

# Dynamics of Economic Spaces and Spatial Economic Inequality in East Asia

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## 경제공간의 역동성과 동아시아지역 공간경제의 불균형

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**Abstract** : The purpose of this study is to understand spatial economic inequalities under the framework of the dynamics of economic spaces in relation to the four global megatrends: globalization, knowledge-based economy, information society, and the service world. The international inequalities in East Asia, as well as inter-regional inequalities within Japan, Korea, and Thailand were analyzed. The variables related to the four megatrends, as a whole, have clearly explained the variations in international inequalities in East Asia, as well as the inter-regional inequalities within a nation. The individual impacts of the variables on spatial inequalities are, however, significantly different depending on the spatial scale of analysis and national characteristics. Overall, there has been a convergence trend of international per capita GNI (Gross National Income) in East Asian nations, while both divergent and convergent trends are evident at the regional scale within a nation. Two global oil crises in the 1970s and the East Asian financial crisis in the late 1990s resulted in the discontinuity of the general convergence trend, and have led to the increase of international and inter-regional inequalities in economic activities. This suggests that although the effect of the global crisis differs in each country, in general, the economies of peripheral countries and regions are more vulnerable during a global economic crisis.

**Key Words** : economic space, spatial inequality, global megatrends, East Asia

**요약** : 이 연구의 목적은 경제공간의 역동성을 이끄는 세계화, 지식기반경제, 정보사회, 서비스세계의 4대 글로벌 메가트렌드를 통해 국가간 및 지역간에 나타나는 공간경제의 불균형을 이해하는 것이다. 동아시아를 대상으로 국가간 불균형과 일본, 한국, 태국을 사례로 국가 내에서 지역간 불균형을 분석하였다. 4대 메가트렌드와 관련된 변수들을 모두 고려할 때, 4대 글로벌 메가트렌드는 국제적인 차원과 국가내의 지역적인 차원에서 불균형의 변이를 설명해주고 있다. 그러나 개별변수들이 공간적 불균형에 미치는 영향은 분석의 공간적 규모와 국가적 특성에 따라 달리 나타난다. 대체로 동아시아국가들간에 1인당 GNI는 수렴하는 경향을 보이고, 한 국가내의 지역차원에서는 불균형이 줄어드는 경향과 확대하는 경향이 함께 나타나고 있다. 1970년대의 두 차례의 석유파동과 1990년대 말경의 동아시아 금융위기는 일반적인 불균형완화경향의 연속성을 단절시키는 결과를 초래했고, 경제활동의 지역간 국제간 불균형을 증가시켰다. 이는 세계적인 위기의 영향이 국가에 따라 다르지만 일반적으로 주변국가와 주변지역의 경제는 세계적 경제위기상황에서 더욱 취약하다는 점을 시사한다.

**주요어** : 경제공간, 공간적 불균형, 글로벌 메가트렌드, 동아시아

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## 1. Introduction

During the last two decades, global economic spaces have been considerably reshaped. In these environments, uneven development is prevalent, and spatial inequality is unlikely to be eliminated or may even be substantially reduced. There are two contrasting views on spatial inequality: convergence and divergence. In the neoclassical equilibrium economics model, the general trend of regional convergence over time is challenged through the flow of labor and capital toward the direction of equilibrium over space, in an integrated national space economy. In the neoclassical model, migration might be expected to reduce spatial inequality resulting in regional convergence. However, such migration is selective, especially common to higher skilled workers, and might result in regional divergence instead of convergence (Kanbur and Rappoport, 2005). Recently, the new empirics of regional convergence in industrialized countries reveal a much slower regional convergence rate than that proposed by the orthodox neoclassical model (Martin and Sunley, 1998).

Accordingly, there has been growing concern over spatial inequality patterns and levels and the underlying processes giving rise to these (Rey and Janikas, 2005). Uneven development with regional divergence trends is suggested with regard to the cumulative concentration of capital, labor, and output. The endogenous growth theories suggest that uneven development results from the fact that key factors of economic growth, such as localized collective learning, accumulation of skills and technological innovation, develop unevenly across the economic space (Martin, 2001; Rey and Janikas, 2005). Spatial externalities and technology spillovers are regarded as primary factors in shaping regional economic growth and spatial

disparity, in both the endogenous growth theory and new economic geography model (Fujita *et al*, 2001; Ravallion and Jalan, 1996; Rey and Janikas, 2005). The endogenous growth model, however, has limitations in the context of globalized knowledge-based information society. According to Martin and Sunley (1998), “its reliance on formal models which fail to capture the importance of the socio-institutional context and embeddedness of regional economic development,” and it has been “overwhelmingly abstractly theoretical and its key conditions have been insufficiently investigated empirically” (p.220). Rey and Janikas (2005) also suggested the limitations of the endogenous regional inequality model in terms of spatial scale choice, level of spatial concentration, and relationship between overall inequality and spatial autocorrelation.

In other aspects, spatial inequality is one of the major issues in reshaping economic spaces in the globalized economy, especially when viewed against the recent global financial crisis. The World Bank (2009) attempted to interpret the reshaping or transformation of economic spaces in terms of three dimensions: density, distance, and division (3Ds). The 3Ds are easy metaphors, since density, distance, and division summon images of human, physical and political geography, respectively. Understanding the transformations along these dimensions helps identify the main market forces and appropriate policy responses at each of the three geographical scales-local, national, and international. ‘Density’, which is related to agglomeration economies, is the most important dimension in a local context. ‘Distance’ to density is the most important dimension at the national scale, while ‘Division’ is the principal dimension in an international context. Density and scale economies have become exceedingly important in the progress of the service world and

knowledge-based economy. The development of information society and globalization has contributed to the easy flow of information and materials over space, and then to the decreasing impact of distance and division. However, there are significant differentiations of 3D impacts over global economic spaces. The theoretical framework of the World Bank's 3Ds can be regarded as a starting point, or an initial basis for understanding the transformation of economic spaces. Additional frameworks are therefore required to explain the dynamics of economic spaces and understand the spatial inequalities occurring in a knowledge-based economy.

Spatial inequalities can be regarded as resulting from the dynamics of economic spaces that have evolved along with the advancement of the four global megatrends, namely, globalization, knowledge-based economy, information society, and the service world (Bryson *et al.*, 2004; Park, 2009b; Rychen and Zimmermann, 2008). The four global megatrends of change are interrelated. Globalization and information society are related to dispersion and long-distance networks, while knowledge-based economy and the service world are mostly correlated with agglomeration and localized networks. In the real world, the forces and processes resulting in inequalities in space are complex and dynamic due to the contrasting spatial trends that govern economic spaces. Economic spaces and spatial inequalities cannot evolve through a single criterion of economic rationality.

The processes of shaping economic spaces and economic inequalities have been diverse over time periods and regions. The changes in economic spaces have been well-recognized at various spatial scales through the emergence of the following: "new industrial spaces" (Scott, 1988) or "sticky places in a slippery space" (Markusen, 1996), the shift of the economic gravity center (Park, 1997), regional world

(Storper, 1997), development of spatial innovation systems (Oinas and Malecki, 1999), industrial restructuring (Park, 1993; Clark and Kim, 1995), and diverse clusters including the temporary and the virtual (Park, 2005; Torre, 2008). These dynamics are also closely related to the techno-economic paradigm shifts that have distinctive characteristics in production, business, and innovation systems (Hayter, 1997; Park, 2003).

This study is a preliminary examination for understanding spatial economic inequality under the framework of the dynamics of economic spaces with regard to the four global megatrends previously identified. The four megatrends of change are not independent of nor separate from each other. Rather, they are interrelated in the processes of concentration and dispersion. This study analyzed both the international economic inequalities in East Asia, as well as inter-regional economic inequalities within a nation. The inequalities within a nation were analyzed using cases from Japan, Korea, and Thailand, while the trends of international inequalities were interpreted through the changes of major variables related to the four megatrends and macroeconomic events such as financial crises and industrial restructuring.

The present paper used three different empirical methodologies to analyze spatial economic inequality in East Asia. First, relative entropy index was measured to analyze international inequalities in East Asia, as well as interprovincial inequalities within selected countries in terms of GDP (Gross Domestic Production) and major economic activities. Considering the level of economic development and reliable data, Japan, Korea, and Thailand were selected for regional inequality analysis. Since the number of observations (countries and provinces) differs, relative entropy indices were used for comparison. Second, multiple regression analysis was employed to examine the impact of

the four global megatrends on the spatial variation of international per capita GNI (Gross National Income) in East Asia. Regression analysis was also applied to countries who are members of the Organization for Economic Co-operation and Development (OECD) to understand the impact differences of the four global trends on the countries' respective economic developments. Third, the impact of the four megatrends on regional inequality within a nation was examined using Korea as the sample. Due to lack of reliable data in relation to the four megatrends, only the case of Korea was analyzed.

This paper is organized as follows. The next section discusses the four global megatrends with regard to the dynamics of economic spaces. The impact of the megatrends on spatial economic inequality is also discussed. The third section analyzes the international inequalities in East Asia. The impact of the four megatrends on the international variation of per capita GNI is analyzed for the East Asian countries as well as for those who are part of OECD. Inter-regional inequalities within Japan, Korea, and Thailand are analyzed in the fourth section. The impact of the four megatrends on the regional variation of per capita GDP is examined in the fourth section. Finally, the fifth section concludes with policy implications on both developing and developed economies.

## **2. The four global megatrends and the dynamics of economic spaces**

Changes of spatial economic inequalities are the result of the changes of economic spaces at regional, national and global scale. During the last two to three decades, the changes of economic spaces at various spatial scales seem to be closely related with the progress of the four

global megatrends. Since this study is a segment of the research on the broader theme of the dynamics of economic spaces, the relationship between the four global megatrends and the dynamics of economic spaces will be briefly examined.

New spatial processes and forms of economic practices have evolved in the global society during the last two decades. These are the results of the four global megatrends previously mentioned. The spatial dynamics of economy has been strengthened by the contrasting forces of the megatrends in the 21st century. The trend of economic inequality over space is inconsistent because these trends bring forth different impacts on global economic spaces. For example, knowledge-based economy and the service world may generally facilitate divergence with increasing spatial inequality, through concentration of high quality human resources and innovation via intensive exchange of knowledge on a local scale. On the other hand, information society and globalization may promote convergence with decreasing spatial disparity through the easy circulation of codified knowledge, capital, and technology in the global space economy. However, the dynamics of spatial inequality is more complex in reality, because knowledge-based economy may also be related to dispersion and spatial convergence with brain circulation and global knowledge networks. In addition, contrasting spatial processes in the organization of economic activities are related to diverse actors, which may display behavioral and strategic conflicts.

Networking is one of the most important processes for knowledge creation in a knowledge-based economy. The transfer of tacit knowledge is often regarded as being confined to the local milieu, whereas codified knowledge may exist ubiquitously. Given that spatial proximity for face-to-face contact is important in

ensuring the effective sharing of tacit knowledge, concentration reinforces the importance of innovative clusters and regions in the knowledge-based economy (Polenske, 2007). In this view, learning processes take place among actors residing in a community by being there - local buzz, contributing spatial divergence with increasing spatial inequalities. In other aspects, recent studies suggest that knowledge can be attained and created by investing in communication channels - called pipelines - with selected providers located outside the local milieu (Bathelt and Maskell, 2004; Rychen and Zimmermann, 2008). Firms, therefore, develop global pipelines not only as venues where they can exchange products or services, but also to benefit from novel ideas and knowledge learned from outside sources. Accordingly, a high level of local buzz and selected global pipelines coexist, providing firms located in clusters with a string of particular advantages not available to outsiders. These contrasting processes may result in regional divergence within a nation, while promoting spatial convergence among other countries.

The knowledge-based economy has facilitated the progress of the service world (Bryson *et al.*, 2004). In a knowledge-based economy, advanced services are very important in reorganizing economic spaces. Diverse services, especially producer services, are closely linked to every stage of manufacturing—from production to distribution. Consequently, producer services such as R&D activities, finance, advertising, engineering, computer software services, design, and so on, have become increasingly important in a knowledge-based economy (Harrington and Daniels, 2006). These advanced services tend to overwhelmingly concentrate in large metropolitan areas because face-to-face contact is important for sharing and creating new information and knowledge. The development of producer

services in a nation, therefore, may result in regional inequalities within it because the concentration of producer services will lead to a concentration of high quality labor forces in a given area and result in new spatial division of labor (Park, 2006).

The development of information and communication technologies (ICTs) and the Internet has contributed to the progress of the information society or digital era. The Internet has a significant impact on the transfer of codified knowledge over the global space. It has also significantly contributed to rapid globalization. However, owing to the existence of knowledge and information that cannot be traded through the Internet, we have witnessed a great paradox in speculation on the spatial impact of ICTs. On the one hand, the rapid development of ICTs in the last decade, as well as the increase in the number of Internet users, have been considered as the important impetus for reducing spatial disparities and promoting spatial convergence of economic activities over space. On the other hand, many geographical studies have revealed that spatial proximity and nodality of cities retain their importance in economic development, even as communication has improved and the economy has become globalized with ICT development (Florida, 1995; 2002; Gertler, 1995; Malecki, 2002; Zook, 2002). Along with the development of the Internet, the creation of knowledge for innovation and the flow of knowledge, information, and materials are critical to the dynamics of economic spaces. The Internet infrastructure, knowledge-intensive manpower, innovation clusters and networks, and a “cluster of wants” are not evenly distributed over space, and thus become important factors in the reorganization of economic spaces (Park, 2003).

Globalization has also considerably impacted the spatial dynamics of economic activities. As it progresses, the processes in and emergence of

new forms of economic spaces have come to extend beyond local and national boundaries over time. Global flows of capital, labor, technology, engineering and even policies are now very important to changes in economic spaces (Alvstam and Schamp, 2005). The foreign direct investments that transnational corporations (TNCs) infuse in developing countries certainly contribute to international convergence, aided by technology and knowledge transfer extending beyond the dispersion of manufacturing activities at the international scale. The progress of globalization, however, may have different impacts at the regional level within a nation. For example, TNCs will prefer to locate their branch plants or offices at the core area of developing countries due to geographical advantages, including transportation and communication infrastructure, labor markets and living environments, thereby revealing regional divergence with increasing inequalities. However, the regional impact of globalization may not be unidirectional and may be different depending on the respective characteristics of each country (Coulombe, 2007).

As discussed above, the global megatrends have significant impacts on the dynamics of economic spaces and spatial economic inequalities. However, the spatial impacts of the four megatrends are multi-directional and complex. The reason why such a complexity exists in the spatial manifestation of megatrend effects to economic spaces is closely related to the disparities existing in physical space. The social, material, and environmental conditions of the physical space are not evenly distributed. Linguistic, cultural, and institutional differences likewise exist, along with significant variations in the characteristics of local labor markets, culture, and social relations. Such disparities have a significant impact on the spatial manifestation of electronic space, because the latter is intrinsically

embedded in physical space. Furthermore, differences in local cultures, institutions, and labor markets in the physical space significantly affect innovations in a knowledge-based economy. Even though physical and electronic spaces are considerably different, the two are complementary in the economic space process. Thus, the ICT infrastructure cannot be separated from the social, political, economic, and cultural contexts in which the technological infrastructure is embedded (Li *et al.*, 2001). Due to these complexities, spatial economic inequalities are persistent even under globalization and in an information society. Furthermore, the spatial dynamics will have both spatial and temporal dimensions, because the inequalities will diversify by spatial scale and will change over time.

### 3. International economic inequalities in East Asia

East Asian countries have experienced significant changes of economy with industrial restructuring, financial crisis, and dynamic economic growth during the last four decades. East Asian countries have diverse histories and cultures, but have experienced dynamic economic growth during the last four decades. Because of the dynamic changes in the East Asian countries, it seems to be appropriate to examine the dynamic economic spaces despite of their diverse cultural and historical backgrounds. This study covers 13 East Asian countries as seen in Table 1. Mongolia and Taiwan were supposed to be included in East Asia, but were excluded in the analysis since there were no available serial data in international statistical records. While the 13 countries have experienced rapid economic growth, they also suffered sharp economic declines during the financial crisis that occurred

around the end of the 20<sup>th</sup> century. During 1971 to 2007, China showed the highest average annual GDP growth rate with 9.0%, while Japan reflected the lowest average GDP growth rate with 2.9% (Table 1).

To measure the trend of spatial economic inequality in East Asia, relative entropy index was measured. Since the entropy value (H) is sensitive to the number of subgroups, it is not comparable when the number of subgroups changes by variables. In order to compare spatial disparities of different economic activities or variables with different number of subgroups, the relative entropy value (RH) was used in this paper. The coefficient of variation (CV) was also examined. However, since RH shows the trend of spatial disparity more clearly and CV shows trends similar to that of RH, spatial economic disparities were explained through different variables based on the changes of RH over time.

The entropy value in this paper is measured as follows:

$$H = - \sum_i^n q_i \log_2 q_i$$

Where

H = entropy value;

q = a set of nonnegative numbers which sum to unity; and

$$\left( \sum_i^n q_i = 1.0 \right)$$

n = number of subgroups.

If any q=1 and all other q's are zero, then H is equal to zero.

For a given n, H is at its maximum when all q's are equal so that

$$\left( H = -n \left( \frac{1}{n} \log_2 \frac{1}{n} \right) = \log_2 n \right).$$

$$\text{Relative Entropy (RH)} = H / \log_2 n$$

The major variables used to explain the spatial disparity in nations are selected as a represented variable for each global megatrend. GDP is used for measuring the spatial economic disparity. Number of patent applications filed under the PCT (PATENT), the ratio of Internet users (INTERNET), service value-added (SERVICE), and export sales (EXPORT) are selected as a surrogate variable for knowledge-based economy, information society, service world, and

Table 1. Average Annual GDP Growth rates, 1971-2007.

	Mean(%)	SD(%)	N(1971-2007)
Korea	6.8951	3.59957	37
China	9.0076	3.51864	37
Japan	2.9192	2.32741	37
Hong Kong	6.2935	4.44289	37
Singapore	7.5605	3.70477	37
Malaysia	7.1200	4.61589	37
Philippines	3.8689	3.45485	37
Indonesia	6.0205	3.94122	37
Vietnam	6.0897	3.31647	37
Thailand	6.1868	4.04972	37
Cambodia	3.3303	8.18772	37
Laos	5.6451	3.72439	37
Myanmar	4.7657	7.22470	37

Source: UN Statistics Division (UNSD), National Accounts Main Aggregates Database, each year.

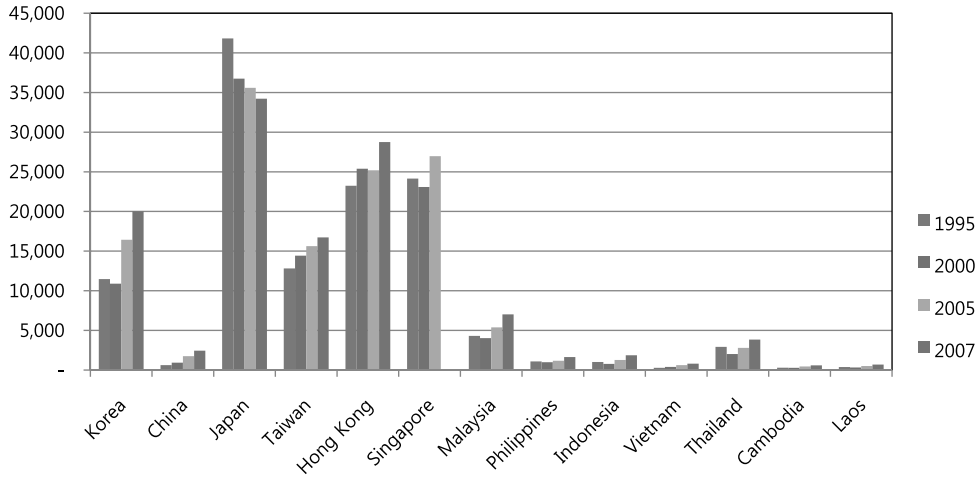


Figure 1. Convergence Trends of Per capita GDP among countries in the East Asia (Source: IMF [International Financial Statistics], World Bank [World Table], UN [http://esa.un.org/unpp], National statistics (Taiwan), each year).

globalization, respectively. In addition to the above variables, population (POPULATION) and manufacturing value-added (MANUFACTURING) are used comparison of the spatial disparity. The two variables of PATENT and INTERNET were measured from 1995 to 2007. The other five variables were measured from 1970 to 2007.

Several important characteristics of the spatial disparities in East Asia at the international level were observed. First, overall, there is a trend of convergence of all variables. It is consistent with the general trend analyzed by the World Bank (Hamaguchi, 2009). The convergence can also be recognized by actual per capita GDP (Figure 1). The decline of Japan’s per capita GDP since 1995 has significantly contributed to the general trend of convergence in East Asian countries.

The RH values of population slightly increased in a continuous manner from 1970 to 2007 (Figure 2). The RH indices of GDP, EXPORT, MANUFACTURING, and SERVICE reveal a general trend of convergence with an increase of the relative entropy value in 1970 to 2007 from 0.482, 0.609, 0.375, and 0.445 to 0.590, 0.745,

0.567 and 0.545, respectively. In general, PATENT and INTERNET also increased in RH values during 1995 to 2007, from 0.228 and 0.509 to 0.436 and 0.626, respectively. This general trend of convergence over time among the countries seemed to be related to the international flow of manufacturing investments as well as transfer of technology and knowledge. The most rapid increase in the RH value of PATENT since 1995 suggests a clear dispersal trend. At the international level, the flow of technology and investment among nations contributed to the overall trend of convergence among nations in East Asia.

Second, there were divergence trends with increasing international inequality during the global crises. Thus, the impact of global crises caused some exceptions in the overall trend of convergence. There were consistent fluctuations during the two oil crises in 1973 and 1978, as well as the East Asian financial crisis at the end of the 20th century. It is clear that there was a divergence trend with a consistent decrease in the RH values of GDP, MANUFACTURING, and



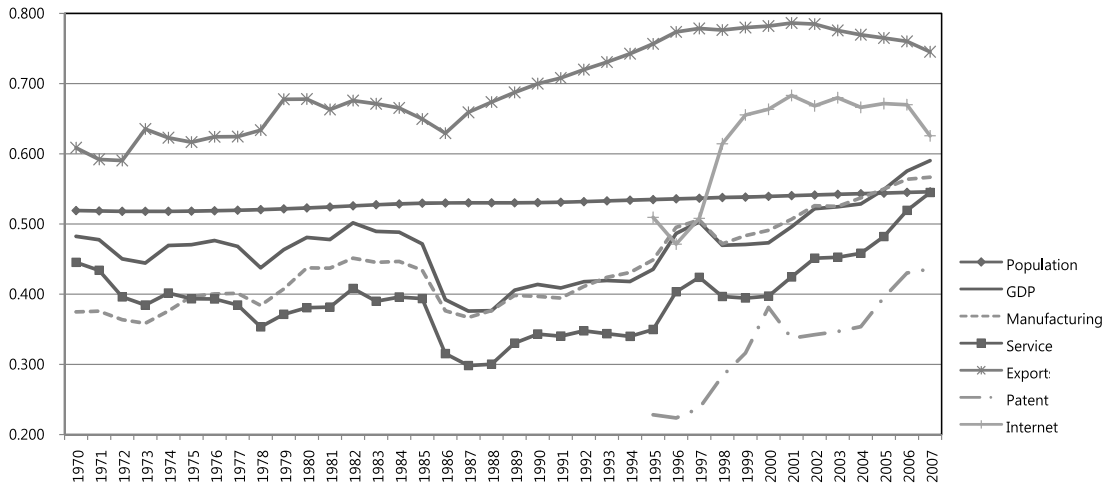


Figure 2. Change of Relative Entropy Values in the East Asia (Source: UN Population Division, 'World Population Prospects: The 2008 Revision Population Database', 2009 / UN, National Accounts Main Aggregates Database, each year / OECD, Patent Database, each year / International Telecommunications Union, World Telecommunication/ICT Indicators Data, each year, Note: For relative entropy value of patent, Cambodia, Myanmar, Laos, and Vietnam are not included and Taiwan is included (10 countries); For other relative entropy values, 13 countries are measured).

SERVICE in 1973, 1978, and from 1998 to 1999 (Figure 2). In addition, there was a considerable decrease in GDP, MANUFACTURING, and SERVICE RH values from 1986 to 1988. EXPORT RH values also decreased in 1986. The considerable decrease of RH values reveals the divergence trend or increase of spatial inequalities among East Asian countries. The global oil crises during the 1970s and Asian financial crisis in 1997 appear to have caused more negative impacts on developing countries. The relative contraction of these countries contributed to the decrease of the RH values and increase of spatial inequalities. The rapid decrease of the RH values in the late 1980s seemed to be related to the temporary contraction of investments, compounded by labor dispute difficulties in the Asian NIEs, and later in the early 1990s, the value increased with increasing investments to low-cost developing countries and industrial restructuring of the Asian

NIES (Clark and Kim, 1995; Park, 1993).

Third, there are considerable differences in the degree of spatial disparities among the variables. The RH value of EXPORT is largest, while that of PATENT is smallest. The sharp increase of the PATENT RH value after the East Asian financial crisis in 1997 reflects considerable dispersion of technology and knowledge to East Asian countries, with the trend of globalization and knowledge-based economy. It is also noticeable that the GDP RH values rapidly increased after the financial crisis, which is related to the relative decline of the Japanese economy and relative growth of developing countries.

What then are the most significant variables with regard to the four megatrends that can explain the international economic inequalities in East Asia? In order to examine this question, multiple regression analyses were conducted, with per capita GNI as the dependent variable and EXPORT, INTERNET, SERVICE, and PATENT

as independent variables of the four megatrends reflected as follows:

$$\begin{aligned} & \text{Per capita GNI} \\ & = f(\text{EXPORT, INTERNET, SERVICE, PATENT}) \\ & \dots (1) \end{aligned}$$

This regression analysis is regarded as an initial attempt and a preliminary analysis of the impact of four mega trends. More detailed analysis of the impact of the four mega trends will be conducted through in-depth interview surveys in the next step following this research.

Data availability for East Asian countries is most substantial in the 1995 and 2005 cases, hence, the analyses concentrated on these periods. In order to compare the result, similar analyses were conducted for OECD countries as well. It is arguable that the four variables may not be representative of the four megatrends. However, due to the consistent availability of reliable data, just one representative variable for each megatrend was used. EXPORT, INTERNET, and PATENT seem to sufficiently represent globalization, information society, and knowledge-based economy, respectively. Producer service is more appropriate as a representative variable for the service world. However, because of the availability of reliable

data, SERVICE variable was used in this study.

Four models were employed: models for the East Asian countries and the OECD countries, respectively, for both 1995 and 2005. Except for the 2005 East Asia model, the other three models are significant at a 0.000 level. The 2005 East Asia model is significant at a 0.1 level (0.053). In East Asia, the model explains 99% and 80% of the variations of per capita GNI in 1995 and 2005, respectively, while in OECD, the model explains 54% and 73% of the variations of dependent variables, respectively (Tables 2 and 3). Out of four variables to explain the dependent variable, only INTERNET is statistically significant at a 0.05 level in the 1995 and 2005 East Asia models (Table 2). The rate of Internet users dramatically increased in the first half decade of this century, but considerable differences in the Internet user rate can be observed (Figure 3).

In the OECD cases, however, both SERVICE and INTERNET are statistically significant. The result of the multiple regression analysis suggests that information society has a significant impact on the spatial conversion trend of international per capita GNI in East Asia. On the other hand, the analysis suggests that the service world and information society have a significant impact on the spatial conversion trend of international per capita GNI in OECD countries. The significance

Table 2. Result of regression analysis for "per capita GNI" in ASIA.

Independent Variable	Dependent Variable			
	Per capita GNI, 1995		Per capita GNI, 2005	
	$\beta$	p-value	$\beta$	p-value
(Constant)		.079		.642
Export	.010	.960	-.169	.639
Internet	.641***	.000	.779**	.027
Service	-1.394	.317	1.547	.424
Patent PCT	2.036	.138	-1.097	.544
R <sup>2</sup>	.992***		.802*	

\*: Significant at the 10% level; \*\*: significant at the 5% level; \*\*\*: significant at the 1% level.

Table 3. Result of regression analysis for “per capita GNI” in OECD.

Independent Variable	Dependent Variable			
	Per capita GNI, 1995		Per capita GNI, 2005	
	$\beta$	p-value	$\beta$	p-value
(Constant)		.790		.087
Export	.130	.660	-.191	.309
Internet	.379**	.013	.524***	.000
Service	.571***	.001	.545***	.000
Patent PCT	-.007	.982	.076	.676
R <sup>2</sup>	.541***		.733***	

Note: See the note to Table 2.

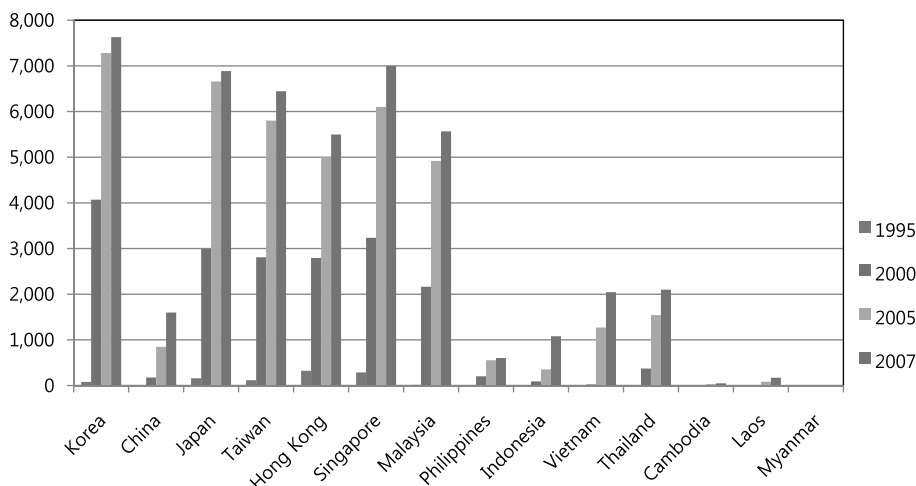


Figure 3. Internet Users of Asian Countries (per 10,000) (Source: International Telecommunication Union, World Telecommunication/ICT Indicators Data, each year).

of the INTERNET variable in both OECD countries and East Asia seems to reflect the meaningful impact of the information society in the global economic space. It also suggests that the service world is well progressed in OECD countries, while it is in the initial stage of impact in East Asia. Considering the trend of spatial inequality in SERVICE in recent years, as seen in Figure 2, the impact of the service world will soon become important in explaining the spatial inequality of per capita GNI in East Asia.

#### 4. Inter-regional inequalities in Japan, Korea, and Thailand

##### 1) Overall Pattern of Changes in GDP Growth Rate

The overall converging international trend in East Asia for the last four decades may not represent inter-regional convergence trend within a nation. This is because regional inequality trends may differ with a nation’s level of

economic development and economic structure characteristics. In this paper, regional inequalities of economic activities were examined for selected countries.

In order to examine the trend of inter-regional inequalities in East Asian countries, the author selected three appropriate nations. Using the annual growth rate data of the 13 countries from 1971 to 2007, factor analysis was first conducted (Table 4). Four factors were extracted from the analysis. Korea, Japan, Hong Kong, Singapore, Malaysia, Indonesia, and Thailand contributed to Factor 1, which were labeled as “market economy.” The rest of the factors were labeled as “socialist country,” “developing country,” and “emerging socialist country.” Case study countries from the “market economy” group were selected for three reasons. First, the examination of the impact of the four megatrends seemed appropriate for a market economy and not for more or less a less-opened economy which may require a different framework. Second,

appropriate data regarding the four megatrends were unavailable from the countries of the other three groups, except China. Third, in order to compare the changes of spatial inequality over time according to development levels, comparison among the market economy countries seems appropriate.

From the “market economy” group, Japan, Korea, and Thailand were selected considering the economic development in these countries. The three were regarded as advanced country, newly developed country, and newly industrializing country, respectively. Given that Japan and Korea are in East Asia, Southeast Asia seemed to have been underrepresented. Accordingly, Indonesian examples were discussed even though the data analysis for Indonesia could not be fully conducted.

There have been considerable fluctuations in the GDP growth rates of the four selected countries since 1971. The first oil crisis in the early 1970s critically hit the Japanese economy,

Table 4. Result of factor analysis.

Nations	Factor			
	1. Market economy	2. Socialist country	3. Less developed	4. Emerging social. country
Korea	.748	.099	-.284	.064
China	.044	.838	.022	.078
Japan	.559	-.210	-.233	-.531
Hong Kong	.667	-.233	-.322	-.112
Singapore	.760	-.205	-.058	-.139
Malaysia	.790	-.303	.062	.057
Philippines	.340	-.640	-.154	.096
Indonesia	.879	-.137	.216	-.119
Vietnam	.048	.177	-.134	.852
Thailand	.864	.105	-.096	-.055
Cambodia	-.137	.675	-.110	.295
Laos	-.023	.090	.880	-.130
Myanmar	-.233	-.155	.560	.492
Eigenvalue	4.228	1.901	1.444	1.424
%Variation	32.527	14.627	11.106	10.952

and the second oil crisis in the late 1970s critically affected the Korean economy, resulting in negative growth rates, respectively (Figure 4). The two oil crises in the 1970s did not significantly impact the Indonesian and Thailand economies. The Asian financial crisis in the late 1990s, however, was more critical for Indonesia and Thailand, in which GDP growth rates were both less than -10%. At that time, Korea, Thailand, and Indonesia suffered from a bailout situation. Japan also showed a negative growth rate even though it was not involved in a bailout. Among the three bailout countries, Korea recovered most rapidly and reflected a greater than 9% growth rate in 1999.

Based on the RH indices of the regional GDP, the level of regional inequality in the three countries differs, but the overall trend of inequality in these nations moves towards convergence. Before the mid-1990s, the degree of regional inequality in Thailand was much higher than those of Japan and Korea, but the differences in regional inequality among the three countries have decreased, and there has been a converging trend of regional inequality levels among them since 2001 (Figure 5).

In general, the three countries showed common short term cyclical trends after 1985. First, there were trends of increasing regional inequalities until 1990 in Japan, 1993 in Korea, and 1990 in Thailand. Second, there was a trend of decreasing regional inequality from 1990 to 1996 in Japan, 1993 to 1998 in Korea and Thailand, until the period before the Asian financial crisis occurred. Third, there was a slight increase in inequality since 1996 in Japan, an overall increasing inequality trend since 1998 in Korea, and a decreasing inequality trend since 2001 in Thailand. In addition, Korea and Thailand, both of which experienced bailouts in 1998, showed common trends around the financial crisis, that is, both countries showed decreasing regional inequalities before the financial crisis, and then increased regional inequality for three to four years after the financial crisis, and then decreased regional inequality in GDP with increasing RH values (Figure 5). Such changes in regional inequality before and after the financial crisis in Korea and Thailand reflect the significant regional impact of a global crisis within a nation. It is clear that a global crisis affects increasing spatial inequality at

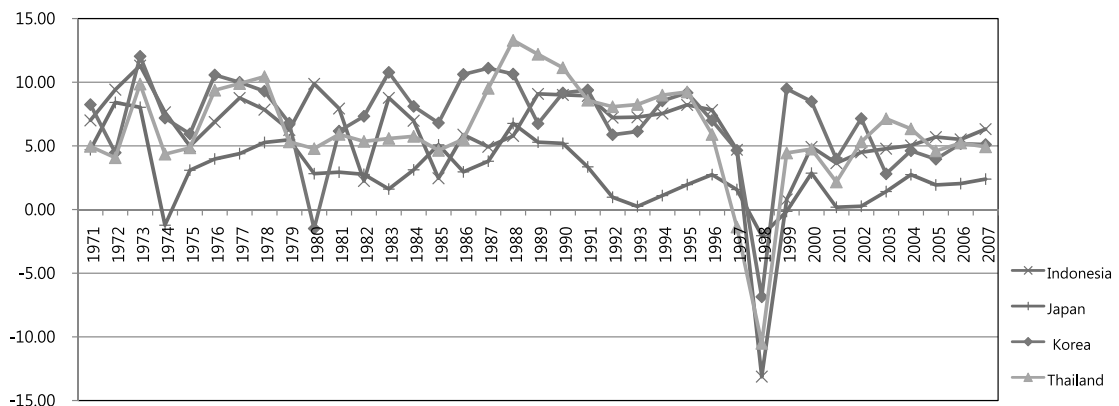


Figure 4. Changes of GDP Growth Rate in Korea, Indonesia, Japan, Thailand (1971-2007)  
 (Source: UN, National Accounts Main Aggregates Database, each year).

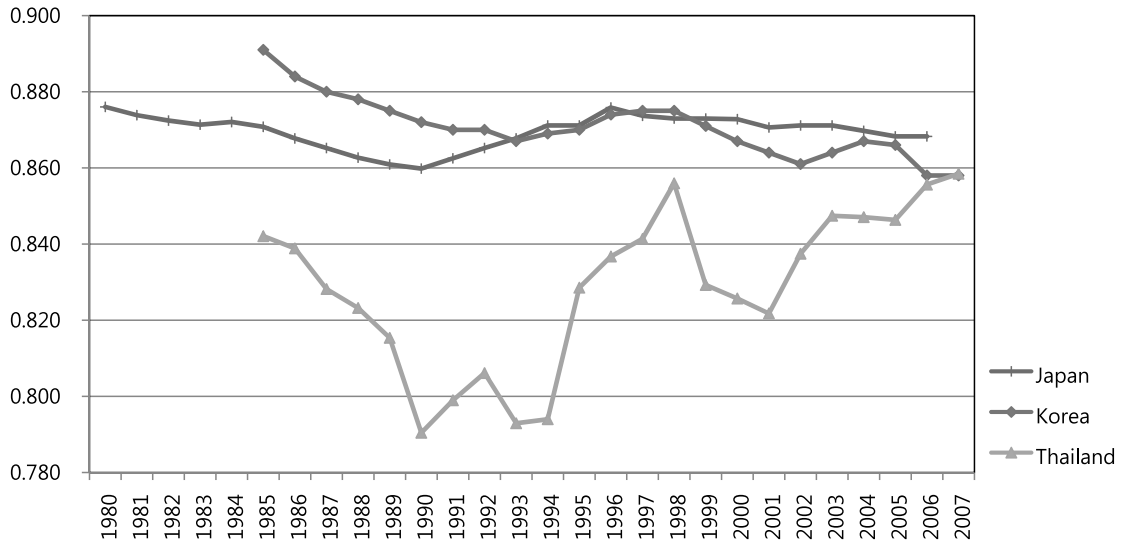


Figure 5. Relative Entropy Values of GRDP in Korea, Japan and Thailand (Source: Japan Statistics Bureau, Korea National Statistical Office, Thailand National Accounts Office, each year).

both international and inter-regional levels. Such a crisis would have more negative effects on less developed countries at an international level and peripheral regions within a nation. This trend may be applicable to the current global economic crisis resulting from the US financial disaster.

Thailand has showed an overall trend of convergence in regional inequality of regional GDP since early 1990s, which differs from the cases of Japan and Korea. If we consider regional inequality of population, there is a possibility of a converging trend in regional inequality of the per capita GDP even in Japan and Korea, because the regional inequalities of population in these countries have increased while there has been no significant change in the regional inequality of the population in Thailand (Figure 6). There has been a continuously increasing regional disparity of population with concentration in the core regions of Japan and Korea, with that in Korea being especially remarkable (Figure 6).

## 2) Comparison of the Regional Disparity of Key Variables

The comparison of the degree and trend of regional disparities in POPULATION, GDP, MANUFACTURING, and SERVICE reveals different national characteristics of regional inequality in the three countries.

In Japan, during the last three decades, the degree of regional inequalities is highest in SERVICE followed by GDP, MANUFACTURING, and POPULATION (Figure 7). During the last four decades, GDP, SERVICE, and POPULATION have shown only a slight overall concentration trend with a slight increase in regional inequality, while only MANUFACTURING has showed a continuous regional convergence trend with a decrease in the degree of regional inequality. Change trends in regional inequality of GDP is similar to that of SERVICE, suggesting that service activities had a significant impact on the trend of regional inequality of GDP and representing the progress of service world in Japan as an

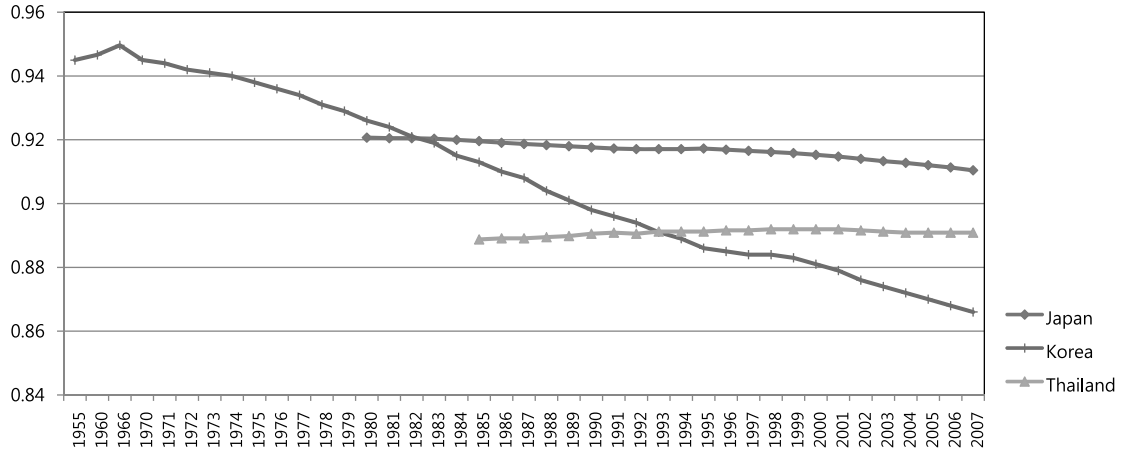


Figure 6. Relative Entropy Values of Population in Korea, Japan and Thailand (Source: Japan Statistics Bureau, Korea National Statistical Office, Thailand National Accounts Office, each year).

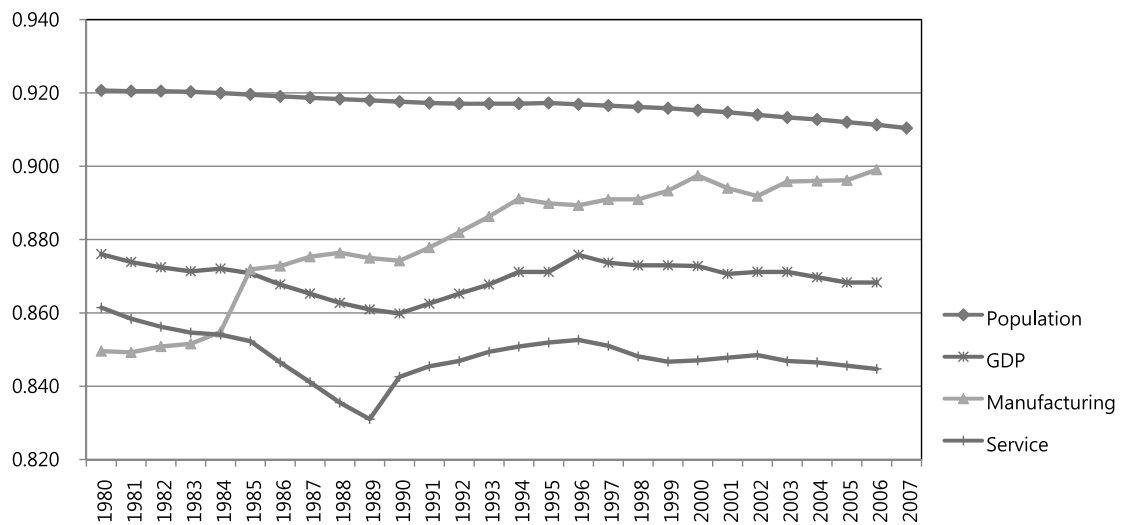


Figure 7. Relative Entropy Values of Population, GDP, Manufacturing production and production added in Japan (Source: Japan Statistics Bureau, each year).

advanced country. Such different trends of regional inequalities in economic activities seem to be related to the spatial dispersion trend of manufacturing activities within a country, while regional concentration of service activities in Japan. It is clear that the RH index of regional GDP is significantly related to the RH index of

SERVICE while the relationship is insignificant, even negative, when it comes to the RH index of MANUFACTURING (Table 5). It also suggests that large metropolitan areas take a leading role in the service world with the agglomeration of service activities in these areas, especially in the core area of Japan.

Table 5. Correlation between “RH of Regional GDP” and “RH of Other variables”

RH of Other Variables	RH of Regional GDP		
	Japan	Korea	Thailand
MANUFACTURING	-0.038	0.682	0.627
SERVICE	0.794	0.840	0.823
Per Capita Regional GDP	0.912	0.128	0.721
Population	0.068	0.872	0.055

In Korea, the overall trend of regional inequality during the last four decades has increased with the regional concentration of economic activities. This overall trend is the same in the four variables even though the degree of regional inequalities is different by variable. The degree of regional inequality of SERVICE is highest, but almost similar to that of MANUFACTURING, while the degree of regional inequality of population is lowest (Figure 8). There was a considerable trend of regional concentration of manufacturing activities with the increasing degree of regional inequality in the 1980s and slight fluctuations since the late 1980s, but the overall trend can be regarded as a steady

increasing the degree of inequality of MANUFACTURING. Compared to Japan, manufacturing activities are important to the level of regional inequality of GDP, and the service world has not progressed as much as it has in Japan in recent years (Figure 8). In contrast to the case of Japan, data from Korea reflect that the RH index of regional GDP is still significantly correlated with MANUFACTURING ( $r=0.682$ ) (Table 5), suggesting that manufacturing remains important to changes of regional inequality in the country.

The case of Thailand showed quite a different story. In Thailand, there has been a considerable fluctuation in regional inequalities of GDP,

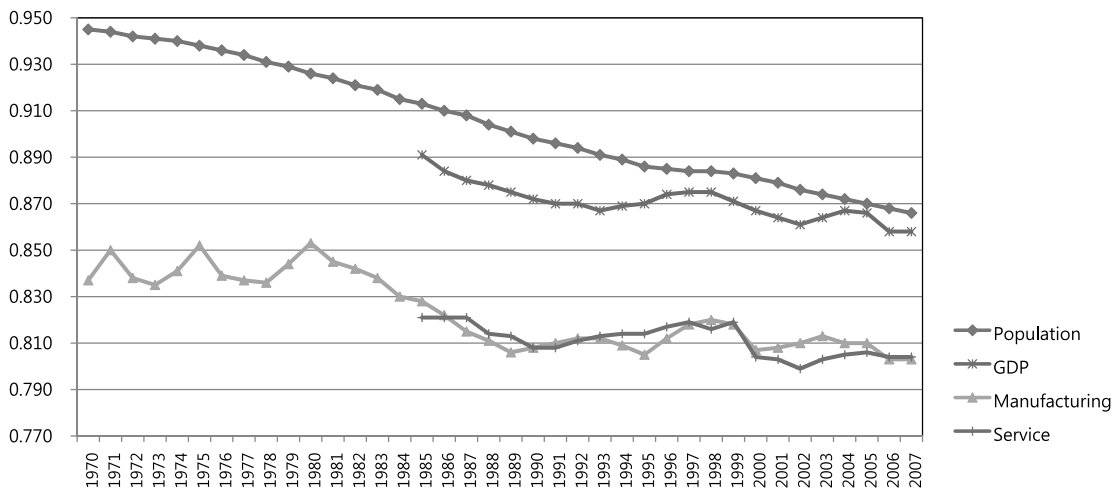


Figure 8. Relative Entropy Values of Population, GDP, Manufacturing production and Service production in Korea (Source: Korea National Statistical Office, each year).



SERVICE and MANUFACTURING, while almost no change is reflected in inequality of POPULATION (Figure 9). MANUFACTURING showed both the highest degree of regional inequality and considerable decrease in regional inequality compared to other variables during the last three decades. The increasing regional inequality with decreasing values of RH from 1998 to 2001 for GDP, SERVICE, and MANUFACTURING represent the impact of the financial crisis and the converging trend after 2001, which came as a result of recovering from the crisis.

Even though there has been a slight trend of increasing regional disparity in regional GDPs in Japan and Korea, the disparity of per capita regional GDP may not significantly change because of the trend of increasing regional inequality of population. The degree of regional disparity in per capita GDP has been very low and changes only slightly during the last three decades have been observed for both Japan and Korea (Figure 10). This means that the regional disparity in regional GDP has been considerably offset by the migration of population toward the core area. An overwhelming concentration of

economic activities in the Capital Region has been observed, but there has been an overall trend of per capita regional GDP convergence by offsetting with the continuous overwhelming concentration of population to the Capital Region in Korea (Park, 2009a). For this reason, a converging trend of per capita regional GDP has occurred, and the correlation between the RH indexes of regional GDP and per capita regional GDP is insignificant in Korea (Table 5). In the case of Thailand, since there have been no significant changes in the degree of regional inequality of population, the trend of changes in regional inequality of per capita regional GDP showed similar patterns with the changes in regional inequality of GDP (Figure 10).

The cases of three countries suggest several implications. Japan has been clearly involved in the service world and service activities are most important for regional economic growth and inequalities in Japan. Manufacturing agglomeration is still very important for regional economic growth and inequalities in Korea, and Korea is now in the initial stage of the progress of the service world, initiated by the agglomeration of advanced service activities in the Capital

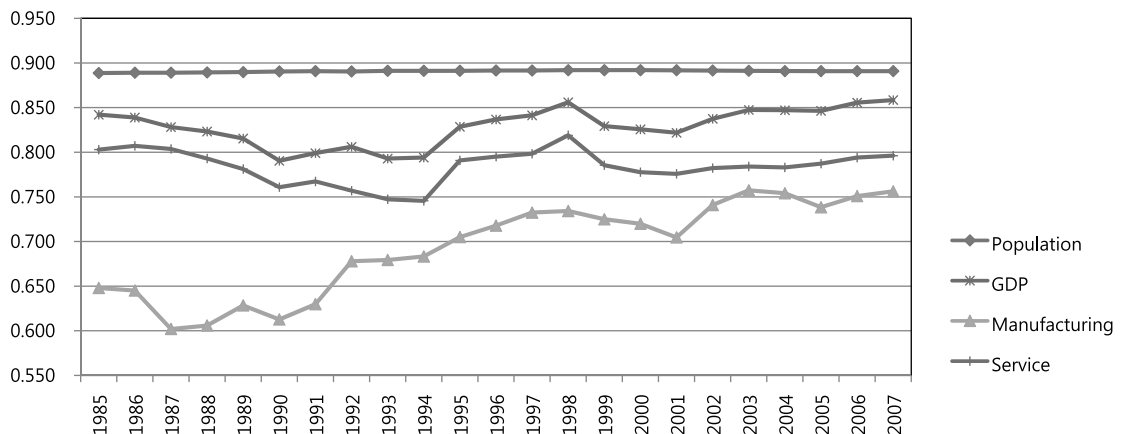


Figure 9. Relative Entropy Values of Population, GDP, Manufacturing production and Service production in Thailand (Source: Thailand National Accounts Office, each year).

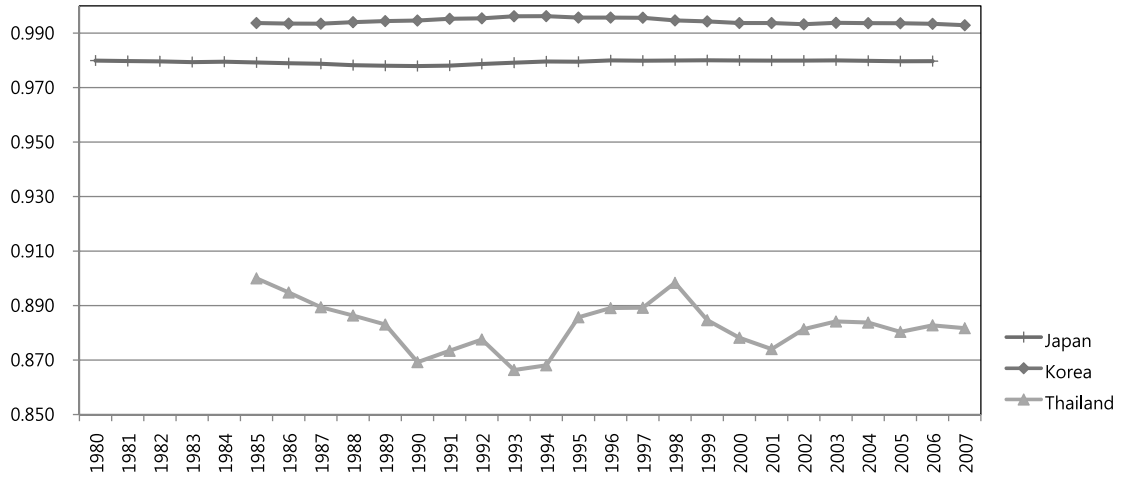


Figure 10. Relative Entropy Values of Per capita GRDP in Korea, Japan and Thailand (Source: Japan Statistics Bureau, Korea National Statistical Office, Thailand National Accounts Office, each year).

region. In Thailand, both manufacturing agglomeration and dispersion are progressing in recent years and are important for regional economic growth and change. The differences of the significant variables for explaining the regional inequalities among the three countries may reflect the difference in the level of economic development, on the one hand, and different impact of the four global megatrends, on the other hand.

### 3) Impact of the Four Megatrends in Korea

As examined in East Asia at the international level, the impacts of the four megatrends were analyzed by multiple regression analysis for 2000 and 2007 in Korea as follows:

$$\begin{aligned} \text{Regional GDP} \\ = f(\text{PATENT, BUSINESS SERVICE, INTERNET, EXPORT}) \quad \dots (2) \end{aligned}$$

$$\begin{aligned} \text{Per capita Regional GDP} \\ = f(\text{PATENT, BUSINESS SERVICE, INTERNET, EXPORT}) \quad \dots (3) \end{aligned}$$

Both “regional GDP” and “per capita Regional GDP” are used as dependent variables. Here, BUSINESS SERVICE is used instead of SERVICE, because the former is a more appropriate variable for representing the “service world.” BUSINESS SERVICE in this paper includes computer and related services, professional, scientific and technical services, and business support services.

Models 2 and 3 are all statistically significant at a 0.01 level. As expected from the previous discussion of the offsetting effect of population, explained variations of model 2 (about 98% for 2000 and 2007) are much higher than those of model 3 (about 70% for 2000 and 81% for 2007). This is because the regional disparity of per capita regional GDP became lower by offsetting the regional GDP disparity through the regional disparity of the population. The statistical significance of the models with regard to regional and per capita regional GDPs reveals the importance of the four megatrends in understanding the dynamics of economic spaces in Korea in the 21st century. However, the importance of each megatrend differs and changes over time.

It is clear that globalization and knowledge-based economy are significant for both regional disparities of regional and per capita regional GDPs in the beginning of the 21<sup>st</sup> century. The PATENT and EXPORT variables are statistically significant at a 0.01 significant level to explain the regional disparity of both regional and per capita regional GDPs in the model for 2000 (Tables 6 and 7). The BUSINESS SERVICE variable is not significant because the service world has not yet progressed much in 2000. The INTERNET variable is most important for the international disparity of per capita GDP in East Asia as previously examined. However, the INTERNET

variable is not significant in explaining both regional disparities of regional and per capita regional GDPs in Korea. This difference in impact of the INTERNET seems to be related to two points. First, since Korea is a small country in land area, it already had a well-developed Internet infrastructure in 2000. The regional disparity in the rate of Internet users was not significant at the provincial level (Park, 2004). Second, there is a limitation in the impact of Internet user rates when Internet diffusion reaches at mature stage, because the maximum value is 100%. Accordingly, even though the development of an Internet infrastructure and

Table 6. Result of regression analysis for "GRDP" by region in Korea.

Independent Variable	Dependent Variable			
	GRDP, 2000		GRDP, 2007	
	$\beta$	p-value	$\beta$	p-value
(Constant)		.146		.054
Export	.261***	.009	.247***	.000
Internet <sup>‡</sup>	-.074	.199	-.089	.101
Business service	.108	.300	.346***	.001
Patent	.700***	.000	.618***	.000
R <sup>2</sup>	.983***		.979***	

Note: See the note to Table 2.

<sup>‡</sup> Internet variable in 2000 used internet user data from 2001.

Table 7. Result of regression analysis for "per capita GRDP" by region in Korea.

Independent Variable	Dependent Variable			
	Per capita GRDP, 2000		Per capita GRDP, 2007	
	$\beta$	p-value	$\beta$	p-value
(Constant)		.962		.724
Export	1.488***	.001	1.015***	.000
Internet <sup>‡</sup>	.059	.802	.093	.546
Business service	.490	.175	.836***	.006
Patent	-1.668***	.002	-1.166***	.001
R <sup>2</sup>	.699***		.814***	

Note: See the note to Table 2.

<sup>‡</sup> Internet variable in 2000 used internet user data from 2001.

information society is critically important to the economic growth of Korea, the impact on the regional disparity at the provincial level within Korea is not statistically significant.

It should be noted that the standardized coefficient ( $\beta$ ) of PATENT is a strong negative value for the model of per capita regional GDP in Table 7. PATENT is highly concentrated in Seoul (about 40% of the nation) and in the Capital region (more than three quarters of the nation). This PATENT concentration is much higher than the concentration of the population in Seoul (about 21% of the nation) and in the Capital region (about 48% of the nation). In contrast to the overwhelming PATENT concentration in Seoul, the share of PATENT in most of the industrial cities, which show higher per capita regional GDP, is very low. Due to the fact that convergence in the regional inequality of per capita GDP was caused by the offset effect of the concentration of regional GDP through population concentration, the overwhelming PATENT concentration in the capital region resulted in statistically negative effects on the regional variation of per capita GDP.

The effect of the BUSINESS SERVICE represents a very interesting story about the progress of the service world in Korea. In both models for regional and per capita regional GDPs, BUSINESS SERVICE was not statistically significant in 2000. In the 2007 models, however, BUSINESS SERVICE was statistically significant in both models for regional GDP and per capita regional GDP at a 0.01 significant level (Tables 6 and 7). This change in the effect of BUSINESS SERVICE in 2007 reflects the rapid progress of the service world in Korea in recent years. The shares of business and producer services to the total services of Korea in terms of employment increased from 4.7 and 26.7% in 2000 to 7.6 and 28.5% in 2007, respectively (Park, 2007). As previously discussed, however, Korea has not yet

fully entered into the service world similar to most advanced countries, with manufacturing still significantly contributing to the regional disparity of regional GDP.

## 5. Conclusion and policy implications

This paper is a preliminary result of the analysis of spatial economic inequality in East Asia with regard to the four global megatrends, namely, knowledge-based economy, globalization, information society, and the service world, under the broad framework of the dynamics of economic spaces. International inequalities of per capita GNI at the national scale in East Asia, and inter-regional inequalities at the regional scale within the national space economies of Japan, Korea, and Thailand were analyzed with regard to the four megatrends. Major findings of this study are as follows.

First, the four megatrends as a whole have clearly explained the variations in international inequalities among the countries in East Asia and inter-regional inequalities at the regional scale within a nation, revealing that the four megatrends significantly impacted the dynamics of economic space in East Asia. Individual impacts of the four megatrends on spatial inequalities are, however, significantly different depending on the spatial scale of analysis and national characteristics. The progress of the information society has significant impacts on international inequalities at the national scale, while it is not statistically significant in explaining the regional inequalities at the regional scale within a nation. These findings support the importance of spatial scale in the analysis of spatial inequalities as suggested by Martin and Sunley (1998), Rey and Janikas (2005), Yamamoto (2008), and so on.

Second, in general, there has been a trend of international convergence of per capita GNI of East Asian nations, while different trends have been observed in countries at the regional scale within a nation. For example, there has been a slightly increasing trend of regional inequality of regional GDP in Japan and Korea, but an overall converging trend with decreasing regional inequalities in Thailand during the last two decades. Due to these differences, the degree of regional inequality tends to converge even though the degree of regional inequality has been higher in Thailand than that of Japan and Korea. Even though there has been a slight increase in the regional inequality of regional GDP in Japan and Korea, the regional inequality of per capita GDP was very low and no significant change had been observed over time due to the offset effects of the concentration of population to the core region.

Third, global crises had a significant impact, which extended beyond the effect of the four megatrends, on the changes in spatial inequalities. Two global oil crises in the 1970s and the East Asian financial crisis in the late 1990s had an effect of discontinuity in the general trend, leading to the increase in international inequality of economic activities. This suggests that even though the effect of the global crisis is different in each country, in general, poor countries are more vulnerable during a global crisis. The previous negative effects of the global crisis on developing economies in the international level and on peripheral regions within a nation suggest that the current global economic crisis resulting from the US financial crisis may increase the international inequalities and inter-regional inequalities within a nation. According to the recent research on inequality in Korea, the regional inequality has expected to increase in 2009 with marginal firms in the non-Capital region closing and new start-ups

concentrating in the capital region (Hyundai Economic Research Institute, 2010).

The findings of this study suggest several policy implications. Considering the significance of the information society in the international level, developing countries should primarily improve their Internet infrastructures in order to catch up with newly industrialized countries. Since the Internet user rates of the Philippines, Indonesia, Cambodia, Laos, and Myanmar are currently extremely low, the improvement of Internet infrastructures in these countries will surely contribute to the diffusion of knowledge and technology and to the converging trend in East Asian countries. In developing countries, agglomeration of manufacturing activities seems to be critical for national economic development and international convergence of per capita GNI. The cluster of manufacturing activities in developing countries may initially lead to the increase of regional disparity within a nation, but the regional disparity of per capita GDP will decrease over time with spillover effects, as seen in Korea. In developing countries, in addition to the improvement of information infrastructure and manufacturing cluster strategy, development of human resources is critical to the global trends of a knowledge-based economy.

Considering the significance of the variables related to the knowledge-based economy (PATENT) for the variation of per capita regional GDP in Korea, brain circulation within a nation will be critical in promoting regional development in the peripheral areas of newly industrialized and advanced countries. Regional innovation systems should also be promoted in the aforementioned areas. Due to the high rate of Internet users in these countries, new forms of economic spaces such as temporary clusters and virtual innovation networks (Park, 2005; 2009b) can be promoted in the peripheral areas to enhance utilization of regional resources and

potentials. In view of the importance of the service world (SERVICE) and information society (INTERNET) for the variation of per capita GNI in OECD countries, newly industrialized countries should develop appropriate policies for promoting the service world. In particular, considering the inclusion of the BUSINESS SERVICE variable for explaining the 2007 per capita GDP of Korea (which was not included in 2000), the development of producer services in the peripheral areas seems to be a critical policy issue in the future of newly industrialized countries.

Finally, bearing in mind the dramatic social changes in advanced and newly industrialized countries resulting from low birth rates and rapid population aging trends, a new system should be established for brain circulation and labor retraining. To support the development of a creative region, retired experts can take on consulting activities for local SMEs (Small and Medium Enterprises) and participate in the local retraining programs as teachers. Employing the expertise of retired professionals is an efficient and inexpensive way of enhancing the competitiveness of the local labor market and brain circulation for regional development in an aging society.

## References

- Alvstam, C. G. and Schamp, E. W., 2005, *Linking Industries across the World*, Ashgate, Aldershot.
- Bathelt, H., Malmberg, A., and Maskell, P., 2004, Clusters and knowledge: Local buzz, global pipelines and the process of knowledge creation, *Progress in Human Geography*, 28(1), 31-56.
- Bryson, J. R., Daniels, P. W., and Warf, B., 2004, *Service Worlds, People, Organizations, Technologies*, Routledge, London and New York.
- Clark, G. L. and Kim, W. B., 1995, *Asian NIEs & the Global Economy*, Johns Hopkins University Press, Baltimore and London.
- Coulombe, S., 2007, Globalization and regional disparity: A Canadian case study, *Regional Studies*, 41(1), 1-17.
- Florida, R., 1995, Towards the learning region, *Futures*, 27, 527-36.
- Florida, R., 2002, *The Rise of the Creative Class*, Basic Books, New York.
- Fujita, M., Krugman, P., and Venables, A. J., 2001, *The Spatial Economy: Cities, Regions, and International Trade*, MIT Press, Cambridge, MA.
- Gertler, M. S., 1995, 'Being there': Proximity, organization, and culture in the development and adoption of advanced manufacturing technologies, *Economic Geography*, 71, 1-26.
- Hamaguchi, N., 2009, Regional integration, agglomeration, and income distribution in East Asia, in Huang, Y. and Bocchi, A. M. (eds.), *Reshaping Economic Geography in East Asia*, 1-18.
- Harrington, J. W. and Daniels, P. W., 2006, *Knowledge-Based Services, Internationalization and Regional Development*, Ashgate, Aldershot.
- Hayter, R., 1997, *The Dynamics of Industrial Location*, Wiley, Chichester, New York, Weinheim, Brisbane, Singapore, Toronto.
- Hyundai Economic Research Institute, 2010, Stagnation and promotion issues of regional economy, *Weekly Review of Economy*, Vol. 10-03.
- Kanbur, R. and Rapoport, H., 2005, Migration selectivity and the evolution of spatial inequality, *Journal of Economic Geography*, 5(1), 43-58.
- Li, F., Whalley, J., and Williams, H., 2001, Between physical and electronic spaces: The implications for organizations in the networked economy, *Environment and Planning A*, 33, 699-716.
- Malecki, E. J., 2002, The economic geography of internet's infrastructure, *Economic Geography*, 78(4), 399-424.
- Markusen, A. R., 1996, Sticky places in slippery space: A typology of industrial districts, *Economic Geography*, 72(3), 293-313.
- Martin, R., 2001, EMU versus the region? Regional convergence and divergence in Euroland,

- Journal of Economic Geography*, 1(1), 51-80.
- Martin, R. and Sunley, P., 1998, Slow convergence? The new endogenous growth theory and regional development, *Economic Geography*, 74(3), 201-227.
- Oinas, P. and Malecki, E. J., 1999, Spatial innovation systems, in Malecki, E. J. and Oinas, P. (eds.), *Making Connections: Technological Learning and Regional Economic Change*, Aldershot, Ashgate, 7-34.
- Park, S. O., 1993, Industrial restructuring and the spatial division of labor: The case of the Seoul metropolitan region, the Republic of Korea, *Environmental Planning A*, 25, 81-93.
- Park, S. O., 1997, Rethinking the Pacific Rim, *Tijdschrift voor economische en sociale geografie (Journal of Economic and Social Geography)*, 88(5), 425-438.
- Park, S. O., 2003, Economic spaces in the Pacific Rim: A paradigm shift and new dynamics, *Papers in Regional Science*, 82(2), 223-247.
- Park, S. O., 2004, The impact of business to business electronic commerce on the dynamics of metropolitan spaces, *Urban Geography*, 25(4), 289-314.
- Park, S. O., 2005, Network, embeddedness, and cluster processes of new economic spaces in Korea, in Le Heron, R. and Harrington, J. W. (eds.), *New Economic Spaces: New Economic Geographies*, Aldershot, UK, Ashgate, 6-14.
- Park, S. O., 2006, Service world and the Dynamics of Economic Spaces, in Harrington, J. W. and Daniels, P. W. (eds.), 2006, *Knowledge-based Services, Internationalization and Regional Development*, 15-40.
- Park, S. O., 2007, Industrial restructuring and changes of economic spaces, in Chung, U. C. and Cho, H. S., (eds.), *Financial Crisis + 10, How Has It Changed Korea?*, SNU Press, Seoul, 59-101 (in Korean).
- Park, S. O., 2009a, A history of the Republic of Korea's industrial structural transformation and spatial development, in Huang, Y. and Bocchi, A. M., (eds.), *Reshaping Economic Geography in East Asia*, 320-337.
- Park, S. O., 2009b, Long-term Visions and Strategies for the Regional Development Policies of Korea, *Proceedings, Reshaping Regional Policy: Co-prosperity and Competitiveness*, Presidential Committee for Regional Development, 75-103.
- Polenske, K. R., 2007, *The Economic Geography of Innovation*, Cambridge University Press, Cambridge.
- Ravallion, M. and Jalan, J., 1996, Growth divergence due to spatial externalities, *Economic Letters*, 53, 227-323.
- Rychen, F. and Zimmermann, J., 2008, Special issue: Clusters in the global knowledge-based economy: Knowledge gatekeepers and temporary proximity, *Regional Studies*, 42(6), 767-776.
- Rey, S. J. and Janikas, M. V., 2005, Regional convergence, inequality, and space, *Journal of Economic Geography*, 5(2), 155-176.
- Rychen, F. and Zimmermann, J. B., 2008, Clusters in the global knowledge-based economy: Knowledge gatekeepers and temporary proximity, *Regional Studies*, 42(6), 767-776.
- Scott, A. J., 1988, *New Industrial Spaces - Flexible Production Organization and Regional Development in North America and Western Europe*, Pion, London.
- Storper, M., 1997, *The Regional World*, The Guilford Press, New York and London.
- Torre, A., 2008, On the role played by temporary geographical proximity in knowledge transmission, *Regional Studies*, 42(6), 869-889.
- World Bank, 2009, *Reshaping Economic Geography*, 2009 World Development Report, World Bank, Washington D.C.
- Yamamoto, D., 2008, Scales of regional income disparities in the USA, 1955-2003, *Journal of Economic Geography*, 8(1), 79-103.
- Zook, M. A. 2002, Hubs, nodes and by-passed places: A typology of e-commerce regions in the United States, *Tijdschrift voor Economische en Sociale Geografie*, 93(5), 509-521.

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