

A Panel Data Analysis of the Effectiveness of Regional Policy on Mitigating Capital Area Population Concentration in Korea^{*}

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Have regional development policies mitigated capital area population concentration in Korea? This paper empirically examines the effects of central and local government investments in regional development policies in Korea, confirming that such investments have played a critical role in reducing provincial migration over the last two decades. This outcome is based on assessments of the performance of intergovernmental fiscal transfers and central government investment in regional policies. The present study therefore argues for the importance of considering and assessing not only the market effects but also the government effects when devising a redistributive policy agenda.

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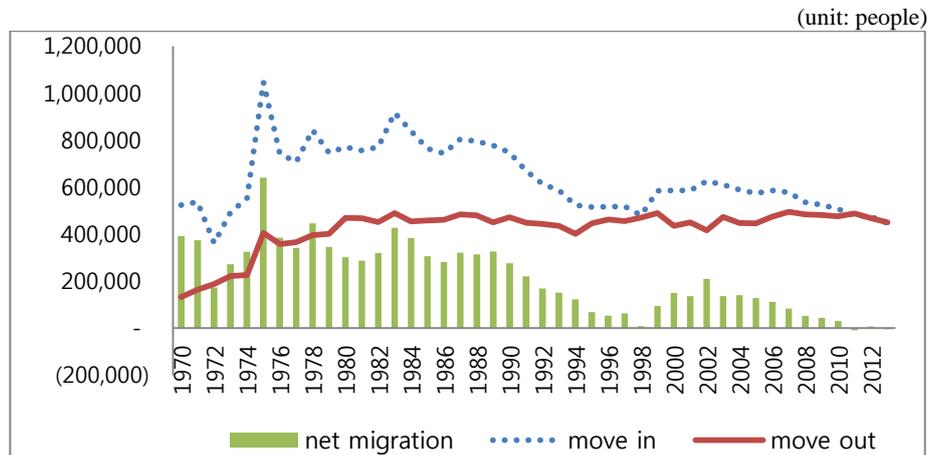
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1. INTRODUCTION

This paper examines the effects of intergovernmental fiscal grants and regional policies on net migration on jurisdictions in Korea. The idea for this research originated in the hypothesis that there might be some linkage between the huge amount of intergovernmental fiscal transfers that have been carried out and the decreasing trend of net migration from non-capital areas to the capital area over the last few decades. Internal migration may play a self-equilibrating role in reducing regional disparities.¹⁾ According to the OECD (2005), the decline in inter-regional migration observed in many countries since the 1970s seems to have halted in most cases, which gross flows even increasing in some countries. The propensity to migrate is much higher among the highly skilled, implying that the low skilled are more dependent on local employment opportunities. This analysis is based on the results of the market force effect. This paper asserts that non-market forces like intergovernmental grants to poorer areas, regional policy regulations and tax support policies, and the introduction of new educational infrastructure among others have played major roles in facilitating the decline of inter-regional migration.

Theoretically, one of the purposes of intergovernmental grants to poor jurisdictions is to facilitate population redistribution. Residents of recipient areas are able to remain there with the financial support provided to improve infrastructure, environment, etc. The green bars in figure 1 indicate the net migration among all jurisdictions. Net migration itself has been on a decreasing trend since the 1990s. As well, the number of people who have moved into the capital area, represented in figure 1 by the blue dots, has reduced. There are several possible reasons for this such as income effects and the impact of governmental efforts to decrease the net number of people migrating to the capital area. Harris-Todaro (1970) asserts a migration theory based on the relationship between economic maturity and migration pattern. Brueckner and Kim (2001) question whether migration can be explained

¹⁾ OECD (2005), p. 75.

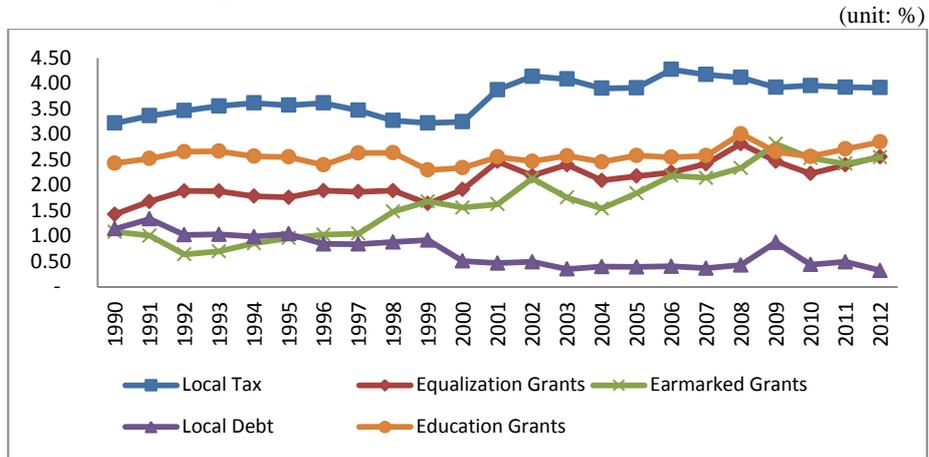
Figure 1 Population Movement in Seoul Metropolitan Area

Source: Statistics Korea. 2012. "Population Movement in Seoul Metropolitan Area in the Last 10 years," In 2012 Statistics on Domestic Population Movement.

by the equalization of expected wages between city and countryside. This theory may overlook another important equilibrating force: the migration-induced rise in the urban cost of living, which occurs principally through escalation of urban land rents as the city population expands. That is, escalated land rents tend to limit rural-urban migration, thus providing an important additional force in terms of controlling urban populations. Migration equilibrium, therefore, can in some aspects be traced back to market forces like rising land rents, increases in formal sector jobs, etc. The economic model focuses on market-induced migration.

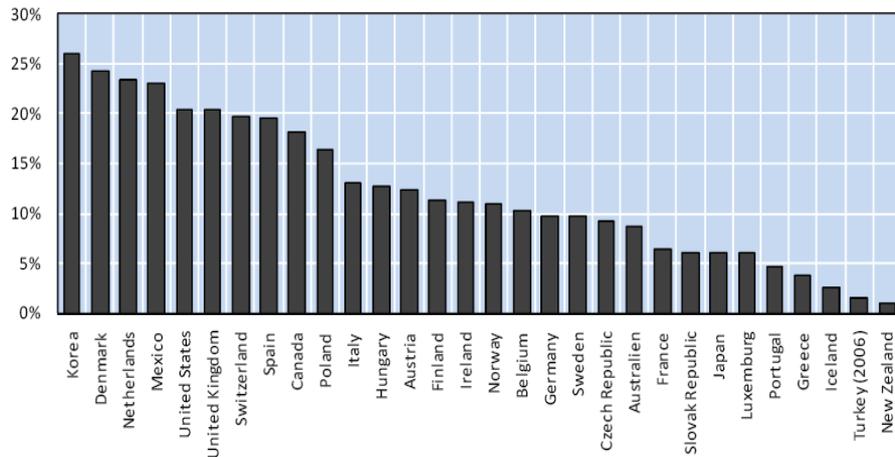
However, the economics-based migration model overlooks the role of government policy — like regional development policies, for example — in mitigating market-induced migration. Of course, intergovernmental grants transferred from the central to local governments have a redistributive purpose: put bluntly, they provide to poorer areas the funds they need to improve standards of living and infrastructure for their residents, thereby curbing the tendency toward migration. Such grants may in fact play the strongest role in spreading out the population as in figure 2. In Korea, the fiscal size of intergovernmental grants has been growing yearly. Korea has

Figure 2 Ratio of Grants to GDP in Korea



Source: Ministry of Government Administration and Home Affairs, Statistical Year Book (yearly).

Figure 3 Ratio of Fiscal Transfer to Total Government Expenditure (2005)



Source: Blöchliger and Petzold (2009), p. 32, Figure 9.

the highest absolute size of transfers among OECD countries in figure 3, and the reasons for this require empirical analysis. This paper therefore examines the performance of regional policy in terms of intergovernmental

grants provided to local governments and the role of such grants in reducing the net migration rate to the capital area.

1.1. The Story of the Concentration and Fiscal Decentralization

In 2008, 49.5 percent of the entire population of South Korea resided in its capital city, Seoul, making it the most densely populated city among OECD countries. Figure 4 shows the comparison of the ratio of the Metropolitan concentration in OECD countries. A fundamental reason for the intense population concentration in the capital area is that Seoul has been, historically, the heart of economic activity in Korea. The country achieved rapid economic development from the 1960s to the 1980s, a time period known as ‘The Miracle of the Han River’.²⁾ However, a side effect of such accelerated development was asymmetric regional development, with the discrepancy between the regional economic capacity of the capital area and other areas expanding from the 1970s to 2000s. The population concentration in the capital has only served to exacerbate this fiscal imbalance.

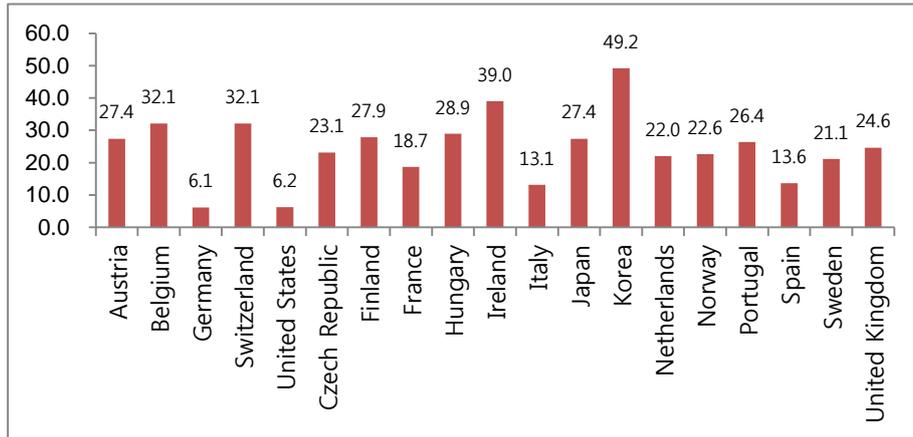
In 1975, the number of people who had migrated to the capital stood at 641,000, a number that continued to increase until 1990. After 1990 people living in Seoul started to move to nearby areas, with 322,000 people moving out of the capital in 1995. Kyung-ki Province, located closest to Seoul, housed 373,000 Seoul emigrants in 1995. Surprisingly, even after 2000 when land prices were exploding, migration to the capital area began increasing again.

The concentration of population in metropolitan areas causes a multitude of social and economic problems, with raised housing costs, increased crime rates, and expanded urban sprawl to name just a few. Aware of this, the central government in Korea has made significant fiscal transfers to the rural sector to curb what is commonly referred to as ‘fiscally-induced migration’. In 2009, the size of the Korean government’s fiscal transfer to rural areas was

²⁾ Kim (2014).

Figure 4 Ratio of Metropolitan Area Population Concentration in OECD Countries (2008)

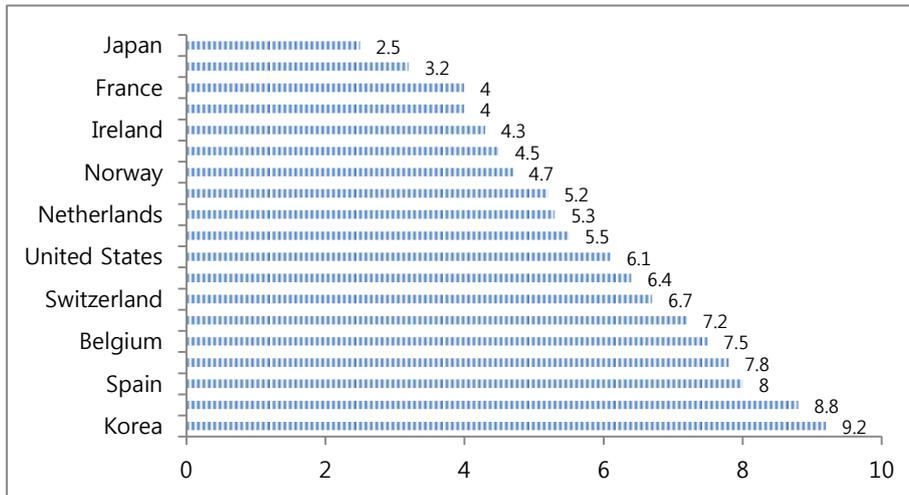
(unit: %)



Source: OECD Metropolitan Areas Database (2009).

Figure 5 Ratio of Intergovernmental Transfer to GDP (2011)

(unit: %)



Source: See Appendix for source details.

the highest among OECD countries (9.2 percent of GDP). Figure 5 shows the size of the intergovernmental transfer to GDP.

Another force behind such population concentration in Korea can be found in the country's history of 'local autonomy', which began in Korea in 1991 with local elections for local councils, and expanded to elections for provincial governors and mayors in 1995. Local elections provide more incentive for local representatives to work for the public good since they are more concerned about their performance, especially if they desire reelection. In other words, the public can make their demands heard through their votes, which pushes local representatives to respond to such demands. Kim (2007) found a significant relationship between the results of re-election and the size of local expenditure.

Political, global, and fiscal trends in Korea at present have necessitated the expansion of the role of local governments. The fiscal transfer from the central government to local governments, referred to as 'intergovernmental fiscal grants', was considerable among OECD countries in 2005 (see figure 2). At that time the fiscal size of local governments was larger, and the expansion of local revenue and expenditures was deemed acceptable in light of political, global, and fiscal trends. Local taxes and expenditures have been the most controversial issues in terms of intergovernmental fiscal relations in Korea. In reality, local expenditure through intergovernmental transfer has steadily grown over the last decade. Figure 3 shows that the transfer size to total government expenditure was highest among the OECD member countries in 2005. The fiscal imbalance among jurisdictions indicates a discrepancy between local taxes and local expenditure.

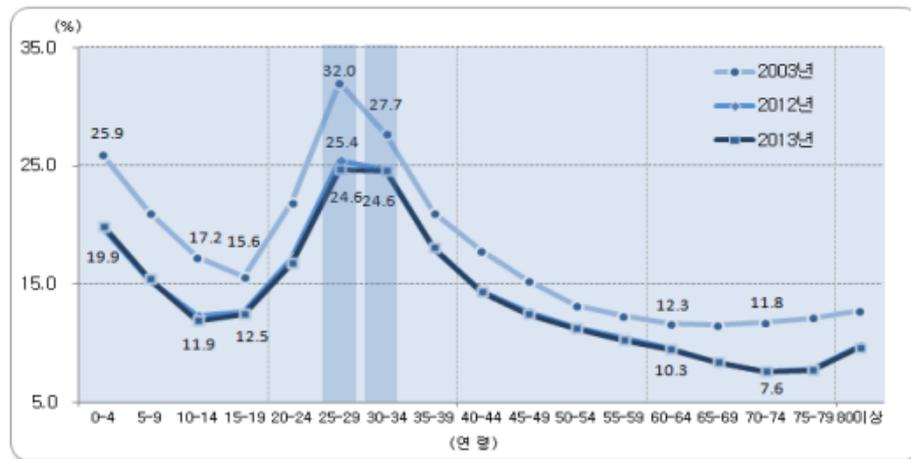
Former administrations have made various attempts to solve this problem, including urbanizing once blighted areas through the construction of infrastructure to increase employment and education opportunities in those areas (e.g., the development of Sejong City as well as various 'innovative cities', 'enterprise cities', etc.). The Roh administration in 2005 introduced the 'Balanced Regional Development Policy' to enhance regional economic capacity and made related laws and committees to support the policy's initiatives. Indeed, 'balanced regional development' was a top priority under Roh, who made the controversial decision to move main government

offices from Seoul to another province. The decision definitely had its opponents, but as of 2014 almost all ministries had relocated to the new administrative city of Sejong. Other diverse policies for balanced regional development are under consideration by the central government now, with the hope that such policies will finally result in an even distribution of the Korean population.

1.2. Internal Migration in Korea and Literature Review

Statistics Korea analyzes the main cause of population increase in any given region as employment, and the main causes of decrease as housing shortages and family affairs. Together these three factors account for 83 percent of all demographic movements in Korea, while transportation, culture, the availability of amenities and convenience facilities, healthcare, and residential/natural environments account for less than 20 percent. People in their 20s comprise the most mobile age group, though the mobility rate of 25 to 29 year olds decreased by more than 7 percentage points between 2003 and 2013.

Figure 6 Demographic Movements of Different Age Groups, 2003-2013



Source: Statistics Korea, Demographic Movement Statistics 2013, 2013 (figure 2).

This pattern is nothing unique to Korea; it is also observed in both the United States and the United Kingdom. Migration researchers assert that the onset of the latest global economic crisis increased the rigidity of job markets worldwide, lessening inter-regional migration on the whole. Some studies on migration patterns in the United States find the cause for reduced migration in the increasing volatility of housing prices.³⁾ The migration rate in the United States is higher than that of Europe due to the greater instability of the American job market. This may indicate that the European job market is relatively more settled and/or that Europeans tend to stay in the same jobs for much longer than Americans.⁴⁾ Bonin *et al.* (2008) provide an empirical analysis demonstrating the significant correlation between the migration rate in a given society and the frequency of job changes over one's lifetime in that society. Other studies show that the United States is almost the only exception, showing a decline in the inter-regional migration rate; that the migration rates in Denmark, Hungary, and Finland are consistently higher than those in the United States; that the migration rate across Europe was relatively high in the first several years of the 21st century; that the inter-provincial migration rate in Canada is lower than the inter-state migration rate in the United States, and so forth.⁵⁾

These studies confirm that, aside from the impact of the latest global economic crisis, the high percentage of people in their 20s in a given population and the flexibility of a job market are reliable indicators of high migration rates. Like the United States, Australia, and New Zealand, Korea today is also receiving an increasing number of immigrants from overseas. These studies show that the major causes of migration include changes in the macroeconomic environment and their impact on the job market and local or regional conditions. In other words, they explain much about migration in terms of the market effect.

³⁾ Molloy *et al.* (2011), pp. 175, 192.

⁴⁾ Oswald (1999).

⁵⁾ "...higher migration rates in the United States may indicate lower frictions in the labor market as compared to Europe. Thus, lower migration rates might signal an increase in labor market frictions, although the direction of causality is not clear...." (Molloy *et al.*, 2011, p. 194).

However, this paper focuses on the fiscal policy effect that contributes to or causes migration. More specifically, I attempt to determine whether and what kinds of fiscal policy measures can induce increases or decreases in the population of a given region. Analyses adopting this approach mostly focus on specific cases, such as Canada, with its sizable amount of fiscal equalization resources, and Sweden, with local governments possessing significant degrees of fiscal responsibility for meting out social and welfare services. In adopting the fiscal policy approach, we must keep in mind that no simple comparisons can be made among countries with significantly different sizes of populations, national territories, or labor market conditions. For instance, Molloy *et al.* (2011), in a study on the high migration rate in the United States, conclude that countries such as the United States need not invest a large amount of fiscal resources in public and social services, as the population holds little expectations of such services. Such a conclusion, however, is excessively focused on the superficial phenomenon of migration patterns, without exploring more deeply what such patterns may imply for the current state of welfare services.

Moreover, the high migration rate in the United States may be more a result of certain exceptional characteristics of the country — e.g., the continued influx of immigrants from overseas, the sustained economic growth, the ethnic diversity of the population, and the vastness of national territories — than a universal phenomenon. It may hold little applicability to European countries or Korea where balanced national development is an essential part of the national policy agenda. Canada, occupying the other half of North America, implements a fiscal policy strikingly different from the American one, and thus it is much more familiar with the concept of fiscally induced migration.

The empirical analysis in this section strives to verify whether there is any significant causal correlation between the steady decline in the migration rate in Korea and fiscal policy. While there can be multiple factors or causes of decline in migration — such as the rise in income level, the economic recession, the growing instability of housing prices, and the aging population

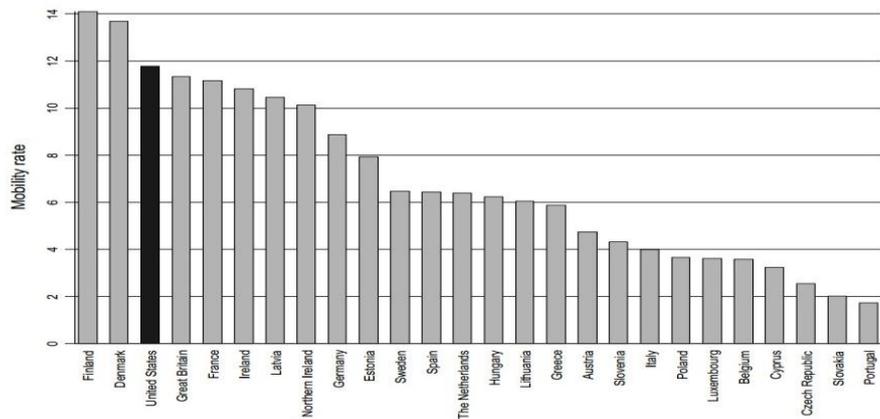
— our concern is to determine the extent of the role of fiscal support policies for local governments and regional development in the phenomenon. From the redistribution perspective, the goal of intergovernmental fiscal coordination is to provide social and public services in a given underdeveloped region to make it more rational for residents to stay in that region and maintain a certain quality of life than move in search of jobs and pay the high cost of migration. Our empirical analysis therefore starts from the hypothesis that Korea's current intergovernmental fiscal coordination system, underpinned by local revenue sharing and subsidies from the central government, has in fact contributed to the drop in the country's inter-regional migration rate. There have been several empirical studies about the relationship between local expenditures and economic growth. Kim (2005) shows strong empirical evidence that local government expenditures increase both the number of establishments and the output per firm in the manufacturing sector. Kim (2007) also found the linkage between the intergovernmental grants and the regional income.

2. DATA AND MODEL

2.1. Stable Decrease in Regional Migration Rate in Korea

According to Statistics Korea, overall regional (inter-province and intra-province) migration decreased to 19.1 percent of the total population in 2006, while the share of intra-province migration stood at 67.3 percent. Population movement into the Seoul metropolitan area also decreased 6.0 percentage points compared to the previous year. As in other countries, there was more intra-province migration and less inter-province migration. There has been evolved as stable decrease in regional migration rate in Korea but still higher than other countries.

The decline in migration rate can be attributed to market force effects such as income growth, the expansion of the aging population, and unstable economic

Figure 7 Ratio of the 2005 Population that Moved in 2004

Sources: European data, Eurobarometer 64.1, distributed as ICPSR No.4641. US data, 2005. *Current Population Survey* (2005). Molloy *et al.* (2011, p. 193, figure 5).

Table 1 Comparison of Internal Migration in Korea, the United States, and Japan

Migration Range Year	KOREA			USA			JAPAN	
	Total Migration	Cities and Districts	Counties and States	Total Migration	Counties	States	Total Migration	Counties and States
2001	19.4	12.7	6.1	13.5	5.6	2.8	4.9	2.2
2002	19.9	12.4	6.2	14.2	5.7	2.8	4.7	2.2
2003	19.7	12.4	6.2	13.7	5.4	2.7	4.7	2.1
2004	17.7	11.2	5.8	13.3	5.3	2.6	4.6	2.1
2005	18.1	11.3	5.8	13.2	5.3	2.6	4.4	2.1
2006	19.1	11.9	6.0	13.3	4.7	2.0	4.4	2.1
2007	18.5	11.6	5.9	12.8	4.2	1.7	4.4	2.1
2008	17.8	11.1	5.7	11.5	3.7	1.6	4.3	2.0
2009	17.1	10.7	5.5	12.1	3.7	1.6	4.2	2.0
2010	16.5	10.3	5.3	12.2	3.5	1.4	4.0	2.0
2011	16.2	9.9	5.2	11.3	3.5	1.6	4.0	1.9
2012	14.9	9.9	5.0	—	—	—	—	—

Sources: Census Bureau, *Current Population Survey*, 2011. Japan Statistics Bureau, *Report on Internal Migration in Japan*, 2012. Statistics Korea, *2012 Annual Report on Internal Migration Statistics* (2012, p. 3).

fundamentals. As mentioned earlier, this paper hypothesizes that institutional effects may have also contributed to shrinking the gap between capital and non-capital areas. For example, intergovernmental fiscal grants have been essential to improving poorer areas in Korea over the last three decades. Regional policies that include such regulations as putting a ceiling on the number of firms allowed to operate in Seoul have facilitated a reduction in migration to the capital area. And yet, Korea's migration rate is still higher than other countries.

Molloy *et al.* (2012) examined migration populations in various countries (excluding Korea) in previous years. They found the highest mobility rate in Europe in Finland and Denmark, at around 14 percent, and the highest mobility rate of all countries in the United States. Figure 7 shows the ratio of the 2005 population that moved in 2004. Korea's migration rate, at 14.9 percent, is still higher than other countries based on the given literature as in table 1.

2.2. Model

This study utilizes the analysis model developed by Mills *et al.* (1983), which has been applied in many other studies including Watson (1986), Kim and Jang (1997), and Kim (2008 and 2013). The model assumes that individuals considering migration to other regions select the regions to which they will move based on a cost-benefit analysis, considering such items as expected income (I), the availability of public goods and services in the given locale (G), and the availability of housing (H). The utility function for such individuals is therefore expressed as follows:

$$B = B(I, G, H), \quad (1)$$

where ' I ' is determined on the basis of the average income level and the employment rate of the region being considered, and ' G ' includes both variables dependent on local government spending (e.g., availability of

waterworks and sewage facilities, roads, etc.) and variables dependent on central government spending (e.g., education). As for public education, the central government provides much of the required resources, but individuals considering migration tend to perceive education as part of the public and social services available in the desired region, which is why it is included as part of 'G'. This study treats the investment income in housing ('H') as a separate variable. Individuals considering migration will necessarily weigh the costs of possible choices. The cost of residence ('R') is comprised of such variables as the amount of monthly or yearly rent. The 'T' stands for the taxes or prices on the local public goods and services provided. We can estimate the net benefits and costs for an individual considering migration using the following formulae:

$$C = C(R, T), \quad (2)$$

$$\text{Net Benefit} = \text{Benefit} - \text{Cost}. \quad (3)$$

An individual considering migration will also estimate the expected future benefits and costs of either staying at their current location ('i') or moving to a new location ('j') at a certain point of time in the future ('t'). When net benefit is greater than zero ($E[NB_{ij}] > 0$), the individual will move from 'i' to 'j' according to equation (4). Equation (5) shows the migration as functional form. The linear equation (equation (6)) for estimating the migration function (equation (5)) is as follows:

$$\begin{aligned} E[NB_{ij}] &\equiv E[NB_j] - E[NB_i] \\ &= f(EI_i, EI_j, G_i, G_j, H_i, H_j, R_i, R_j, T_i, T_j), \end{aligned} \quad (4)$$

$$M_{ij}^t = F\left(\frac{EI_j^t}{EI_i^t}, \frac{ED_j^t}{ED_i^t}, \frac{RO_j^t}{RO_i^t}, \frac{RE_j^t}{RE_i^t}, \frac{LT_j^t}{LT_i^t}, \frac{HP_j^t}{HP_i^t}\right), \quad (5)$$

$$\begin{aligned}
M_{ij}^t = & \beta_1 + \beta_2 \frac{EI_j}{EI_i} + \beta_3 \frac{ED_j}{ED_i} + \beta_4 \frac{RO_j}{RO_i} + \beta_5 \frac{RE_j}{RE_i} \\
& + \beta_6 \frac{LT_j}{LT_i} + \beta_7 \frac{HP_j}{HP_i} + \varepsilon_{ij}.
\end{aligned} \tag{6}$$

Let's now consider the models and anticipated signs underlying our hypotheses. First, according to the classic theory of urban economics originating from the Harris-Todaro model (1970), an increase in expected income is the most important factor prompting migration. When people decide to migrate based on the expectation of higher income, the sign in front of the coefficient will be $\beta_2 > 0$. Second, the Boadway and Flatters model (1982) explains migration and population concentration as effects of fiscal policies. The variables resulting from fiscal policies in this model include education, extended roads, capital expenditure, local taxes per capita, and transferred fiscal resources per capita. We can assume that the signs attached to all these variables except local taxes per capita will be positive (+). In this analysis, we equate local taxes per capita to the prices of public goods available at the migration destination.

Third, Dusansky and Koc (2007) demonstrate that the greater the returns on investment, the greater the demand for house ownership. The price of housing is seen as a return on investment, unlike the cost of residence. Such returns in investment reflect the fiscal costs and benefits in large cities (i.e., tax revenue per capita subtracted by tax spending per capita). Local taxes are not spent on metropolitan and regional transportation facilities, subway services, and environmental maintenance services in which the central government invests for the benefit of local communities. The fiscal costs and benefits in various regions and communities resulting from national government-led policy projects shape and affect the living environments in these regions and communities (e.g., quality of schools, park services), and they are ultimately reflected in the prices of local real estate properties. Accordingly, the migration and concentration of populations in urban areas indicate that for the same amount of taxes they pay, taxpayers receive public

services of better quality (e.g., in Gangnam-gu, Gwacheon). The quality of public services in these areas further serves to induce greater migration, exerting an upward pressure on local housing prices. Therefore, we can assume $\beta_7 > 0$. Finally, the Brueckner and Kim model (2001) helps us estimate the residential costs one will likely pay upon migrating to a large city (e.g., housing rents). The sign attached to this variable therefore will be negative ($\beta_5 < 0$).

2.3. Panel Data Set and Migration Variables

The panel data is composed of 16 provincial regions covering 16 years from 1997 to 2012.⁶⁾ The migration data used in the estimation is derived from *Statistics Korea*. Since there is one moving-out province to 15 moving-in provinces each year, each year has 240 (=16*15) variables, bringing the total variables to 3,840 (=240*16). The dependent variable is used in the estimation, and the rate of out-migration from region i to region j is calculated as the gross migration flow from i to j divided by the population of region of origin, i . The independent variables are also normalized in this estimation, as the rate of in-migration to out-migration.

$$M_{ij} = \frac{GM_{ij}}{POP_i}, \quad i, j = 1, \dots, 16,$$

where M_{ij} = the rate of out-migration from region i to j ,
 GM_{ij} = the gross flow of migrants from region i to j ,
 POP_i = the population of region i .

The earnings variable employed in the estimation is an estimate of average yearly wages and salaries in each province. The average wage in each region was weighted by the probability of obtaining employment in the

⁶⁾ Because Ulsan was joined in 1997 as one of the authorities in Statistics, the starting year of the data in this analysis is the year of 1997.

region. Both the earnings and unemployment rate data for these calculations were obtained from *Statistics Korea*, 1997 to 2012. Second, the education variables, derived from the Ministry of Education statistics (YEAR), are the number of college students in each province. Third, for the public provision variables, the total paved road ratio is used as stated in the *Statistical Year Book* (YEAR) of the Ministry of Land, Infrastructure and Transportation. Also, this analysis includes capital expenditure variables which denote the regional capital investment in each province. Since intergovernmental fiscal transfers includes cash transfer and capital investment, estimations using simple transfer variables alone may not accurately reflect the regional investment.

This study isolates capital expenditure variables from transfer variables in the estimation based on data coopted from the *Statistical Year Book* (YEARS needed here) of the Ministry of Government Administration and Home Affairs. This analysis also shows the central government's effect on provincial migration using the variable of gross capital formation for the first time. Even though there are several papers that show the effect of fiscal transfers on provincial migration and local economic growth, the impact of the central government's direct investment in provinces has, before now, never been probed in Korea's case. The housing rent variable was derived from the *Micro Public Panel Data Set* of the KIPF. According to Brueckner and Kim (2001), housing rents can be assumed as barriers to entry into the urban area. The land price variable in this study is used to show the capitalization effect and represents the merits of residence amenities. Therefore, the expected impact of this variable is either positive.

For the control variables, the rapid transit railway system, KTX (Korail), was also included in the estimation. Much debate has surrounded whether the KTX affects internal migration or not. Cash transfer expenditure is also controlled in this estimation. Recently, subnational expenditure has significantly increased because of the broadened scope and cost of cash transfer-based projects. For migration equilibrium, the concept of moving cost is included in the model as well. The variable of the direct distance

from i to j province is used for the moving cost. The distance between provinces is not ‘time invariant’ since the city center — i.e., the location of city hall — has changed in some provinces.

3. ESTIMATION METHODOLOGY

Basic estimating equations were set out in (6). Each specification was estimated for each of 16 regions for the period from 1997 to 2012. All variables were standardized as the rate of each variable. For example, the expected income variable of Seoul (i) to Busan (j) migrants in 2008 was derived by dividing Seoul’s expected income by Busan’s expected income, 1.1. Therefore, as table 2 shows, the correlation among variables does not matter as much as the level variables. This analysis was carried out using fixed effect and random effect methodology, and includes a number of controls which vary enough within provinces over time so as not to be captured by

Table 2 Correlation Matrix of Standardized Variables

	Net Migration	Education	Expected Income	Gross Capital Formation	Capital Expenditure	Land Prices	Distance	GRDP	Local Tax	Transfers
Net Migration	1.00									
Education	0.23	1.00								
Expected Income	0.11	0.02	1.00							
Gross Capital Formation	0.25	0.43	0.11	1.00						
Capital Expenditure	0.29	0.34	0.08	0.88	1.00					
Land Prices	0.23	0.28	0.15	0.06	0.01	1.00				
Distance	-0.41	0.08	-0.02	0.15	0.04	0.01	1.00			
GRDP	0.32	0.51	0.20	0.77	0.62	0.32	0.18	1.00		
Local Tax	0.27	0.21	0.41	0.15	0.16	0.45	0.05	0.39	1.00	
Transfers	-0.06	-0.14	-0.11	-0.01	0.04	-0.13	0.02	-0.13	-0.28	1.00

fixed effects. Since the variables are standardized as the rate of each variable, the degree of correlation among the variables would not be serious as expected. Also, according to given literature, the stationarity tests such as unit root test and covariance test may not be considerable in this setup.

4. EMPIRICAL RESULTS

From our empirical analysis we can surmise the relationship between the reduction of provincial migration rates and the huge investment of subnational governments. Model 1 uses macro-data as the baseline of the estimation; Model 2 includes the KTX variable; and Model 3 uses micro-panel data from the KIPF for the variables of ‘local tax’ and ‘rent deposit (see table 4)’.

The coefficients of capital expenditure and capital stock (gross capital formation) in the local budget are significantly positive. This result implies that the higher the capital investment, the more migration at the provincial level. Intergovernmental fiscal transfers and capital stock transfers by the central government are strongly redistributive. The dominant share of such transfers is from richer provinces to poorer ones, and this policy tendency has helped facilitate infrastructure expansion and economic development in those areas and as result, decreased migration of residents out of those areas and into urban centers. Thus moving costs have dropped as well. From this result we can conclude that intergovernmental fiscal transfer and central government investment in underdeveloped areas hinder migration. Capital expenditure and capital stock, both representing the amount of fiscal resources provided for local development, both retained a significance level of 1 percent as explicatory variables, thus confirming the hypothesis that an increase in capital expenditure by a given local government and in the amount of capital stock directly subsidized by the central government will translate — all things being equal — into an increase in the number of people migrating to the given region. Capital expenditure includes spending not

Table 3 Hypothesis and Empirical Results

	Harris-Todaro (1970)	Boadway and Flatters (1982)			Brueckner and Kim (2001)	Capital Gain
	Expected Income	Education	Capital Expenditure / Capital Stock	Local Taxes	Deposit / Housing Rent	Land Price
Hypothesis	+	+	+	-	-	+
Results	?	+	+	?	+	+

Table 4 Empirical Results

<i>Dep:</i> Net Migration	Model 1	Model 2	Model 3
Expected Income	0.0006 (0.84)	0.0011 (0.29)	-0.0012 (0.21)
Number of College Students	0.00001 (0.00)***	0.0003 (0.03)**	0.0001 (0.00)***
Capital Expenditure	0.0004 (0.00)***	0.0004 (0.00)***	0.0004 (0.00)***
Capital Stock	0.0006 (0.00)***	0.0006 (0.00)***	0.0008 (0.00)***
Land Prices	0.0002 (0.00)***	0.0002 (0.00)**	0.0001 (0.02)**
Per Capita Local Tax	0.0020 (0.40)	0.0019 (0.11)	-0.0017 (0.62)
Number of KTX Users	-	-0.00001 (0.37)	-
Per Capita Welfare Expenditure	-	-	-0.0001 (0.01)**
Rent Deposit	-	-	0.0005 (0.00)***
Distance	-0.0002 (0.00)***	-0.0003 (0.00)***	-0.0004 (0.00)***
Year	-0.0005 (0.00)***	-0.0003 (0.00)***	-0.0001 (0.04)**
Constants	0.1015 (0.01)**	-0.62 (0.03)**	-0.98 (0.02)**
Methodology	Fixed Effect	Fixed Effect	Fixed Effect
No. of Observations	3,810	946	596
(Overall) R^2	0.12	0.10	0.14
Hausman Stat.	42.7	21.6	19.7

Notes: The figures in parenthesis denote P -statistics. *** means significance at the 1% level. ** means significance at the 5% level. And * means significance at the 10% level.

only on SOC development, but also on the creation of local facilities for culture, recreation, and social and welfare services. It is therefore crucial for future research to clarify and explain the exact nature of the correlation between fiscal efficiency (in expanding capital facilities) and the competitiveness of a given region in relation to migration. As massive public investments in SOC development have also been found to induce migration, we should analyze the exact impact of capital stock in ensuring balanced development. Total road networks, standing in for SOC development, also exerted an impact on migration of all types.

The correlation coefficients between variables align with those found in existing literature (e.g., Kim (2008) and Kim (2013)), with the exception of 'expected income'. According to traditional migration theory, the most powerful incentive of provincial migration is the expectation of income growth. In the case of Korea, this hypothesis was confirmed in Kim (2013). However, the present analysis does not support income growth as an incentive for provincial migration. In other words, the coefficient of expected income is not statistically significant in this study, straying from both existing literature and intuition. The insignificance of the income effect may be explained in two ways. The first is related to the age of the migration population, which has seen a dramatic shift in recent years. In the past, most migrants between provinces were in their twenties, but these days their share has continuously decreased. The second is related to the fact that the income discrepancy between provinces has been rendered meaningless since the unemployment rate of those in their twenties is now the highest in Korea's history. Thus the expected income effect in the Seoul metropolitan area is no longer attractive enough to spur migration to the urban center among this age group.

This analysis also reveals Korea's patterns of fiscal federalism. Unlike other countries, Korea applies a uniform tax rate across all provinces. Since the tax rate and tax bases are determined by the National Assembly, local governments have no taxing authority. However, local governments are granted partial autonomy in the flexible adjustment of local tax rates. But

as such tax rates are not applied on the entry price of public goods in each province, the coefficient of local tax might be insignificant. Our results show the coefficient of housing deposit and rent as significantly positive, differing from Brueckner and Kim (2001). This means that housing rents may not represent the cost of living in the urban area. In contrast, housing rents in specific provinces may still represent the opportunity of capital improvement and be indicators of better education environments. The significant positive correlation of housing rent implies that migrants are willing to pay higher rents when the targeted province promises better education facilities, etc. As a result, monthly housing rent may be the proxy of land prices in Korea. A key aspect of this empirical analysis is the isolation of the fiscal effect from the market effect (e.g., economic crises). The analysis attempts to capture unstable economic trends by variable and year.

Additional findings are as follows. First, the number of students in colleges etc. acted as a significant factor in migration. Standing in for the educational environment of a given region, the number of students in colleges etc., along with other education-related variables such as educational spending, exerted a great impact on migration.

Second, the KTX effect failed to serve as an adequate explicatory variable, when analyzed separately or jointly as part of capital expenditure. Because the KTX effect was analyzed for the years after 2004, there were only 946 samples subjected to analysis. No 'straw effect' was found in this analysis framework, as there appeared to be no KTX effect on migration.

Third, the 'year' variable controlling for the annual decline in the migration rate and the distance between two given regions also explained the downward trend in inter-regional migration in Korea. That is, the greater the linear distance between two given regions, the less the inclination to migrate. The linear distance variable is time-invariant and therefore should be properly excluded from the fixed effect analysis. This study, however, included the variable in the fixed effect model in order to control the cost of migration.

Finally, educational conditions and official land value, which are variables of the market effect, are two decisive factors that clearly and significantly impact migration. Furthermore, the presence of SOC-like infrastructure (effect of public policy) and the increase in capital expenditure (i.e., fiscal spending) also exert a demonstrable impact on migration.

5. CONCLUSION

Has regional policy mitigated population concentration in the capital area in Korea? Our empirical analysis confirms that regional capital investment by the central and local governments has played a critical role in reducing provincial migration over the last two decades. This study therefore encourages policymakers to look beyond just market effects and consider the government investment effect in the course of devising redistributive regional policies.

This study contributes to the field by taking a unique approach to the migration issue, determining the net migration effect by isolating market forces such as employment, marriage education, etc., and showing the linkage between central and local governments' capital investment in underdeveloped areas and the reduction of migration rates. In this way it opens up a new dimension in the redistributive policy agenda.

APPENDIX

Table A1 Local Debt and Fiscal Decentralization in OECD Countries

	General Government Expenditure as a Percentage of GDP		Intergovernmental Transfer Revenue as a Percentage of GDP	Tax Burden Ratio to GDP	Total Tax Revenue	
	Central	Local			Central	Local
Austria	26.1	17.0	7.2	30.06	93.3	6.7
Belgium	30.3	22.2	7.5	29.79	84.5	15.5
Germany	14.4	20.7	4.5	22.83	52.3	47.7
Switzerland	10.9	20.8	6.7	21.50	47.9	52.1
United States	26.3	19.2	6.1	19.39	53.0	47.0
Canada	14.7	18.3		28.14	45.6	54.4
Federal (average)	20.5	19.7	6.4	25.29	62.8	37.2
Czech Republic	29.5	11.4	4	19.82	97.8	2.2
Denmark	42.3	37.2		47.06	72.5	27.5
Estonia	28.7	9.7		27.03	83.8	16.2
Finland	27.4	22.6	5.5	30.91	67.3	32.7
France	22.3	11.7	4	20.31	71.5	28.5
Hungary	33.8	11.5	6.4	23.64	89.9	10.1
Iceland	36.1	13.4		35.96	73.6	26.4
Ireland	40.9	5.8	4.3	22.62	100.0	0.0
Israel	38.5	6.1		27.02	91.2	8.8
Italy	28.1	15.3	7.8	29.51	76.9	23.1
Japan	19.7	16.4	2.5	16.67	56.6	43.4
Korea	20.1	13.0	9.2	19.78	78.6	21.4
Luxembourg	29.9	5.4	2.3	26.39	93.4	6.6
Netherlands	28.9	16.5	5.3			
Norway	35.2	14.8	4.7	43.23	87.8	12.2
Poland	24.9	14.1				
Portugal	36.3	7.0	3.2			
Slovak Republic	22.4	6.6		16.75	95.1	4.9
Slovenia	32.7	9.7		21.96	81.7	18.3
Spain	17.1	24.6	8	19.91	48.3	51.7
Sweden	29.1	25.2	5.2	38.88	59.2	40.8
United Kingdom	44.8	13.2	8.8	28.81	94.0	6.0
Unitary (average)	30.4	14.1	5.4	27.17	80.0	20.0

Sources: 1) Data for 'General government expenditure as a percentage of GDP', 'Tax burden ratio to GDP', and 'Total tax revenue' are based on the OECD National Accounts (OECD Stat. comparative tables <http://stats.oecd.org/Index.aspx?DataSetCode=REV>). The data for Korea is based on the *Outline of the Local Government Budget* (2011), and for Japan is based on the 国民経済計算確報 (2011). 2) Data for 'Local government' includes state and local government. 3) Data for social security funds is excluded from the tax burden ratio. Data for 'Intergovernmental transfer revenue as percentage of GDP' was measured in 2006.

REFERENCES

- Blöchliger, Hansjörg and Oliver Petzold, "Taxes and Grants: On the Revenue Mix of Sub-Central Governments," OECD Network on Fiscal Relations Across Levels of Government, 2009.
- Boadway, R. and F. Flatters, "Efficiency and Equalization Payments in a Federal System of Government: A Synthesis and Extension of Recent Results," *Journal of Canadian Economics*, 15, 1982, pp. 613-633.
- Bonin, H., W. Eichhorst, C. Florman, M. O. Hansen, L. Skiöld, J. Stuhler, K. Tatsiramos, H. Thomasen, and K. F. Zimmermann, "Geographic Mobility in the European Union: Optimizing its Economic and Social Benefits," IZA Research Report, No.19, 2008.
- Brueckner, J. K. and H. Kim, "Land Markets in the Harris-Todaro Model: A New Factor Equilibrating Rural-Urban Migration Source," *Journal of Regional Science*, 41, 2001, pp. 507-520.
- Dusansky, Richard and Cagatay Koc, "The Capital Gains Effect in the Demand for Housing," *Journal of Urban Economics*, 61(2), 2007, pp. 287-298.
- Gobillon, L. and T. Magnac, "Regional Policy Evaluation: Interactive Fixed Effects and Synthetic Controls," IZA Discussion Paper Series, No. 7493, 2013.
- Harris, J. R. and M. P. Todaro, "Migration and Unemployment: A Two-sector Analysis," *American Economic Review*, 60, 1970, pp. 126-142.
- Kim, Hyun-A, "Fiscal Decentralization and Regional Income in Korea," *The Korean Journal of Public Finance*, 21(2), 2007, pp. 1-22 (in Korean).
- _____, "An Empirical Analysis of Interregional Migration," *Korean Journal of Applied Economics*, 9(3), 2008, pp. 75-103 (in Korean).
- _____, "Interregional Migration and Public finance Policy," *Monthly Public Finance Forum*, No. 203, 2013, pp. 23-38 (in Korean).
- _____, "Fiscal Crisis, Consolidation and Economic Recovery," In

- Planning and Budgeting in Korea and Selected Asian Countries, Seoul: Korea Institute of Public Finance, 2014.
- Kim, Junghun, "Non-market Effects An Agglomeration and Their Policy Response: Can We Overcome the Mismatch?," *OECD Regional Outlook: Building Resilient Regions for Stronger Economies*, OECD, 2011.
- Kim, Sung Tai, "Scale Economies and Returns to Variety of Local Government Expenditures in Korea," *The Journal of the Korean Economy*, 6(1), 2005, pp. 103-121.
- Kim, Sung Tai and Jung-ho Jang, "Empirical Analysis on the Economic Determinants of Regional Migration in Korea during 1970-91 Period," *International Economic Journal*, 3(2), 1997, pp. 175-197 (in Korean).
- Mills, K. E., M. B. Percy, and L. S. Wilson, "The Influence of Fiscal Incentives on Interregional Migration: Canada 1964-1978," *The Canadian Journal of Regional Science*, 1983, 6(2), pp. 207-229.
- Molloy, Raven, Christopher L. Smith, and Abigail Wozniac, "Internal Migration in the United States," *Journal of Economic Perspectives*, 25(3), 2011, pp. 173-196.
- OECD, "How Persistent are Regional Disparities in Employment? The Role of Geographic Mobility," *OECD Employment Outlook*, 2005.
- Oswald, Andrew, "The Housing Market and Europe's Unemployment: A Non-Technical Paper," 1999 (<http://www2.warwick.ac.uk/fac/soc/economics/staff/academic/oswald/>).