경제학박사 학위논문

Three Essays on Economic Sources of Spatial Development

지역경제 성장에 관한 에세이

2012년 8월

서울대학교 대학원

농경제사회학부 지역정보 전공

이 창 근

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이 논문을 경제학박사 학위논문으로 제출함
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이창근의 경제학박사 학위논문을 인준함
2012년 8월

위 원 장 _____ (인)

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Abstract

Three Essays on Economic Sources of Spatial Development

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This study focused on the regional development and consisted of three essays. The first thesis analyzed the effect of labor or population mobility between the two regions on regional economies employing a simple two-region model. As a result of comparative analysis, for the success of Sejong City, the residential and work sites need to be reconciled without having to commute to the SMA region. Finally, the key issue is the policy of migration to Sejong City for a short period of time, which needs to involve subsidies or incentives. Consequently, economic activities should be relocated in the target region. Numerical simulation showed that high transportation and commuting costs induce labor and population dispersion to the Choungchong region, including Sejong City, and positively affect the output growth. However, social welfare also decreases. Therefore, subsidies and tax policies are needed to achieve labor and population dispersion in the Choungchong region, including Sejong City, without a decrease in welfare.

The second paper is to analyze economic growth patterns of high and low income regions during economic recession and recovery periods using asymmetric income growth model with neighboring effects. This paper also attempts to identify economic causes for the stagnant underdevelopment of the less developed region. The quantitative results found that there have been the less developed regions which recorded a low average regional income levels from 1998 to 2009 and even lower regional income growth rates in 2009 against 1998 compared with the national average, moreover grew less during the recovery periods compared with the developed regions. This structural factor caused the low income growth among less developed regions. In addition, the neighboring developed regions pulled most of the regional income growth of the less developed regions. Finally, capital enlargement, reinforcement of the manufacturing basis, and a more active role in of regional government, including the optimal regional tax burden, were needed to facilitate regional income growth in the less developed regions. These results imply that urban integration would be needed not between the

developed regions and the adjacent developed regions but between less developed regions and its neighboring developed regions. Moreover, the empirical results of concentration in manufacturing sector suggest that the relocation of manufacturing facilities among regions may be required.

The third study analyzed the factors of output growth of firms in financial sectors considering the role of local government in regional government policies. This study employed multi-level statistical models using firm-level data. Firms in ROK are inferior in financing through the direct financial market (market-based financial system). Moreover, firms in ROK regions are inferior in the financial credit assistance of local governments to firms in SMA, which can cause them financial constraints. The relationship between the market-based system and the bank-based system must be mutually complementary even though the direct financing market more significantly affects the output growth of firms. Also, financial tools and fiscal policies as local government policies positively and differently activate the output growth of firms per region at the macro level. This result continues to promote the regional deviation of output growth of firms. Finally, the local government should establish a vigorous fiscal policy on economic activities and financing assistance for firms. The local government credit guarantee program must also be revised more efficiently to contribute to the financing and the output growth of firms. Also, financial tools and fiscal policies should be more diversified in ROK regions. Lastly, the regional financial policy of the local government must be revised in the direction more suitable to the output growth of firms through the participation in the direct financial system such as bond issues and paid-in-capital increase.

Keywords : Simple Two-Region Model, Migration and Commuting, Agglomeration, Transportation and Commuting Costs, Concentration and Dispersion, Asymmetric Regional Income Growth, Neighboring Effect, Underdevelopment, Capital Accumulation, Integration, Financial Tools, Fiscal Policy, Multi-Level Statistical Models, Bank-Based and Market-Based System

Student ID Number : 2006-30301

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Chapter I
Introduction

1.1 Background and Purpose

Regional development and policy are major issues in regional economics. These issues stem from disparities among regions, especially in terms of income. Regional economic growth has been studied, and the effect of regional policy measures has been evaluated to reduce regional disparities. These disparities are a result of different economic activities and resources, industrial structures and development, and infrastructures. In expediting the implementation of free trade and liberalization of capital movement among nations and regions, regional integration and external forces are considered important. These progressed to the study of spatiality, to which economic outcome and resources (such as degree of development, knowledge spill-over, accessibility and connectivity through infrastructures within and between regions, and backward and forward linkages from labor and commodity markets) as well as economic and non-economic occurrences such as financial crisis and disaster would spread.

Therefore, regional policies have been developed under the framework of (national) efficiency and (inter-regional) equity to reduce regional disparities. Regional policies are also collaboratively formulated in terms of various aspects.

Armstrong (2002) stated that at least seven related theories of regional

growth have been created, and these theories affect the formulation of regional policies (Dijk et al., 2009). The first theory is neoclassical growth theory, which states that output growth is determined by the growth and the mobility of production factors and technology. Convergence of output among regions occurs as developing regions rapidly accumulate capital until they reach a situation of diminishing returns, which result in attractive and productive investments in less developed regions. The second theory is the endogenous growth model, which explicitly and endogenously includes technological progress that was not identified in neoclassical growth theory. Technological progress is a result of human capital, scale effects, spill-over from investments in physical capital, and research and development. The third theory is post-Fordism and radical theory, which can be achieved within a geographical concentration of small and medium-sized firms. Regions that achieve geographical concentration can prosper, whereas those that do not are left behind. The fourth theory is social capital theory, which emphasizes the effects of the social, cultural, and political influences of regional economic growth under the framework of neoclassical growth theory. The fifth theory is the new economic geography (NEG) model based on the study of Krugman (1991). Upon acquiring an advantage, a region attracts new firms and potential workers because of its ability to exploit economies of scale and to demonstrate variety. The agglomeration process can be driven by productivity effects from input–output linkages that are associated with transportation costs. Sixth, agglomeration advantages are also stressed in evolutionary economic geography, but the model is focused on the role of entrepreneurship

and innovation in the Schumpeterian sense in relation to cohesion in networks and in clusters. Finally, the demand-driven export competition model exhibits the essential mechanisms of export competitiveness in some regions. The concept of regional competitiveness originally came from the theory of comparative advantage in the Heckscher–Ohlin theorem, which explains regional patterns of production and export specialization. Increasing competitiveness is mostly based on Verdoon's Law, which considers productivity growth as a function of output growth.

From the above overview, regional economic growth can clearly be explained by a broad variety of relevant factors (Dijk et al., 2009). Under the efficiency–equity trade-off, regions become less developed because of low economic growth rates, outdated industrial structures, and high unemployment rates. With regard to regional policies, the unemployed people in less developed regions are obviously expected to move to prosperous areas (Dijk et al., 2009). However, two kinds of perspectives are present. The first perspective is the movement of jobs from regions with tight labor markets to regions with high unemployment rates. The second perspective is the creation of new jobs in regions with high unemployment rates. The first perspective is demonstrated by the migration of firms in the UK in the 1960s and 1970s and by the relocation of public sector jobs. Oosterhaven (1981) showed that this perspective became a very effective regional policy in the Netherlands. Marshall et al. (2005) identified the positive effects of public sector dispersal in Great Britain. Specifically, the relocation of economic activities made target regions attractive and allowed central government subsidies or

incentives for economic activities to be considered. The second perspective is to support starting firms, provide export and innovation appropriation for small regional firms, create social networks among firms, stimulate spin-offs of universities and technological institutes, and provide office spaces with common facilities (Dijk et al., 2009).

Therefore, this study focuses on regional development. Using a simple two-region model with agglomeration economies, this study analyzes the effect of labor or population mobility on regional economies with mobility costs. The model identifies regional policy directions toward regional development, which include the relocation of economic activities. This study identifies less developed regions in Korea and investigates why they continue to show backward development and how their status can change with neoclassical growth theory. The regional policy implication is also discussed to expound on the regional income growth of less developed regions. Finally, this study examines the regional income growth and development of firms as a result of understanding the role of entrepreneurship and innovation in the Schumpeterian sense. Therefore, this study analyzes the factors in the output growth of firms, including financial sectors and regional government policies, by using the endogenous growth model. The study additionally explores how various financial resources contribute to the output growth of firms through productive channels. The important role of financial sectors in regional income growth, as the supplier of capital, is worthy of debate. Finally, this study states policy implications that are aimed to improve the efficiency of financial sectors and the output growth of firms.

1.2 Organization

This paper consists of five chapters, as shown in Figure 1. Chapter I describes the background and the purpose of the study. Chapter II illustrates a simple two-region model and discusses the effect of labor or population mobility between regional economies. Chapter III presents the less developed regions, analyzes the asymmetric regional income growth model, and studies the neighboring effect of regional income growth in less developed regions. Chapter IV presents multi-level statistical models that involve financial sectors. It also analyzes the determinants of the output growth of firms and the effect of financial tools and fiscal policies as regional government policies. Finally, Chapter V summarizes previous results and synthesizes the policy implications for regional development.

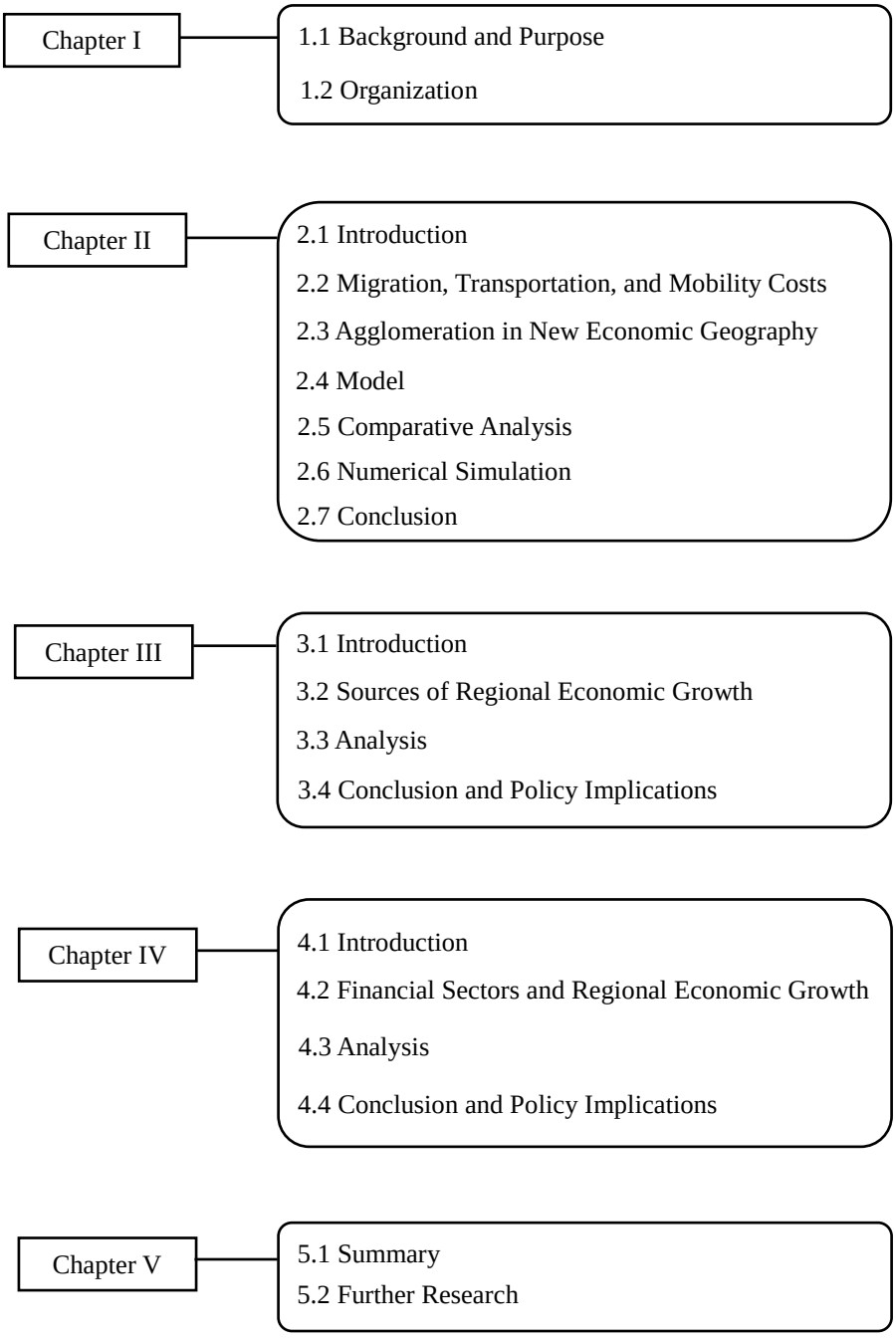


Figure 1.1 Organization of the Study

Chapter II
Migration and Regional Economic Growth Using a Simple Two-Regions Model

2.1 Introduction

The construction of Sejong City in Korea caused considerable controversy, with the proposal of the former government on either balanced regional growth or balanced national development. The key objective of the construction of Sejong City was to transfer residential places in Seoul Metropolitan Areas [1] (SMA) to the Chungchong Area, which was approximately 160 km south of Seoul. Officials at the ministries were assigned, and employment was created. Furthermore, the purpose of the construction of Sejong City was to achieve balanced regional growth and national development, as well as to solve the problems caused by extreme concentration and overcrowding in SMA. With regard to the construction of Sejong City, Jun and Hur (2003) projected that the population in the Chungchong Area will increase by 0.48 or 1.56 million people, whereas a decrease will be observed in SMA by 0.38 or 1.22 million people. Korea Land Corporation (2004) predicted that 25,000 or 85,000 officials will migrate to Sejong City. However, three cases can alter these forecasts. First, if the job site will be moved to Sejong City, people will naturally migrate to the Sejong

[1] SMA includes Seoul, the capital of Korea, the Incheon region that is nearby Seoul, and the Kyounggi region that surrounds Seoul.

City. Second, although Sejong City is considered as a new job site, people may still reside in SMA. Third, people residing in Sejong City may opt to commute to SMA. Therefore, how will indirect utility depend on mobility, such as commuting or migration? How will transportation costs, which include logistics, commuting costs, or migration costs, affect indirect utilities? When will agglomeration economies emerge or improve?

This study aims to analyze the effect of labor or population mobility between two regions on regional economies. The study seeks to identify how indirect utility can change according to four scenarios that consider mobility. These scenarios involve residence and work locations in the same region or in different regions. Cases of commuting and migration are considered as mobility modes. The study also aims to examine how transportation (logistics) costs during the trading of commodities and mobility costs, such as commuting and migration costs, can affect indirect utilities. Finally, the study investigates how indirect utilities can be affected by agglomeration. The paper is organized as follows. First, a literature review on mobility and agglomeration economies is presented. A simple two-region model is then developed. The results are analyzed through comparative analysis, and numerical simulation is performed with the use of transportation and commuting costs. Finally, concluding remarks and policy implications are presented.

2.2 Migration, Transportation, and Mobility Costs

Mobility can be categorized into two types: migration and commuting. Transportation costs are logistically defined as the shipping (trade) costs of commodities, whereas mobility costs are the costs of commuting and migration of workers. Lower transportation costs, economies of scale, product differentiation, and positive general equilibrium feedback apparently work against the development of remote and sparsely populated suburb areas (Fujita et al., 1999). However, transportation and mobility costs are traditionally key factors that affect the relocation of economic activities and mobility, such as commuting or migration.

Migration has initially been studied in various aspects, such as in terms of market-driven factors and public sector programs. For market-driven factors, Todaro (1969) emphasized that based on the market mechanism, a relatively higher permanent income attracts a steady stream of rural migrants into urban areas. Harris and Todaro (1970) considered migration as a response to urban–rural differences in terms of expected earnings. Porell (1982) examined the effect of economic incentives and quality of life (QOL) on inter-metropolitan migration. QOL includes factors such as climate, park, sports events, crime, density, and local government expenditures that are exclusive of welfare payments. Cristopher and McMaster (1990) concluded that the market mechanism can remove regional inequality in economic prosperity. Inter-regional migration was found to respond to changes in regional wages and to differences in employment opportunities. Migration that is induced by changes in unemployment rates restores the system to equilibrium. Cushing and Poot (2004) stressed that migration is a result of a forward-looking

behavior that maximizes an individual's or household's expected future benefits against cost. Gabszewicz and Tarola (2011) suggested the effect of wage differentials on migration between two countries. Kancs (2011) studied the determinants of migration, such as market potential, wages, and cost of living in European regions. For the non-market aspect, Tiebout (1956) suggested policies that promote residence mobility, and postulated that an increase in consumer–voter knowledge can improve the allocation of government expenditures. Meanwhile, mobility in acquiring jobs and knowledge relevant to the location of the industry and workers can improve the allocation of private resources. In the study of Cristopher and McMaster (1990), they determined the necessity of a regional policy that can move jobs to a depressed region to eliminate disequilibrium of the unemployment differential. Wilson (2003) examined the effect of an equal payment system on migration in Canada. Marshall et al. (2005) determined the positive effects of public sector dispersal in Great Britain. Mckinnish (2007) identified welfare migration effects based on the Aid to Families with Dependent Children in the US. Glazer et al. (2008) analyzed the relationship of tax policy to income. This relationship can affect property values and induce migration.

For the effect of transportation costs, such as shipping (trade) costs of commodities on economic activities, Weber (1909) pioneered that transportation costs are theoretically the most fundamental element that can determine location. Transportation costs are related to two fundamental aspects: material index and locational weight. Kilkenny (1998) studied the relationship between transportation costs and mobility and the rural

development of firms and workers. Changes in transportation costs can affect regional wage rates, thus determining the location of production cost-oriented firms and inducing spatial mobility of firms and workers. Finally, reduced transportation costs can result in the optimal number of firms and the concentration of firms in each region. Tabuchi (1998) demonstrated that when the transportation costs are low enough to overcome the advantages of agglomeration, dispersion prevails under equilibrium within a two-region framework. Tabuchi et al. (2005) also analyzed the effects of a decrease in inter-city transportation cost on the spatial distribution of the population in a multi-regional economy. An increase in the regional population can generate high urban costs.

From the analysis on mobility costs, Suh (1988) defined conditions where inter-city commuting is plausible. In this study, workers lived in two strip cities that differ in distance from the central business districts. The cities also differ in their average prices for housing rents and commuting costs, with the absence of migration costs. Consequently, when the income gap is large enough relative to the distance between the two cities and to the amount of commuting costs, the residents of the low-income city tend to commute for work to the high-income city despite commuting costs. Pinto (2003) observed that if commuting or mobility costs are reduced, mobility is induced. Anas and Xiong (2003) explored high intra-city commuting costs and concluded that population growth favors diversification. Murata and Thisse (2005) examined the interplay between the transportation costs of commodities and the commuting costs of workers within a general equilibrium model, with the

assumption that workers can be mobile and can choose a region where they prefer to work and live. Low transportation costs facilitate the dispersion of economic activities, whereas low commuting costs foster the agglomeration of economic activities. Anas and Rhee (2007) indicated that toll fees as a commuting cost reduce inefficient suburb-to-city commuting, as demonstrated in a simple city-suburb model with cross-commuting. Baum-Snow (2007a, b) found that in metropolitan areas where the intra-highway system is more developed, the population is less concentrated at the center of the metropolitan city. Therefore, the degree of suburbanization is higher. Using a two-city model, Sorek (2009) studied how workers' migration or commuting decisions depend on commuting or migration costs and on commuting time. Equilibrium migration is uni-directional, in which migrants become the most able workers in suburbs. Suburb workers exhibit moderate ability to commute to work in the metropolis and become the least able workers in suburbs. Sorek (2009) showed that a reduction in commuting time can moderate, stop, or reverse the migration process. As transport technology is developed, potential inter-city commuting time sharply declines. Therefore, commuting beyond the mono-centric framework or commuting between distant cities where workers can reside and work is made possible.

In summary, four points are emphasized. First, migration is categorized according to a market mechanism and to public sector programs. Second, low transportation costs can induce concentration or dispersion of production factors, such as the mobility of workers. Third, high commuting costs can result in population dispersion in a multi-regional economy. Fourth, a low

commuting time caused by developed transportation technologies can results in population dispersion to suburban areas.

2.3 Agglomeration in New Economic Geography

Weber (1909) was the first to consider the concept of agglomeration economies in his analysis of an industrial location that is focused on manufacturing. In NEG, externalities are justified as agglomeration economies and involve a spatial aspect. Krugman (1991) suggested pecuniary externalities that are associated with demand or supply linkages in the location of firms and in the spatial mobility of workers. Krugman (1998) mentioned that producers tend to choose locations that are accessible to large markets and to the supplies of goods. Two linkage effects were identified. Locations with easy access to large markets are excellent for industries with large internal economies of scale (backward linkages). Large markets also favor the establishment of local suppliers of intermediate goods and hence the benefits of a supply chain (forward linkages). Krugman (1998) reported on the main forces that affect industrial concentration, as shown in Table 2.1. Parr (2002) also argued that the agglomeration economies enjoyed by a firm can be categorized into those based on spatially constrained internal economies and those based on spatially constrained external economies. This categorization refers to the fact that the unit cost of production is a decreasing function of the output. Parr (2002) categorized spatially constrained internal economies into three cases. The first case is horizontal integration, which means the

economies of scale are associated with the physical output. The second case is lateral integration, such as when a firm operates a plant that produces electric generators and pumping machinery. The third case is vertical integration, which is demonstrated by a firm that achieves cost savings by engaging in various stages and processes of production. Spatially constrained external economies are beyond the control of an individual firm and are typically caused by the presence and the collective action of other firms. As a result, the cost savings of an individual firm depend on the scale of the industry it belongs to, the existence of firms in other industries, the efficient flow of information, and the ability to coordinate the activities of the firm with other firms. Parr (2002) also strongly stressed that spatially constrained external economies may exist in a variety of spatial settings such as intra-urban spaces, regional level, and city-region or metropolis-based areas.

Table 2.1 Main Categories of Forces Affecting Industrial Concentration

Centripetal forces	Centrifugal forces
Market-size effects Thick labor markets Pure external economies	Immobile factors of production Land rents Pure external diseconomies

Source: Krugman (1998)

The important factor of agglomeration economies in NEG is the transportation cost, which is the same as that in classical location theories. Decreasing transportation costs affect the movement of production factors, such as labor and changes in land rent and wage. If the land price becomes naturally higher, firms can start moving from core regions to nearby peripheral regions. With high land prices, expense rates also increase as

evident in high housing costs and high prices of non-traded goods and services in a large agglomeration. Meanwhile, transportation costs are further reduced. Fujita (2007) called this phenomenon as the "flying geese effect."

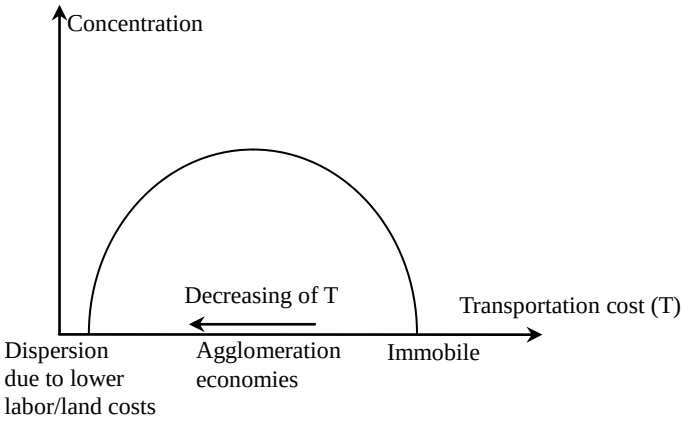


Figure 2.1 Impact of Decreasing Transportation Cost

Source: Fujita (2007)

Tabuchi (1998) illustrated the effect of reducing inter-city transportation costs on the patterns of agglomeration or dispersion among firms and workers in a two-region model. When transportation costs are low enough to overcome the advantages of agglomeration, dispersion expands under equilibrium. Wang and Wang (2010) reported that if the real wages are the same between two regions, agglomeration economies can disappear regardless of the amount of transportation costs. If a differential is observed on real wages, producers can agglomerate in a region with a high real wage. The relationship between agglomeration economies and transportation costs is not monotonous. The connection can be described as a reverse U curve, which represents the results from fragmentation to agglomeration and from agglomeration to fragmentation. The same trend was obtained by Fujita (2007). Alstadt et al. (2012) analyzed the relationship of transportation access and connectivity to

local economic outcomes. The local 40-minute and the regional three-hour market sizes were consistent strong factors that affect industry employment concentration, industry labor productivity, and foreign export proportion in trade and in service industrial sectors. However, these factors are less strong in the manufacturing, construction, and industrial utility sectors. Finally, transportation cost is an important factor in agglomeration economies. The effect of reducing inter-city transportation costs can be represented by agglomeration or dispersion of firms and workers. The effect of accessibility also varies among different industries.

2.4 Model

2.4.1 Background

Urban economics started on the question of how the economy in a region is spatially organized. Thünen (1826) formulated the theoretical basis of the urban economy and analyzed agricultural land use through the bid–rent curve. Alonso (1964) designed a monocentric city model that involves commuters and the central business district, with the assumption of transportation costs included. According to Alonso (1964), the urban economic model can be expanded from its basic form to a time-extended model that introduces the time costs of commuting and time constraint. Beckmann (1973) subsequently assumed that the family structure of a household is characterized by two parameters: d as the number of dependent members and n as the number of

working members. Each working member of the household is assumed to incur the same pecuniary transportation costs and to receive the same wage rate despite budget constraints.

These assumptions were applied to the basic or the extended model for research purposes and for the development of urban economic models such as the non-monocentric characteristic of modern metropolitan regions. Although these cities have a traditional downtown area, they can typically have a number of subcenters that can compete with the firms in the downtown area in terms of employment (Fujita et al., 1999). Fujita and Ogawa (1982) observed that the trade-off between commuting costs and land rental prices supports polycentric urban structures. Similarly, with regard to urban system, Mills (1967) and Henderson (1974, 1980, 1988) focused on the change in city size and on the relationship between city size and residents' utility.

Urban economics contributes to providing the basis of spatial economic theory, such as land use and location choice within and around cities or regions in the urban spatial structural aspect. However, the more borderless global economies become and the more perfectly mobile production factors develop, spatiality becomes an important aspect of economies. This study focuses on where, how, and why economic activities occur and spread out, when a spatial concentration of economic activities is considered sustainable, and what conditions or small differences among regions can grow into large differences over time through mobility and agglomeration economies.

NEG is developed from the model of Dixit and Stiglitz (1977), which considered transportation cost, mobility, and monopolistic competition in

regional economies. NEG increases returns instead of maintaining these returns because of differences among regions. In the new trade theory from NEG, Helpman and Krugman (1985) explained the "home market effect" that occurs when imperfectly competitive industries concentrate their production in large markets and export to small ones, with the implication of trade and location theories through transportation costs.

Krugman (1991) developed a simple two-region model that demonstrated how a country can endogenously transform into an industrialized "core" and an agricultural "periphery." This transformation depended on factors such as transportation costs, economies of scale, and the share of manufacturing to the national income, as well as on how mobile workers spend their income in the region where they are active. The geographical concentration of industries consequently generates an additional demand for manufactured goods because of low transportation costs and mobile production factors.

Therefore, location choice and transportation costs, which have a trade-off relationship, are the key factors in urban economic theory. This study designed a simple two-region model based on the model of Alonso (1964) on urban economics and that of Krugman (1991) on NEG.

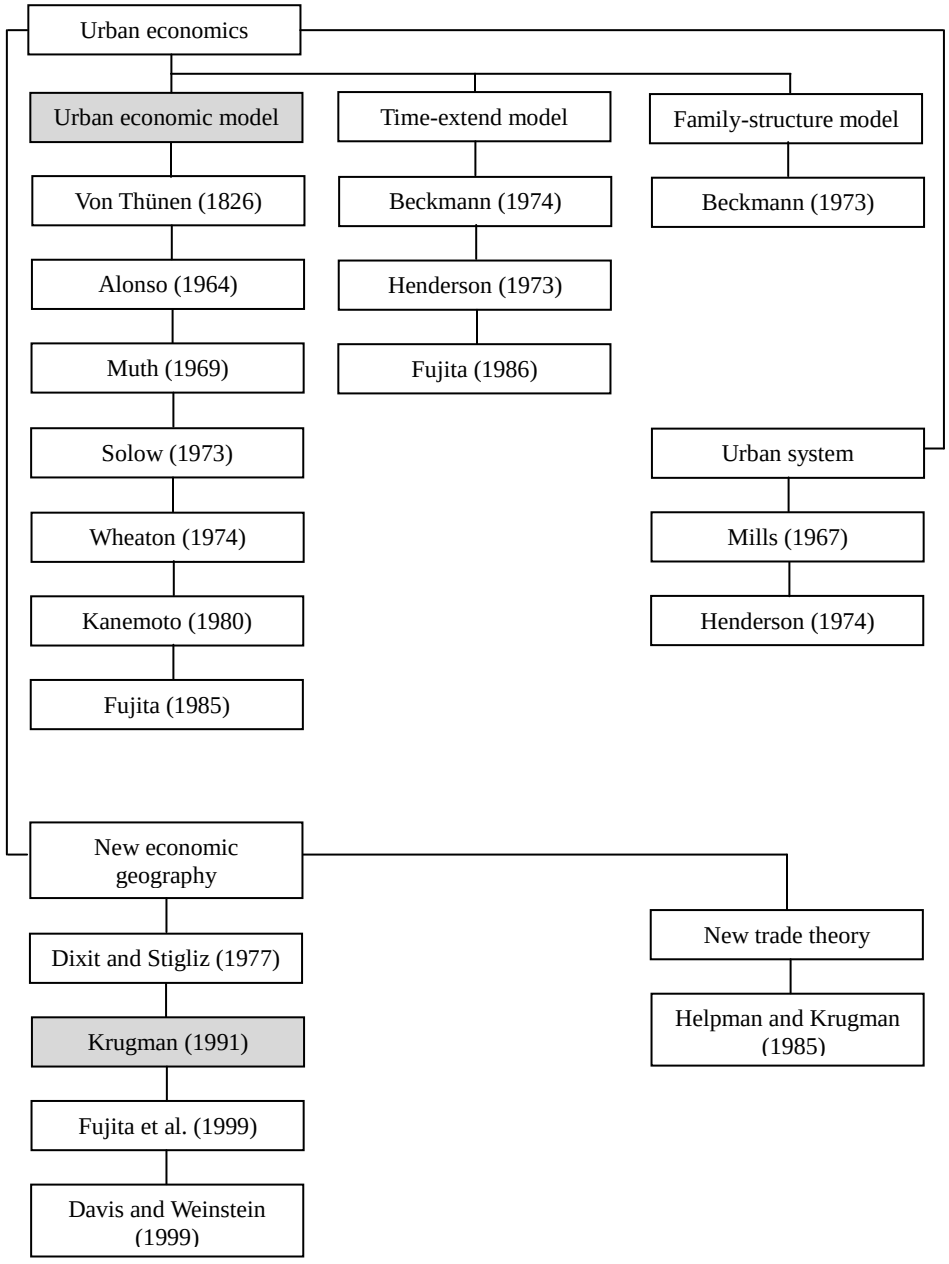


Figure 2.2 Flow of Urban Economic Theory

2.4.2 Structure

This study considers the choice probabilities of residential and working

sites, namely, four cases, and designs a simple two-region model according to Sorek (2009). Two regions are assumed. Travel refers to mobility travel only, such as commuting and migration, and it is accompanied by mobility cost. Mobility cost is categorized into commuting cost and migration cost. Only travel by road is costly. Commuting cost is incurred between two regions but not within each region. If the residential site is changed, migration cost is incurred. Shopping travel is not assumed. Commodities are traded between two regions, but consumption occurs only in the residential area. Therefore, transportation cost, such as the shipping (trade) cost of commodities, is incurred according to the trading of goods, which follows the iceberg form. Production occurs in any region. The commodities between two regions are heterogeneous, and only labor is a production factor. Agglomeration economies are represented as a function of the population. Mobility cost, including commuting and migration cost, and transportation cost are both exogenous.

Total labor is given exogenously. Laborers represent four types of residence and work according to employment dispersion. The four groups are as follows: residing and working in Region 1; residing and working in Region 2; cross-commuting between residential and work sites in which the residence is in Region 1, but the work is in Region 2; and the opposite of the third group.

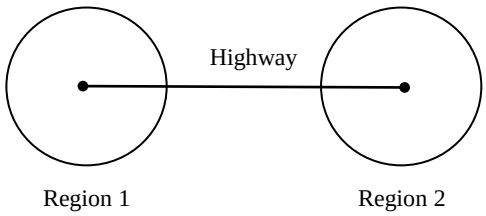


Figure 2.3 Structure of Two Regions Model

Finally, households are categorized into four types based on residential and working sites, as shown in Table 2.2. Households house household members.

Table 2.2 Cases for the Location of the Residential and Working Site

Case I	Case II	Case III	Case IV
(1, 1)	(1, 2)	(2, 1)	(2, 2)
residing and working in region 1	residing in region 1, but working in region 2	residing in region 2, but working in region 1	residing and working in region 2

(i, j) = (residing, working)

Laborers are supplied by the household, and house members produce $k + 1$ times laborers in each house. The total population is $k + 1$ times laborer in each region, as in Equation (2.1). The size of the total population is fixed.

Population[2]

$$N_i = \sum_{j=1}^{2} L_{ij}(k+1) \tag{2.1}$$

N_{ij} : Population in region i

L_{ij} : Labor residing in i region, but working in region j

$$\overline{N} = \sum_{i=1}^{2} N_i \tag{2.2}$$

Firms produce heterogeneous commodities between the two regions, with laborers taking the Cobb–Douglas form. The presence of agglomeration economies implies that the personal interactions involved in the production and the sales of output contribute to the productivity of firms. Therefore, the

[2] Each region retains a minimum positive population.

price as a result of external economies exerts a decreasing effect. Each household supplies homogenous labor, and the total labor input refers to the total man/hour.

Production

$$X_i = A g(N_i) L_{ii}^{\delta} L_{ji}^{\theta} \quad (j \neq i) \tag{2.3}$$

X_i : Aggregate output

A : Scale factor

L_{ii} : Aggregate labor residing and working in region *i*

L_{ji} : Aggregate labor residing in region *j*, but working in region *i*

$g(N_i)$: Agglomeration economies function

$\delta + \theta = 1$

$0 < \delta , \theta < 1$

Firms maximize their profit, and the conditional input demand functions for each laborer are as follows. Perfectly competitive firms operate in each region.

Demand of each labor in region i

$$L_{ii} = \frac{\delta X_i p_i}{w_i} \tag{2.4}$$

$$L_{ji} = \frac{\theta X_i p_i}{w_i} \quad (j \neq i) \tag{2.5}$$

Price in region i

$$p_i = \frac{w_i}{A g(N_i) \delta^{\delta} \theta^{\theta}} \tag{2.6}$$

Consumers [3] maximize the utility when consuming heterogeneous commodities between the two regions. Commodities produced in a non-residential area are consumed in the consumers' residential area at the transportation cost-inclusive price because of the shipping (trade) of the commodities. The transportation cost (t) is assumed to be greater than 0.

Utility

$$U_{ij} = z_{ij}^{i\,\alpha_{ij}} z_{ij}^{k\,\beta_{ij}} \qquad (i \neq k) \tag{2.7}$$

z_{ij}^{i} : Commodities produced in region *i* which are consumed by worker residing in region *i* and working in region *j*

z_{ij}^{k} : Commodities produced in region *k* which are consumed by worker residing in region *i* and working in region *j*

$\alpha_{ij} + \beta_{ij} = 1$

$0 < \alpha_{ij}, \beta_{ij} < 1$

The household income is basically the wage that household members earn. The total monthly income of a household is shown in Equation (2.8).

$$y_{ij} = w_j H - 2d\,c_{ij} - m_{ij} \tag{2.8}$$

where y_{ij} is the total monthly income of the household, excluding the mobility cost. H indicates the total monthly working time.[4] In addition, d is the working days in a month, and c represents the commuting cost between the two regions. m is the migration cost, which is incurred only when the

[3] Only the household is assumed to supply labor and consume the commodities in each house in this model.

[4] This study did not adopt a time constraint because a simple two-region model was used instead of a time-extended model.

residential site is changed.

Consequently, the household consumes each homogeneous commodity produced in each region to maximize utility. The budget constraint function of the household is shown in Equation (2.9). In addition, the Marshallian demands for each commodity are presented in Equations (2.11) and (2.12).

Demand of the house

$$y_{ij} = p_i z_{ij}^{i} + p_i^{'} z_{ij}^{k} \tag{2.9}$$

$$p_i^{'} = p_k \, t_{ki} \tag{2.10}$$

$$z_{ij}^{i} = \frac{\alpha_{ij} \, y_{ij}}{p_i} \tag{2.11}$$

$$z_{ij}^{k} = \frac{\beta_{ij} \, y_{ij}}{p_i^{'}} \tag{2.12}$$

where p_i is the price of a commodity in Region *i*, and $p^{'}_{i}$ represents the price of a commodity in Region *k* (p_k) plus the transportation cost from the trading of commodities from Region *k* to Region *i*. In addition, t_{ki} represents the transportation cost from the shipping of commodities from Region *k* to Region *i*. z^{i}_{ij} is the commodity produced in Region *i*, which is consumed by a worker residing in Region *i* and working in Region *j*. Similarly, z^{k}_{ij} is the commodity produced in Region *k*, which is consumed by a worker residing in Region *i* and working in Region *j*. Finally, the maximized indirect utility function[5] is suggested in Equation (2.13).

[5] $U_{ij} = V_{ij} + \varepsilon_{ij}$

$$V_{ij} = \frac{\alpha_{ij}^{\alpha_{ij}} \beta_{ij}^{\beta_{ij}} y_{ij}}{p_i^{\alpha_{ij}} (p_i^{'})^{\beta_{ij}}} \tag{2.13}$$

The choice of residential and working sites is needed to achieve the maximized indirect utility. This choice is probabilistic because of a probability error term, ε_{ij}. Assuming that ε_{ij} is independently identically distributed and follows Gumbel distribution (mean, zero, and variance, σ^2)[6], the choice probability of residential and working sites is equal to Equation (2.14). λ is called the taste heterogeneity parameter. If λ approaches infinity (∞), the taste heterogeneity disappears.

$$\psi_{ij} = \frac{\exp \lambda V_{ij}^*}{\sum_{\forall (k,s)} \exp \lambda V_{ks}^*} \qquad (j \neq i) \tag{2.14}$$[7]

The expected welfare measure can be expressed as follows:

$$W = E[\max_{\forall (i,j)} U_{ij}] = \frac{1}{\lambda} \ln \sum_{i,j} \exp(\lambda V_{ij}) \tag{2.15}$$

The general equilibrium is computed from the market clearing for output, labor, and firms' zero profit condition.

---

[6] $\sigma^2 = \pi^2 / 6\lambda^2$

[7] The probability that a randomly identified household chooses the residential and working site (i, j) to maximize the utility is calculated with the following quatrinomial logit model (Anas and Rhee, 2007).

Pr_{ij} = Prob [$U_{ij} > U_{ks}$; $\forall (i, j) \neq (k, s)$] = Prob [$V_{ij} + \varepsilon_{ij} > V_{ks} + \varepsilon_{ks}$; $\forall (i, j) \neq (k, s)$]

$\sum Pr_{ij} = 1$

Product market

$$X_k = \sum_{i,j,k} L\psi_{ij} z_{ij}^k \tag{2.16}$$

Labor market

$$L_{ii} + L_{ji} = \sum_{k,i} L\psi_{ki} H \qquad (j \neq i) \tag{2.17}$$

Zero profit condition in region i

$$p_i - \frac{w_i}{A g(N_i) \delta^{\delta} \theta^{\theta}} = 0 \tag{2.18}$$

The mobility scenarios that represent commuting or migration in the original cases are discussed through a comparative analysis in the next section.

Table 2.3 Mobility Scenarios from Changing the Residential and Working Site

Origin	Alternative I	Alternative II	Alternative III	Alternative IV
(1, 1)	(1, 2)	(2, 1)	(2, 2)	-
-	Changing working site (Commuting)	Changing residing site (Commuting)	Changing residing and working site (Migration)	-
(2, 1)	-	-	-	(2, 2)
-	-	-	-	Changing working site

(i, j) = (residing, working)

2.5 Comparative Analysis

2.5.1 Indirect Utility and Mobility

We assume four alternatives with regard to labor or population mobility. The symmetric spatial distribution of population is initially assumed: $N_1 = N_2$.

Alternative I: Changing the working site from Region 1 to Region 2

From L_{11} to L_{12}, only the laborer can change the working site through commuting. The population of Region 1 does not change. The real income that a laborer residing in Region 1 but working in Region 2 earns decreases because of commuting cost c_{12}. The indirect utility V_{12}' is negative in L_{12}. This result may be related to the commuting cost.

$$\frac{V_{11}}{V_{12}'} = \frac{\phi_{11}\, y_{11}}{\phi_{12}\, y_{12}}\, p_1^{-\alpha_{11}+\alpha_{12}}\, (p_1')^{-\beta_{11}+\beta_{12}} \tag{2.19}$$

$$\frac{\partial V_{11}}{\partial L_{12}} > 0 \quad , \quad \frac{\partial V_{12}'}{\partial L_{12}} < 0 \quad , \quad \frac{\partial V_{21}}{\partial L_{12}} > 0 \quad , \quad \frac{\partial V_{22}}{\partial L_{12}} < 0$$

In this case, even if the laborer's mobility occurs, the total population in each region does not change. Changing the working site without any subsidy or incentive does not benefit inducing to commute to Region 2. Moreover, additional subsidy or incentives are needed to induce commuting to Region 2 on the condition of the indirect utility $V_{11} < V_{12}'$ because of $dc_{12} > w_2 H$. Finally, commuting affects the regional economy negatively, even if commuting occurs for any reason.

Alternative II: Migrating to Region 2 and retaining the working site in Region 1

From L_{11} to L_{21}, the population, including laborers, migrates to Region 2, but these laborers remain in Region 1, and commuting occurs from Region 2 to Region 1. Thus, the population in Region 2 increases. Nominal wage in

Region 2 then increases. The commuting cost is incurred after moving from a residential site in Region 1 to a residential site in Region 2. Migration cost is also incurred at the same time. Indirect utilities V_{21}' and V_{11} are negative in L_{21}. However, V_{12} and V_{22} are positive in L_{21}. These changed are related to the increasing nominal wage in Region 2 from migration.

$$\frac{V_{11}}{V_{21}'} = \frac{\phi_{11}\, y_{11}}{\phi_{21}\, y_{21}}\, p_1^{-\alpha_{11}} (p_1')^{-\beta_{11}}\, p_2^{\alpha_{21}} (p_2')^{\beta_{21}} \tag{2.20}$$

$$\frac{\partial V_{11}}{\partial L_{21}} < 0 \quad , \quad \frac{\partial V_{21}'}{\partial L_{21}} < 0 \quad , \quad \frac{\partial V_{12}}{\partial L_{21}} > 0 \quad , \quad \frac{\partial V_{22}}{\partial L_{21}} > 0$$

In this case, V_{11} is not equal to V_{21}' because the commuting cost plus the migration cost incurred from migrating to Region 2 is greater than 0. Hence, retaining the work site in Region 1 does not benefit migrating to Region 2.

Alternative III: Migrating to Region 2 and changing the working site

From L_{11} to L_{22}, the population, including the laborers, migrates to Region 2, and the working site also changes. The population in Region 2 increases. The nominal wage in Region 2 also increases, whereas the nominal wage in Region 1 decreases. Migration cost is incurred. Indirect utility V_{22}' is positive in L_{22}. This result is caused by the increasing wage in Region 2.

$$\frac{V_{11}}{V_{22}'} = \frac{\phi_{11}\, y_{11}}{\phi_{22}\, y_{22}}\, p_1^{-\alpha_{11}} (p_1')^{-\beta_{11}} (p_2')^{\beta_{22}}\, p_2^{\alpha_{22}} \tag{2.21}$$

$$\frac{\partial V_{11}}{\partial L_{22}} < 0 \quad , \quad \frac{\partial V_{22}'}{\partial L_{22}} > 0 \quad , \quad \frac{\partial V_{12}}{\partial L_{22}} > 0 \quad , \quad \frac{\partial V_{21}}{\partial L_{22}} < 0$$

Migration decreases the population in Region 1. Possibly, $V_{22}' > V_{11}$ if w_2H is larger than m_2 $[N_2^2/(N_1^2+N_2^2)]$. Finally, if the household income is large enough to cover the migration cost without any subsidy or incentive, migration benefits the population, including the laborers.

Alternative IV: Changing the working site from Region 1 to Region 2

From L_{21} to L_{22}, only the work site is changed; the population in Region 2 does not change. Real income increases because no commuting cost is incurred from the change in working site. Hence, indirect utility V_{22}' is positive in L_{22}.

$$\frac{V_{21}}{V_{22}'} = \frac{\phi_{21}\, y_{21}}{\phi_{22}\, y_{22}} (p_2')^{-\beta_{21}} (p_2')^{\beta_{22}}\ p_2^{-\alpha_{21}} p_2^{\alpha_{22}} \qquad (2.22)$$

$$\frac{\partial V_{21}}{\partial L_{22}} < 0 \quad , \quad \frac{\partial V_{22}'}{\partial L_{22}} > 0 \quad , \quad \frac{\partial V_{11}}{\partial L_{22}} < 0 \quad , \quad \frac{\partial V_{12}}{\partial L_{22}} > 0$$

Each population does not change. If V_{21} is equal to V_{22}', any subsidy or incentive is needed because of the original commuting cost. Moreover, more subsidy is needed to maintain $V_{22}' < V_{21}$ because of $dc_{21} > w_1H$. Finally, residing and working in the same area is more beneficial in Region 2 than residing in Region 2 and working in Region 1 in the regional economy.

In summary, the population, including the laborers, migrates to Region 2,

and the working site is changed from Region 1 to Region 2, as shown in Alternative III. However, if the household income is not large enough to cover the migration cost, a subsidy or incentive needs to be provided to migrants. In Alternative IV, subsidy is always provided to commuters. Hence, changing the working site is beneficial. Finally, residing and working in the same region (i.e., Region 2) is more beneficial than residing and working in different areas, such as in Region 1 or Region 2, respectively. Indirect utility is also directly related to the nominal wage or real income.

2.5.2 Indirect Utilities, Mobility, and Transportation Costs

Indirect utility is affected by mobility and the transportation cost because these costs are related to real income and the commodity's price.

Alternative I: Changing the working site from Region 1 to Region 2

$$\frac{V_{11}}{V_{12}^{'}} = \frac{\phi_{11}(Ae^{-\nu_1/N_1}\delta^{\delta}\theta^{\theta}p_1H)}{\phi_{12}(Ae^{-\nu_2/N_2}\delta^{\delta}\theta^{\theta}p_2H-2dc_{12})}\, p_1^{-\alpha_{11}+\alpha_{12}}\,(p_1^{'})^{-\beta_{11}+\beta_{12}} \tag{2.23}$$

Figure 2.4 shows that the ratio of indirect utilities is affected by the transportation cost related to the trade of the commodity. Particularly in β_{11} and β_{12}, the parameters for the preference for consumption commodity produced in Region 2 affect the ratio of the two indirect utilities. If a laborer who resides in Region 1 but works in Region 2 prefers the commodity produced in Region 2 more than a laborer who resides and works in Region 1, then the gap of indirect utility in the transportation cost increases. The

increasing transportation cost is evident in the price and affects the indirect utility negatively. However, if a laborer who resides and works in Region 1 prefers the commodity produced in Region 2, the production of this commodity in Region 2 increases and ultimately raises the nominal wage in Region 2. This effect increases the welfare of the population, including the laborers residing in Region 1 but working in Region 2. Hence, the ratio of indirect utilities will be lower than 1 and will continue to decrease even if the transportation cost rises.

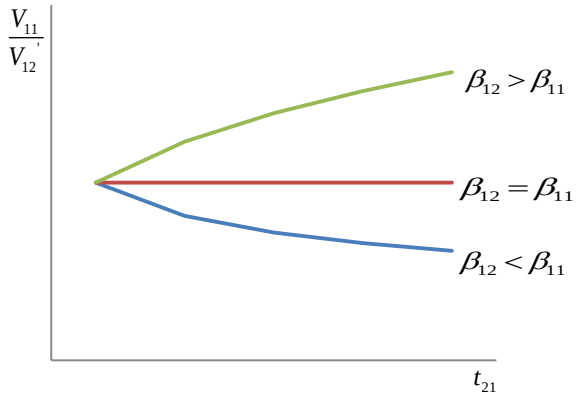


Figure 2.4 Transportation Cost and Indirect Utilities

In relation to the commuting cost and the ratio of indirect utilities, the gap between the two indirect utilities increases according to the rising commuting cost subject to $w_2H > 2dc_{12}$. Therefore, changing the work site is not beneficial. This result is provided in the comparative analysis.

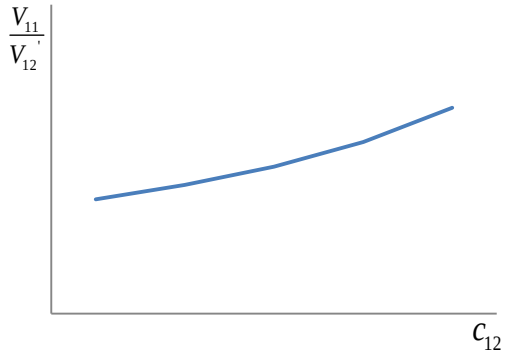


Figure 2.5 Commuting Cost and Indirect Utilities

Alternative II: Migrating to Region 2 and retaining the working site in Region 1

$$\frac{V_{11}}{V_{21}'}=\frac{\phi_{11}(Ae^{-\nu_1/N_1}\delta^{\delta}\theta^{\theta}p_1H)}{\phi_{21}(Ae^{-\nu_1/N_1}\delta^{\delta}\theta^{\theta}p_1H-2dc_{21}-m_{21})}\,p_1^{-\alpha_{11}}(p_1')^{-\beta_{11}}\,p_2^{\alpha_{21}}(p_2')^{\beta_{21}} \tag{2.24}$$

Figure 2.6 shows that if the transportation cost t_{12} increases, the price of the commodity produced in Region 1 also increases. Therefore, the indirect utility for laborers residing in Region 2 but working in Region 1 is negatively affected after migration. Finally, the gap for indirect utilities widen based on the increase in transportation cost t_{12}. However, when the transportation cost t_{21} increases, the gap for indirect utilities decreases. Thus, the price of the commodity produced in Region 2 is paid by the laborer residing and working in Region 1. This result negatively affects the indirect utility, V_{11}.

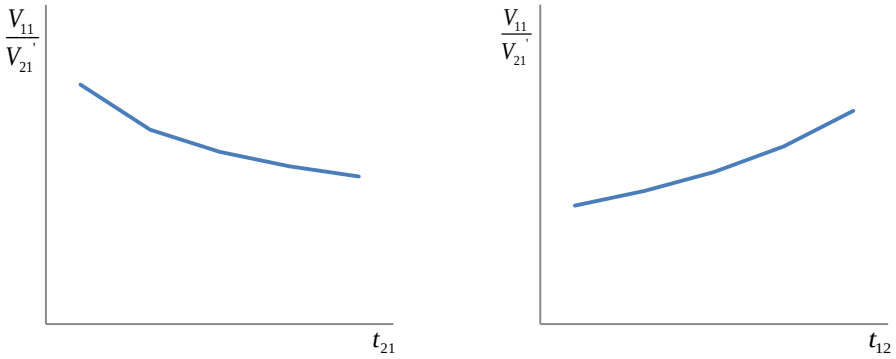


Figure 2.6 Transportation Cost and Indirect Utilities

In the relationship between mobility cost, commuting cost plus migration cost, and ratio of indirect utilities, the gap between the two indirect utilities increases based on the increasing mobility cost subject to $w_1H > 2dc_{21} + m_{21}$. Finally, migrating but maintaining the work site in Region 1 is not beneficial in the long run because of the increasing mobility cost.

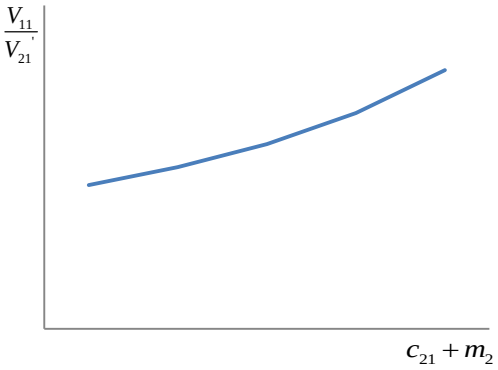


Figure 2.7 Mobility Cost and Indirect Utilities

Alternative III: Migrating to Region 2 and changing the working site

$$\frac{V_{11}}{V_{22}'} = \frac{\phi_{11}(Ae^{-v_1/N_1}\delta^{\delta}\theta^{\theta}p_1H)}{\phi_{22}(Ae^{-v_2/N_2}\delta^{\delta}\theta^{\theta}p_2H - m_{22})} p_1^{-\alpha_{11}}(p_1')^{-\beta_{11}}(p_2')^{\beta_{22}} p_2^{\alpha_{22}} \qquad (2.25)$$

At first, if the transportation cost t_{12} increases, the price of the commodity

produced in Region 1 increases. Hence, the indirect utility a laborer residing in Region 2 obtains after migration is negatively affected. Finally, the gap of indirect utilities widens according to the increasing transportation cost t_{12}. However, when the transportation cost t_{21} increases, the gap of indirect utilities decreases. This result is related to the price of commodity produced in Region 2, which is paid by the laborer residing and working in Region 1. This result negatively affects indirect utility V_{11}.

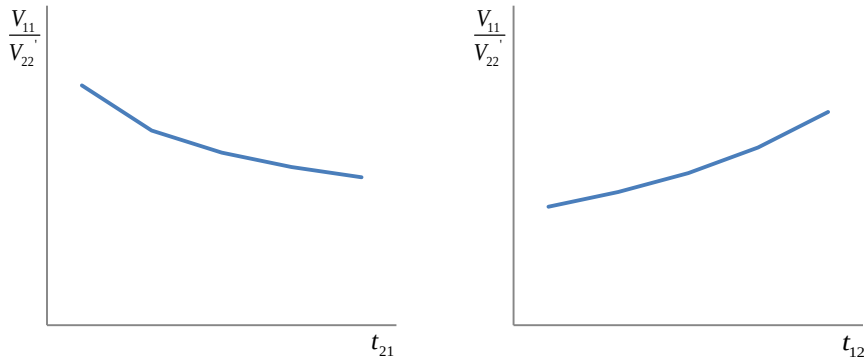


Figure 2.8 Transportation Cost and Indirect Utilities

In relation to the migration cost and the ratio of indirect utilities, the gap between the two indirect utilities increases according to the rising migration cost, subject to $w_2H > m_{22}$. However, migration cost is incurred at a time. If the nominal wage in Region 2 is large enough to cover the migration cost without any subsidy or incentive, migration results in benefits. Determining the migration cost to achieve the optimum indirect utility V_{22}' is another matter.

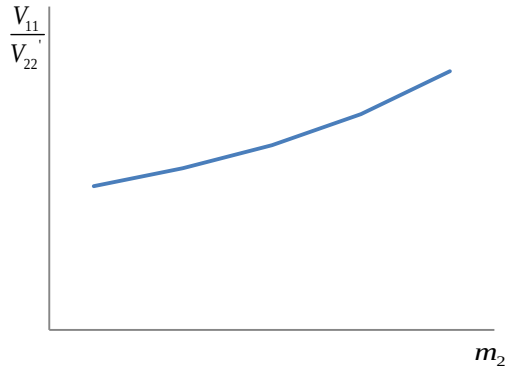


Figure 2.9 Migration Cost and Indirect Utilities

Alternative IV: Changing the working site from Region 1 to Region 2

$$\frac{V_{21}}{V_{22}^{'}}=\frac{\phi_{21}(Ae^{-\nu_1/N_1}\delta^{\delta}\theta^{\theta}p_1H-2dc_{21})}{\phi_{22}(Ae^{-\nu_2/N_2}\delta^{\delta}\theta^{\theta}p_2H)}(p_2^{'})^{-\beta_{21}}(p_2^{'})^{\beta_{22}}\ p_2^{-\alpha_{21}}p_2^{\alpha_{22}} \qquad (2.26)$$

Figure 2.10 shows that the ratio of indirect utilities is affected by the transportation cost related to the trade of commodity. Particularly in β_{22} and β_{21}, the parameters for the preference of consumption commodity produced in Region 1 affect the change in the ratio of the two indirect utilities. If a laborer residing in Region 2 but working in Region 1 prefers a commodity produced in Region 1 more than a laborer residing and working in Region 2, the gap between the indirect utility and the transportation cost decreases. The increasing transportation cost is evident in the price and affects the indirect utility negatively. However, the production of commodity in Region 1 also increases and ultimately raises the nominal wage in Region 1. The transportation cost effect is stronger than the nominal wage effect. However, if a laborer residing and working in Region 2 prefers a commodity produced in Region 1, the gap between the indirect utility and the transportation cost

increases. The increasing transportation cost is shown in the price and affects the indirect utility negatively.

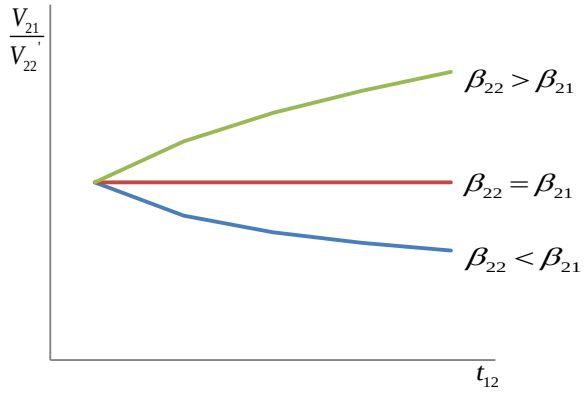


Figure 2.10 Transportation Cost and Indirect Utilities

In relation to the commuting cost and the ratio of indirect utilities, the gap between the two indirect utilities decreases according to the rising commuting cost subject to $w_1H > 2dc_{21}$. Finally, changing the work site is beneficial. This result is used in the comparative analysis.

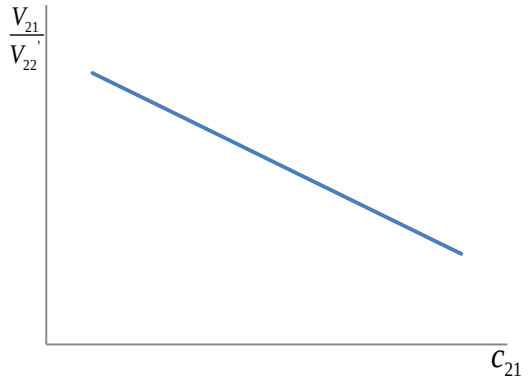


Figure 2.11 Commuting Cost and Indirect Utilities

In summary, the ratio of or the gap between indirect utilities is affected by

transportation and mobility costs. In Alternatives III and IV, migration or changing the working site reconciles the residential site to the working site. Transportation cost affects the price of the commodity and hence the indirect utility.

2.5.3 Agglomeration Effect and Indirect Utilities

Agglomeration economies arise from the total population in each region. The indirect utility may be affected by agglomeration factors, parameters, and population size. The agglomeration effects of the increasing region size induce urban costs, such as congestion or disamenity (Henderson, 1988).

$$g(N_1)=e^{-\nu_1/N_1} \quad , \quad g(N_2)=e^{-\nu_2/N_2} \qquad \text{s.t} \qquad \nu>0 \tag{2.27}$$

Alternative I: Changing the working site from Region 1 to Region 2

$$V_{12}^{'}=\phi_{12}(Ae^{-\nu_2/N_2}\,\delta^{\delta}\,\theta^{\theta}\,p_2H-2dc_{12})\,p_1^{-\alpha_{12}}\,(p_1^{'})^{-\beta_{12}} \tag{2.28}$$

In Alternative I, the population in each region is constant, and the indirect utility changes in a declining degree or according to elasticity *v*. The indirect utility is opposite in *v*. Thus, the indirect utility that laborers residing in Region 1 but working in Region 2 use is affected only by a declining degree of agglomeration economies.

Alternative II: Migrating to Region 2 and retaining the working site in Region 1

$$V_{21}^{'} = \phi_{21}(Ae^{-v_1/N_1}\,\delta^{\delta}\,\theta^{\theta}\,p_1H - 2dc_{21} - m_{21})\,p_2^{-\alpha_{21}}\,(p_2^{'})^{-\beta_{21}} \quad (2.29)$$

If the population, including the laborers, migrates, the laborer still works in Region 1 and commutes to Region 1. However, the population in Region 2 increases. Thus, the indirect utility the laborer residing in Region 2 but working Region 1 uses declines from the reduced agglomeration effects. In the change of *v*, the slope of the indirect utility becomes steep.

Alternative III: Migrating to Region 2 and changing the working site

$$V_{22}^{'} = \phi_{22}(Ae^{-v_2/N_2}\,\delta^{\delta}\,\theta^{\theta}\,p_2H - m_{22})\,p_2^{-\alpha_{22}}\,(p_2^{'})^{-\beta_{22}} \quad (2.30)$$

The population, including the migrating laborer, and the working site change. Therefore, the population in Region 2 increases. The indirect utility the laborer residing and working in Region 2 uses increases from the improved agglomeration effects. Moreover, in the change of *v*, the slope of the indirect utility is less steep. Alternative IV follows the indirect utility of Alternative III.

Finally, residing and working in the same region (i.e., Region 2) is more beneficial than residing and working in different areas (i.e., Region 1 or Region 2). Hence, the residential site needs to be reconciled with the working site, especially if the transportation cost negatively affects the indirect utility. In addition, the laborer's indirect utility decreases his/her mobility cost. Agglomeration economies improve in the increasing population. Finally, the

indirect utility that the laborer residing and working in Region 2 after the mobility uses increases from the improved agglomeration effects.

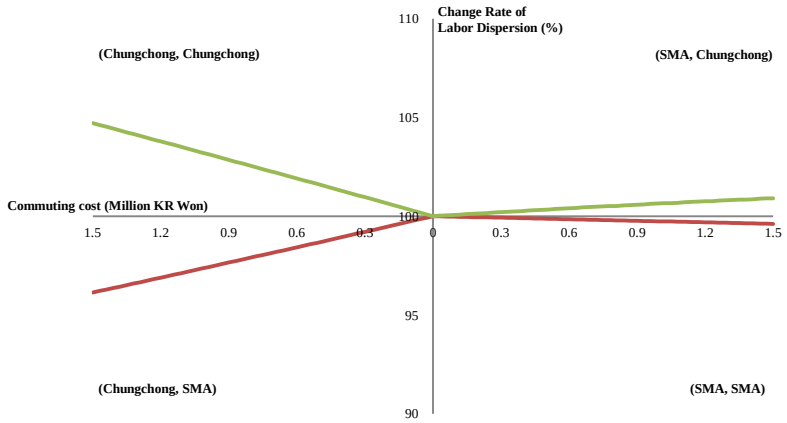
2.6 Numerical Simulation

The labor dispersion between SMA and the Chungchong regions, as well as their effect on regional economies, is discussed with numerical simulation. The change in commuting and transportation costs is considered under static conditions. The initial data for labor and production were obtained from Statistics Korea.[8] The labor dispersion in each residing and working site was interpreted as the change rate of the initial value set to 100.

Figures 2.12 and 2.13 illustrate the change rate in labor dispersion in each location by the choice of residing and working site, which depend on the change in commuting and transportation costs, respectively. Four dimensions were given. The first dimension indicates the case of residing in the SMA region but working in the Chungchong region. The second dimension is the case of residing and working in the Chungchong region. The third case represents the case of residing in the Chungchong region but working in the SMA region. The fourth dimension represents the case of residing and working in the SMA region. The change rate of four labor dispersions responds to the change in transportation cost steeply. If the transportation and commuting costs increase, the number of laborers residing and working in the SMA region and the number of laborers residing in the Chungchong region

[8] The number of laborers residing in the SMA region was 11 million. The number of laborers residing in the Chungchong region was 3.5 million.

but working in the SMA region decrease. However, the choice probabilities of residing in the SMA region but working in the Chungchong region and that of residing and working in the Chungchong region increase. Finally, the population in the Chungchong region increases, which indicates the dispersion of population to the Chungchong region.



(i, j) = (*residing*, *working*)

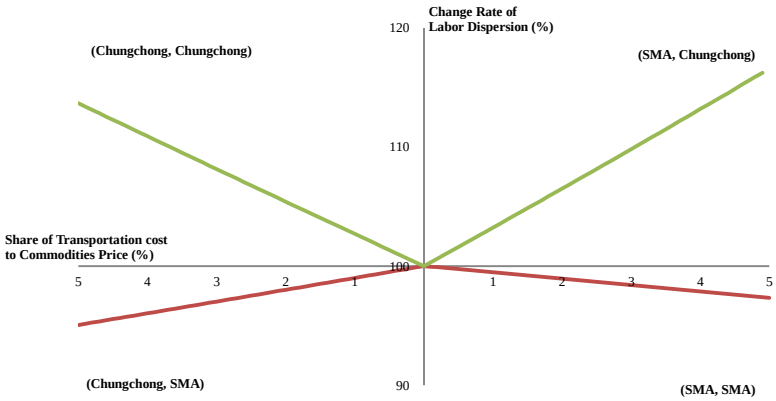
Figure 2.12 Labor Dispersion in Each Location of Residing and Working Site Depending on Change of Commuting Cost

Figure 2.14 shows the positive relationship between the number of laborers residing in the Choungchong region and the higher transportation cost, which refers to the dispersion of labor and population from the SMA region to the Chungchong region. However, the concentration in the SMA region is favored by the reduction in transportation cost, which has been demonstrated by Krugman (1991), Kilkenny (1998), and others.[9] At a lower transportation cost, more laborers reside in the SMA region[10], the population of which ultimately

[9] Murata and Thisse (2005) suggest that a higher transportation cost fosters labor concentration and agglomeration.

[10] Originally, 11 million laborers out of the total 14.5 million laborers in the two regions resided in the SMA region.

increases. Commuting cost shows a similar trend. However, the dispersion speed in the increasing transportation cost is expectedly higher than the increasing commuting cost from Figures 2.12 and 2.13.



(i, j) = (*residing*, *working*)

Figure 2.13 Labor Dispersion in Each Location of Residing and Working Site Depending on Change of Transportation Cost

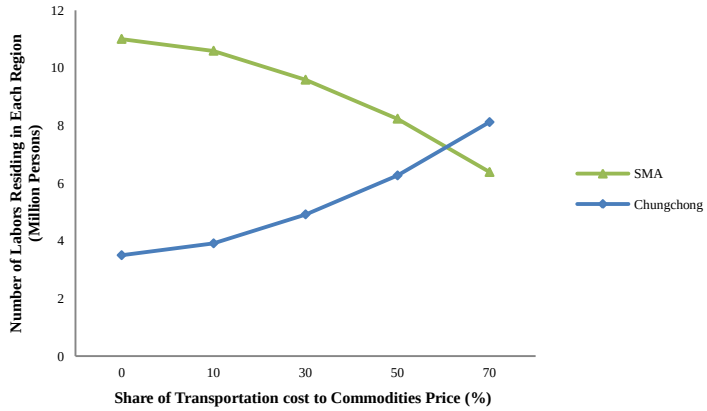


Figure 2.14 Transportation Cost and Labor Dispersion between Two Regions

Figures 2.15 and 2.16 illustrate the relationship between the transportation or commuting costs and utilities. Higher transportation or commuting costs negatively affect the utilities, even if they contribute to labor and population dispersion. The increasing transportation cost on utilities was greater than that

in the case of increasing commuting cost.

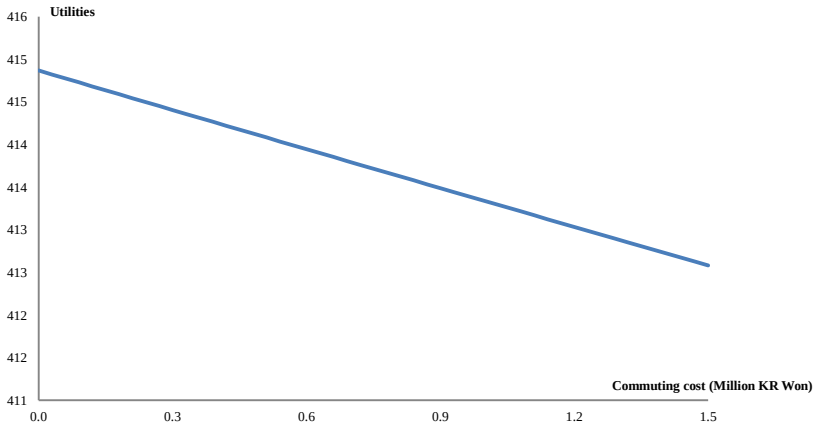


Figure 2.15 Utilities Depending on Change of Commuting Cost

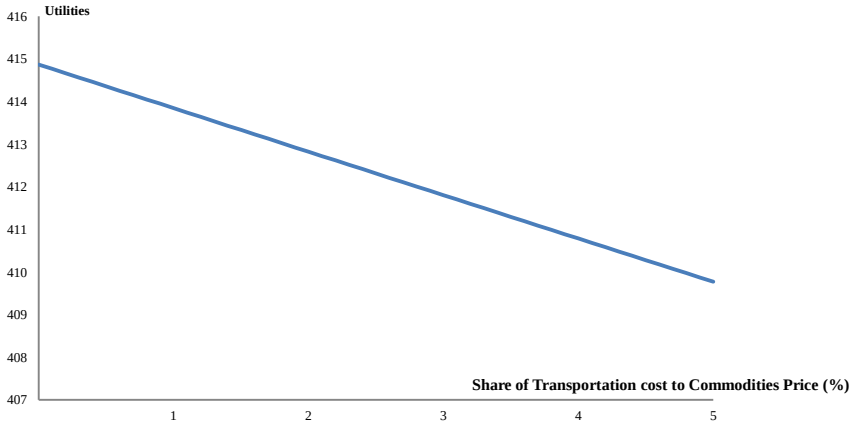


Figure 2.16 Utilities Depending on Change of Transportation Cost

Finally, Figures 2.17 and 2.18 show that the output in the Chungchong region increased according to the increasing transportation and commuting costs.

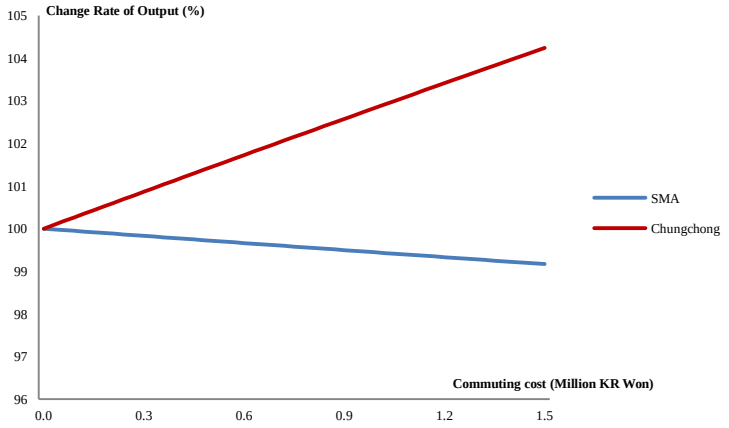


Figure 2.17 Output in Each Region Depending on Change of Commuting Cost

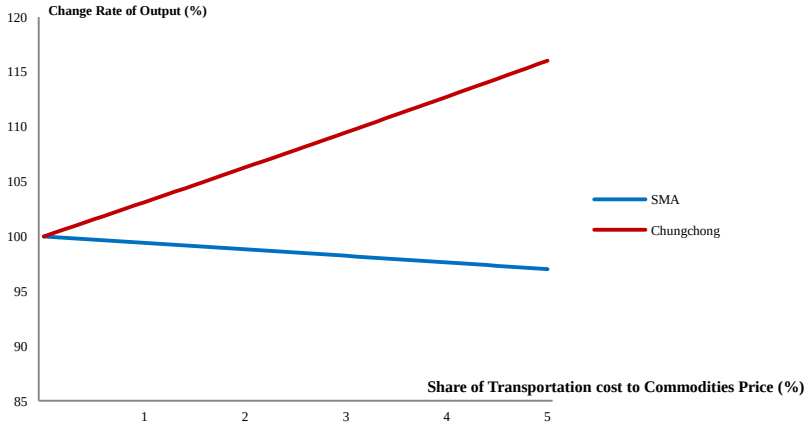


Figure 2.18 Output in Each Region Depending on Change of Transportation Cost

Consequently, the lower transportation and commuting costs fostered the labor and population concentration in the SMA region and hence led to agglomeration. Paradoxically, higher transportation and commuting costs induce labor and population dispersion to the Choungchong region, including Sejong City, and positively affect the output growth. However, the social welfare decreases, as Kilkenny (1998) indicates. Kilkenny (1998) pointed out that rural development could only be achieved at a lower overall welfare.

Therefore, subsidies and tax policies are needed to achieve labor and population dispersion in the Choungchong region, including Sejong City, without a decrease in welfare.

2.7 Conclusion

This study aims to analyze the effect of labor or population mobility between the two regions on regional economies. Indirect utility is directly related to nominal wage or real income. Residing and working in the same region are found to be beneficial. Indirect utility is also maximized when the residence follows the work site in the mobility. The ratio of or the gap between indirect utilities is affected by transportation and mobility costs. The transportation cost negatively affects indirect utility. A laborer's indirect utility decreases in his mobility cost. Agglomeration economies improve in the increasing population. Finally, the case of residing and working in the same region is more beneficial than residing and working in different regions. As a result, the residential site needs to be reconciled with the work site. For Sejong City, the residential and work sites need to be reconciled without having to commute to the SMA region. If the residential location does not follow the work site in the mobility process, indirect utility is decreased. Finally, the key issue is the policy of migration to Sejong City for a short period of time, which needs to involve subsidies or incentives. Agglomeration economies depend on the number of migrants who settle in Sejong City. Consequently, economic activities should be relocated in the target region.

Numerical simulation showed that high transportation and commuting costs induce labor and population dispersion to the Choungchong region, including Sejong City, and positively affect the output growth. However, social welfare also decreases. Therefore, subsidies and tax policies are needed to achieve labor and population dispersion in the Choungchong region, including Sejong City, without a decrease in welfare.

This study applied a simple two-region model to study the effect of mobility. However, it only considered commuting and migrating in a limited geographical region, as well as excluded migration from outside places. The optimal size for the population, including migration from outside places, needs to be examined further. The model may need to consider transportation and mobility costs, including time constraints. A dynamic model that includes changes in commuting or migration patterns between overlapping generations can be considered in future research. As an important factor that induces the migration between two regions, QOL should also be taken into account in future models.

Chapter III
Asymmetric Patterns of Regional Income Growth and Decline

3.1 Introduction

Traditionally, the South Atlantic and the Northeast areas have been regarded as rich regions according to the US Bureau of Economic Analysis. For example, Maryland grew more during the recovery periods after the economic recession in 2001 and outperformed the national average by (+) 0.6% in the recent recession periods that begun in 2007.[11] However, based on its real GRP (Gross Regional Product), West Virginia underperformed during the economic booming periods in the 1990s and declined even further during the economic recession in 2001. Likewise, Mississippi underperformed the national level in the late 1980s, but outperformed the national average in the early 1990s. However, during the economic boom that occurred in the middle 1990s, the regional economy of Mississippi declined compared with the national economic growth. It showed (-) 0.1% growth during the economic recession in the 2000s and recorded a growth rate of (+) 1.1% from 2009 to 2010 after the recent recession periods, both of which were below the national average. What was worse, the hardest hit was Mississippi, where the poverty rate was almost one-third, whereas the states with the lowest poverty rate

[11] Details of the changes in real GRP by state are in appendix I.

were found to be those in the Northeast and the North Central Regions.[12] These cases exemplify asymmetric patterns of economic growth and decline. Furthermore, the recurrence of decline patterns could contribute to poverty and low development, which in turn, can result in an increased number of less developed regions with high poverty rate.[13] In addition, the low growth in the less developed regions could become permanent and structured. At present, the global economic slump caused by the debt and financial crises in Europe has worsened the condition in the low growth regions.

The purpose of this study is to analyze the income growth patterns of the less developed regions and to examine why such regions continuously show low income growth. Earlier studies have dealt with the determinants of the regional income growth, dynamic income growth patterns, and the spatial dependence of the regional economies. In comparison, the current study focuses on the asymmetric income growth structure of the developed and the less developed regions, including the estimation of the neighboring effects[14] of the regional income growth. This current study reviews how the regional income growth of the developed and the less developed regions affects the income growth of their neighbors. This current study also discusses how the less developed regions augment their low income level. The present analysis focuses on the target periods from 1998 to 2009 when the economic shock

[12] US poverty is concentrated in certain regions and sub-regions located mainly in the South. However, poverty tends to persist in the same geographic locations decade after decade (Wimberley and Morris, 2003).

[13] US defines less developed regions as those where the poverty rate and the average unemployment rate are more than 1.5 times of the national average, and with a GRP per capita that is under 67% of the national average.

[14] Neighboring effect is defined as the growth effect of other regions except the focal region in this study. This study considers other regions as contiguous to the focal region depending on the spatial weighted matrix.

occurred in 1997 in Korea. Data by region include information sourced mainly from *Statistics Korea*. The Mining and Manufacturing Survey Data are used to estimate GRP due to the limited regional data. The rest of this paper is organized as follows. First, it discusses the sources of the regional economic growth. Then, it presents a model of the asymmetric patterns of regional income growth. Next, it estimates the effects of the income growth on the neighboring regions. Finally, it presents the concluding remarks and the policy implications of the study.

3.2 Sources of Regional Economic Growth

Previous studies on regional economic growth have explored the positive effects of physical capital, infrastructure, human capital, R&D, and policy matters. The neoclassical approach has emphasized the role of factor supplies in the growth process, whereas technical progress determines the rate at which output per worker increases over the long run (Armstrong and Taylor, 2000). The neoclassical growth model identifies three sources of output growth: factor mobility and growth (e.g., labor and capital), population growth and R&D, and knowledge-spillover. In addition, agglomeration economies, such as concentration process, localization phenomena and diversity in industrial structure and region (city) size, are important factors in regional economic growth.

Capital Accumulation and Investment

The standard neoclassical growth model assumes that the economy has some amounts of capital (*K*), labor (*L*), and knowledge (*A*). (*AL*) represents effective labor. The initial levels of labor, knowledge, and capital are given in time *t*, as shown in Equation 3.1.[15] *k* represents the amount of capital per unit of effective labor. In addition, *n* and *g* are exogenous and represent population and knowledge growth at constant rates, respectively. *s* is saving rate and δ is depreciation rate, which illustrates that the saving exists considering the poverty trap. Hence, the saving rate is the exogenous function of the capital stock per unit of effective labor, *s(k)*. Finally, the fraction of output is devoted to investment. The standard neoclassical growth model analyzes the behavior of capital. The key feature of the neoclassical growth model is the exogenous saving rate.

$$\dot{k}(t) = s(k)\, f(k(t)) - (n + g + \delta)\, k(t) \qquad (3.1)$$

$$s.t \qquad f(k(t)) = k(t)^{\alpha}$$

The path of neoclassical economic growth follows the dynamics of *k* (Equation 3.1). Here, *k* and actual investment per unit of effective labor are determined by the capital elasticity, the depreciation rate, the saving rate, and the output growth. For example, Kang et al. (2011) have argued that capital infusion from foreign or domestic sources and the saving rate are critical to recovery based on the dynamics of capital accumulation in the neoclassical economic growth model. By applying a variant of the overlapping generation

[15] Refer to Romer (2001).

growth model, they explained the differences in recovery patterns detected in postwar periods between the developed and the developing countries through the dynamics of capital accumulation and political capacity. Equation 3.1 was calibrated from macro data assuming the low growth and the poverty trap in the less developed regions. This equation differs from that used in the previous cases[16] in Sachs (2004). Figure 3.1 illustrates the calibrated results, in which two steady states, k^{Low} and k^*, are in the less developed regions.

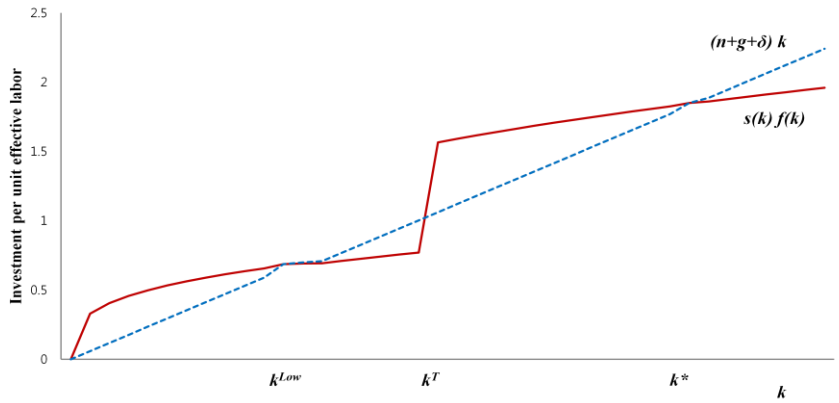


Figure 3.1 Poverty Trap in the Less-Developed Regions

Note: It was revised from Romer (2001).

The poverty trap from the low growth in the less developed regions, such as the interval from k^{Low} to k^T, was identified. The low growth in the less developed regions led to the low saving rate, which could not accumulate the capital. If the less developed regions started out below k^{Low}, they would just increase until they reach the low steady state. Moreover, if they started out between k^T and k^*, and therefore had a high saving rate depending on the

[16] Sachs (2004) explained that the poverty trap occurs because of three cases: the lowest capital below a minimum threshold of capital, the low or negative saving rate, and the rapid population growth, as shown in Equation 3.1. Detailed explanations of the three cases leading to poverty and the calibration process are shown in Appendices II and III.

increase of saving, they would increase until they reach the high steady state. With the slow development, the saving rate was insufficient and investment was so low that it could only sustain a very small capital stock. Finally, the structural poverty trap interval from the low growth occurred in the less developed regions.

Moreover, both *k* and investment were expected to be sensitive depending on the capital share and the depreciation, respectively. In this work, the capital share rate and the depreciation rate were adjusted assuming that there was no change in the output growth and in the saving rate as exemplified by three cases. First, as shown in Figures 3.2 and 3.3, if the output elasticity of capital increased without the change of the depreciation rate, the output and investment would increase with the rising *k*. Thus, the new high steady state of *k*''* would have more capital stock and investment (Figure 3.2). Conversely, if the depreciation rate decreased without the change of the output elasticity of capital, $(n+g+\delta)\ k$ would decrease and *k* would rise. The new high steady state of *k*',* as shown in Figure 3.2, would have more capital stock and investment.

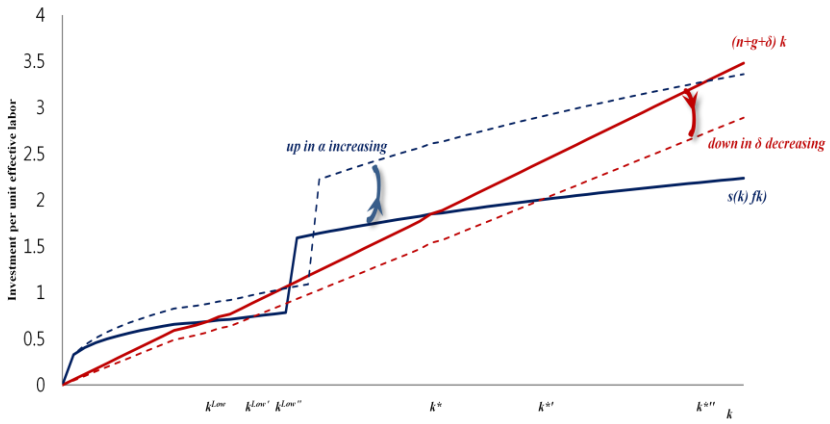


Figure 3.2 Output Elasticity of Capital and Depreciation Rate

Finally, if the output elasticity of capital increased and the depreciation rate decreased, the output and investment would increase further with the rising *k*. The largest capital stock and investment are shown in Figure 3.3. In summary, the order of the increase of *k* and investment is as follows:

decreasing δ in constant α < increasing α in constant δ < increasing α, decreasing δ

(a) (b)

where (a) and (b) mean a sign of inequality in *k* and investment. If the decreasing rate of the depreciation rate were higher than the increasing rate of the output elasticity of capital, the condition (a) would not be satisfied and the sign would be changed reversely.

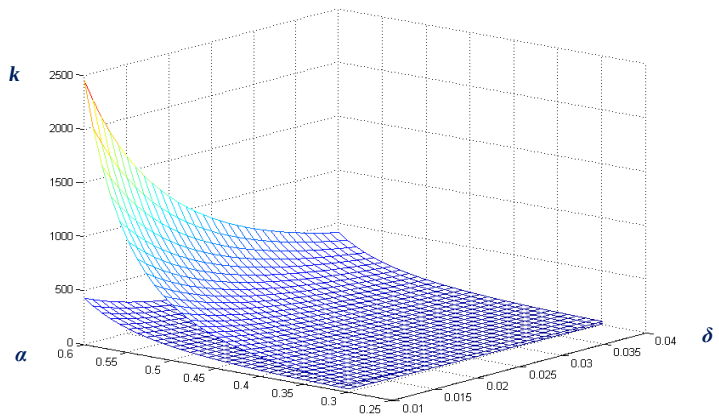


Figure 3.3 Change of Capital Stock from Adjusting Output Elasticity of Capital and Depreciation Rate

Consequently, the increase of the output elasticity of capital and the decrease of the depreciation rate must occur to increase capital stock and

investment; this would escape the interval from k^{Low} to k^{T}, if there were no change in the output growth and the saving rate. However, if the parameters (α, δ) were constant, the saving rate or capital stock would grow through the output growth, representing the virtuous cycle in the regional economic growth. Similarly, Sachs (2004) concluded that extreme poverty leads to the low national saving rate, which in turn leads to the low or negative economic growth rate. This results in a vicious cycle mechanism in the regional economic growth.

Human Capital

To drive the output growth and accumulate capital stock, the role of factors of regional economic growth must be reinforced, especially when disparity in the regional economic growth occurred because of differences in factors and production technology. Human capital is one such important factor. In relation to this, such factors as the cultivation and movement of human capital as well as the effect of human capital on the national or regional economies must also be considered.

The intentional accumulation of knowledge through educational investments cultivates human capital. Moreover, human capital in a region is reallocated spatially and migrated among regions. Universities often perform the dual roles of fostering and upgrading human capital and assisting in the dissemination of knowledge through formal and informal networks (Weinstein, 2000). Anselin et al. (2000) suggested that universities not only motivate people to conduct basic research but also draw human capital to a region.

Traditionally, when it comes to the cultivation of human capital, developed, developing, and industrialized economies prioritize secondary education, both primary and secondary education and tertiary education, respectively, although more importance has been given to educational research and policy in the industrialized economies in recent years (Faggian and McCann, 2009). According to Faggian and McCann (2009), the competitiveness of a region to maintain its human capital and induce it from other regions has also been given importance. They stressed that the highly educated workforce in a region have been attracted by the innovativeness in that region. One example is the region-specific learning process.

Higher level of physical capital as well as educational system induces human capital (Acemoglu, 1996). In addition, a few metropolitan areas reap the advantages stemming from agglomeration economies, especially services that attract an increase of people concentration (Glaeser and Kohlhase 2003). Both industrial structure (Moretti, 2004) and agglomeration (Berry and Glaeser, 2005) are emerging factors in the movement of human capital within the urbanized regions. Empirically, Breschi and Lenzi (2010) concluded that skilled workers tend to reside in the metropolitan area in the US from simple descriptive figures. They used the patent data on inventors to track their mobility. Finally, regarding the spatial patterns of the inventors' mobility, not surprisingly, they involved almost exclusively metropolitan benefits (i.e., knowledge spillovers) arising from the migration of highly-skilled workers. This finding is consistent with the those on the spatial patterns of mobility of UK graduates who obtained their first employment (Faggian and McCann

2006, 2009). However, the lack of appropriate local conditions impedes the adoption of diffused technological innovation (Nijkamp and Poot, 1998).

Human capital affects regional economy through the productivity of each worker and the positive externalities of the productivity of the regional economy. However, reallocation of human capital does not necessarily reduce interregional disparities, which means that the neoclassical economic convergence does not work as a theory (Van Dijk et al., 1989). Sterlacchini (2008) found that the effects of human capital on the regional economic growth vary depending on the regional development level. By contrast, Fleisher et al. (2010) concluded that human capital investment in the less developed areas would be rational in terms of efficiency. Dao (2010) found that the growth of GDP per capita is linearly dependent on net migration of skilled workers in the developing countries from the World Bank data of 46 developing economies. As a result, Dao (2010) insisted that an increase in net migration from removing restrictions on labor mobility would positively influence economic growth in developing countries.

In conclusion, the accumulation of human capital is dominated by regional competitiveness, such as educational system, physical capital, agglomeration, and industrial structure. The effect of human capital on the regional economic growth depends significantly on the degree of the regional development or the regional amenities. Therefore, the less developed regions do not have comparative advantages to attract human capital compared with the developed regions. Furthermore, these would continue to trigger the brain-drain of

human capital in the less developed regions.[17] Secondary or tertiary education and high-level job-training for workers in the developed regions might be useless or needless in the less developed regions due to the differences in industrial structures in those regions (i.e., some may be weak).

Localization and Urbanization Economies

The two kinds of agglomeration economies are localization economies and urbanization economies. The other kinds are called external diseconomies or negative agglomeration economies. Marshall (1920) clarified the meaning of localization economies. Several factors lead to the clustering of firms. First, clustering allows individual plants to specialize more than they would if the firms in the same industry are widely dispersed. Second, clustering strongly facilitates research and innovation in an industry. Finally, the clustering of firms in the same industry reduces risks for workers and employers. Workers with industry-specific skills are potentially more mobile between firms if firms in the same industry are geographically concentrated; this is because changing jobs does not necessarily mean moving out of that region. Firms also have greater access to workers with relevant skills. In other words, localization economies result from the geographical concentration of plants in the same industry. It implies externalities in the intra-industry. Mills (1967) suggested that workers and firms cluster together from geographical concentrations in order to assert a greater scale of economy in the city and enhance productivity through technological innovations, greater employment

[17] Huang et al. (2002) pointed out the brain drain from rural areas because of the higher returns to human capital in urban markets.

opportunities, and abundant supply of intermediate goods. Agglomeration economies, such as urbanization economies caused by the geographical association of large economic activities, jointly serve different industries and the extension of the city scale highlight the variety of benefits of a diversified economy for the exchange of complementary knowledge among economic activities (Jacobs, 1969). Glaeser et al. (1992) found evidence for positive Jacobs-externalities from diversity in industrial structure using a data set on the growth of large industries in 170 US cities between 1956 and 1987. They found that local competition and urban variety encourages employment growth in industries and knowledge spillovers occur between rather than within industries.

Agglomeration economies could generate positive external effects that could outweigh the negative effects, if these phenomena are accompanied by appropriate regional infrastructure investments (Karlsson et al., 2000). Moomaw (1986) employed population size and the number of production worker hours in the industry to estimate urbanization and localization economies. His analysis was based on different industries. For example, urbanization advantages increase for lumber, electrical, apparel, transportation equipment and instruments industries, whereas urbanization diseconomies are significant for petroleum refining. Similarly, Moomaw (1986) concluded that localization economies are created for apparel, nonelectrical machinery, furniture, and transportation equipment. Mills (2000) analyzed how the productivity of labor would increase by 5% to 10% if the city scale expanded twice its size. Porter (2003) analyzed the clustering in the trade industries and

found that they greatly affect the regional economy. Mizuno (2006) demonstrated how industrial diversity resulted in the reduction of unemployment in metropolitan area. He further analyzed the correlation between the concentration of manufacturing and the construction sector and found that the unemployment rate in metropolitan area was strongly negative. Baldwin et al. (2008) identified the geographic concentration of industry stimulated by the concentration of upstream suppliers, pools of skilled labor, and the exchange of knowledge and learned that it is an important determinant of labor productivity in Canada. In addition, they found the strong and positive geographical extent of knowledge spillovers on the location of individual manufacturing plants within 10 km of the plant, suggesting that physical distance is more important in terms of knowledge flows than political boundaries.

However, Henderson (1986) discovered no significant correlation between city size and industrial productivity. In addition, Combes (2000) found that concentration negatively affects employment growth in France. Meanwhile, De Groot et al. (2009) found some strong indications of sectoral, temporal, and spatial heterogeneity of the effects of specialization, competition, and diversity on regional growth through meta-analysis, which are rather mixed.

In summary, the effects of concentration or diversity on the industry sector and population size (city scale) on the regional economic growth are more mixed. Finally, as city size increased, the external diseconomies also increased, including crime, traffic congestion, environmental pollution, social conflict, racial externalities, and crowding externalities (Fujita, 1989). These

external diseconomies continue to affect the regional policies. They include congestion toll, subsidy, urban growth boundary, and tax policy.

Devolution and Public Finance

Previous works on government policies and regional growth are very few. Nevertheless, studying the economic growth at the regional level, the local government's expenditure or tax and another regional development policy need to be considered first. The study of regional policies has been closely related to the analysis of decentralization, often referred to as fiscal federalism (Abreu and Savona, 2009). Regional policymakers hold discretionary authorities to allocate government expenditures to public goods and services, development projects, compensation, and other expenditures. Two perspectives for the regional economic growth regarding the effect of decentralization of public finance have been identified.

First is the view that fiscal decentralization must be continued for better resource allocation. This might be because locally determined policies are better able to take account of regional and local conditions in the provision of public goods, such as infrastructure and education (Thornton, 2007). Netzer (1991) realized that the decentralized economic development policy would result in the overall benefits and convenience within the country due to the existing competition among other regions in other countries. Peterson (1995) stressed the active role of regional governments and investments for the regional economic development program. This idea came from modern federalism, which means that each level of government has its own

independently elected political leaders and its own separate taxing and spending capacity. Akai and Sakata (2002) and Stansel (2005) also asserted that the fiscal decentralization affects the regional economic growth in the US. In the allocation of regional government expenditures from decentralization, counties that spent more on highways, but had lower local taxes, recorded higher rate of growth in the US (Ruspasingha et al., 2002). In addition, the regional government could provide formal institutional support to stimulate local development initiatives by developing work facilities for community groups, establishing technical assistance, and making community-based initiatives a component of the overall local development strategy (Rupasingha and Goetz, 2007).

Second, some conflicts could occur in the process of macro-economic policy coordination under fiscal decentralization. Bartik (1991) affirmed that the economic development policy by the regional government expenditure could not create the pure economic value generally, because it would incur additional external cost due to the competition among the local governments to attract a specific industry. Huang et al. (2002) reported that the net effect of local fiscal expenditures and county taxation is neutral or even a small negative on rural working-age populations. This is because the tax and expenditure policies have equal but opposite effects on the population, in accordance with the Tiebout model. Thornton (2007) found that fiscal decentralization statistically does not have significant effects on economic growth after examining the data of 19 OECD (Organization for Economic Cooperation and Development) members. Rodriguez-Pose and Ezcurra (2011)

noted the negative but significant association between fiscal decentralization and the economic growth in the 21 OECD sample countries they examined. Moreover, they learned that an increase in regional tax revenue hinders investment and employment due to excessive taxation in China, which is unfavorable to the regional economic growth (Chen and Wu, 2008). Abreu and Savana (2009) also stressed the optimum level of decentralization in the developed and the less developed regions. The effectiveness of specific regional policies depends on the extent of sectoral specialization across regions and the degree of regional variation in the initial endowments in physical and social infrastructure (Abreu and Savona, 2009).

Consequently, fiscal decentralization may push regional economic growth or hinder it through regional government expenditure and regional taxation. The way by which the policymakers allocate the definite resources to various expenditures, such as the government consumption, investment and redemption of a local government department, is very vital. In fact, all regional policy-making has become an increasingly important factor in the goal of achieving economic development.

Neighboring Effect

Neighboring effect refers to the effect of the performance of neighboring economies. Neighboring effect has been analyzed in a range of theoretical and applied contexts and has proven to be of interest in understanding questions – ranging from the asymptotic properties of various evolutionary games to explaining the persistence of poverty in inner cities. Neighboring effect has

received much attention because it provides a way of understanding why poverty traps might exist based on the background of social theory. For example, supposing one way to think about a poverty trap is that a community, if initially comprised of poor members, will remain poor across long time periods and even across generations (Durlauf, 2004). Hence, capital cannot be accumulated from the low saving caused by poor members and the poverty traps will exist continuously. In the case of human capital, interdependence in behavior creates the possibility that if one has two communities – one where the adults are all college graduates and another where none is – that these communities will converge to different levels of college attendance in a steady state (Durlauf, 2004).

Furthermore, the neighboring effect could be applied to business cycle, economic growth, land use, technology adoption, and preferences in consumption. As proof of preferences in consumption, Bell (2002) provided the negative feedback operating through the price system and the positive feedback expressed in the bandwagon effect. Finally, the agents' preferences and consumption were completely polarized into stable regions in which every agent consumed the same good exclusively. Kelly (1997) developed a model of local transportation linkages and economic development that captured Adam Smith's insights on market and specialization. This model has been discussed in the context of networks and neighboring effect. Irwin and Bockstead (2002) showed how neighboring interactions could affect long-term patterns of land use. In this model the decision to develop a given parcel of land is seen to be affected by the development state of the neighboring

parcels. Allen (1982) analyzed technology adoption when network externalities are restricted to local neighboring. An and Kiefer (1995) addressed the question of technological adoption and provided conditions under which more efficient technologies are adopted and when they are not, considering the neighboring effect.

In summary, the neighboring effect covers an enormous range of economic issues. It can influence neighboring formation, behavior, or economic activities.

Table 3.1 Determinants of Regional Economic Growth

Descriptions	Determinants	Representative previous studies
Physical Capital	Capital	Feldstein and Horioka (1980), Acemoglu (1996), Romer (2001), Sacks (2004), Kraay and Raddatz (2007)
Human Resources	Human Capital	Romer (1986), Glaeser (1994), Acemoglu (1996), Bal and Nijkamp (1997), Black and Henderson (1999), Glaeser and Shapiro (2003), Cohen and Soto (2007), Sterlacchini (2008), Fleisher et al. (2010)
	Factor Mobility and Growth	Borts and Stein (1964), Smith (1975), Kraay and Raddatz (2007), Dao (2010)
Agglomeration Factors	Concentration or Diversity in Industry Sector	Marshall (1920), Jacobs (1969), Glaeser et al. (1992), Henderson et al. (1995), Combes (2000), Karlsson et al. (2000), Porter (2003), Mizuno (2006), Baldwin et al. (2008)
	Number of Firms	Sheppard (1983)
	Population Growth Rate or Population / City Size	Moomaw (1986) , Henderson (1986) , Glaeser et al. (1995), Mills (2000), Portnov (2004), Strulik and Weisdorf (2008)
	Accessibility to Metropolitan Area	Lutz (2001), Monchuk et al. (2006)
Policy Factors	Local Government's Expenditure or Tax	Landau (1986), Netzer (1991), Bartik (1991), Rupasingha et al. (2002), Thornton (2007), Rodriguez-Pose and Ezcurra (2011)
	Policy and Political Factors	Barro (1991), Homles (1998), Rupasingha and Goetz (2007)
Neighboring Effect		Allen (1982), Durlauf (1993, 2004), Kelly (1997), An and Kiefer (1995), Bell (2002), Irwin and Bockstead (2002)

The determinants of the regional economic growth are summarized in Table

3.1 based on the previous literature review. In summary, apart from capital and labor as the basic input factors, agglomeration factors (such as city or population size and industrial structure), policy factor, neighboring effect, and human capital are also important because they reflect the regional characteristics. All of these will contribute to sustainable regional economic growth. In addition, Nash (1977) identified non-economic factors that contribute to economic development as well. This factor would be related to the notion that the less developed countries do not achieve the economic growth despite massive capital supply from the developed countries.

3.3 Analysis

3.3.1 Data Analysis

In this study, the less developed regions were identified depending on the average regional income level and regional income growth rate based on the real GRP[18]. For the analysis, data were collected from 224 regions in Korea[19] and covered the period from 1998 to 2009,[20] right after the financial crisis in Korea. The average regional income level was defined as the relative real GRP. The differences in the annual growth could result in the modification of the relative ranking of each region's income level. Based on the period under

[18] GRP by a region was calibrated from each region's GRP and Value-added (VA) in Mining and Manufacturing Survey Data in 2007 from *Statistics Korea* because of the regional data limitation.
[19] These were the local administrative districts in Korea. The Ulsan metropolitan area was considered as one region and Jeju, Ulrung, and Ongjin islands were excluded.
[20] The regional data could be gathered respectively since 1998.

study, the relative real GRP of a region was averaged from 1998 to 2009. If the relative real GRP was higher than 1 then, income level of region *i* was considered better than the national average income in year *t*.[21] Furthermore, regional income growth rate of GRP in region *i* was compared to the national income growth rate at period *t* against period *t-k*.[22] There were four categories under regional income level, and the regional income growth rate was compared to the national level.

HH: higher income level with higher growth rate;

HL: higher income level with lower growth rate;

LH: lower income level with higher growth rate; and

LL: lower income level with lower growth rate.

Figure 3.4 shows the average regional income level and the regional income growth rate based on the 224 regions. In the same figure, 40 regions fell under the HH category as compared to the national level, which was 17.9% of the total regions. Under the LL category, there were 87 regions or 38.8% of the total regions expressing a lower regional income growth rate than the national level. Finally, LL regions were classified as the less developed regions, whereas the HH regions were considered the developed ones. Meanwhile, even though LH regions were lower in terms of the income level, these regions recorded rapid growth rates.

[21] $y_{i,t} = GRP_{i,t} / [(\sum_{i=1}^{n} GRP_{i,t})/N]$

[22] $Z_{i,t/t-k} = ln(GRP_{i,t} / GRP_{i,t-k})$

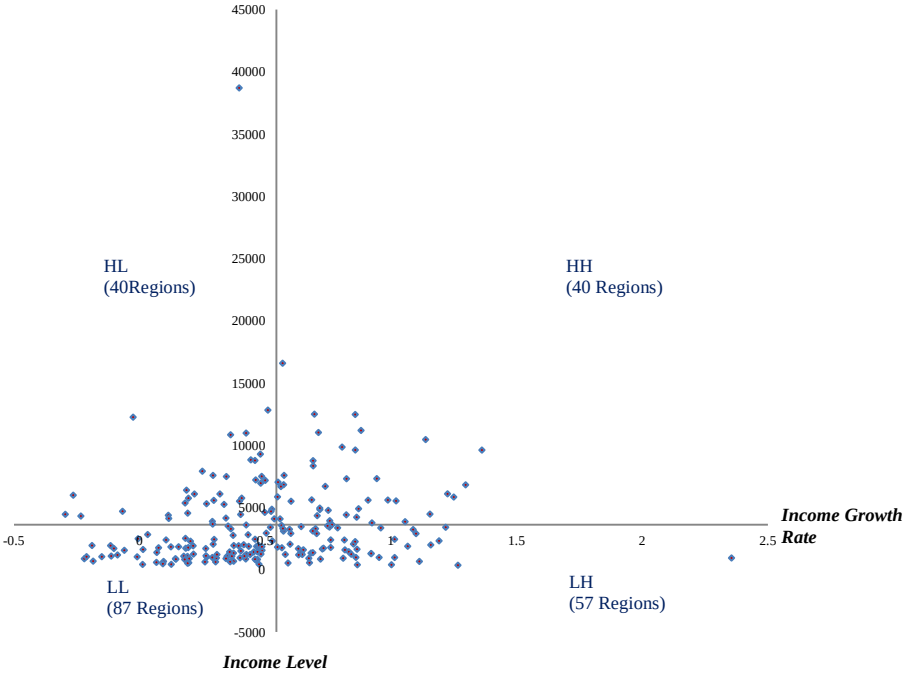


Figure 3.4 Divisions of Regions by Income Level and Income Growth Rate

Figure 3.5 illustrates the four-group classification based on income level and income growth rate. HH regions were concentrated in the Midwest area of Korea, while LL regions were mostly concentrated in the Eastern and South-Western areas of Seoul, Korea. In the GRP ranking, most HH regions went up in the said ranking in 2009 against 1998, except for three regions. However, only 10 regions under the LL category moved higher in the GRP ranking in 2009 against 1998.[23] This implied that a low growth rates could become permanent and structured in most regions among the less developed ones, which could result in poverty and the vicious cycle of having low income level.

[23] Detail lists were attached in Appendix IV and V.

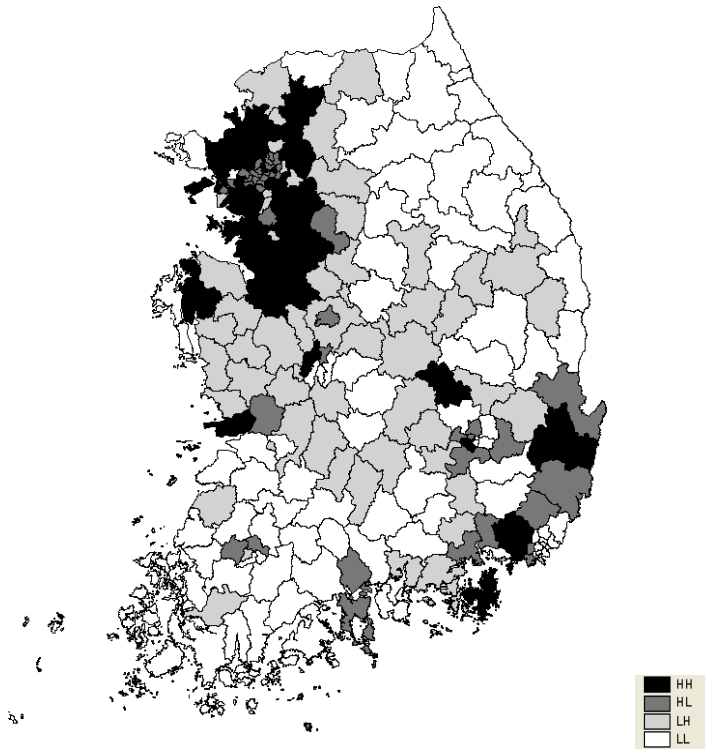


Figure 3.5 Classification of Regions by Income Level and Income Growth Rate

In 1999, right after the financial crisis, 31 regions or 78% among HH regions recorded a higher regional income growth rate compared with the national income growth rate (in the year 1997[24]) that fostered a fast recovery among HH regions. On the contrary, only 33% among LL regions showed a higher regional income growth rate compared with the national income growth rate in 1999.[25] This indicated that most LL regions slowly recovered from the crisis compared with the HH regions, thereby indicating an asymmetric structure of regional income growth among less developed regions.

[24] The national economic growth rate was 9.6%. The regional economic growth rates for 31 regions among HH regions ranged from10.1% to 36.4%.

[25] The regional economic growth rates for 29 regions among LL regions ranged from 9.7% to 34.9%.

3.3.2 Estimation of the Regional Income Model

It is necessary to average the development experiences of the regions to determine their attributes in an event and to check whether or not their applicability can scope a universal event or can only be applied on a regional scope. Urban and regional development patterns generally change through various combinations of deindustrialization, such as population loss and growth, sunbelts and frostbelts, and metropolitan expansion stimulated by changing patterns of specialization and employments (Storper, 2011). The current study focused on the regional income growth of the developed and less developed regions. The regional income growth model was used to analyze both regions given an asymmetric regional income growth from 1998 to 2009. Based on the previous studies, the independent variables (e.g., capital, labor, agglomeration factors, the degree of concentration in the manufacturing sector, degree of industrial diversity, population size, regional government's tax revenue, and the asymmetric regional economic growth factor) were considered determinants of the regional income growth assuming there was no exogenous change in the technical progress. For labor, it was divided into two types, namely, the regular and temporary employees. The asymmetric regional income growth model was represented as follows:

$$\begin{aligned}\ln GRP_{i,t} = {} & \alpha_i + \beta_i \ln K_{i,t} + \gamma_i \ln RL_{i,t} + \lambda_i \ln TL_{i,t} + \phi \ln T_{i,t} + \theta_i \ln P_{i,t} \\ & + \varphi_i (\ln P_{i,t})^2 + \delta_i \ln LQM_{i,t} + \eta \ln D_{i,t} + Dummy_{i,t} + \varepsilon_i\end{aligned} \quad (3.2)$$

$GRP_{i,t}$: Gross Regional Product in region *i* at period *t*

K : capital

RL : regular employees

TL : temporary employees

T : regional government's tax revenue

P : population size

LQM : degree of concentration in manufacturing sector[26]

D : degree of industrial diversity[27]

Dummy : the asymmetric regional economic growth factor[28]

Data were gathered and calculated based on the *Statistics Korea*. All the variables, except the Dummy, were transformed into its logarithm, which was helpful in interpreting the elasticity and in maintaining the consistency of the data.

Table 3.2 presents the results of estimating Equation (3.2). In column 2, the estimated coefficient of the asymmetric regional economic growth factor was negative and statistically significant at 1% significance level. This demonstrated that the asymmetric regional economic growth was evident among less developed regions. The structural factor led the less developed regions to low growth and impeded the growth of those economies as well.

The current study also aimed to explain the factors contributing to the regional income growth were explained in the current study. The output

[26] The concentration of manufacturing sector was represented by $LQM_i = (L_{i,m} / L_i) / (L_m / L)$, where *i* and *m* meant respectively each region and manufacturing. *L* represented total employees in the nation.

[27] The index of industrial diversity in each region was calculated from $D_i = 1 - \Sigma |(L_{i,j} / L_i) - (L_j / L)|$, where *i, j* meant respectively each region and each industry sector. *L* represented total employees in the nation.

[28] If a region would record the lower growth than the national average comparing to the previous year, the value was noted as 1.

elasticity of capital was positively larger among less developed regions than those in developed ones, implying that the role of capital was more important in facilitating regional income growth among less developed regions. The marginal productivity of capital was higher by 0.091 compared with the developed regions. Martin (1998) noted that regions with low capital stocks and low income should have a higher return on capital based on Neoclassical Growth theory. The marginal labor productivity of regular and temporary employees was positively larger in developed regions. This proved that the effects of human capital on regional income growth depended on the regional amenities. For less developed regions, they might not have developed their comparative advantage to attract human capital unlike the developed regions. Among all regions, the regional government tax revenue has a negative effect on the regional income growth. Evident among less developed regions, the negative effect of the regional government tax revenue was greater and statistically significant at 1% significance level. The higher local tax burden or the excessive regional tax revenue generally affects the regional income growth negatively. This means that the local government and public sector play very important roles in the economic development of these regions. In addition, the central and the local governments should provide formal institutional support and assistance to stimulate local development initiatives. The goal of the central and local governments is to help the less developed regions escape low growth and poverty as well as to attain remarkable growth considering optimal tax burden. With regards agglomeration economies, column 1 showed that the developed regions have attained a high level of

urbanization economies through industrial diversity and localization economies through concentration in the manufacturing sector. Among less developed regions, localization economies through concentration in the manufacturing sector contributed to the regional income growth, while industrial diversity had no significant effect, implying that more than any other factor, the manufacturing sector should be reinforced. Moreover, localization economies related to the industrial structures were more important for the regional income growth for less developed regions. Levernier et al. (1998) reported that the greater employment among goods producing sectors is associated with a low level of poverty and higher regional economic growth. Birnie and Hitchens (1998) noted the improvement in the manufacturing productivity and further explained that the growth of manufacturing sector leads to the convergence of GDP per capita among the peripheral countries in the European Union (EU).

Table 3.2 Estimation of Asymmetric Regional Income Model

Regions	Developed regions	Less-developed regions
Intercept	13.052***	35.732***
Log (Capital)	0.076***	0.167***
Log (Regular employees)	0.586***	0.583***
Log (Temporary employees)	0.338***	0.250***
Log (Regional government tax revenue)	-0.045	-0.253***
Log (Population size)	1.452**	-1.986***
Log (Population size) square	-0.078***	0.073***
Log (Degree of concentration in manufacturing Sector)	0.060*	0.335***
Log (Industrial diversity)	0.088**	-0.037
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	-0.003	-0.054***
F-value	76.92***	439.10***
Adj R-Sq	58.05	78.66

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

Finally, population size representing the size of the region showed a concave graphical illustration derived from developed regions. This implied the concept of diminishing marginal growth of population. However, for less developed regions, there was an increased marginal growth of population derived from the convexity of its graphical illustration.

Table 3.3 Estimation of Asymmetric Regional Income Model for the Developed Regions

Regions	Population ≥ 0.5 Million	Population < 0.5 Million
Intercept	-45.906	47.815***
Log (Capital)	0.176***	0.063***
Log (Regular employees)	0.361***	0.626***
Log (Temporary employees)	0.463***	0.311***
Log (Regional government tax revenue)	-0.120*	-0.039
Log (Population size)	10.362	-4.316***
Log (Population size) square	-0.413	0.161***
Log (Degree of concentration in manufacturing Sector)	-0.069	0.070*
Log (Industrial diversity)	-0.258	0.169***
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	0.016	-0.050
F-value	29.89***	59.91***
Adj R-Sq	65.83	59.71

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

In addition, Table 3.3 reports the results of the regression for developed regions based on the population size. There were different results regarding the population coefficient between the developed regions with a population of more than 500,000 and those with less than 500,000;[29] the former showed a concave graphical illustration based on population size, while latter presented a convex illustration. The average population in regions with over 500,000 was 695,017, which was considered overcrowded by 6.7%. With regards industrial structure, service sector was expected to contribute to the regional

[29] The average population of the developed regions was 403,000. In addition, the standard of decentralization is the population size of 500,000 in the local government Act of Korea.

income growth of the developed regions with over 500,000 based from column 1.

Consequently, there was an asymmetric regional income growth structure among the less developed regions that hindered the regional income growth; the structural factor led to the low growth among the less developed regions. For agglomeration economies related to industrial structures, the concept of localization economies was clear based on less developed regions. Capital enlargement, reinforcement of the manufacturing basis, and a more active role in of regional government, including the optimal regional tax burden, were needed to facilitate regional income growth in the less developed regions. The urge to escape from the asymmetric regional economic growth pattern would persist in regional income growth and accumulation of capital stock, which would further lead to the output growth seen in the virtuous cycle. Furthermore, the improved comparative advantages and regional income growth in less developed regions would attract brain-gain.

The asymmetric regional income growth model was employed to examine how the performance of neighboring economies affected the regional income growth. Mossi et al. (2003) suggested that a prosperous area would have a positive influence on a region's economic performance. In analyzing the neighboring effect, a spatially weighted value for all neighboring regions' GRP (except the focal region) was utilized for developed and less developed regions in relation to the asymmetric regional income growth model shown in Equations (3.3) and (3.4). Equation (3.3) included the GRP level of neighboring regions as the neighboring effect. In Equation (3.4) the GRP

differential between the neighboring region and the own focal region was used. These are respectively expressed as:

$$\ln GRP_{i,t} = \alpha_i + \beta_i \ln K_{i,t} + \gamma_i \ln RL_{i,t} + \lambda_i \ln TL_{i,t} + \phi \ln T_{i,t} + \theta_i \ln P_{i,t} + \varphi(\ln P_{i,t})^2 + \delta_i \ln LQM_{i,t} + \eta \ln D_{i,t} + Dummy_{i,t} + \tau \ln WGRP_{j,t} + \varepsilon_i \quad (3.3)$$

$$\ln GRP_{i,t} = \alpha_i + \beta_i \ln K_{i,t} + \gamma_i \ln RL_{i,t} + \lambda_i \ln TL_{i,t} + \phi \ln T_{i,t} + \theta_i \ln P_{i,t} + \varphi(\ln P_{i,t})^2 + \delta_i \ln LQM_{i,t} + \eta \ln D_{i,t} + Dummy_{i,t} + \tau \ln W(GRP_{i,t} - GRP_{j,t}) + \varepsilon_i \quad (3.4)$$

where W denotes the row-standardized spatial weighted matrix,[30] which is derived through the rook continuity between region i and region j, and GRP_j represents the GRP of other neighboring region j surrounding a certain developed or less developed region i.

Table 3.4 presents the results of estimating neighboring effect for the developed and less developed regions. There were significant positive neighboring effects in the GRP level and GRP differential, and the values were 0.184 and 0.004 for the developed regions, respectively. This suggested that the developed regions were pushed by its neighboring regions based on the income level. Parameters of all other independent variables showed the same results as the asymmetric regional income growth model previously presented for the developed regions.

[30] This was based on the notion of binary contiguity between spatial units, which was expressed by 0 or 1 value. We also followed row standardization to avoid possible bias and misinterpretations.

Table 3.4 Estimation of Asymmetric Regional Income Model with Neighboring Effect

Regions	Developed Regions		Less-Developed Regions	
Neighboring Effects Descriptions	GRP Level	GRP Differentials	GRP Level	GRP Differentials
Intercept	6.932*	20.865***	32.635**	37.306***
Log (Capital)	0.094***	0.068***	0.184***	0.183***
Log (Regular employees)	0.602***	0.492***	0.544***	0.562***
Log (Temporary employees)	0.303***	0.439***	0.272***	0.255***
Log (Regional government tax revenue)	-0.107***	-0.151***	-0.300***	-0.279***
Log (Population size)	1.748**	0.630	-2.033***	-2.234***
Log (Population size) ^{2}	-0.089***	-0.043*	0.076***	0.085***
Log (Degree of concentration in Manufacturing Sector)	0.029	0.063**	0.282***	0.309***
Log (Industrial diversity)	0.088**	0.100***	-0.021	-0.036
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	-0.003	0.008	-0.051***	-0.054***
Log (GRP Level of Neighboring Regions)	0.184***		0.147***	
Log (GRP Differentials between Own Region and Each Neighboring Region)		0.004***		-0.003***
F-value	74.45***	96.71***	406.16***	419.93***
Adj R-Sq	60.07	66.24	79.85	79.86

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

Columns 3 and 4 presented the results of estimating neighboring effect for less developed regions. There was a positive neighboring effect in the GRP level given by the value of 0.147, which was significant at 1%. This value was smaller than in the case of developed regions, indicating that the neighboring regions pulled the economies of the less developed regions. In column 4, the GRP differential in the neighboring effect showed a significant negative effect on the regional income growth. Results identified that the regional economies of the less developed regions became more depressed as the gap between the less developed regions and the neighboring regions became bigger. As a result, they could not converge with the other developed regions. Therefore, the disparity of income must be reduced based on the regional income growth for

less developed regions. The coefficient of asymmetric economic growth factor has the same sign as that shown in Table 3.2.

Table 3.5 shows that developed regions were categorized into four cases; it also shows the results of estimating the GRP level and GRP differentials in relation to the neighboring effects. In column 4, employing the GRP level, results showed that if the developed regions had less developed regions as their neighbors, the coefficient of regional income growth of the developed regions would be equal to 0.799 (the highest value and statistically significant at 1%). Derived from column 1, when developed regions had HH regions as their neighbors, their economies were pushed toward further growth. Thus, developed regions were expected to be clustered and become richer because of the neighboring effect. With HL regions as their neighbors, the regional income growth showed the lowest value compared with other cases. With regards the variables of industrial structures, when developed regions had LL regions as their neighbors, the coefficients of manufacturing sector and industrial diversity were found to be negative and insignificant; thus, they did not contribute to the regional income growth. This explained why there were no backward linkages in the case of a developed region neighbored by the less developed region. In all cases, the parameters for population size showed the same signs as those shown in Table 3.2 and Table 3.4. In considering regional government tax revenue, a significant and positive effect (column 1 and column 3) was derived from cases where regions had HH or LH regions as their neighbors; this was presented by employing GRP level, which affected the regional income growth positively. It was expected that more tax revenue

would be needed due to the higher economic growth caused by the neighboring effect. Compared with the coefficient of the GRP level, the developed regions had more advantages given that these developed regions were neighbored by specific group (i.e., developed or less developed regions).

The results of estimating the GRP differential with the neighboring effect for the developed regions are shown in Table 3.5. For all cases, the coefficients of the GRP differentials showed a significant and positive sign. Results showed the same trends as those observed with the GRP level. It was shown in column 1, where GRP differentials were employed, that if the neighboring HH regions would grow more, this would continue and be reflected in the regional income growth of the developed regions. In column 4, were the GRP differentials are employed, the increased disparities between the developed regions and the neighboring less developed regions resulted in a more induced regional income growth for the former. This might intensify the gap between –the two regions; thus, the developed regions were expected to be clustered and become richer. The other independent variables, such as industrial structures, regional tax revenue and population, presented the same results with the GRP level.

Table 3.5 Estimation of Asymmetric Regional Income Model with Neighboring Effect by Four Cases of Developed Regions

1) Income Level

Scenarios	Neighbored with HH	Neighbored with HL	Neighbored with LH	Neighbored with LL
Intercept	-17.012***	-4.021	15.485	-461.273***
Log (Capital)	0.131***	0.003	0.229***	0.076
Log (Regular employees)	0.801***	0.503***	0.728***	0.798***
Log (Temporary employees)	0.068	0.494***	0.042	0.126***
Log (Regional government tax revenue)	0.216***	-0.290***	0.476***	0.151
Log (Population size)	3.803***	4.447***	-2.596	70.468***
Log (Population size) ^{2}	-0.191***	-0.195***	0.082	-2.746***
Log (Degree of concentration in Manufacturing Sector)	-0.417***	0.243***	0.084**	-0.570***
Log (Industrial diversity)	0.143***	-0.145*	0.130**	-0.258
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	-0.042	0.035	-0.038	-0.023
Log (GRP Level of Neighboring HH Regions)	0.349***			
Log (GRP Level of Neighboring HL Regions)		0.196*		
Log (GRP Level of Neighboring LH Regions)			0.253***	
Log (GRP Level of Neighboring LL Regions)				0.799***
F-value	82.78***	19.51***	114.29***	280.19***
Adj R-Sq	76.19	60.45	94.97	98.74
Number of Observations	252	120	60	48

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

2) Income Disparities

Scenarios	Neighbored with HH	Neighbored with HL	Neighbored with LH	Neighbored with LL
Intercept	3.843	4.531	-5.984	51.774**
Log (Capital)	0.141***	0.050	0.257***	0.175***
Log (Regular employees)	0.510***	0.296***	0.684***	0.720***
Log (Temporary employees)	0.348***	0.654***	0.059	0.104***
Log (Regional government tax revenue)	0.156***	-0.439***	0.435***	0.232***
Log (Population size)	2.409***	4.377***	1.749	-4.355
Log (Population size) ^{2}	-0.135***	-0.185***	-0.084	0.142
Log (Degree of concentration in Manufacturing Sector)	-0.408***	0.150***	0.141***	0.009
Log (Industrial diversity)	0.128***	-0.141**	-0.079	-0.005
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	-0.012	0.063	-0.019	-0.036**
Log (GRP Differentials between Own Region and Each Neighboring HH Region)	0.006***			
Log (GRP Differentials between Own Region and Each Neighboring HL Region)		0.005***		
Log (GRP Differentials between Own Region and Each Neighboring LH Region)			0.005**	
Log (GRP Differentials between Own Region and Each Neighboring LL Region)				0.007***
F-value	123.91***	38.15***	94.38***	365.63***
Adj R-Sq	82.79	75.41	93.96	98.71
Number of Observations	252	120	60	48

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

Table 3.6 reports the results of estimating the GRP level and the GRP differentials with the neighboring effect for less developed regions categorized into four cases. In column 1, where GRP level was employed, if the less developed regions would be neighbored by the developed regions, the regional economies of the former would show the highest growth. This would be related to the pull effect of the adjacent developed regions. The rapid growing regions, such as the neighboring LH regions, show higher neighboring effect than the coefficient of the GRP level as the neighboring effect shown in Table 3.4. However, neighbored by HL regions, the regional economic growth showed insignificant value. The neighboring effect, in a case where regions were neighbored by less developed regions, was found to be the same as the neighboring effect in Table 3.4. This implied that the neighboring effect must be considered more as a development plan of the neighboring regions for the regional economic growth of the less developed regions. In all cases, regional tax revenue affected economies of the less developed regions negatively. Moreover, the reinforcement of the manufacturing sector was more important as in previous results shown in Table 3.2 and Table 3.4.

The results in estimating the GRP differential with the neighboring effect for the less developed regions are shown in Table 3.6. For all cases among less developed regions, the GRP differential affected the regional economic growth negatively. The greater the disparity between the neighboring developed regions and the less developed regions, the more it hindered the regional economic growth of the latter, especially by employing GRP

differentials. As a result, the less developed regions could not catch up with the developed regions. Finally, the gap between the regions would repeatedly be intensified. If the disparity between the neighboring regions and the less developed regions can be reduced, then the regional income growth of the latter regions can be expected to grow.

The developed regions were expected to be clustered and become richer by means of the neighboring effects (i.e., the GRP level and the GRP differential). The developed regions would gain more advantage if they had specific groups, such as the developed or the less developed regions, as their neighbors. The neighboring developed regions pulled the regional income growth of the less developed regions more. The greater the disparity between the neighboring developed and less developed regions, the more it hindered the regional income growth of the latter. As a result, the gap between the two regions would repeatedly be intensified. If the disparity between the neighboring regions and the less developed regions would be reduced, the regional economies of the latter can be expected to grow. Moreover, the reinforcement of manufacturing sector was more important for the regional income growth among the less developed ones.

Table 3.6 Estimation of Asymmetric Regional Income Model with Neighboring Effect by Four Cases of Less-Developed Regions

1) Income Level

Scenarios	Neighbored with HH	Neighbored with HL	Neighbored with LH	Neighbored with LL
Intercept	42.862	67.290***	28.712***	28.327***
Log (Capital)	0.301***	0.069**	0.232***	0.190***
Log (Regular employees)	0.593***	0.693***	0.585***	0.510***
Log (Temporary employees)	0.106	0.238***	0.183***	0.299***
Log (Regional government tax revenue)	-0.263**	0.059	-0.327***	-0.307***
Log (Population size)	-5.697	-8.136***	-1.733**	-1.277***
Log (Population size) ^{2}	0.204	0.319***	0.067**	0.045***
Log (Degree of concentration in Manufacturing Sector)	0.298***	0.296***	0.219***	0.390***
Log (Industrial diversity)	-0.289	0.280***	-0.213***	-0.082***
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	-0.023	-0.026	-0.034	-0.045**
Log (GRP Level of Neighboring HH Regions)	0.544***			
Log (GRP Level of Neighboring HL Regions)		0.025		
Log (GRP Level of Neighboring LH Regions)			0.189***	
Log (GRP Level of Neighboring LL Regions)				0.146***
F-value	128.85***	239.67***	60.73***	285.18***
Adj R-Sq	97.29	96.11	71.05	81.54
Number of Observations	36	96	240	672

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

2) Income Disparities

Scenarios	Neighbored with HH	Neighbored with HL	Neighbored with LH	Neighbored with LL
Intercept	53.367	68.057***	36.186***	33.183***
Log (Capital)	0.300***	0.070**	0.238***	0.193***
Log (Regular employees)	0.598***	0.688***	0.537***	0.544***
Log (Temporary employees)	0.102	0.242***	0.224***	0.264***
Log (Regional government tax revenue)	-0.257*	0.062	-0.288***	-0.281***
Log (Population size)	-4.963	-8.155***	-2.257***	-1.553***
Log (Population size) ^{2}	0.177	0.320***	0.089***	0.057***
Log (Degree of concentration in Manufacturing Sector)	0.340***	0.297***	0.231***	0.412***
Log (Industrial diversity)	-0.204	0.281**	-0.166**	-0.096***
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	-0.029	-0.026	-0.037	-0.049**
Log (GRP Differentials between Own Region and Each Neighboring HH Region)	-0.013***			
Log (GRP Differentials between Own Region and Each Neighboring HL Region)		-0.003		
Log (GRP Differentials between Own Region and Each Neighboring LH Region)			-0.005*	
Log (GRP Differentials between Own Region and Each Neighboring LL Region)				-0.005***
F-value	120.52***	239.55***	57.06***	299.08***
Adj R-Sq	97.11	96.11	69.73	81.47
Number of Observations	36	96	240	672

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

The analysis of neighboring effects was extended from the developed and less developed regions, considering the total regions in Korea. Table 3.7 presents the results of the estimation of the neighboring effects for the 224 regions in Korea. As can be seen, there were positive neighboring effects in the GRP level. The GRP differential values were 0.269 and 0.002 as shown in columns 1 and 2, respectively. These implied that the regional income level of neighboring regions was more important for the regional income growth. Table 3.8 and Table 3.9 present the results of estimating the neighboring effects for the 224 regions in Korea categorized into four cases. In addition, the number of regions neighbored with HH regions had 38 cases, in which the neighboring effect value was found to be the highest (shown in column 1 of Table 3.8). However, in column 4 the regions neighbored with LL regions had the lowest neighboring effect. Finally, more prosperous neighboring regions had a more positive influence on the regional economic performance.

Table 3.7 Estimation of the Neighboring Effects for 224 Regions in Korea

Neighboring Effects Descriptions	GRP Level	GRP Differentials
Intercept	28.077***	32.664***
Log (Capital)	0.120***	0.059***
Log (Regular employees)	0.558***	0.606***
Log (Temporary employees)	0.322***	0.335***
Log (Regional government tax revenue)	-0.236***	-0.127***
Log (Population size)	-1.872***	-1.573***
Log (Population size) ^{2}	0.068***	0.053***
Log (Degree of concentration in Manufacturing Sector)	0.213***	0.321***
Log (Industrial diversity)	0.064***	0.070***
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	-0.020	-0.028**
Log (GRP Level of Neighboring Regions)	0.269***	
Log (GRP Differentials between Own Region and Each Neighboring Region)		0.002***
F-value	1534.26***	1438.12***
Adj R-Sq	85.16	84.03

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

Table 3.8 Estimation of Asymmetric Regional Income Model with the GRP level as Neighboring Effect for 224 Regions in Korea

Scenarios	Neighbored with HH	Neighbored with HL	Neighbored with LH	Neighbored with LL
Intercept	-13.593***	31.356***	17.974***	35.004***
Log (Capital)	0.088***	0.060***	0.212***	0.208***
Log (Regular employees)	0.705***	0.650***	0.428***	0.514***
Log (Temporary employees)	0.207***	0.290***	0.360***	0.278***
Log (Regional government tax revenue)	-0.271***	-0.256***	-0.166***	-0.217***
Log (Population size)	4.145***	-3.459***	-0.308	-2.505***
Log (Population size) ^{2}	-0.177***	0.141***	-0.006	0.093***
Log (Degree of concentration in Manufacturing Sector)	-0.042	0.246***	0.071**	0.304***
Log (Industrial diversity)	-0.048	-0.191***	0.165***	0.010
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	0.003	0.040	-0.067***	-0.013
Log (GRP Level of Neighboring HH Regions)	0.468***			
Log (GRP Level of Neighboring HL Regions)		0.481***		
Log (GRP Level of Neighboring LH Regions)			0.224***	
Log (GRP Level of Neighboring LL Regions)				0.089***
F-value	208.94***	170.84***	361.01***	1060.55***
Adj R-Sq	81.78	76.83	85.02	90.91
Number of Regions	38	42	52	92

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

Table 3.9 Estimation of Asymmetric Regional Income Model with the GRP Differentials as Neighboring Effect for 224 Regions in Korea

Scenarios	Neighbored with HH	Neighbored with HL	Neighbored with LH	Neighbored with LL
Intercept	2.160	47.940***	23.885***	32.242***
Log (Capital)	0.095***	0.052***	0.189***	0.176***
Log (Regular employees)	0.376***	0.431***	0.430***	0.544***
Log (Temporary employees)	0.529***	0.516***	0.381***	0.280***
Log (Regional government tax revenue)	-0.199***	-0.223***	-0.068***	-0.228***
Log (Population size)	3.746***	-3.732***	-0.476	-1.434***
Log (Population size) ^{2}	-0.166***	0.147***	-0.002	0.047***
Log (Degree of concentration in Manufacturing Sector)	-0.061	0.256***	0.132***	0.307***
Log (Industrial diversity)	0.024	-0.056	0.195***	0.018
Asymmetric Economic Growth Factor (Growing Less than National Average=1)	0.009	0.077**	-0.069***	-0.017
Log (GRP Differentials between Own Region and Each Neighboring HH Region)	0.005***			
Log (GRP Differentials between Own Region and Each Neighboring HL Region)		0.003***		
Log (GRP Differentials between Own Region and Each Neighboring LH Region)			0.001	
Log (GRP Differentials between Own Region and Each Neighboring LL Region)				0.003***
F-value	207.38***	153.07***	334.98***	1247.70***
Adj R-Sq	81.67	74.80	84.04	91.85
Number of Regions	38	42	52	92

*Note: *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively.*

Table 3.9 presents the GRP differentials with the neighboring effects for each case in the 224 regions. As shown in column 1, if the neighboring HH regions would grow more, these neighboring effects would positively affect the neighbored regional income growth, proving that developed regions expected to be clustered and become richer.

To conclude, the regions in Korea would be more clustered based on the level of development through the neighboring effects (more development in the GRP level). Based on the result, more prosperous regions were needed in the neighborhoods to facilitate regional income growth. Table 3.10 summarizes the policy and market factors for the regional income growth from the estimation results.

Table 3.10 Sources for the Regional Income Growth of Total 224 Regions in Korea

Description	Economic Sources
Policy Factor	· Capital accumulation and investment · Expediting industrial diversity · Easing the regional tax burden · Reinforcing manufacturing sector · Increasing population as urbanization economies
Market Factor	· The developed level of the neighboring regions, especially the neighboring HH and HL regions · The lower disparity between the less-developed regions and the developed regions

3.4 Conclusion and Policy Implications

This study was aimed at analyzing the economic growth patterns of the less developed regions and identifying the reasons why the less developed regions continuously show low income growth. The results showed that there were

regions that remained as less developed for a long time, which can be considered as structured. The less developed regions recorded a low average regional income levels from 1998 to 2009 and even lower regional income growth rates in 2009 against 1998 compared with the national average. The less developed regions were mostly concentrated in the Eastern and South-Western areas of Seoul, Korea. Most of the less developed regions grew less during the recovery periods compared with the developed regions. Consequently, there was an asymmetric regional income growth structure among the less developed regions that significantly hindered the regional income growth; specifically, the structural factor caused the low income growth among less developed regions. The developed regions were expected to be clustered and become richer by means of the neighboring effect. The neighboring developed regions pulled most of the regional income growth of the less developed regions. The greater the disparity between the neighboring developed regions and the less developed regions the more it hindered the regional income growth of the latter. Reducing the disparity between the neighboring regions and the less developed regions would result in the growth of the regional economies of the latter.

From a viewpoint of the neighboring effect, urban integration would be needed not between the developed regions and the adjacent developed regions but between less developed regions and its neighboring developed regions. This could achieve a balanced regional development through the regional income growth of the less developed regions. The World Bank (2009) has already pointed out the integration between rural and urban areas, between

slums and parts of cities, and between lagging and leading provinces within a nation. However, it would be inappropriate to integrate between the over-crowing developed regions as explained in the results presented in Table 3.3. A general overhaul of the administrative system has been going on in Korea. This has been implemented in the integration and the reorganization of municipalities. Finally, the results on the neighboring effects, the effects of industrial structures, and population are very important to the present discussion. Moreover, the empirical results of concentration in manufacturing sector, as seen from Table 3.5 and Table 3.6, suggest that the relocation of manufacturing facilities among regions may be required.

There were some limitations in gathering the regional data, and these limitations restricted some of the analyses in the current study due to the time period considered. If the study considered a longer time period, asymmetric variables representing the business cycle could be designed. In future studies, a spatial weighted matrix, such as discussing the accessibility based on railroad or road network beyond the contiguity, could be considered to extend the scope of the analysis. Moreover, the neighboring effect could be studied dynamically with the inclusion of a time variable. Manufacturing and service sectors could also be classified in a more detailed manner because energy, information and communication, and cultural industry have become important aspects included in the analysis. Finally, the change of the labor structure caused by a rapidly ageing society would be covered for the regional income growth.

Chapter IV
Contribution of Financial Incentives of Local Governments to the Output Growth of Firms

4.1 Introduction

Korea has experienced two large financial crises in the last 10 years, that is, in 1997 and 2008. In the midst of these big shocks, bank- and market-based financial markets experienced structural changes such as merger and acquisition, liquidity crisis, and financial hemorrhage caused by uncollectible accounts from bankruptcy. Furthermore, many firms continue to experience an ongoing-restructuring process and a readjustment of bonds and debts through Non-Performing Loan Disposal Fund and Structural Regulation Fund[31] by the Korea Asset Management Company. In the public sector, the local government has established credit guarantee funds since 2000. The institutions administering these funds play a role in credit guarantee schemes, such as loans for intra-regional firms, which contribute to financing.

These experiences have reinforced the relationship between firms and regional economic growth. In 1934, Schumpeter stressed the role played by entrepreneurship in the development and spread of innovation (Minniti, 2008). A significant amount of literature also established the important social implications of entrepreneurial activity (Chell, 2007). For example,

[31] In 1997 the government established the Corporate Restructuring Committee and accomplished corporate restructuring emergency funding. In 2008, the Coordinating Committee of Creditor Financial Institutions was launched to advance the restructuring process.

entrepreneurs (both social and economic) typically garner alienable resources consciously through networking and other processes, and use their personal or human capital to achieve their espoused mission of wealth and social value creation. Local and central governments establish and execute financing, taxation, budgetary adjustments for early public finance expenditure, assistance for innovation activities, and regulations or encouragement on industrial policies. Moreover, the role of finance in economic growth increased at the local and national levels during the last two financial crises. Financial sectors can be evaluated in two ways. First is through the importance of their role in economic growth. Whether financial sectors are overemphasized or affect economic growth negatively, or promote technological innovation and economic growth by facilitating capital accumulation and industrial investment is debatable. The second is through the relation between direct and indirect financial markets. Are these two complementary or substitutes? Which contributes more to achieving economic growth? In other words, is the bank-based financial system or market-based financial system more helpful to financing and economic growth issues because of their comparative advantage and efficiency? These two issues have been studied for a long time at the regional and national levels.

The purpose of this study is to analyze the factors that affect the output growth of firms in financial sectors considering the role of local government as a regional policy-making body. The financial sectors include bank-based and market-based financial systems. Previous studies focused on the role played by the financial sector in national or regional economic growth.

However, this paper explores how the financial resources generated by either financial system contribute to the output growth of firms through productive channels and how the output growth of firms depends on the disparity among financial tools of local government as regional government policies. Finally, this study presents policy implications to improve the efficiency of financial sectors and of financial tools as regional government policies. This study employed micro firm-level data and regional macro data from 1997 to 2009 that were sourced from the National Information and Credit Evaluation Inc. (NICE) and Statistics Korea. Multi-level statistical methods were used. The rest of the paper is organized as follows. First, previous literature is discussed, mostly on the relationship between financial sectors and financial tools and regional economic growth. Next, multi-level statistical models are estimated considering the endogenous economic growth theory. Finally, the conclusion and policy implications are presented.

4.2 Financial Sectors and Regional Economic Growth

Financial sectors and regional development

In terms of the regional financial market, Beare (1976) contributed first to the development of the monetary theory at the regional level. National money is important in determining regional income, with the differential regional impacts explained by the regional differences in income or wealth elasticity of demand for regional output. Moore et al. (1985) developed a regional monetary multiplier based on the proportion of loanable funds invested in the

region rather than outside it, assuming that the money supply of the region is managed by regional banks. For example, a fixed supply of real money balances is assumed. Money supply is an exogenous policy variable by a regional financial market or system because a larger supply of money or finance increases regional aggregate demand. This work finally identified the mutual interaction between income and credit. Amos and Wingender (1993) considered the contribution of regional financial activity to regional growth based on the work of Moore et al. (1985) that considers an extended model of regional financial markets. Thus, this analysis provides a basis for determining the importance of regionally segmented financial markets to regional growth. Analysis of the results shows that unbalanced regional economic growth occurs within a nation because the effect and the role of the financial market on regional economic growth differ according to regional conditions. Generally, the availability of more regional credit induces regional output growth. Koo (1996) studied the relationship between regional financial market and regional economic growth. He focused on how regional economic growth would differ based on regional financing conditions. In his study, regions with active granting of credit within a region show high economic growth rate because of access to a financial market at the national level. Choi and Cho (2001) assumed a separate regional financial sector and analyzed the correlation between such sector and regional economic growth in a particular region in Korea. Results from metropolitan cities indicate that the regional financial market leads regional economic growth caused by the imbalance in the regional development of the financial sectors. Guiso et al. (2004) studied

the effects of the differences in the local financial development within an integrated financial market. They found that financial development enhances the probability of start-up businesses, favors the entry of new firms, increases competition, and promotes growth and that these effects are weaker for large firms. Large firms can more easily raise funds outside the local area. In Italy, local financial development is generally an important determinant of the regional economic success when no frictions to capital movements exist within an integrated financial market. However, the analyses of Carbo Valverde and Rodriguez Fernandez (2004) showed that bank concentration does not have a significant impact on the economies of the 17 Spanish regions from a panel analysis. A panel granger causality test showed that each financial sector did not advance regional economic growth. This finding is caused by regions having a more accurate definition of the relevant retail bank market and all kinds of institutional, legal, and cultural differences that can be held constant at the regional level.

Contribution of financial sectors to economic growth

With regard to the contribution of financial sectors to economic growth, a number of empirical academic debates have been conducted on the relationship between these two. One argument is that the role of financial sectors in economic growth is overemphasized, and the other is that the role of financial sectors is more important in economic growth. These arguments can be represented by the question of which between monetary and fiscal policy is more effective. Lucas (1988) pointed out that economists have

overemphasized the role of financial sectors in economic growth. Chandavarkar (1992) insisted that the financial market has a negative overall impact on economic growth based on his review of previous studies on developing countries, which are related to the competitiveness and autonomy of oligopolistic financial systems owned and managed by the government. Docherty (2011) found that the monetary policy is ineffective based on Keynes' General Theories because of the liquidity trap. In this case, the rate of interest may have fallen to such a low level that the demand for money becomes absolute and the liquidity preference function effectively becomes horizontal. Classical theories emphasize the monetary policy, assuming no change in the demand of money. The Schumpeterian view stresses that financial services are essential elements in technological innovation and economic growth, and that the development of financial markets promote economic growth through the improved quality and quantity of credit provision. Hicks (1969) studied how the financial system promotes capital accumulation through various channels and contributes to economic growth under the industrial revolution periods in the United Kingdom. King and Levine (1993a, 1993b) proved that the correlation between financial sector and economic growth is strong in fast growing countries after analyzing 80 countries in the period of 1960 to 1989. Such result is possibly caused by the financial sector fostering investment and increasing the financial wealth of firms and households towards capital market activity. Hassan et al. (2011) concluded that domestic credit provided by the banking and private sectors and money supply have the largest impact on economic growth in the East

Asia and Pacific regions based on the analysis of the neo-classical growth model. This impact is related to higher growth rate and finance because of the increasing demand for financial services. Rousseau and Wachtel (2002) showed the inflation threshold from panel regression for 84 countries from 1960 to 1995. The inflation threshold for the finance–growth relationship is between 13% and 25%. When inflation exceeds the threshold, finance ceases to increase economic growth. In examining a panel of 74 countries, Rioja and Valey (2004) found that, in the low region (countries with low levels of financial development), additional improvements in financial markets have an uncertain effect on growth; in the intermediate region, financial development has a large, positive effect on growth; in the high region, the effect is positive but smaller. However, in his analysis of 57 countries from 1967 to 2001, Fung (2009) showed that financial development most positively affects the national economies of low-income countries. Rousseau and Wachtel (2011) concluded that the relationship between finance and growth is unstable based on recent data reexamining the core cross-country panel results. For example, the deepening of financing in a banking system has a strong effect on growth as long as the country avoids a financial crisis. The role of equity markets was not available for all the countries in the samples.

Financial and fiscal policies

Local government policies related to the overall output growth of firms can be divided into three types: financial offering, taxation and public finance expenditure as fiscal policies, and industrial policy. Many attempts have been

made to create policies that enhance finance offering to firms (Harrison et al., 2004). Local and central government have tried to reduce financial constraints faced by firms, especially venture and small- and medium-sized firms. They have employed diverse financial tools such as mutual funds, credit assistance, credit guarantee, venture capital, interest subsidies, and various investment funds. Empirical evidence reveals mixed results on the effectiveness of financing offerings. Li (2002) showed that current credit assistance programs in the form of interest subsidies exert strong effects on the allocation of credit to targeted entrepreneurs that enhances the liquidity of agents, but they come at the cost of non-targeted entrepreneurs. A general equilibrium analysis showed reduced total entrepreneurial activities and large output losses. In analyzing 280 Australian venture capital and private equity fund investments in the period of 1982 to 2005, Cumming (2007) found that the Australian Innovation Investment Fund government program facilitated investment in start-up, early-stage, and high-tech firms and in cost-effective monitoring, and fostered the development of the Australian venture capital industry. Kreft and Sobel (2005) studied whether development efforts to bring in venture funds are better than encouraging more entrepreneurial activity by enacting policy reform that expands economic freedom. Their conclusion stresses that economic development policies should focus on creating an environment attractive to individual entrepreneurs rather than to venture capital. Fiscal policies such as taxation system, and local and central government expenditure can be favorable to firms or discourage entrepreneurship. According to Bruce and Mohsin (2006), top income and capital gains tax rates

exert negative but quantitatively small influences on entrepreneurship from regression analysis. This finding indicates that tax policies are not good instruments for generating changes at the level of entrepreneurial activity. Takii (2008) argued that, as government expenditure could not reflect changes in consumer tastes, expansionary fiscal policy weakens the social role of firms' activities to predict and adapt to idiosyncratic changes in consumer taste. Chen and Groenewold (2011) found that interior local government fiscal policies such as increasing government expenditure could widen the inter-regional gap in terms of income and output per capita. However, Jacobides et al. (2006) pointed out that direct subsidies for R&D and support for linkages between universities and the private sector are effective in encouraging innovation.

Bank-based and market-based financial system

The debate on the comparative advantage between a bank-based financial system and a market-based financial system originated from the perspective of Gershenkron (1962) on financial structures. However, studies on this debate only began to be conducted in the early 1980s. Three issues exist regarding this matter, namely, the comparative advantage of a market-based system, the dominant position of a bank-based system, and the complementary relationship between two financial systems. After the secular recession in the Japanese economy and the regression in the German economy in the 1990s, the financial market moved from a bank-based financial system to a market-based financial system. Rajan and Zingales (1998) insisted that the bank-

based financial system could produce inefficiency in the allocation of funds because it entails oblique dealings. For example, the financial crisis in East Asia in 1997 was attributed to the inefficient allocation of resources. Koo (2007) suggested that, as banks grow larger, the allocation of funds becomes more inefficient. Such inefficiency is caused by the decreasing efficiency in financial intermediation. He also evaluated that the profit-oriented management of banks weakens long-term financing and investment in small- and medium-sized companies in Korea. However, he pointed out that the competition between bank-based and market-based financial systems has alleviated as a result of the role of banks as a source of investment funds for market-based financial market based on abundant liquidity. The bank-based financial system has comparative advantages in information gathering, relationship with companies, reduction of fund-raising expense through economies of scales in financing, and liquidity management. Such system focuses on financial intermediation through information gathering and valuation of companies. Becketti and Morris (1992) and Hooks and Opler (1993) emphasized the role of banking sectors in the growth of small- and medium-sized companies despite the development of a market-based financial system. They pointed out that the declining effect of banks is temporary. Chant (1992) argued that the role of the banks is still important because even large companies prefer financing from banks to avoid special information disclosure. Schmidt et al. (1999) found that banks could persistently hold an important role by emphasizing the supply of short-term loans. According to Carbo Valverde and Rodriguez Fernandez (2004), market-based finance such

as mutual funds has a negative effect on Spanish regional economies. Such effect can be explained by the investment of mutual funds in large, highly concentrated financial markets in which securities, shares, and government bonds of large international and national corporations are mainly traded. As a result, they are rarely invested in the regions where they are captured. However, in analyzing the financial sectors in 45 countries from 1980 to 1995, Levine (2002) estimated that a better developed financial system between bank-based and market-based financial systems induces economic growth. Beck and Levine (2001) revealed that banks and stock markets are mutually complementary, thus jointly contributing to economic growth. Park et al. (2006) argued that a developed market-based financial system attenuates the intermediation functioning of a bank-based financial system because a market-based financial system is superior to the other with respect to efficiency in the allocation of resources.[32] Nevertheless, they suggested a mutual complementary relationship between market-based and bank-based financial systems based on the important role played by the bank-based financial system in small- and medium-sized companies.

Summary

The relationship between finance and economic growth in countries or regions may vary empirically across analyzed countries, regions, or economic environment. Moreover, such relationship changes over time. The policies of local and central governments are crucial as financial tools and fiscal policies

[32] Porter (1992), Franks and Mayer (1993), and Boyd and Gertler (1994) insisted the same.

to the entrepreneurial activities and the output growth of firms. However, mixed results were obtained on the effectiveness of each policy. Given better economic growth and more developed financial sectors, financial sectors induce economic growth more positively based on the complementary relationship between bank-based and market-based financial systems.

4.3 Analysis

4.3.1 Data

This research employed micro firm-level data from KIS-VALUE. KIS-VALUE provides analysis data, which are supplied by NICE, for each firm in Korea. A total of 3,045 firms that existed sustainably from 1997 to 2009 were analyzed. In relation to the financial sectors, the amount of bond issues and the amount of paid-in-capital increase were represented for the market-based financial sector, and the amount of short-term loans and the amount of long-term loans were utilized in the bank-based financial sector. The financial tools of local governments used were the credit guarantee amounts from each local government. Fiscal policies were classified as either local government expenditures or local tax revenue. The total expenditures of each local government were divided into investment expenditures and non-investment expenditures. Locations were divided into two regions, namely, the Seoul

Metropolitan Area (SMA) and the Rest of Korea (ROK).[33] Firms were classified into two based on their size: large firms and small- and medium-sized firms.[34] The industry sectors with which each firm is affiliated were grouped into manufacturing, service, construction, and electric power sectors.

Table 4.1 Summary for Firms' Data

Description			Numbers	Description			Numbers
SMA			1912	ROK			1133
	Large Firms		510		Large Firms		194
		Construction	39			Construction	6
		Service	214			Service	53
		Electric Power	3			Electric Power	3
		Manufacturing	254			Manufacturing	132
	Small and Medium Sized Firms		1402		Small And Medium Sized Firms		939
		Construction	99			Construction	90
		Service	477			Service	159
		Manufacturing	826			Manufacturing	690

Table 4.1 shows data by region, firm size, and industrial sectors. Data differed in terms of indirect or direct financing based on bank-based or market-based financial systems by region, by industries within a region, by firm sizes within a region, and by firm sizes and industries within a region. Restrictions in indirect or direct financing between regions result in financing constraints for each firm in each region. The analysis of data on indirect or direct financing is summarized in Tables 4.2 and 4.3.

Table 4.2 describes the relative share of the number of firms experienced in financing resources such as bonds, paid-in capital increases, short-term loans, and long-term loans. Firms located in SMA showed a generally decreasing trend in financing through bond issues after the financial crisis in 1997

[33] The Seoul Metropolitan Area is composed of Seoul, Incheon, and the Kyounggi region among 16 metropolitan regions, and is represented as SMA. The Rest of Korea excludes SMA.
[34] In Korea, small- and medium-sized firms are defined in the Minor Enterprises Act.

(columns 1 to 3), but these firms could issue bonds more easily than firms located in ROK. Considering the sizes of the firms, large firms generally had better opportunities to issue bonds than did small and medium firms in all regions. Thus, small and medium firms were inferior to large firms in terms of management performance and internal reserves. In the case of industrial sectors, large firms showed high bond issues in construction and electric power sectors, and small and medium firms presented higher bond issues in the manufacturing sector than in other industrial sectors. Columns 4 to 6 show that only a few firms in each region could be financed by paid-in-capital increase. However, a large number of firms were heavily dependent on short-term and long-term loans in each region (columns 7 to 12). These firms had considerable financing constraints through the direct financial market (market-based financial system). Moreover, firms in ROK depended more on bank-based financing resources. The difference in long-term loans between regions was more significant than that in short-term loans even though the dependence on long-term loans in all regions decreased since 2000.

Table 4.2 Relative Share of Number of Firms by Financing Resources: Bond, Paid-in Capital Increase, Short-Term Loan, Long-Term Loan

(Unit: %)

Descriptions			Bond			Paid-in Capital Increase			Short-Term Loan			Long-Term Loan		
Year			1997-2000	2001-2004	2005-2009	1997-2000	2001-2004	2005-2009	1997-2000	2001-2004	2005-2009	1997-2000	2001-2004	2005-2009
SMA	Total		19.5	16.8	17.4	0.0	1.3	3.9	81.4	74.0	72.7	72.0	58.6	52.8
	Large Firms	Sub Total	43.2	35.0	32.6	0.0	2.5	5.6	82.7	70.6	64.9	78.4	63.8	55.7
		Construction	57.1	52.6	67.2	0.0	5.8	10.8	94.9	69.2	74.9	84.0	79.5	80.0
		Service	30.8	27.1	24.5	0.0	2.5	5.2	72.5	63.3	50.5	59.6	44.3	37.7
		Electric Power	66.7	66.7	93.3	0.0	0.0	0.0	75.0	50.0	80.0	100.0	100.0	100.0
		Manufacturing	51.3	38.7	33.5	0.0	2.1	5.3	89.5	77.2	75.4	93.2	77.5	66.7
	Small and Medium Sized Firms	Sub Total	10.9	10.1	11.8	0.0	0.9	3.3	80.9	75.2	75.5	69.7	56.7	51.7
		Construction	9.1	5.6	5.5	0.0	0.0	1.0	84.6	65.4	70.3	53.3	45.2	49.9
		Service	8.6	9.5	9.9	0.0	0.9	3.5	72.0	66.6	64.5	47.1	35.5	33.5
		Manufacturing	12.4	11.0	13.7	0.0	1.0	3.4	85.7	81.4	82.4	84.7	70.4	62.4
ROK	Total		13.3	11.2	12.2	0.0	0.7	2.6	85.4	79.4	79.2	81.8	71.8	65.6
	Large Firms	Sub Total	33.9	26.7	25.1	0.0	2.1	3.9	80.4	69.5	67.3	79.6	66.2	53.2
		Construction	58.3	66.7	60.0	0.0	12.5	6.7	75.0	62.5	60.0	70.8	66.7	73.3
		Service	23.1	15.1	10.2	0.0	0.9	3.4	60.4	53.8	51.7	47.6	42.0	32.5
		Electric Power	66.7	50.0	13.3	0.0	0.0	0.0	75.0	58.3	6.7	100.0	100.0	80.0
		Manufacturing	36.4	29.0	29.7	0.0	2.1	4.1	88.8	76.3	75.3	92.4	75.2	60.0
	Small and Medium Sized Firms	Sub Total	9.0	8.0	9.6	0.0	0.4	2.3	86.4	81.4	81.7	82.3	72.9	68.2
		Construction	7.8	3.6	4.7	0.0	0.0	0.7	79.4	69.4	68.9	65.0	55.0	50.4
		Service	5.8	6.8	7.0	0.0	0.2	2.3	80.5	76.9	75.6	59.1	50.9	52.7
		Manufacturing	9.9	8.8	10.8	0.0	0.5	2.6	88.7	84.1	84.7	89.9	80.3	74.1
Nation			17.2	14.7	15.5	0.0	1.1	3.4	82.9	76.0	75.1	75.7	63.5	57.6

Table 4.3 Relative Share of Financing Amount by Financing Resources: Bond, Paid-in Capital Increase, Short-Term Loan, Long-Term Loan

(Unit: %)

Descriptions			Bond			Paid-in Capital Increase			Short-Term Loan			Long-Term Loan		
Year			1997-2000	2001-2004	2005-2009	1997-2000	2001-2004	2005-2009	1997-2000	2001-2004	2005-2009	1997-2000	2001-2004	2005-2009
SMA	Total		16.0	12.8	12.6	0.0	3.5	1.6	12.8	8.8	8.5	9.8	5.5	5.9
	Large Firms	Sub Total	16.2	12.9	12.6	0.0	3.2	1.1	12.2	7.9	7.0	9.6	5.3	5.7
		Construction	20.6	9.9	10.6	0.0	3.4	0.6	23.9	4.5	6.0	11.2	3.7	3.0
		Service	7.4	13.4	15.4	0.0	3.5	0.7	8.2	6.7	5.5	3.1	3.5	5.7
		Electric Power	74.8	34.6	33.0	0.0	0.0	0.0	11.8	7.4	5.6	40.3	15.5	8.8
		Manufacturing	18.3	9.0	7.2	0.0	2.4	1.7	15.7	10.1	8.5	13.8	5.4	5.5
	Small and Medium Sized Firms	Sub Total	13.4	9.8	11.8	0.0	5.0	10.8	18.1	15.9	19.4	11.4	7.9	8.8
		Construction	12.4	6.8	7.3	0.0	0.0	7.5	24.7	10.6	16.3	16.8	12.5	16.9
		Service	19.4	13.2	20.9	0.0	11.2	15.5	19.6	16.5	19.0	10.0	8.5	9.8
		Manufacturing	11.2	8.8	9.8	0.0	4.2	9.7	16.5	16.3	19.9	11.2	7.3	7.4
ROK	Total		19.8	14.1	10.0	0.0	40.9	3.1	20.3	13.2	12.3	13.3	7.6	4.9
	Large Firms	Sub Total	20.5	14.2	10.3	0.0	26.6	3.3	19.8	11.1	8.5	12.3	6.3	3.2
		Construction	22.1	6.1	22.3	0.0	86.9	1.1	23.7	21.8	11.4	14.4	8.4	10.1
		Service	19.5	15.9	15.2	0.0	0.7	8.3	18.4	13.2	16.3	16.0	5.8	5.1
		Electric Power	39.6	15.4	3.8	0.0	0.0	0.0	36.6	15.1	7.4	45.3	14.4	4.7
		Manufacturing	19.3	14.6	9.4	0.0	2.1	0.7	19.1	9.8	7.6	10.6	5.8	2.7
	Small and Medium Sized Firms	Sub Total	15.5	11.5	7.3	0.0	7.9	4.8	21.1	17.5	20.0	15.7	10.7	9.4
		Construction	12.3	11.7	9.0	0.0	0.0	3.5	29.0	11.2	17.6	21.7	11.2	10.3
		Service	13.7	10.4	14.2	0.0	4.1	6.0	25.5	19.4	19.1	13.2	14.1	15.1
		Manufacturing	16.5	12.0	6.3	0.0	8.5	4.8	18.9	18.1	20.5	15.3	10.1	8.5
Nation			16.5	13.0	12.2	0.0	17.3	1.7	14.1	9.6	9.3	10.3	5.9	5.7

Table 4.3 describes the relative share of the financing amount by financing resources to the average sale amount of firms in each financing situation. As shown in columns 1 to 3, the firms located in ROK issued a higher amount of bonds to the average sale amount of firms in bond issues than did the firms located in SMA. Thus, although the absolute number of firms issuing bonds was smaller in ROK than in SMA, the issue limit of bonds to the average sale amount of firms was larger in ROK. However, considering the firm size, large firms had significant advantages over small and medium firms in terms of opportunity costs in bond issues in all regions. Columns 4 to 6 show the same results as those in Table 4.2. Only a few firms in each region were financed by paid-in-capital increase. Based on the amount of short-term loans to the average sale amount of firms in columns 7 to 9, firms in ROK were more dependent on financing short-term loans. In short, firms in ROK were inferior in financing through the direct financial market (market-based financial system).

For regional economic activation, the Act on Regional Credit Guarantee Foundation was established in 1999 in Korea. Based on this act, 16 local governments [35] founded their Credit Guarantee Foundation in 2000. Aggregated national average credit guarantee amounts per firm decreased continuously since 2000 (Table 4.4). Especially in Seoul among SMA regions, average credit guarantee amounts per firm dropped by 22.2% in 2000 according to the 2009 records; this level was the lowest in Korea. Among SMA regions, only in Incheon did average credit guarantee amounts per firm

[35] Korea has 16 metropolitan regions, and each region has a local government.

in 2009 increase compared with that at the beginning year of 2000. The North Jolla and Jeju regions established the institutions last. The North Jolla, which is located in South Seoul, showed the lowest average credit guarantee amounts per firm in 2009. The average credit guarantee amounts in ROK regions were generally lower than the national average. Thus, firms in ROK were inferior in terms of financial credit assistance of local governments to firms in SMA, which could cause them financial constraints. Since the financial crisis in 2008, credit guarantee amounts of all local governments decreased. SMA and ROK showed sharp decreases by (-) 14.5% and (-) 18.6% in 2008 and by (-) 13.4% and (-) 13.1% in 2009, respectively. Moreover, the national average decreased by (-) 16.4% and (-) 13.4% in 2008 and 2009 compared with that in the previous year. During the financial crisis, the local government significantly reduced its financial offering. This move was expected to impede the output growth of firms.

Table 4.4 Average Credit Guarantee Amounts per Firm

(Unit: Million Won)

Region		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SMA	Seoul	73.14	53.75	36.07	27.91	26.02	18.96	19.04	18.21	17.02	16.20
	Incheon	17.79	16.06	16.92	19.75	20.95	22.82	23.66	24.41	20.85	19.18
	Kyounggi	34.74	27.14	25.07	24.86	28.46	34.26	34.44	32.82	25.41	19.13
	Average	36.87	30.90	27.07	25.27	26.58	24.97	25.10	23.75	20.31	17.59
ROK	Busan	32.42	30.48	30.19	29.95	29.70	28.96	29.19	27.32	20.63	18.42
	Daegu	29.14	27.31	27.39	27.32	27.29	27.13	22.23	21.10	18.82	17.64
	Gwangju	35.69	29.52	29.52	26.56	24.80	22.99	21.34	20.50	16.05	13.83
	Daejeon	23.51	22.95	23.19	22.84	22.95	22.74	21.78	21.83	18.10	14.98
	Ulsan	54.08	43.25	35.65	30.66	30.60	31.29	34.27	32.09	23.45	18.38
	Kangwon	45.01	37.56	32.32	31.07	30.74	31.57	30.26	28.81	19.67	15.85
	Chungbuk	23.39	24.02	23.89	21.84	21.34	20.97	21.01	22.87	19.12	16.37
	Chungnam	53.25	42.15	37.21	33.69	32.00	28.89	27.48	27.69	20.98	18.01
	Jeonbuk	-	-	-	27.85	28.59	23.12	19.62	17.20	14.43	11.34
	Jeonnam	-	22.35	21.42	21.93	25.00	23.58	22.33	21.72	17.01	14.63
	Kyoungbuk	45.89	41.88	26.19	22.02	20.62	19.13	19.35	19.61	16.75	16.44
	Kyoungnam	28.71	25.39	24.68	22.02	20.36	20.73	19.96	19.12	17.28	15.96
	Jeju	-	-	-	20.83	22.92	21.47	24.52	25.30	23.71	17.38
	Average	31.42	29.16	28.24	26.70	26.07	25.18	23.81	23.02	18.73	16.27
National Average		33.86	30.07	27.60	25.88	26.35	25.06	24.53	23.43	19.57	16.95

Data was aggregated annually, which was supplied by the Small and Medium Business Administrative.

As regards local tax revenue, the gap between SMA and ROK widened 1.7 times in 2009, but little difference was observed in 1997 (Figure 4.1). Figure 4.2 describes the local government expenditures. The total local government expenditures in two regions increased since 1997.

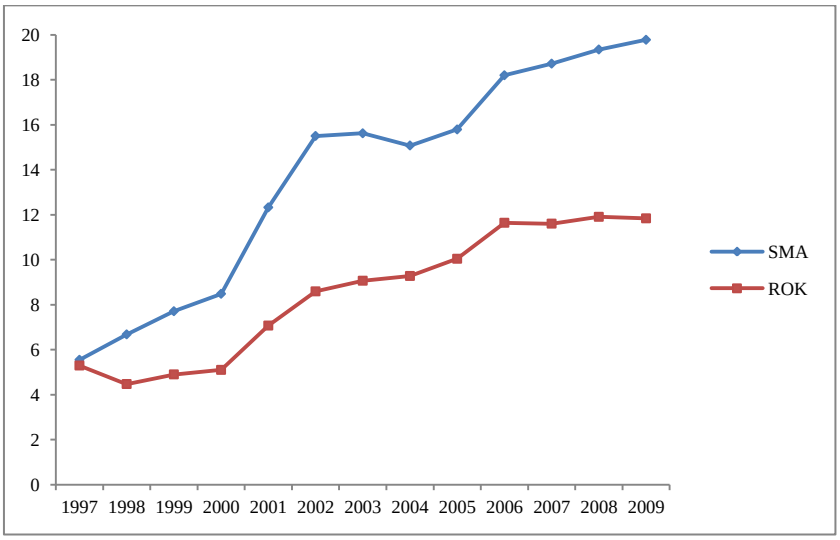


Figure 4.1 Local Tax Revenue (Unit: Trillion Won)

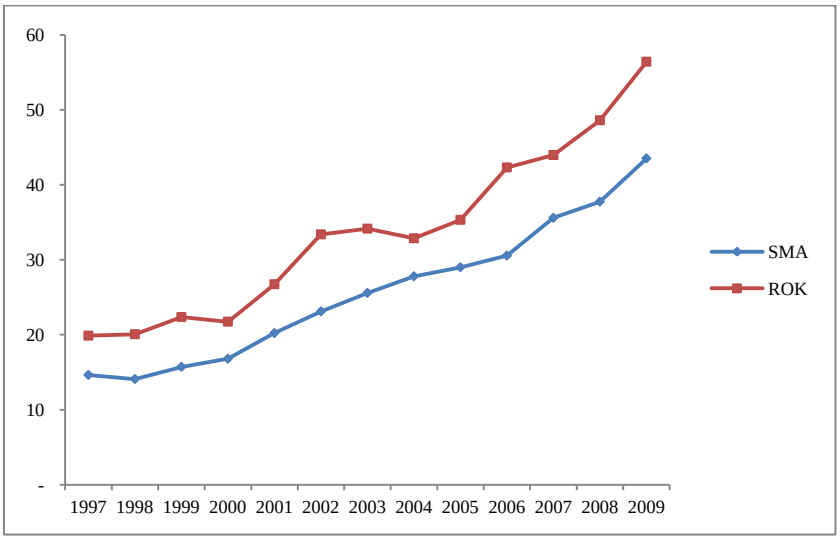


Figure 4.2 Total Local Government Expenditures (Unit: Million Won)

Firms in ROK were inferior in financing through the direct financial market (market-based financial system). Moreover, firms in ROK were dependent on financing short-term loans. Only a few firms in each region were expected to be financed by paid-in-capital increase, which would continue to constrain financing for firms in ROK. The average credit guarantee amounts of local governments in ROK were generally lower than the national average. Thus, firms in ROK were inferior in terms of financial credit assistance of local governments to firms in SMA, which could also cause them financial constraints.

4.3.2 Analysis

King and Levine (1993a, 1993b) found that financial sectors and human capital affect productivity through the production channel. In their empirical analysis, Guiso et al. (2004) showed that financial development positively affects the creation and the output growth of firms. Thus, this study estimated which financial resources financed by each financial system contributed to the output growth of firms with financial tools and fiscal policies of local governments, respectively. The output growth model of firms was considered, including the financial sectors in this study. This aspect was identified as the financial productivity that affects the capital productivity and was compared with the skilled labor technology that affects labor productivity under the endogenous economic growth model. This process ultimately induced the increasing returns to scale and the scale of economies by enhancing the capital

productivity. The basic form of the output growth model of firms including financial sectors is expressed as Equation (4.1).

$$\ln Y_{i,t} = a + \alpha \ln L_{i,t} + \beta \ln K_{i,t} + \gamma \ln F_{i,t} + \varepsilon_{i,t} \qquad (\gamma = \lambda\beta) \qquad (4.1)$$

where *Y*, *L*, and *K* represent output, labor, and capital, respectively, of firm *i* in year *t*. *F* implies each financial source such as short-term loans, long-term loans, bond issues, and paid-in-capital increase. α and β denote labor and capital share rate, respectively. γ represents financial productivity. If the financial sectors develop the most significantly, the rate of growth in the financial productivity will increase and affect the output growth of firms. However, this study considered how various financial resources financed by each financial system contribute to the output growth of firms through the productive channels. Thus, the estimated results of the financial resources could be different.

This study employed multi-level statistical models useful in analyzing hierarchical structural data (Goldstein, 2003). For example, firms are the *Level 1* units clustered within regions, which are the *Level 2* units. Determinants of the output growth of firms at the micro level can be different from the results at the macro level. The dependent variable is the total amount of sales of each firm, which indicates the output growth of each firm. The total amount of tangible fixed assets and total number of employees were used as the capital and labor variables, respectively. The amounts of short-term and long-term loans, bond issues, and paid-in-capital increase were included

among the independent variables as financial resources. The local credit guarantee amounts, local tax revenue, and total expenditures of each local government were included as regional macro variables. The total expenditures of each local government were divided into investment expenditures and non-investment expenditures. These variables affect the output growth of firms as financial tools and fiscal policies of the local governments examined by this study. Financial crisis and firm size dummies indicate the economic shock and the effect of large firms on the output growth of firms, respectively. The data spanned the period of 1997 to 2009. Sixteen metropolitan regions in Korea were included. The final estimated equations on the two-level models are as follows:

Random effect model

Level 1

$$\ln y_{ij,t} = \beta_j^0 + \varepsilon_{ij} \qquad \varepsilon_{ij} \sim N(0, \sigma_\varepsilon^2) \tag{4.2}$$

Level 2

$$\beta_j^0 = \gamma^o + \upsilon_j^0 \qquad \upsilon_j^0 \sim N(0, \sigma_\upsilon^2) \tag{4.3}$$

Random intercept model

Level 1

$$\ln y_{ij,t} = \beta_j^0 + \sum_{k=1}^{K} \beta_j^k \ln x_{ij,t}^k + \varepsilon_{ij} \qquad \varepsilon_{ij} \sim N(0, \sigma_\varepsilon^2) \tag{4.4}$$

Level 2

$$\beta_j^0 = \gamma^o + \sum_{s=1}^{S} \gamma_j^{0s} \ln z_{j,t}^s + \upsilon_j^0 \qquad \upsilon_j^0 \sim N(0, \sigma_\upsilon^2) \tag{4.5}$$

Random slope model

Level 1

$$\ln y_{ij,t} = \beta_j^0 + \sum_{k=1}^{K} \beta_j^k \ln x_{ij,t}^k + \varepsilon_{ij} \qquad \varepsilon_{ij} \sim N(0, \sigma_\varepsilon^2) \qquad (4.6)$$

Level 2

$$\beta_j^k = \gamma_j^k + \sum_{s=1}^{S} \gamma_j^{ks} \ln z_{j,t}^s + \upsilon_j^k \qquad \upsilon_j^k \sim N(0, \sigma_\upsilon^2) \qquad (4.7)$$

Random intercept-slope model

Level 1

$$\ln y_{ij,t} = \beta_j^0 + \sum_{k=1}^{K} \beta_j^k \ln x_{ij,t}^k + \varepsilon_{ij} \qquad \varepsilon_{ij} \sim N(0, \sigma_\varepsilon^2) \qquad (4.8)$$

Level 2

$$\beta_j^0 = \gamma_j^0 + \upsilon_j^0$$

$$\beta_j^k = \gamma_j^k + \sum_{s=1}^{S} \gamma_j^{ks} \ln z_{j,t}^s + \upsilon_j^k \qquad \upsilon_j \sim N(0, \sigma_\upsilon^2) \qquad (4.9)$$

where *y* represents the output of firm *i* (*i = 1… m*) in region *j* (*j = 1… n*) and in time *t*. *x* includes labor, capital, each financial resource, and financial crisis and firm size dummies.[36] *z* represents regional macro variables as local government policies. *Level 1* and *Level 2* imply the firm level and the regional level, respectively, in each model. Equation (4.9) includes variance of intercept, variance of parameter, covariance between intercept and parameter, and residual of firm level as a random effect. The deviations of the output growth of firms can be interpreted by these effects, which can be divided into the disparity among firms and among regions.

Table 4.5 presents the results of the output growth model of firms for 16

[36] Linear variables are grand mean-centered regardless of region. In the alternative random intercept-slope model, the set of *x* variables includes the set of *z* variables.

metropolitan regions. As regards financial resources, the short-term loan positively affected the output growth of most firms except those in the North Gyoungsang and Jeju regions. However, the effects of long-term loan on the output growth of firms were negative except that on firms in the South Jolla and Jeju regions. In the South Jolla region, only long-term loans among the financial resources positively affected the output growth of firms. In the North Jolla region, only short-term loans among the financial resources positively affected the output growth of firms. In the review of previous literature, Schmidt et al. (1999) stressed that banks persistently hold an important role by emphasizing the supply of short-term loans, but Koo (2007) found that the profit-oriented management of banks weakens long-term financing and investment in small and medium companies in Korea. The parameters of estimating short-term and long-term loans show results similar to those of the previous studies. Bond positively affected the output growth of firms, and paid-in-capital increase had a positive effect only in the Gyounggi region. However, previous studies pointed out the inefficient allocation of resources of the bank-based financial system because of the financial crisis. Small and medium firms were expected to lead the regional economies in the North Chungchong, North Jolla, and Jeju regions. The financial crisis affected the economy of Gwangju region the most significantly. The effect of each financial resource such as the market-based and the bank-based system was different per region. The sum of elasticity for each financial sector was low in the Daejeon and Jeju regions. Thus, financing among regions was constrained by each financial resource.

Table 4.5 Estimation of Output Growth Model of Firms for 16 Metropolitan Regions

Variable	Seoul	Busan	Daegu	Incheon
	Parameter	Parameter	Parameter	Parameter
Intercept	10.737***	10.688***	10.511***	10.457***
Log (Labor)	0.898***	0.949***	0.965***	0.860***
Log (Capital)	0.102***	0.051***	0.035*	0.140***
Firms Size Dummy (Large Firms=1)	0.062***	-0.041	0.015	0.473***
Log (Short-Term loan)	0.031***	0.024***	0.019**	0.017**
Log (Long-Term loan)	-0.003	-0.022***	-0.039***	-0.034***
Log (Bond)	0.020***	0.037***	0.059***	0.011**
Log (Paid-in-Capital Increase)	0.002	-0.005	-0.022	-0.002
Financial Crisis Dummy (1997~1999)	-0.654***	-0.713***	-0.682***	-0.685***
Adj R-Sq	68.98	50.85	63.90	70.72
Variable	Gwangju	Daejon	Ulsan	Gyounggi
	Parameter	Parameter	Parameter	Parameter
Intercept	10.801***	10.406***	10.647***	10.522***
Log (Labor)	0.718***	0.824***	0.886***	0.837***
Log (Capital)	0.282***	0.176***	0.114***	0.163***
Firms Size Dummy (Large Firms=1)	-0.066	0.177*	0.299***	0.162***
Log (Short-Term loan)	0.031**	0.029**	0.011	0.018***
Log (Long-Term loan)	-0.070***	-0.035***	0.009	-0.015***
Log (Bond)	0.001	-0.008	0.004	0.019***
Log (Paid-in-Capital Increase)	0.010	-0.099	-0.052	0.019*
Financial Crisis Dummy (1997~1999)	-1.013***	-0.057***	-0.862***	-0.625***
Adj R-Sq	49.92	57.77	77.11	67.45
Variable	Kangwon	North Chungchong	South Chungchong	North Jolla
	Parameter	Parameter	Parameter	Parameter
Intercept	10.227***	10.488***	10.514***	10.661***
Log (Labor)	0.883***	0.896***	0.893***	0.921***
Log (Capital)	0.117***	0.104***	0.107***	0.079***
Firms Size Dummy (Large Firms=1)	-0.088	-0.157***	0.433***	-0.215**
Log (Short-Term loan)	0.001	0.020***	-0.006	0.026**
Log (Long-Term loan)	-0.003	-0.028***	-0.039***	-0.003
Log (Bond)	0.033**	0.015*	0.041***	0.014
Log (Paid-in-Capital Increase)	-0.087	0.004	-0.038*	0.023
Financial Crisis Dummy (1997~1999)	-0.642***	-0.634***	-0.608***	-0.619***
Adj R-Sq	57.33	54.33	63.60	64.43
Variable	South Jolla	North Gyoungsang	South Gyoungsang	Jeju
	Parameter	Parameter	Parameter	Parameter
Intercept	10.560***	10.594***	10.613***	10.682***
Log (Labor)	0.873***	0.856***	0.942***	0.750***
Log (Capital)	0.127***	0.144***	0.058***	0.250***
Firms Size Dummy (Large Firms=1)	-0.126	0.043	0.086*	-0.951***
Log (Short-Term loan)	-0.015	-0.011*	0.023***	-0.158***
Log (Long-Term loan)	0.041***	0.002	-0.020***	0.076***
Log (Bond)	-0.004	0.029***	0.024***	0.098
Log (Paid-in-Capital Increase)	-0.020	0.007	0.011	-1.164
Financial Crisis Dummy (1997~1999)	-0.772***	-0.675***	-0.722***	-0.432*
Adj R-Sq	65.70	65.88	63.42	48.05

, **, and * meant respectively the statistical significance at 10%, 5%, and 1%.*

Each estimated parameter was regressed by regional macro variables such as local government credit guarantee, local tax revenue, investment expenditures, and non-investment expenditures of each local government. Column 2 in Table 4.6 shows that the credit guarantee of the local government positively affects the elasticity of each parameter. The effect of credit guarantee is the highest on bond issues. However, in column 3, the sign of local tax revenue is negative for all parameters. Thus, a low regional tax burden can be helpful in financing the output growth of firms. Investment expenditures of each local government positively affected the elasticity of paid-in-capital increase. The effects of investment expenditures as local government policy on the elasticity of labor, capital, short-term loans, long-term loans, and bond issues were unclear.

Table 4.6 Estimation of Each Parameter in Output Growth Model of Firms

Dependent Variable	Intercept	Log (Credit Guarantee)	Log (Local Tax Revenue)	Log (Non-Investment Expenditures)	Log (Investment Expenditures)
Intercept	5.882***	0.798***	-0.643*	0.658	0.187
Labor	-3.338*	0.840***	-0.753*	0.696	0.208
Capital	-3.675**	0.883***	-0.582*	0.481	0.219
Short-Term loan	-4.246***	0.848***	-0.501*	0.394	0.259
Long-Term loan	-4.286**	0.845***	-0.618*	0.497	0.275
Bond	-4.128**	0.853***	-0.616*	0.524	0.239
Paid-in-Capital Increase	-5.229***	0.794***	-0.134	-0.109	0.449**

, **, and * meant respectively the statistical significance at 10%, 5%, and 1%.*

Thus, the credit guarantee of local government and the reduction of regional tax burden are important in financing the output growth of firms. The present role of credit guarantee of the local government expands from credit offering to loans to participation in the direct financing resources, such as bond of buying firms or takeover of paid-in-capital increase. Moreover, the

investment expenditures of each local government play a more active role such as financial support.

Table 4.7 presents the results of five multi-level statistical models and the ordinary least square (OLS) model. The model fitness of the random intercept-slope model is the highest among five multi-level statistical models. First, the random effect model in column 1 shows that the disparity of growth among firms was 2.361, but the regional deviation of output growth of firms was 0.051 based on the random effect. Thus, disparities of output growth were present among firms and regions. However, in the random intercept model (column 2), the disparity of output growth among firms was reduced, whereas the regional disparity increases. In fixed effects, the short-term loan in the bank-based system and the bond and paid-in-capital increase in market-based system efficiently manage the output growth of firms. However, a negative effect was observed for the long-term loan from indirect financial sectors. This result is similar to the previous estimation results of the output growth model for 16 metropolitan regions. The ideal case is that firms will be financed by banks for short periods or urgent cases but will raise funds from the market for long periods. This method affects the cost and rollover burden of long-term loans. This method is also caused by the profit-oriented management of banks pointed out in the previous study, which weakened the long-term financing for firms in Korea. The effect of bond on the output growth of firms was 5.38 times larger than that of paid-in-capital increase. Regional macro variables show that local government investment expenditures more positively affected the output growth of firms than non-

investment expenditures. However, the current credit guarantee program of the local government is inefficient because it negatively affects the output growth of firms. The credit guarantee program of the local government must be revised to contribute to the financing and growth of firms. Moreover, the tax burden was insignificant. The large firms showed economic growth higher by 0.40%. The financial crisis shock decreased the economic growth of firms by (-) 0.53%.

The random slope and the random intercept-slope model in columns 3 and 4, respectively, imply a regional disparity of financial tools and fiscal policies as local government policies. As a result, the random intercept-slope model in column 4 shows that the regional deviation of output growth of firms, which was recorded at 7.105, increased even more than the random intercept model from random effects. The local tax revenue shows a positive effect on the regional level for the output growth of firms in the random intercept-slope model. Thus, if the local government achieves a higher fiscal self-reliance ratio from more local tax revenue, the national loan or deficit finance will decrease, which will be helpful to the regional economy. The effect of credit guarantee of local government shows a sign at the regional level different from that of the fixed effect in the random intercept model. However, the effect of investment expenditures was the most significant, whereas the effect of credit guarantee of the local government was the least significant. The random effects in column 4 show that each regional macro variable was activated differently for the output growth of firms at the regional level. In the fixed effect, each independent variable shows results similar to those of the

random intercept model.

Table 4.7 Estimation of Multi-Level Statistical Models

Variable	Random Efficient	Random Intercept	Random Slope	Random Intercept -Slope	OLS	Alternative Random Intercept -Slope
fixed effect						
Intercept	10.311***	2.105***	0.320	0.115	10.524***	0.057
Firm Specific Variables						
Log (Labor)		0.721***	0.722***	0.722***	0.724***	0.722***
Log (Capital)		0.083***	0.082***	0.082***	0.076***	0.082***
Firms Size Dummy (Large Firms=1)		0.403***	0.403***	0.403***	0.446***	0.403***
Financial Variables						
Log (Short-Term loan)		0.026***	0.026***	0.026***	0.028***	0.026***
Log (Long-Term loan)		-0.004***	-0.003**	-0.004***	-0.002	-0.004***
Log (Bond)		0.043***	0.043***	0.043***	0.041***	0.043***
Log (Paid-in-Capital Increase)		0.008*	0.007*	0.007*	-0.001	0.007*
Regional Macro Variables						
Financial Crisis Dummy (1997~1999)		-0.530***	-0.285***	-0.239***	-0.662***	-0.302***
Log (Credit Guarantee)		-0.062***				-0.021
Log (Local Tax Revenue)		0.017				0.228***
Log (Investment Expenditures)		0.553***				0.458***
Log (Non-Investment Expenditures)		0.015				0.047
random effect						
level 1						
Intercept	2.361***	0.743***	0.741***	0.740***		0.740***
level2						
Intercept	0.051***	0.119***		7.105***		4.636***
Regional Macro Variables						
Log (Credit Guarantee)			0.001*	0.001		0.001
Log (Local Tax Revenue)			0.025	0.083**		0.017**
Log (Investment Expenditures)			0.339***	0.290***		0.017**
Log (Non-Investment Expenditures)			0.054*	0.014*		0.006*
Chi-Square	686.95***	799.78***	1765.56***	1795.96***		875.67***
Adj R-Sq					67.62	

, **, and * meant respectively the statistical significance at 10%, 5%, and 1%.*

Using the OLS method, the effect of long-term loan on financial resources was insignificant. Paid-in-capital increase was negative even if it was insignificant. This unclear result suggests an error or misunderstanding in the policy on decision making. In short, the clear regional disparity present in financial tools and fiscal policies of local governments in Table 4.7 was

compared with the results of estimating each parameter in the output growth model in Table 4.6. Thus, the regional economy was activated positively and differently at the macro level. Although the credit guarantee of the local government is affected reversely at the micro and macro levels, the local government credit guarantee program must be revised more efficiently to contribute to the financing and the output growth of firms. The local government needs to establish a vigorous fiscal policy on economic activities and financial support for firms that focus on investment expenditures. The relationship between the market-based system and the bank-based system must be mutually complementary even though the direct financing market significantly affects the output growth of firms more.

Table 4.8 illustrates how the output growth of firms changes per region depending on the financial tools and fiscal policies as local government policies using the random intercept-slope model.[37] The random intercept-slope model shows that the firms in SMA regions recorded an average of (-) 0.380 in the output growth change of firms, and the firms in ROK recorded an average of 0.088. Thus, the effects of financial tools and fiscal policies were higher in the ROK regions than in the SMA regions. For example, among SMA regions, Seoul, the capital of Korea, and Gyounggi exhibited negative change of (-) 1.669 and (-) 0.094, respectively. Among SMA regions, Incheon exhibited a small positive change of 0.624. Among ROK regions, Jeju exhibited the highest change rate in the output growth of firms from financial tools and fiscal policies. Kangwon, Choungchong, and South Gyoungsang

[37] The fitness of this model is high among the five multi-level statistical models.

regions showed the second highest change in the output growth of firms. However, four metropolitan cities[38] in ROK regions exhibited negative output growth change rates from financial tools and fiscal policies as local government policies. The previous analysis confirms regional disparity in the financial tools and fiscal policies of the local government. Firms in ROK regions were inferior in the financial credit assistance of local governments to firms in SMA, which could cause them financial constraints. Thus, financial tools and fiscal policies are more diversified in ROK regions. Moreover, the local government expenditures need to be examined in terms of efficiency and increased further. For example, Daejeon and Gwangju metropolitan cities had a population size similar to that of Kangwon province, but the former regions reported lower local government finance than the latter. Thus, balanced local government expenditures are required nationally.

Table 4.8 Changes in the Output Growth of Firms among Regions from Financial Tools and Fiscal Policies

Regions		Random Intercept-Slope Model	Alternative Random Intercept-Slope Model
SMA	Seoul	-1.669	-1.266
	Incheon	0.624	0.265
	Gyounggi	-0.094	0.447
ROK	Kangwon	2.668	1.860
	North Chungchong	1.813	1.779
	South Chungchong	1.385	1.692
	North Jolla	0.276	0.075
	South Jolla	-1.990	-1.477
	North Gyoungsang	0.792	0.817
	South Gyoungsnag	1.661	1.536
	Daejeon	0.218	0.235
	Daegu	-4.180	-3.646
	Ulasn	-1.662	-1.454
	Gwangju	-4.216	-3.105
	Busan	-0.756	-1.349
	Jeju	5.129	3.590

, **, and * meant respectively the statistical significance at 10%, 5%, and 1%.*

[38] These regions are Busan, Daegu, Gwangju, and Ulsan metropolitan city (Table 4.8).

As regards to current government policies in financial sectors, the regional financial policy of the local government must be revised in the direction more suitable to the output growth of firms through the participation in the direct financial system such as bond issues and paid-in-capital increase.

4.6 Conclusion and Policy Implications

This study analyzed the factors of output growth of firms in financial sectors considering the role of local government in regional government policies. The results of estimating the multi-level statistical models are as follows. First, firms in ROK are inferior in financing through the direct financial market (market-based financial system). Moreover, firms in ROK regions are inferior in the financial credit assistance of local governments to firms in SMA, which can cause them financial constraints. Second, the firms are financed by banks for short periods or urgent cases but raise funds from the market for long periods. The relationship between the market-based system and the bank-based system must be mutually complementary even though the direct financing market more significantly affects the output growth of firms. Third, financial tools and fiscal policies as local government policies positively and differently activate the output growth of firms per region at the macro level. This result continues to promote the regional deviation of output growth of firms. Fourth, the local government should establish a vigorous fiscal policy on economic activities and financing

assistance for firms. The local government credit guarantee program must also be revised more efficiently to contribute to the financing and the output growth of firms. For example, the screen system should be improved. Fifth, the effects of financial tools and fiscal policies are high in ROK regions. Therefore, financial tools and fiscal policies should be more diversified in these regions. Lastly, the regional financial policy of the local government must be revised in the direction more suitable to the output growth of firms through the participation in the direct financial system such as bond issues and paid-in-capital increase. This requirement is related to the recent rapidly changing financial environments, such as the increasing influence of direct financing and the enactment of the Capital Market Integration Act.

Future studies may consider the year growth effect of financing resources because of the time lag between the financing and the investment periods. In terms of year growth effect, the overlapping generation model can be used. Moreover, regions must be broken down further such as by county level. Further division will reflect more minutely the regional deviation of financial tools and fiscal policies as local government policies. The regional trade among real sectors aside from financial sectors can be represented in the model. Thus, the regional economic growth can be determined not only by production, consumption, and trade but also by saving and investment through direct and indirect financial markets.

Chapter V

Conclusion

5.1 Summary

Regional development and policy are major issues in regional economics. Chapter II analyzed the effect of labor or population mobility between the two regions on regional economies. Residing and working in the same region are found to be beneficial. Indirect utility is also maximized when the residence follows the work site in the mobility. The ratio of or the gap between indirect utilities is affected by transportation and mobility costs. The transportation cost negatively affects indirect utility. A laborer's indirect utility decreases in his mobility cost. Agglomeration economies improve in the increasing population. Finally, the case of residing and working in the same region is more beneficial than residing and working in different regions. As a result, for the success of Sejong City, the residential and work sites need to be reconciled without having to commute to the SMA region. Finally, the key issue is the policy of migration to Sejong City for a short period of time, which needs to involve subsidies or incentives. Agglomeration economies depend on the number of migrants who settle in Sejong City. Consequently, economic activities should be relocated in the target region. Numerical simulation showed that high transportation and commuting costs induce labor and population dispersion to the Choungchong region, including Sejong City, and

positively affect the output growth. However, social welfare also decreases. Therefore, subsidies and tax policies are needed to achieve labor and population dispersion in the Choungchong region, including Sejong City, without a decrease in welfare.

Chapter III examined the economic growth patterns of the less developed regions and identifying the reasons why the less developed regions continuously show low income growth. The results showed that there were regions that remained as less developed for a long time, which can be considered as structured. The less developed regions recorded a low average regional income levels from 1998 to 2009 and even lower regional income growth rates in 2009 against 1998 compared with the national average. The less developed regions were mostly concentrated in the Eastern and South-Western areas of Seoul, Korea. Most of the less developed regions grew less during the recovery periods compared with the developed regions. Consequently, there was an asymmetric regional income growth structure among the less developed regions that significantly hindered the regional income growth; specifically, the structural factor caused the low income growth among less developed regions. The developed regions were expected to be clustered and become richer by means of the neighboring effect. The neighboring developed regions pulled most of the regional income growth of the less developed regions. The greater the disparity between the neighboring developed regions and the less developed regions the more it hindered the regional income growth of the latter. Reducing the disparity between the neighboring regions and the less developed regions would result in the growth

of the regional economies of the latter. Finally, the results on the neighboring effects, the effects of industrial structures, and population are very important to the present discussion. Moreover, the empirical results of concentration in manufacturing sector suggest that the relocation of manufacturing facilities among regions may be required. In addition, capital enlargement, reinforcement of the manufacturing basis, and a more active role in of regional government, including the optimal regional tax burden, were needed to facilitate regional income growth in the less developed regions.

Lastly Chapter IV analyzed the factors of output growth of firms in financial sectors considering the role of local government in regional government policies. Firstly, firms in ROK are inferior in financing through the direct financial market (market-based financial system). Moreover, firms in ROK regions are inferior in the financial credit assistance of local governments to firms in SMA, which can cause them financial constraints. The relationship between the market-based system and the bank-based system must be mutually complementary even though the direct financing market more significantly affects the output growth of firms. Also, financial tools and fiscal policies as local government policies positively and differently activate the output growth of firms per region at the macro level. This result continues to promote the regional deviation of output growth of firms. Finally, the local government should establish a vigorous fiscal policy on economic activities and financing assistance for firms. The local government credit guarantee program must also be revised more efficiently to contribute to the financing and the output growth of firms. Also, financial tools and fiscal policies should

be more diversified in ROK regions. Lastly, the regional financial policy of the local government must be revised in the direction more suitable to the output growth of firms through the participation in the direct financial system such as bond issues and paid-in-capital increase.

5.2 Further research

This study approached to the regional development through three essays. From first thesis, in the further research, a simple two-region model may need to be extended to time-extend model including time constraints, as well as transportation and mobility costs. A dynamic model that includes changes in commuting or migration patterns between overlapping generations can be considered in future research. As an important factor that induces the migration between two regions, QOL should also be taken into account in future models.

In the second thesis, a spatial weighted matrix, such as discussing the accessibility based on railroad or road network beyond the contiguity, could be considered to extend the scope of the analysis. Moreover, the neighboring effect could be studied dynamically with the inclusion of a time variable. Manufacturing and service sectors could also be classified in a more detailed manner because energy, information and communication, and cultural industry have become important aspects included in the analysis. Finally, the change of the labor structure caused by a rapidly ageing society would be covered for the regional income growth.

The last thesis may consider the year growth effect of financing resources because of the time lag between the financing and the investment periods. In terms of year growth effect, the overlapping generation model can be used. Also, the regional trade among real sectors aside from financial sectors can be represented in the model. Thus, the regional economic growth can be determined not only by production, consumption, and trade but also by saving and investment through direct and indirect financial markets. In addition, the effect of local private finance such as credit association or village level institution for mutual savings and loans within a region would need to be researched.

Appendix I.

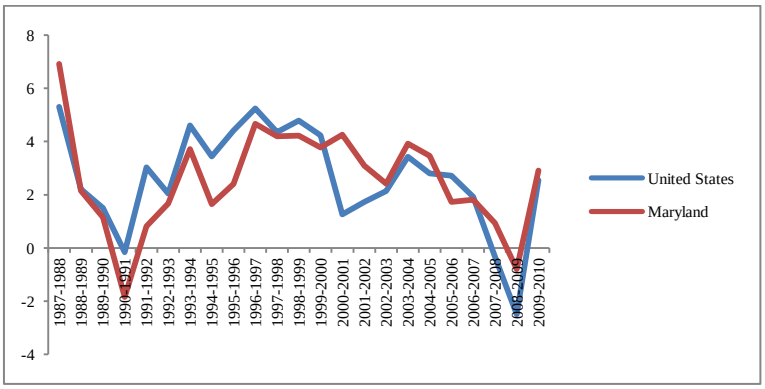


Figure I.1 Percentage Change in Real GDP of Maryland

Source: Bureau of Economic Analysis

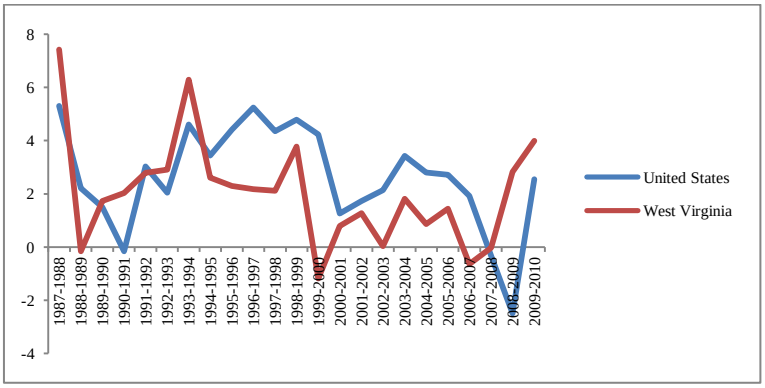


Figure I.2 Percentage Change in Real GDP of West Virginia

Source: Bureau of Economic Analysis

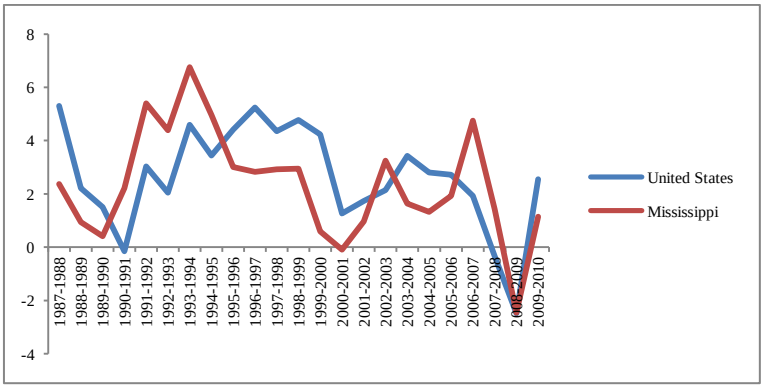


Figure I.3 Percentage Change in Real GDP of Mississippi

Source: Bureau of Economic Analysis

Appendix II.

With regards the factors leading to the poverty trap, first, a minimum threshold of capital is needed before modern production processes can be started. When *k* is very low, the marginal productivity of capital tends to be very low. Moreover, based on Figure II.1, small increments of *k* below a threshold k^T may insignificantly raise production based on Figure II.1. As a result, the poverty trap can occur under k^T.

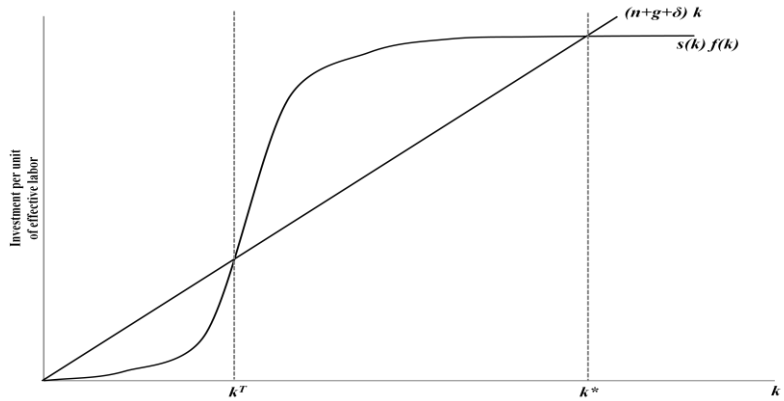


Figure II.1 Shortage of Capital Stock Threshold

Source: Sachs (2004)

Second, the savings rate was very low or even negative because of the impoverished households who divide their output into consumption and saving. Given that particular situation, these people are not capable of generating their own savings, rather, they use all (or more than all) of their current income for consumption. Therefore, *k* is very low and the saving trap occurs below a threshold k^T similar to the shortage of capital stock threshold, as shown in Figure II.1. These two cases showed two equilibria and suggest the very poor indeed get poorer and are pushed more into extreme poverty by the lack of capital accumulation, coupled with population growth and other input factors.

Lastly Sachs (2004) proposed a third factor that can push an economy into a poverty trap – the rapid population growth at low levels of k (shown in Figure II.2). Very poor people do not have any savings, and if they do, these are in the form of reproducible capital or human capital. On the contrary, these people save in the form of progeny. These people have low productivity, and as a result, the investment cannot follow the quantity of effective labor and the depreciated capital cannot be replaced. Finally, the capital stock accumulation does not hold k steady. Consequently, dk / dt become negative when $k < k^T$. The lack of capital accumulation, coupled with population growth and other input factors, push the economy into more extreme poverty and continuously low levels of regional economic growth.

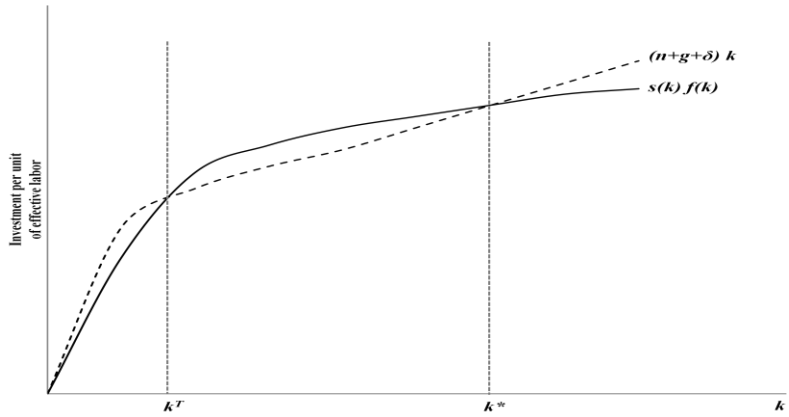


Figure II.2 Demographic Trap

Source: Sachs (2004)

Appendix III.

In the less developed regions, the savings rate was the key feature of reality. This was assumed to be at 0.329, and the growth rate of population and knowledge was set within the range of -0.4% to 2.3%. The depreciation rate was assumed to be 4.0%. The capital share in output, α, was set to a benchmark value of 0.3 in Non-Seoul Metropolitan Regions (Seo, 2008). The other high steady state was calibrated for the savings rate that was twice as high as calculated, but with no other changes in any of the parameters of the neoclassical growth model. It was presumed that the point at which savings rate jumped to the higher rate occurred to the left of what was shown as the poverty trap equilibrium. Finally, the capital share in the output and the depreciation rate were adjusted to solve the high steady state.

Appendix IV.

Table IV.1 Rank of GRP for the Developed Regions among 224 Regions

Area	Region	Rank : 2009	Rank : 1998	Area	Region	Rank : 2009	Rank : 1998
Seoul	Jongro	8	7	Kyounggi	Goyang	72	104
Seoul	Dongdae mungu	16	22	Kyounggi	Namyang ju	79	99
Seoul	Geumcheon gu	2	2	Kyounggi	Sihung	23	46
Seoul	Seochogu	15	17	Kyounggi	Gunpo	54	63
Seoul	Kangnamgu	3	8	Kyounggi	Yongin	7	15
Seoul	Songpagu	10	16	Kyounggi	Paju	21	69
Seoul	Kangdong gu	24	41	Kyounggi	Ansung	36	70
Busan	Kangseogu	27	74	Kyounggi	Kimpo	38	68
Daegu	Dalseogu	31	34	Kyounggi	Hwasung	5	30
Incheon	Joonggu	65	77	Kyounggi	Gwangju	48	71
Incheon	Donggu	49	62	Kyounggi	Yangju	50	65
Incheon	Namdonggu	28	32	Kyounggi	Pocheon	64	83
Incheon	Seogu	34	37	South Chungcheong	Cheonan	18	47
Daejeun	Yoosung	51	90	South Chungcheong	Asan	12	53
Kyounggi	Sungnam	37	61	South Chungcheong	Seosan	42	86
Kyounggi	Anyang	41	51	North Jeonla	Gunsan	66	66
Kyounggi	Bucheon	33	36	North Kyoungsang	Kyoungju	67	76
Kyounggi	Gwang myoung	69	89	North Kyoungsang	Gumi	11	9
Kyounggi	Pyoungtaek	6	48	South Kyoungsang	Kimhae	46	52
Kyounggi	Ansan	13	20	South Kyoungsang	Geuje	39	38

Appendix V.

Table V.1 Rank of GRP for the Less-Developed Regions among 224 Regions

Area	Region	Rank : 2009	Rank : 1998	Area	Region	Rank : 2009	Rank : 1998
Busan	Joonggu	210	182	South Chungcheong	Taean	206	201
Busan	Seogu	152	127	North Jeonla	Jeonju	109	67
Busan	Donggu	180	138	North Jeonla	Jeongeub	139	125
Busan	Jingu	130	85	North Jeonla	Namwon	170	173
Busan	Dongraegu	168	110	North Jeonla	Kimje	126	126
Busan	Namgu	114	112	North Jeonla	Muju	223	215
Busan	Bukgu	184	139	North Jeonla	Imsil	188	183
Busan	Haewondaegu	120	101	North Jeonla	Sunchang	205	194
Busan	Gumjunggu	97	73	North Jeonla	Buan	191	195
Busan	Yeonjegu	138	118	South Jeonla	Mokpo	144	116
Busan	Suyounggu	176	154	South Jeonla	Suncheon	118	123
Busan	Gijang	88	78	South Jeonla	Naju	115	103
Daegu	Joonggu	171	137	South Jeonla	Damyang	154	122
Daegu	Donggu	116	82	South Jeonla	Goksung	129	98
Daegu	Namgu	220	199	South Jeonla	Gurae	221	212
Daegu	Susunggu	167	124	South Jeonla	Goheung	187	178
Incheon	Kyeoyangu	101	79	South Jeonla	Bosung	185	187
Incheon	Kanghwa	164	163	South Jeonla	Hwasun	155	151
Gwangju	Donggu	209	177	South Jeonla	Jangheung	203	202
Gwangju	Namgu	198	157	South Jeonla	Kangjin	201	188
Daejeon	Donggu	163	115	South Jeonla	Haenam	143	131
Daejeon	Joonggu	161	109	South Jeonla	Muan	174	156
Daejeon	Seogu	128	107	South Jeonla	Ham pyoung	189	169
Kangwon	Chuncheon	156	148	South Jeonla	Yong kwang	207	197
Kangwon	Wonju	106	97	South Jeonla	Jangsung	121	113
Kangwon	Kangleong	142	119	South Jeonla	Wando	199	152
Kangwon	Donghae	146	111	South Jeonla	Jindo	214	211
Kangwon	Sokcho	217	204	South Jeonla	Shinan	192	191
Kangwon	Samchuk	132	130	North Kyoungsang	Andong	158	153
Kangwon	Hongcheon	131	129	North Kyoungsang	Euisung	173	165
Kangwon	Hweng sung	145	146	North Kyoungsang	Choung song	224	220
Kangwon	Youngweol	157	128	North Kyoungsang	Youngduk	194	192
Kangwon	Pyoung chang	193	196	North Kyoungsang	Choung do	183	172
Kangwon	Jeongsun	178	174	North Kyoungsang	Chilgok	94	75
Kangwon	Cheolwon	200	190	North Kyoungsang	Uljin	186	179
Kangwon	Yanggu	219	218	South Kyoungsang	Jinju	108	100

Area	Region	Rank : 2009	Rank : 1998	Area	Region	Rank : 2009	Rank : 1998
Kangwon	Inje	215	210	South Kyoungsang	Jinhae	100	87
Kangwon	Gosung	216	203	South Kyoungsang	Milyang	134	134
Kangwon	Yangyang	202	207	South Kyoungsang	Euir young	166	171
North Chungcheong	Chungju	117	117	South Kyoungsang	Namhae	218	214
North Chungcheong	Okcheon	159	150	South Kyoungsang	Hadong	204	193
North Chungcheong	Young dong	172	176	South Kyoungsang	San chung	195	198
North Chungcheong	Goesan	175	175	South Kyoungsang	Hapchun	196	161
North Chungcheong	Danyang	148	143	-	-	-	-

Reference

Abreu, M. and M. Savona, 2009, New regional policies for less developed areas: the case of India, In R. Capello and P. Nijkamp (eds.), *Handbook of Regional Growth and Development Theories*, MA: EE.

Acemoglu, D., 1996, "A Micro-foundation for Social Increasing Returns in Human Capital", *Quarterly Journal of Economics*, 111(3): 779-804.

Akai, N. and M. Sakata, 2002, "Fiscal decentralization contributes to economic growth: evidence from state-level cross-section data for the United States", *Journal of Urban Economics*, 52: 93–108.

Alonso, W., 1964, *Location and Land use*, Honolulu: Easr-West Center.

Allen, B., 1982, "Some stochastic processes exhibiting externalities among adopters", *International Economic Review*, 23(3): 595-608.

Alstadt, B., 2012, "The Relationship of Transportation Access and Connectivity to Local Economic Outcomes: A Statistical Analysis", *Transportation Research Board Annual Conference*.

Amos, O. M., 1992, "The regional distribution of bank closing in the United States from 1982 to 1988", *Southern Economic Journal*, 58: 801-815.

Amos, O. M. and J. R. Wingender, 1993, "A model of the interaction between regional financial markets and regional growth", *Regional Science and Urban Economics*, 23: 85-110.

An, M. and N. Kiefer, 1995, "Local externalities and societal adoption of technologies", *Journal of Evolutionary of Economics*, 5(2): 103-117.

Anas, A., R. Arnott and K. A. Small, 1998, "Urban spatial structure", *Journal of Economic Literature*, 36(3): 1426-1464.

Anas, A. and I. K. Kim, 1996, "General Equilibrium Models of Polycentric Urban Land Use with Endogenous Congestion and Job Agglomeration", *Journal of Urban Economics*, 40: 232-256.

Anas, A. and H. J. Rhee, 2006, "Curbing excess sprawl with congestion tolls and urban boundaries", *Regional Science and Urban Economics*, 36: 510-541.

Anas, A. and H. J. Rhee, 2007, "When are urban growth boundaries not second-best policies to congestion tolls?", *Journal of Urban Economics*, 61: 263-286.

Anas, A. and R. Xu, 1999, "Congestion, Land Use and Job Dispersion: A General Equilibrium Model", *Journal of Urban Economics*, 45: 451-473.

Anselin, L., A. Varga, and Z. Acs, 2000, "Geographicl Spillovers and University Research: A Spatial Econometric Perspective", *Growth and Change*, 31: 501-515.

Amstrong, H. and J. Taylor, 2000, *Regional Economics and Policy*, MA: Blackwell Publishing.

Arauzo-Carod, J. M., D. Liviano-Solis, and M. Manjon-Antolin, 2010, "Empirical Studies in Industrial Location: An Assessment of Their Methods and Results", *Journal of Regional Science*, 50(3): 685-711.

Armstrong, H. W., 2002, European Union regional policy: reconciling the convergence and evaluation evidence, In Cuadrado-Roura, J. R. and M. Parellada (eds.), *Regional Convergence in the European Union. Facts, Prospects and Policies*, Berlin: Springer.

Arnott, R., 2007, "Congestion tolling with agglomeration externalities", *Journal of Urban Economics*, 62: 187-203.

Artikis, G. P., A. Merikas, and G. S. Vozikis, 2011, "Revisiting the Use of Financial Incentives As an Instrument of Regional Economic Development Policy: The Case of Greece", *Journal of Applied Business Research*, 12(4): 89-99.

Au, C. C. and V. Henderson, 2002, "How migration restrictions limit agglomeration and productivity in China", *NBER working paper series*, No. 8707

Au, J. I. and K. D. An, 2006, "The causality analysis between migration and employment in Korea", *Issue paper in KIET*, 2006-216.

Baldwin, J. R., D. Beckstead, W. M. Brown, and D. L. Rigby, 2008, "Agglomeration and the Geography of Localization Economies in Canada", *Regional Studies*, 42(1): 117-132.

Bal. F. and P. Nijkamp, 1997, "Exogenous and Endogenous Spatial Growth Models", *Tinbergen Institute, Discussion Paper*, 97-022/3, Amsterdam.

Bali, T. G., 2000, "Testing the empirical performance of stochastic volatility models of the short-term interest rate", *Journal of Financial and Quantitative Analysis*, 35(2): 191-216.

Barro, R., 1991, "Economic Growth in a Cross-Section of Countries", *Quarterly Journal of Economics*, 106: 407–444.

Barro, R. J. and X. Sala-i-Martin, 1992, "Convergence", *The Journal of Political Economy*, 100(2): 223-251.

Bartik, T. J., 1991, *Who Benefits from State and Local Development Policies*, Kalamazoo, M.I.: W.E. Up John Institute for Employment Research.

Baum-Snow, N., 2007a, "Did highways cause suburbanization?", *Quarterly Journal of Economics*, 122: 775-805.

Baum-Snow, N., 2007b, "Suburbanization and transportation in the monocentric model", *Journal of Urban Economics*, 62: 405-423.

Beare, J. B., 1976, "A monetarist model of regional business cycles", *Journal of Regional Science*, 16: 57-63.

Beck, T. and R. Levine, 2001, "Stock Markets, Banks, and Growth", *Policy Research Working Paper*, 2670, The World Bank.

Beck, T. and R. Levine, 2002, "Industry growth and capital allocation: does having a market or bank system matter?", *Journal of Financial Economics*, 64: 147-180.

Becketti, S. and C. Morris, 1992, "Does money still forecast economic activity? Federal Reserve Bank of Kansas City", *Economic Review*, 77: 65-77.

Beckemann, M. J., 1973, "Equilibrium models of residential land use", *Regional and Urban Economics*, 3: 361-368.

Bell, A., 2002, "Locally interdependent preferences in a general equilibrium environment", *Journal of Economic Behavior and Organization*, 47(3): 619-652.

Berry, Y. K. and EL. Glaeser, 2005, "The Divergence of Human Capital Levels across Cities", *Papers in Regional Science*, 84(3): 407-444.

Birnie, J. E. and M. W. N. Hitchens, 1998, "Productivity and Income Per Capita Convergence in Peripheral European Economy: The Irish Experience", *Regional Studies*, 32: 223-234.

Black, D. and V., Henderson, 1999, "A Theory of urban growth", *Journal of Political Economy*, 107(2): 252-284.

Borts, G. H. and J. L. Stein, 1964, *Economic Growth in a Free Market*, NY: Free Press.

Breschi, S. and C. Lenzi, 2010, "Spatial Patterns of Inventors' Mobility: Evidence on US Urban Areas", *Papers in Regional Science*, 89(2): 235-250.

Bruce, D. and M. Mohsin, 2006, "Tax policy and entrepreneurship: New Time Series Evidence", *Small Business Economics*, 26(5): 409-425.

Carbo Valverde, S. and F. Rodriguez Fernandez, 2004, "The Finance-Growth Nexus", *European Urban and Regional Studies*, 11(4): 339-354.

Chandavarkar, A., 1992, "Of finance and development: Neglected and unsettled questions", *World Development*, 20(1): 133-142.

Chant, J., 1992, The new theory of financial intermediation, In Dowd, K. and Lewis, M. K. (eds.), *Current Issues in Financial and Monetary Economics*, London: Macmillan Education.

Chen, A. and N. Groenewold, 2011, "Regional Equality and National Development in China: Is There a Trade-off?", *Growth and Change*, 42(4): 628-669.

Chen, C. H. and H. L. Wu, 2008, "Fiscal Structures and Regional Economic Growth: Evidence from China's Fiscal Contract System", *The Journal of Developing Areas*, 41(2): 119-135.

Chell, E., 2007, "Social enterprise and entrepreneurship", *International Small Business Journal*, 25(1): 5-26.

Cho, B. H., 2004, "Financial Structure and Economic Growth: Bank-based System versus Capital Market-based System", *Journal of Korea Development Economics*, 10(2): 143-177.

Choi, J. S. and S. I. Cho, 2004, "Regional Finance and Regional Economic Development: A Test for Causality", *Journal of Industrial Economic Studies*, 17(1): 19-40.

Cohen, D. and M. Soto, 2007, "Growth and human capital: good data, good results", *Journal of Economic Growth*, 12: 51-76.

Combes, P., 2000, "Economic Structure and Local Growth: France 1984-1993", *Journal of Urban Economics*, 47: 329-355.

Cristopher, A. P. and I. McMaster, 1990, "Regional Migration, Wages and

Unemployment: Empirical Evidence and Implication for Policy", *Oxford Economic Papers*, 42(4): 812-831.

Cumming, D., 2007, "Government policy towards entrepreneurial finance: Innovation investment funds", *Journal of Business Venturing*, 22(2): 193-235.

Cushing, B. and J. Poot, 2004, "Crossing Boundaries and Borders: Regional Science Advantages in Migration Modelling", *Papers in Regional Science*, 83: 317-338.

Dao, M. Q., 2010, "Factor Mobility, Net Migration, Growth and the Lot of the Poorest Quintile in Developing Countries", *The Journal of Applied Economic Research*, 4(1): 127-137.

De Groot, H. L. F., P. Jacques, and J. S. Martijn, 2009, Agglomeration externalities, innovation and regional growth: theoretical perspectives and meta-analysis, In Roberta, C. and P. Nijkamp (eds.), *Handbook of Regional Growth and Development Theories*, Cheltenham and MA: Edward Elgar.

Demirgüc-Kunt, A. and V. Maksimovic, 2002, "Funding Growth in bank-based and market-based financial systems: evidence from firm-level data", *Journal of Financial Economics*, 65: 337-363.

Dijk, J., H. Folmer, and J. Oosterhaven, 2009, Regional policy: rationale, foundations and measurement of its effects, In Roberta, C. and P. Nijkamp (eds.), *Handbook of Regional Growth and Development Theories*, Cheltenham and MA: Edward Elgar.

Dixit, A. K. and J. E. Stiglitz, 1977, "Monopolistic competition and optimum product diversity", *American Economic Review*, 67(3): 297-308.

Dow, S. C. and C. J. Rodriguez-Fuentes, 1997, "Regional Finance: A Survey", *Regional Studies*, 31(9): 903-920.

Docherty, P., 2011, "Keynes's Analysis of Economic Crises and Monetary Policy in the General Theory: Its Relevance after 75 Years", *Review of Political Economy*, 23(4): 521-535.

Durlauf, S., 1993, "Nonergodic economic growth", *Review of Economic Studies*, 60(2): 349-366.

Durlauf, S., 2004, Neighborhood Effects, In Henderson, J. V. and J. F. Thisse (eds.), *Handbook of Regional and Urban Economics*, Vol.4, Amsterdam: Elsevier.

Eliasson, K., U., Lindgrent and O. Westerlund, 2003, "Geographcal Lobor Mobility: Migration or Commuting?", *Regional Studies*, 37(8): 827-837.

Faggian, A. and P. McCann, 2006, "Human capital flows and regional knowledge assets: A simultaneous equation approach", *Oxford Economic Papers*, 58: 475–500.

Faggian, A. and P. McCann, 2009, "Human Capital, Graduate Migration and Innovation in British Regions", *Cambridge Journal of Economics*, 33: 317-333.

Fleisher, B., H. Li, and M. Q. Zhao, 2010, "Human capital, economic growth, and regional inequality in China", *Journal of Development Economics*, 91: 215-231.

Fujita, M., 1989. *Urban Economic Theory: Land use and city size*, New York: Cambridge.

Fujita, M., P. Krugman, and A. J. Venables, 1999. *The Spatial Economy*, MA: MIT Press.

Fujita, M., 2007. *Regional Integration in East Asia: from the viewpoint of spatial economy*, New York: Palgrave.

Fung, M. K., 2009, "Financial development and economic growth: Convergence or divergence? ", *Journal of International Money and Finance*, 28: 56-67.

Gabszewicz, J.J and O. Tarola, 2011, "Migration, wage differentials, and fiscal competition", *CORE Discussion Paper*, 2011-65.

Gerschenkron, A., 1962, *Economic Backwardness in Historical Perspective*, Harvard: MA.

Gilbert, B. A., P. McDougall, and D. Audretsch, 2006, "New Venture Growth: A View and Extension", *Journal of Management*, 32: 926-950.

Glaeser, EL., 1994, "Cities, Information and Economic Growth", *Cityscape*, 1: 9-48.

Glaeser, EL., H. Kallal, J. Scheinkman, and A. Shleifer, 1992, "Growth in Cities", *Journal of Political Economy*, 100(6): 1126-1152.

Glaeser EL. and J. Kohlhase, 2003, "Cities, regions and the decline of transport costs", *Papers in Regional Science*, 83: 197–228.

Glaeser, EL., J. Scheinkman, and A. Shleifer, 1995, "Economic Growth in a cross-section of Cities", *Journal of Monetary Economics*, 36(1): 117-143.

Glaeser, EL. and J. M. Shapiro, 2003, "Urban Growth in the 1990s: Is city living back?", *Journal of Regional Science*, 43(1): 139-165.

Glazer, A., V. Kanniainen, and P. Poutvaara, 2008, "Income taxes, property values", *Journal of Public Economics*, 92(3-4): 915-923.

Goldsmith, 1969, *Financial structure and economic development*, Yale: NH.

Goldstein, H., 2003, *Multilevel Statistical Models*, London: Arnold.

Grant, K. E. and J. Vanderkamp, 1980. "The effects of migration on income: a micro-study with Canadian data", *Canadian Journal of Economics*, 13: 375-406.

Greenwood, J. and B. Jovanovic, 1990, "Financial Development, Growth, and the Distribution of Income", *The Journal of Political Economy*, 98(5): 1076-1107.

Greenwood, J. and B. D. Smith, 1997, "Financial Markets in development, and the development of financial markets", *Journal of Economic Dynamics and Control*, 21(1): 145-181.

Gu, B. S., 2007, *Structural Change of Direct Finance after Financial Crisis and Tasks*, The Korea Institute of Finance.

Gu, J. W., 1996, "Growth And Finance: An Inter-Regional Study", *Journal of Regional Science*, 12(1): 115-126.

Guiso, L., P. Sapienza, and L. Zingales, 2004, "Does local financial development matter?", *Quarterly Journal Economics*, 119(3): 929-969.

Harris, J. R. and M. P. Todaro, 1970, "Migration and Unemployment: A Two-Sector Analysis", *American Economic Review*, 60: 126-142.

Harrison, R. T., C. M. Mason, and P. Girling, 2004, "Financial bootstrapping and venture development in the software industry", *Entrepreneurship and Regional Development*, 16(4): 307-333.

Hassan, M. K., B. Sanchez, and J. S. Yu, 2011, "Financial development and economic growth: New evidence from panel data", *The Quarterly Review of Economics and Finance*, 51: 88-104.

Helpman, E. and P. Krugman, 1985, *Market Structure and Foreign Trade*, Cambridge: MIT Press.

Henderson, J. V., 1974, "The sizes and types of cities", *American Economic Review*, 64: 640-656.

Henderson, J. V., 1980, "Community development: The effects of growth and uncertainty", *American Economic Review*, 70: 894-910.

Henderson, J. V., 1986, "Efficiency of Resource Usage and City Size", *Journal of Urban Economics*, 19: 47-70.

Henderson, J. V., 1988, *Urban Development: Theory, Fact and Illusion*, New York: Oxford.

Henderson, J. V., A. Kuncoro, and M. Turner, 1995, "Industrial development in cities", *Journal of Political Economy*, 103(5): 1067-1090.

Hicks. J., 1969, *A Theory of economic history*, Oxford: NY.

Homles, T., 1998, "The effect of state policies on the location manufacturing: evidence from state borders", *Journal of Political Economy*, 106(4): 667-705.

Hooks, L. and T. Opler, 1993, "The Determinants of corporate bank borrowing", *Federal Reserve Bank of Dallas Financial Industry Studies*, 1-21.

Hsing, Y. and D. J. Smyth, 1994, "Kuznets's inverted U hypothesis revisited", *Applied Economics Letters*, 1: 111-113.

Hu, D., 2002. "Trade, rural-urban migration, and income disparity in developing countries: a spatial general equilibrium model inspired by the case of China", *Regional Science and Urban Economics*, 32: 311-338.

Huang, T. L., P. F. Orazem, and D. Wohlgemuth, 2002, "Rural Population Growth, 1950-1990: The Roles of Human Capital, Industry Structure, and Government Policy", *American Journal of Agricultural Economics*, 84: 615-627.

Hutchinson, R. W. and D. G. Mckillop, 1990, "Regional financial sector models: an application to the Northern Ireland financial sector", *Regional Studies*, 24: 421-431.

Im, K. S., M. H. Pesaran and Y. Shin, 1997, "Testing for Unit roots in heterogeneous panels", *Working Paper*, University of Cambridge.

Irwin, E. and N. Bockstaed, 2002, "Interacting agents, spatial externalities, and the evolution of residential land use patterns", *Journal of Economic Geography*, 2: 31-54.

Jacobides, M. J., T. Knudsen, and M. Augier, 2006, "Benefiting from innovation: Value creation, value appropriation and the role of industry architectures", *Research Policy*, 35(8): 1200-1216.

Jacobs, J., 1969, *The Economy of Cities*, NY: Random House.

Jun M. J. and J. W. Hur, 2003. "The Effect of Population and Employment according to relocating Administrative Capital", *The Seminar for the effect of the Construction of New Administrative Capital*.

Kancs, A., 2011, "The economic geography of labor migration: Competition, competitiveness and development", *Applied Geography*, 31: 191-200.

Kane, R., 2001, "Investigating Convergence of the U.S. Regions: A Time-Series Analysis", *The Journal of Regional Analysis and Policy*, 31(1): 1-22.

Kang, K. K., J. Kugler, and T. Kugler, 2011, "Economic Consequences of Conflict", *The Meeting of the American Political Science Association*.

Karlsson, Ch., B. Johansson, and R. R. Stough, 2000, Introduction: Endogenous Regional Growth and Policies, In Johansson, B., Ch. Karlsson, and R. R. Stough (eds.), *Theories of Endogenous Regional Growth*, NY : Springer.

Kelly, M., 1997, "The dynamics of Smithian growth", *Quarterly Journal of Economics*, 112(3): 939-964.

Kilkenny, M., 1998, "Transport costs and Rural Development", *Journal of regional Science*, 38(2): 293-312.

Kim, H. S., 2006, "Endogenous Economic Growth and Financial Development", *Journal of Money and Finance*, 11(3): 67-90.

King, R.G. and R. Levine, 1993a, "Finance, entrepreneurship, and growth", *Journal of Monetary Economics*, 32: 513-542.

King, R.G. and R. Levine, 1993b, "Finance and Growth: Schumpeter Might be Right", *The Quarterly Journal of Economics*, 108(3): 717-737.

Korea Land Corporation, 2004. *The Estimation of ripple effect according to the Construction of New Administrative Capital*.

Koo, B. S., 2007, "Challenges and Structural Changes of Direct Financial Markets after the Financial Crisis in Korea", *Korea Institute of Finance*.

Koo, J. W., 1996, "Growth and Finance: An Inter-Regional Study", *Journal of the Korean Regional Science Association*, 12(1): 115-126.

Kraay, A. and C. Raddatz, 2007, "Poverty traps, aid, and growth", *Journal of Development Economics*, 82: 315-347.

Kreft, S. F. and R. Sobel, 2005, "Public policy, entrepreneurship, and economic freedom", Cato *Journal*, 25(3): 595-616.

Krugman, P., 1991, "Increasing Returns and Economic Geography", *The Journal of Political Economy*, 99(3): 483-499.

Krugman, P., 1998, "What's new about the new economic geography?", *Oxford Review of Economic Policy*, 14: 7-17

Kuznets, S. 1973, *Population, Capital, and Growth*, NY: Norton.

Landau, D., 1983, "Government Expenditure and Economic Growth: A Cross-Country Study", *Southern Economic Journal*, 49(3): 783-792.

Levernier, W., M. D. Partridge, and D. S. Rickman, 1998, "The Causes of Regional Variations in U.S. Poverty: A Cross-County Analysis", *Paper presented at the 38th Congress of the European Regional Science Association.*

Lee, C. K. and E. J. Kim, 2011, "The analysis of asymmetric structure between

business cycle and criminal activities and determinants in crime activities", *Journal of Economic Studies*, 29(1): 33-51.

Lee, J. W. and B. G. Yu, 2002, "An Endogenous Growth Model Approach to the Korean Economic Growth Factors", *The Journal of Productivity*, 8: 1-14.

Lee, J. W., 1997, "A Study on the Convergence and Factors of Regional Growth in Korea", *Journal of Local Government Studies*, 9(4): 1-15.

Levernier, W., M. D. Partridge, and D. S. Rickman, 1998, "Differences in Metropolitan and Nonmetropolitan U.S. Family Income Inequality: A Cross-County Comparison", *Journal of Urban Economics*, 44: 272-290.

Levhari, D. and N. Srinivasan, 1969, "Opimal Savings under Uncertainty", *The Review of Economic Studies*, 36(2): 153-163.

Levine, R., 2002, "Bank-Based or Market-Based Financial Systems: Which is Better?", *Journal of Financial Intermediation*, 11: 398-428.

Levine, R., 2004, "Regulations, Market Structure, Institution, and the cost of financial intermediation", *Journal of Money, Credit, and Banking*, 36(3): 593-622.

Li, W., 2002, "Entrepreneurship and government subsidies: A general equilibrium analysis", *Journal of Economic Dynamics and Control*, 26(11): 1815-1844.

Lucas Jr., R. E., 1998, "On the Mechanics of Economic Development", *Journal of Monetary Economics*, 22: 3-42.

Lutz, J. M., 2001, "Determinants of population growth in urban centers in the Republic of Ireland", *Urban Studies*, 38(8): 1329-1340.

MacKinnish, T., 2007, "Welfare-induced migration at state borders: New evidence from Micro-data", *Journal of Public Economics*, 91: 437-450.

Mankiw, N. G., D. Romer and D. N. Weil, 1992, "A contribution to the emprics of Economic Growth", *The Quarterly Journal of Economics*, 107: 407-437.

Marshall, A., 1920, *Industry and Trade*, London: Macmillan.

Marshall, J. N., D. Bradley, C. Hodgson, N. Alderman, and R. Richarson, 2005, "Relocation, relocation, relocation: assessing the case for public sector dispersal", *Regional studies*, 39: 767-787.

Martin, P., 1998, "Can Regional Policies Affect Growth and Geography in Europe? ", *The World Economy*, 21(6): 757-774.

Mckinnon, R. I., 1973, *Money and capital in economic development*, Brookings: NW.

Mills, E. S., 1967. "An Aggregative Model of Resource Allocation in a Metropolitan Area", *American Economic Review*, 57: 197-210.

Mills, E., 2000, "A Thematic History of Urban Economics", *Brookings-Wharton Papers on Urban Affairs*, 1-52.

Minniti, M., 2008, "The Role of Government Policy on Entrepreneurial Activity: Productive, Unproductive, or Destructive?", *Entrepreneurial Theory and Practice*, 32(5): 779-790.

Mizuno, K., 2006, "Industrial Diversity and Metropolitan Unemployment rate", *The Annals of Regional Science*, 40: 157-172.

Mocan, H. N. and T. G. Bali, 2005, "Asymmetric crime cycles", *NBER Working Paper*, 11210.

Monchuk, D.C., J. A. Miranowski, D. J. Hayes, and B. A. Babcock, 2006, "An analysis of regional economic growth in the US Midwest", *Review of Agricultural Economics*, 29(1): 17-39.

Moomaw, R. L., 1986, "Have changes in localization economies been responsible for declining productivity advantages in large cities?", *Journal of Regional Science*, 26(1): 19-32.

Moore, C. L., A. Nagurney, 1989, "A general equilibrium model of interregional monetary flows", *Environment Planning A*, 21: 397-404.

Moore, C. L., G. J. Karaska, and J. M. Hill, 1985, "The impact of the banking system on regional analyses", *Regional* Studies, 22: 499-512.

Moretti, E., 2004, "Workers' Education, Spillovers and Productivity: Evidence from Plant-level Production Functions", *American Economic Review*, 3: 656-690.

Mossi, M. B., P. Aroca, I. J. Fernandea, and C. R. Azzoni, 2003, "Growth dynamics and space in brazil", *International Regional Science Review*, 26(3): 393-418.

Murata, Y. and J. F. Thisse, 2005, "A simple model of economic geography à la Helpman–Tabuchi", *Journal of Urban Economics*, 58(1): 137-155.

Myers, P. G., 1978. "Interstate Migration and Economic Growth: a simultaneous equations approach", *Environment Planning A*, 10: 1241-1252.

Nash, M., 1977, "Essays on Economic Development and Cultural Change in Honor of B. F. Hoselitz", *Economic Development Cultural Change*, 25, Supplement.

Netzer, D., 1991, An Evaluation of Interjurisdictional Competition through Economic Development Incentives, In Kenyon and Kincaid (eds.), *Competition among States and Local Governments*, Washington D.C.: The Urban Institute Press.

Nijkamp, P. and J. Poot, 1998, "Spatial Perspective on New Theories of Economic Growth", *The Annals of Regional Science*, 32: 7-37.

Oosterhaven, J., 1981, *Interregional Input-Output Analysis and Dutch Regional Policy Problems*, Aldershot: Gower Publishing.

Pagano, M., 1993, "Financial markets and growth: An overview", *European Economic Review*, 37(2-3): 613-622.

Paluzie, E., 2001, "Trade policies and regional inequalities", *Papers in regional science*, 80: 67-85.

Park, H. G., S. J. Lee, and B. S. Kim, 2006, *Change of Financial Market and Intermediation of Banks*, The Bank of Korea.

Parr, J. B., 2002, "Agglomeration economies: ambiguities and confusions", *Environment Planning A*, 34: 717-731.

Peterson, P. E., 1995, *The Price of Federalism*, Washington D.C.: The Brookings Institution.

Pinto, S. M., 2002. "Residential Choice, Mobility, and the Labor Market", *Journal of Urban Economics*, 51: 469-496.

Porell, F. W., 1982, "Inter-metropolitan Migration and Quality of Life", *Journal of Regional Science*, 22(2): 137-158.

Porter, M.E., 2003, "The Economic Performance of Regions", *Regional Studies*, 34(6&7): 549-578.

Portnov, B. A., 2004, "Long-term growth of small town in Israel: Does location matter?", *The Annals of Regional Science*, 38: 627-653.

Pyo, H. K., S. Y. Jung, and J. S. Cho, 2007, "Estimates of Gross Fixed Capital Formation, Net Capital Stock and Capital Intensity in Korea: 11 Assets by 72 Sectors (1970-2005) ", *Journal of Korean Economic Analysis*, 13(3): 137-191.

Rajan, R. G. and L. Zingales, 1998, "Financial Dependence and Growth", *The American Economic Review*, 88(3): 559-586.

Renkow, M., 2003. "Employment growth, worker mobility and rural economic development"**,** *American Journal of Agricultural Economics*, 85(2): 503-513.

Richardson, H. W., 1979, Aggregate efficiency and interregional equity, In Folmer, H. and J. Oosterhaven (eds.), *Spatial Inequalities and Regional Development*, Boston and Dordrecht: Martinus Nijhoff-Kluwer.

Rioja, F. and N. Valey, 2004. "Does One Size Fit All? A Reexamination of the Finance and Growth Relationship"**,** *Journal of Development Economics*, 74: 429-447.

Romer, P., 1986, "Increasing returns and long run growth", *Journal of Political Economy*, 94(3): 1002–1037.

Romer, P., 2001, *Advanced Macroeconomics*, NY: McGraw Hill.

Rodriguez-Pose, A. and R. Ezcurra, 2011, "Is fiscal decentralization harmful for economic growth? Evidence from the OECD countries", *Journal of Economic Geography*, 11: 619-643.

Rosenbloom, J. L. and A. S. William, 1999, "The Sources of Regional Variation in the Severity of the Great Depression: Evidence from U.S. Manufacturing, 1919-1937", *The Journal of Economic History*, 59(3): 714-747.

Rousseau, P. L. and P. Wachtel, 2002, "Inflation Thresholds and the Finance-Growth Nexus ", *Journal of International Money and Finance*, 21(6): 777-793.

Rousseau, P. L. and P. Wachtel, 2011, "What is Happening to the Impact of Financial Deepening on Economic Growth", *Economic Inquiry*, 49(1): 276-288.

Rupasingha, A., S. J. Goetz, and D. Freshwater, 2002, "Social and institutional factors as determinants of economic growth: Evidence from the United States counties", *Papers in Regional Science*, 81: 139-155.

Rupasingha, A. and S. J. Goetz, 2007, "Social and political forces as determinants of poverty: A spatial analysis", *The Journal of Socio-Economics*, 36: 650-671.

Sachs, J. D., 2004, "Ending Africa's Poverty Trap", *Brookings Papers on Economic Activity*, 2004(1): 117-216.

Safirova, E., 2002, "Telecommuting, traffic congestion and agglomeration: a general equilibrium model", *Journal of Urban Economics*, 52: 26-52.

Schmidt, K. M., Fehr and Ernst, 1999, "A Theory of Fairness, Competition and Cooperation", *Quarterly Journal of Economics*, 114(3): 817-868.

Schumpeter, J., 1912, *The Theory of Economic Development*, Translated by R. Opie, 1934.

Seo, S. H., 2008, "A Study on the Economic Impact of Seoul Metropolitan Area Regulations", *Applied Economics*, 10(2): 33-29.

Sheppard, E., 1983, "Community trade, corporate ownership and urban growth", *Papers in Regional Science*, 52: 175-186.

Silverman, B.W., 1986, *Density estimation for statistics and data analysis*, London: Chapman and Hall.

Smith, D. M., 1975, "Neoclassical Growth Models and Regional Growth in the US", *Journal of Regional Science*, 15(2): 165-181.

Sorek, G., 2009, "Migration costs, commuting costs and intercity population sorting", *Regional Science and Urban Economics*, 39: 377-385.

Stansel, D., 2005, "Local decentralization and local economic growth: a cross-sectional examination of US metropolitan areas", *Journal of Urban Economics*, 57: 55–72.

Sterlacchini, A., 2008, "R&D, higher education and regional growth: Uneven linkages among European regions", *Research Policy*, 37(6-7): 1096-1107.

Storper, M., 2011, "Why do regions develop and change? The challenge for geography and economics", *Journal of Economic Geography*, 11: 333-346.

Strulik, H. and J. Weisdorf, 2008, "Population, food, and knowledge: a simple unified growth theory", *Journal of Economic Growth*, 13: 195-216.

Suh, S. H., 1988, "The Possibility and impossibility of intercity commuting", *Journal of Urban Economics*, 23(1): 86-100.

Tabuchi, T., 1998, "Urban Agglomeration and dispersion: a Synthesis of Alonso and Krugman", *Journal of Urban Economics*, 44: 333-351.

Tabuchi, T., J. F. Thisse, and D. Z. Zeng, 2005, "On the number and size of cities", *Journal of Economic Geography*, 5: 423-448.

Takii, K., 2008. "Fiscal policy and entrepreneurship", *Journal of Economic Behavior and Organization*, 65(3-4): 592-608.

Thornton, J., 2001, "The Kuznets inverted U hypothesis: panel data evidence from 96 countries", *Applied Economics Letters*, 8: 15-16.

Thornton, J., 2007, "Fiscal decentralization and growth reconsidered", *Journal of Urban Economics*, 61: 64-70.

Tiebout, C., 1956, "A pure theory of local public expenditures", *Journal of Political Economy*, 64: 416-424.

Todaro, M., 1969, "A Model of Labor Migration and Urban Unemployment in Less Developed Countries", *American Economic Review*, 69: 486-499.

Treyz, G. I., D. S. Rickman, G. L. Hunt and M. J. Greenwood, 1993. "The dynamics of US internal migration", *Review of Economics and Statistics*, 75: 209-214.

Van Dijk, J., H. Folmer, H. W. Herzog Jr., and A. M. Schlottmann, 1989, *Migration and labor market adjustment*, Dordrecht: Kluwer.

Wang, L. L. M. and M. Wang, 2010, "Convergence or Divergence? China's Land Rents, Transport Cost and its Industrial Agglomeration", *Management and Service Science International Conference*.

Weinstein, B. L., 2000, Regional Growth Theories and Local Economic Development: Some Case Studies, In Johansson, B., Ch. Karlsson, and R. R. Stough (eds.), *Theories of Endogenous Regional Growth*, NY : Springer.

Wheaton, W. C., 2004, "Commutind, cingestion and employment dispersal in cities with mixed land use", *Journal of Urban Economics*, 55: 417-438.

Wiison, L. S., 2003, "Equalization and Migration: Watson Revisited", *Canadian Public Policy*, 29(4): 385-396.

Wimberley, R. C. and L. V. Morris, 2002, "The Regionalization of Poverty: Assistance for the Black Belt South?", *Southern Rural Sociology*, 18(1): 294-306.

Wimberley, R. C. and L. V. Morris, 2003, "U.S. Poverty in Space and Time: Its Persistence in the South", *Sociation Today*, 1(2): 1-6.

국문초록

지역경제 성장에 관한 에세이

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본 논문은 지역경제성장에 관한 세 가지 에세이를 제시하였다. 2장은 두 지역모형을 통해 두 지역간 인구와 노동의 이동이 지역경제에 미치는 영향을 분석하였다. 특히 거주지와 직장이 일치될 때 효용이 증가되는 것으로 나타났다. 궁극적으로 세종시에서 수도권 지역으로의 통근 없이, 이주를 통해 세종시에 조기 정착하기 위해서는 보조금이나 인센티브 정책이 적극적으로 필요하였다. 시뮬레이션 결과에서는 물류비나 통행비의 증가가 수도권과 충청 지역간 인구분산을 촉진시키는 것으로 나타났다. 또한, 충청 지역의 생산은 증가하나 사회후생은 감소하였다. 결과적으로 물류비나 통행비의 감소는 수도권 지역으로의 인구 집중을 초래하였다. 궁극적으로 수도권에서 충청권으로의 인구분산을 위해서는 물류비나 통행비의 증가보다도 보조금 또는 감세정책을 보다 적극적으로 수립할 필요가 있을 것이다.

3장은 저성장 지역의 성장패턴과 성장요인을 불균형 성장모형을 통해 분석하였다. 저성장 지역은 우리나라의 강원, 호남 지역에 집중되어 있었으며, 외환위기 이후 저성장 패턴이 고착화되었다. 특히 저성장 지역은 경기회복기에 국내 평균 성장률보다 낮은 성장률을 보였다. 주변지역의 경제성장 효과와 관련하여 주변에 고성장 지역이 분포할 때 저성장 지역은 보다 더 성장하는 것으로 나타났다. 저성장 지역의 성장을 위해서는 자본축적, 제조업 기반 강화, 지방정부의 감세 또는 재정확대 정책 등이 필요한 것으로 나타났다. 또한, 국내에서 추진되고 있는 행정구역 통합과 관련하여 저성장 지역의 성장을 견인하기 위해서는 주변지역 도시 간의

통합이 중요한 고려사항으로 대두되었다.

4장은 지방 정부의 금융지원과 재정정책의 효과를 고려하여 금융 수단별로 기업 성장에 미치는 영향을 분석하였다. 이를 위해 기업 통계 자료와 지방 정부의 거시 지표를 사용하여 다중 통계 모형을 적용하였다. 분석 결과, 비수도권 지역의 기업들은 채권발행이나 유상증자와 같은 직접금융 시장에서의 자금조달에 제약이 있었다. 또한, 지방 정부의 금융지원에 있어서도 수도권 지역의 기업들보다 불리한 환경에 처해 있었다. 하지만, 지방 정부의 금융지원과 재정정책의 효과는 비수도권 지역의 기업성장에 보다 긍정적으로 작용하였다. 궁극적으로 지방 정부의 금융지원과 재정정책은 기업 성장의 지역별 격차를 초래하지만, 현행 간접금융 시장에서의 지방 정부의 신용보증과 같은 금융지원 수단은 채권매입 또는 유상증자 참여 등과 같은 직접금융 수단으로까지 확대될 필요가 있었으며, 비수도권 지역의 경우 보다 적극적인 재정정책이 필요하였다.

주요어 : 두지역모형, 이주 · 통근, 집적경제, 물류비 · 통행비, 집중 · 분산, 불균형 성장모형, 주변효과, 저성장, 자본축적, 지역통합, 금융지원, 재정정책, 다중 통계 모형, 직접 · 간접금융

학번 : 2006-30301

감사의 글

지금까지의 성과물들이 나올 수 있게 아낌없이 지도해주시고 무엇을 해야 하는지를 행동으로 늘 보여 주신 김의준 교수님께 진심으로 감사드립니다. 때로는 교수님의 열정에 뒤따라가지 못할 때도 있었지만, 교수님의 그 열정 덕분에 하루하루 저 자신이 성장하고 있는 것을 느낄 때면, 저 스스로의 만족감으로 마음이 충만했었습니다. 하지만, 이제 연구실을 나서면서 걱정이 먼저 앞섭니다. 늘 해주시던 말씀이 오늘따라 더욱 선명하게 생각납니다.
"평생 먹고 살 거리를 찾아야 한다."
"왜 그런가, 왜 그런 결과가 나왔는가"
"이론, 적용, 정책적 함의! 기여도가 무엇인가" …
늘 고민하시고 뭔가를 찾으시는 교수님의 모습을 보면서 느꼈던 많은 것들, 소중히 간직하고 있겠습니다. 그리고, 늘 부끄럽지 않은 제자가 되도록 노력하겠습니다. 감사하다는, 이 이상의 말이 떠오르지가 않습니다. 교수님! 감사합니다.

유학생보다 못할 거 없다며 국내박사를 키우시겠다는 열정으로 대학원생들을 지도해 주셨고 논문심사위원장을 맡아주셨던 이성우 교수님, 늘 학생들과 가까이서 스스럼 없이 대해주셨고 논문 심사 때에도 사소한 것 하나라도 코멘트해주고자 하셨던 김홍석 교수님, 논문심사 때 아낌없는 조언과 향후 연구과제를 함께 제시해 주셨던 김호연 교수님, 그리고 멀리 일본에서 바쁘신 일정에도 불구하고 논문심사를 위해 기꺼이 수고해 주시고 영어단어 선택 하나하나 교정해 주고자 하셨던 Daisuke Nakamura 박사님, 모든 분들께 다시 한번 감사드립니다.

지나온 연구실 생활 기간, 함께 생활했던 동기, 후배님들 모두 감사합니다. 특히, 논문심사 기간 동안 궂은일 고생해준, 영현, 은진, 제원, 형근 고맙습니다. 함께 연구실 생활을 했었던, 나보다 먼저 연구실을 떠나 유학에서 직장에서 자신의 일에 최선을 다하는 아영, 가영, 상헌, 석, 유진에게도 이제야 감사의 말을 전합니다. 그리고 명섭, 재연도 빨리 논문 마무리 잘 하길 바랍니다.

늘 함께 가까이서 묵묵히 기다려준 나의 아내 숙현아 고맙다. 지금의 결실이 사랑하는 아내가 곁에 있었기에 가능했음을 잊지 않고 이제 잘 할께! 고마워! 정선, 정현, 정민, 건강하게 잘 자라줘 고맙고 늘 힘이 되어 줘서 고마워! 사랑하는 가족들에게 다시 한번 고마움을 전합니다.

자식 잘 되기만을 바라시는 어머니께도 인사 드립니다. 어느덧 한 가정의 가장이 되어버린 아들이지만, 어머니께는 과거에도 그랬듯이 앞으로도 늘 걱정하는 자식일 뿐입니다. 낳아 주셨기에 지금의 제가 있고 길러 주셨기에 지금의 제가 있습니다. 감사드립니다.

지금의 마침은 새로운 시작임을 명심하고 더욱 더 정진하겠습니다.

'참으로 먼 길을 돌고 돌아온 느낌이다.
하지만, 이제 끝마침은 새로운 시작이다.
제 2 막의 시작이다…'

2012 년 8 월
이창근 드림