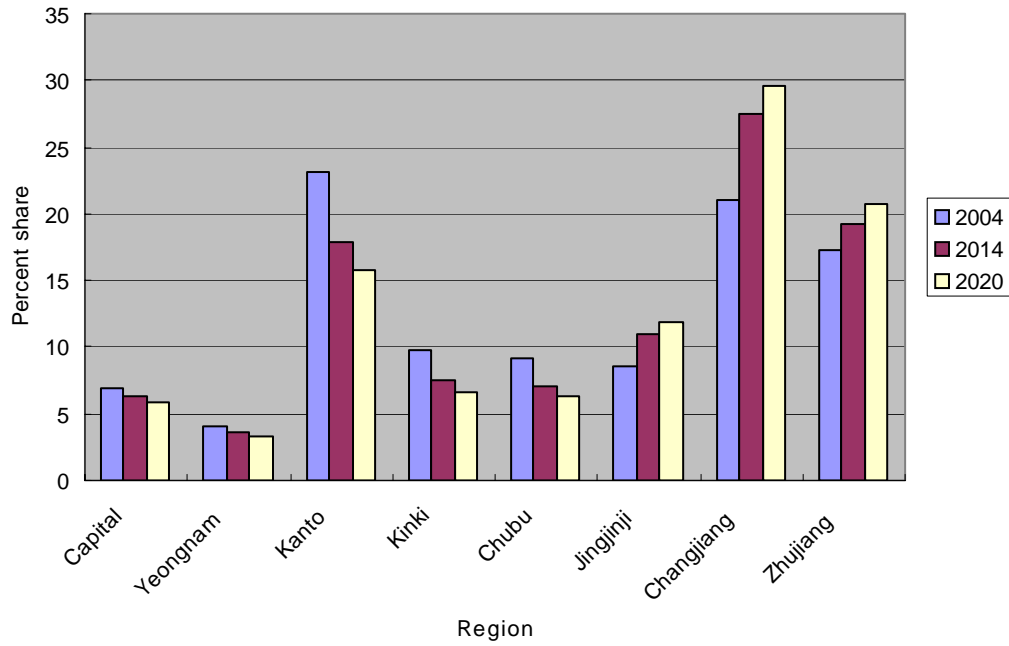
Figure 5. Shifting Rank of the Eight Core Regions

Inter-regional economic relations

Together with the shifting economic power among the core regions, it would be worthwhile to examine the nature of inter-regional economic relations among them. The critical question here is whether the eight core regions would maintain the current, more ore less, complementary relations in the future. Fore example, will the growth of Changjiang region contribute to the growth of other core regions positively or negatively, especially those across the national border? Using the Granger causality model, inter-regional relations were examined.[9] The results show diverse patterns of

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[9] Identification on Granger causality between X and Y depends on significant levels of α_i and δ_j coefficients and F-statistics in the following equations. $Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{j=1}^{m} \beta_j X_{t-j} + \varepsilon_{1t}$

14

interactions. Surprisingly, China's Jing-Jin-Ji region has the largest number of relations with other core regions, which implies the region's economy is affecting or affected by the other seven regions. Changjiang delta also shows interactions with the other seven regions but with less number of links. On the other hand, Zhujiang delta has relations only with the five regions.

Interestingly, the Seoul region does not affect the growth of other core regions. Instead, the growth of other core regions such as China's Zhujiang, Changjiang, Jing-Jin-Ji affects the growth of the Seoul region. Furthermore, the Seoul region does not have any significant relations with the core regions of Japan, which implies a highly independent pattern of the Seoul's regional economy. In contrast, the Jing-Jin-Ji region seems affecting the growth of Zhujiang delta including Hong Kong, Korea's Seoul and Yeongnam region, and the three core regions of Japan. Moreover, it is affected by the growth of the three core regions of Japan.

Even though it is not possible to analyze causality, these economic interactions suggest that a region interacting with a larger number of other regions can be a central node of regional production and trade networks. In a sense, it is an indication of centrality. Given the number of interdependent economic relations, the Jing-Jin-Ji region may be a hub of economic interaction among the eight core economic regions in northeast Asia. A caution is necessary, however, because the analysis here did not

$$X_t = \sum_{i=1}^{m} \gamma_i X_{t-i} + \sum_{j=1}^{m} \delta_j Y_{t-j} + \varepsilon_{2t}$$

where m : time span   α, β, ɣ, δ : regression coefficients
The null hypothesis (H$_0$: $\alpha_i = 0$ or H$_0$: $\delta_j = 0$) was tested by

$$F = \frac{(RSS_R - RSS_{UR})/q}{RSS_{ur}/(n-k)}$$

where n: number of observations   k: number of regression coefficient.

include the U. S. or Europe, which are important trading destinations of the eight core regions in addition to the neighboring Asian core economic regions. Nonetheless, it is not too far fetched to say that a region interacting with more regions would have a more stable economy than that interacting with lesser regions since diversified inter-regional linkages would reduce risks arising from limited inter-regional linkages.
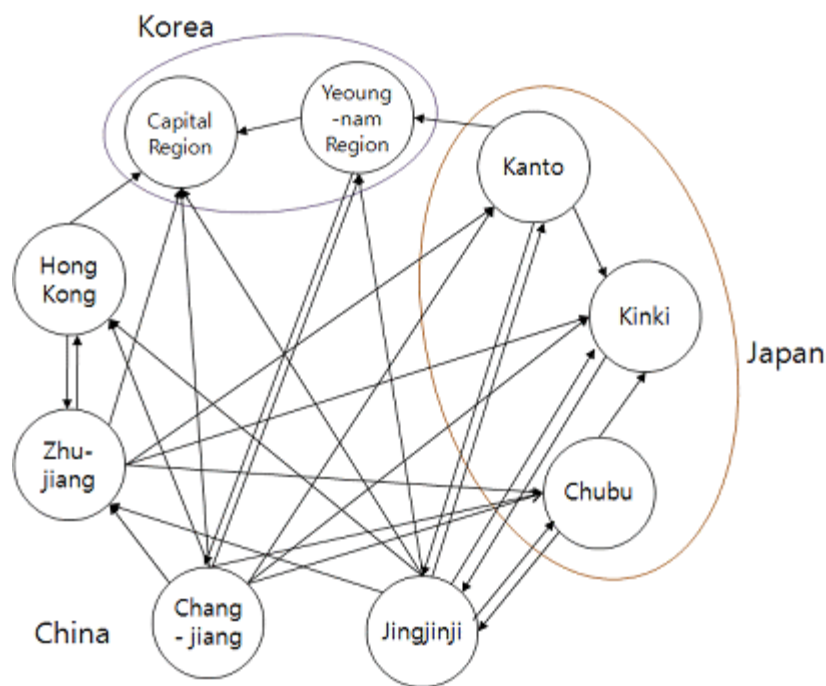

Figure 6. Economic Relations among the Eight Regions

Future Research Agenda

One can speculate many factors inducing changes in inter-regional economic relations. Diverse theories and models such as comparative advantage theory, new international division of labor, product life-cycle theory and more recently global production networks and regional industrial cluster could provide useful explanations. The geo-economic context of northeast Asia suggests the partial relevance of each of

16

those theories and models. Given the trend toward regionalized free trade arrangements, global corporations are likely to play a more important role in changing inter-regional economic relations than in the past and thus in reshaping the economic landscape of northeast Asia.

Since the knowledge-based economy of the future is believed to be less dependent on production activities *per se*, regions with a more capacity of innovation and knowledge generation, whether they are related to high technology or advanced service industries, are considered to have more influence than those regions with a lesser capacity of innovation and knowledge generation.

The foregoing discussion clearly suggests a need to look at the role of global and multinational corporations in bringing changes in inter-regional economic relations. Future research needs to take a closer look at the behavior of multinational corporations, especially in the electronics and communication industry and the automobile industry, which was found out to be the two most important sector for cross-regional trade and investment among the eight core regions of northeast Asia. In addition, given the strong tradition of centralism in northeast Asian countries, one should pay due attention to policies at both national and regional level, especially those policies and strategies regarding regional positioning, regional industrial clusters, inward and outward investment, and infrastructure construction.

It should be stressed, here again, the need for (subnational) regional statistics. Trade and investment data are usually constructed at the national level. Subnational level data are not easy to obtain. Cargo and human flows with origin and destination are also difficult to construct for subnational regions. It is therefore crucial to build a database for regional analysis in northeast Asia by concerted efforts of specialists in the region.

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