Local decentralization and economic growth in Korea

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Abstract

Local public finance in Korea substantially and significantly has changed for the efficient public provision after 1991 local autonomy. Policy makers are trying to find out the effect of devolution. This paper attempts to examine how local share out of national expenditure (decentralization) affects the growth of regional income. This empirical paper shows the relationship between the increase of local share out of national expenditure and the growth of regional income in Korea. The significant results confirm the connection between them. These findings indicate the transfer effect of central government may cause the regional economy to municipal level rather than province level. For the province level of governments, the finding explains the tax-benefit ratio may not affect the regional income growth.

1. Introduction

A summary of the empirical search for a direct relationship between fiscal decentralization and economic growth is that it remains an open question. A by now literature of decentralization and economic growth has argued whether decentralization

causes regional economic growth or not. In the context of decentralization, the concern for developed countries is how devolution works, when it starts, how it influences the regional economic growth. For the design of decentralization policy, these findings suggest that developing countries do for welfare improvement in terms of per capita regional-growth.

There is a growing literature that tests this theory of a link between fiscal decentralization and economic development. Much of those work have focused on the change of per capita GDP with the nations as its unit of analysis. For example, Iimi (2005) shows the percentage change of per capita GDP with using the latest cross-country data from 1997 to 2001. The empirical result implies that fiscal decentralization fosters the economic growth as decentralization particularly on the fiscal expenditure side. Arzaghi and Henderson(2005) confirms the hypothesis that income per capita, population, land area and the degree of population concentration in the largest city in a country have large effects on the degree of decentralization. With 48 countries and 25 years, the paper finds that decentralization changes in ways predicted, in particular it increases with economic growth, country size and population. Stansel(2005) support for the hypothesis that decentralization enhances economic growth. The results indicate a negative relationship between the central-city share of metro area population and economic growth and a positive relationship between both the number of municipalities per 100,000 residents and the number of counties per 100,000 residents and economic growth. Feltenstein and Iwata(2005) offers evidence that there is a connection between decentralization and macroeconomic performance in China from 1952 to 1996. Also, Huther and Shah(1998), Akai and Sakata(2002) and Lin and Liu(2000) provide the finding that fiscal decentralization contributes to economic growth.

With regard to connection between decentralization and economic growth, there has been a marked inconsistency between theory and evidence. Oates' decentralization theorem underlies the belief that residents could move and choose between jurisdictions that provide different packages of local public goods and taxes with Tiebout mechanism. But the evidence does not always support the theory. Davoodi and Zou(1998), investigating the impact of fiscal decentralization on economic growth with cross-country data 1970 to 1989, show that there is a significant negative relationship in developing countries, and none in developed countries. Zhang and Zou(1998) also find that a higher degree of fiscal decentralization is associated with lower regional economic growth in China with 28 countries from 1986 to 1992. This means that an increase in sub-national government level expenditure causes a decline in the real growth rate of regional income. However, ironically, China has been recording

remarkable performances since the latter 1990s. Xie et al.(1999) examines how to relate fiscal decentralization to regional growth in the US economy from 1948 to 1994. The findings are that the decentralization effect is hardly significant. The insignificant coefficients on sub-national government expenditure shares are interpreted to mean that further decentralization in public spending is harmful to growth in the US context.

Iimi(2005) analyzes the reasons why empirical evidence contradicts the theoretical expectation. Firstly, decentralization is too sophisticated to measure by a set of empirical packages at the aggregate level since there are various dimensions. Such a political decentralization should be concerned in the empirical model. Secondly, the capability of local governments to achieve planning and implementing local economic environments such as local public enterprises is deficient. Finally, in contrast to the assumption in theory, residents cannot freely move between municipalities because of high-moving cost.

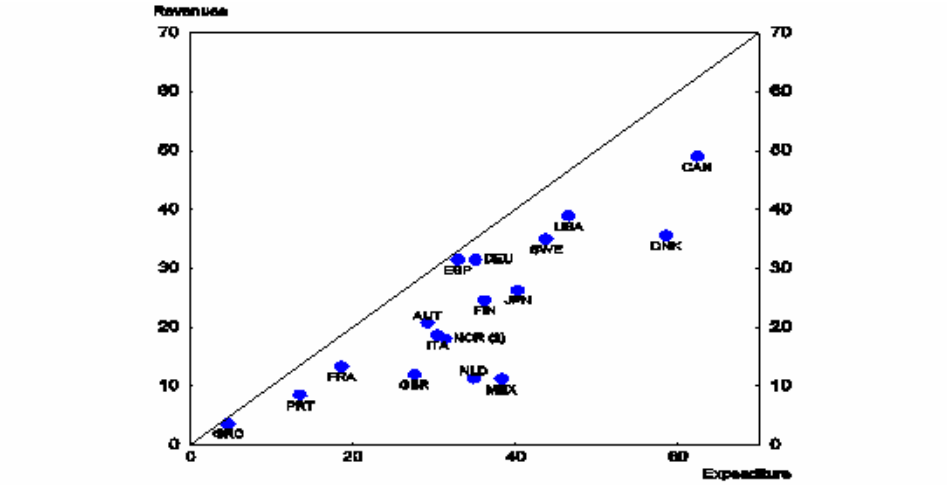
Local public finance in Korea substantially and significantly has changed for the efficient public provision after 1991 local autonomy. Policy makers are trying to find out the effect of devolution. Actually, there has few academic achievements related to the linkage between fiscal decentralization and regional growth in Korea. No clear answer emerges for the following two reasons. First, pure local share out of public expenditure is still negligible. So far even after 1991, the size of local government expenditure heavily depends on the amount of transfer from central government. There has been no need to check out the relationship between local economy and fiscal policy. Second, no reliable regional data induces bias implication for the results. There are several regional data sets such as GRDP, total private consumption by region. However, they do not have clear relationship with regional income, but with regional production. It is not possible to focus on regional income in current data. As a result, empirical evidence undertaken for plausible application might not support the performance of local governments, which are not attributed as organic subject.

While there has not been a wide concept about the local share out of public expenditure, this paper tries to figure out the role of intergovernmental fiscal policy in Korea. Since the local share has risen a lot, the function and composition of local budget should be investigated. According to KIPF specification in 2003, local revenue share was 23.5%, and local expenditure share was 50.3%(including Education expenditure). In comparison with 2000, the increased growth rate of revenue and expenditure in local government is 3.2% and 5.7% respectively. Surprising fact should be shown. The speed of growth rate would be much more greater than other OECD member countries. Local revenue and expenditure changes expressed in percentage points from 1985 to 2000 are

6% in revenue and 11% in expenditure. These figures imply that main tool of fiscal decentralization has been the expansion of expenditure side like other developed countries. Also, fiscal relations across levels of government in Korea are much more important caveats to be shown. The functional behavior has been different in municipal level and province level respectively.

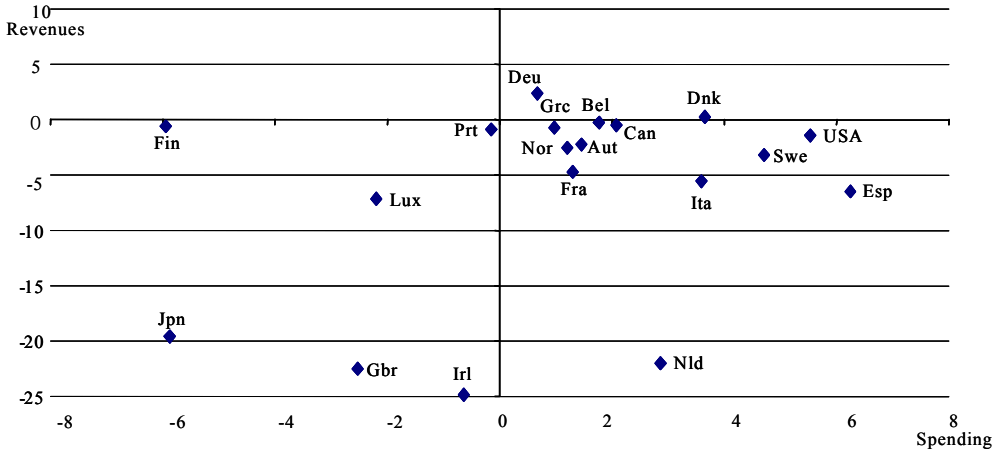
[Picture 1] Indicators of fiscal decentralization in OECD : Sub-national governments' share in general government revenues and expenditures in 2003 (1)

(Percentages)



Sources : OECD, National Account; Statistical Norway; Statistics Canada; US Bureau of Economic Analysis(Unpublished)

[Picture 2] Local revenue and expenditure changes expressed in percentage points from 1985 to 2001



Source : OECD National Accounts data. Statistics Norway(Unpublished).

This paper attempts to examine how local share out of national expenditure (decentralization) affects the growth of regional income. The aim of this paper is to empirically shed light on the question of whether decentralization stimulates growth, using the latest regional data from 1990 to 2003 in Korea. This empirical paper shows the relationship between the increase of local share out of national expenditure and the growth of regional income in Korea.

The remainder of this paper is organized as follows. The analytical framework and model are presented in Section 2. In section 3, the data used is explained and the feature of local issues is mentioned. Empirical results are provided in Section 4, and Section 5 concludes the paper. The policy issues and limits are discussed.

2. Model

The approach used in this paper borrows from the Davoodi and Zou(1998)'s framework, which is the modification of Barro and Sala-i-martin. The model assumes two levels of government, central and local. In this model, only the difference from Davoodi and Zou's set up is the number of levels of government. The level of fiscal decentralization is identified as the spending by local government as a fraction of total government spending. From the Barro, the factors in production function are private capital and public spending. Let k denote private capital stock, g total government spending, f central government spending and l local government spending. A per capita basis is utilized. The production function is Cobb-Douglas;

(2. 1) $f + l = g$, $y = k^{\alpha} f^{\beta} l^{\gamma}$

where y is per capita output, $0 < \alpha < 1$, $0 < \beta < 1$, $0 < \gamma < 1$ and $\alpha + \beta + \gamma = 1$. The composition of government spending is allocated the following form:

(2. 2) $f = \theta_f g$, $l = \theta_l g$, $\theta_f + \theta_l = 1$, $0 < \theta_i < 1$, $i = f, l$

Thus, θ_f is the share of central government in total spending, and θ_l the share of local government. Total government spending g is financed by flat tax rate τ .

(2. 3) $g = \tau y$

The representative agent term is given by

(2. 4) $v = \int_0^{\infty} \frac{c^{1-\sigma} - 1}{1-\sigma} e^{-pt} dt$,

where c is per capita private consumption, and ρ is the discount rate. The dynamic budget constraint of the representative agent is

(2. 5) $\frac{dk}{dt} = (1-z)y - c = (1-z)k^{\alpha} f^{\beta} l^{\gamma} - c$.

Given the assumption of balanced growth path, tax rate is constant. Representative agent's choice of consumption is decided by maximizing (2.4) subject to (2.5). With the balanced growth path, the per capita growth rate of this economy is given by

(2. 6) $\frac{dy/dt}{y} = \frac{1}{\sigma}\left[(1-\tau)\tau^{1-\alpha/\alpha}\alpha\theta_f^{\beta/\alpha}\theta_s^{\gamma/\alpha} - \rho\right]$.

Equation (3.6) shows the growth pattern of per capita production and the shares of different levels of government. This equation notes the share of each levels of government and the allocation of public spending. In dynamic setup, each government budget share with maximization of (3.6) is respectively,

$$(2.7)\ \theta_f^* = \frac{\beta}{\beta+\gamma} \quad , \qquad \theta_l^* = \frac{\gamma}{\beta+\gamma}.$$

In this equation, γ is the contribution amount from the share of each government in spending. Empirical tests focus on the clarification of the local impact.

3. Data

This paper studies the hypothesis that regional economy, in part, may be affected by the fiscal decentralization. The data used in this paper has two units of local government: municipal(city, county, autonomous district) and province level(metropolitan city and province). In order to examine the impact of fiscal decentralization on regional economy(income), revenue and expenditure data for 184 municipalities was collected using the *financial yearbook of local government* for the years 1990 through 2003. This panel uses *Gross classification data* instead of net amount classification for consistency, and *Settled account* data instead of budget account for accuracy.

Table 1 Data description (unit: million won, people)

Variable	Obs	Mean	Std. Dev.	Min	Max
Population	2393	289,685	859,874	9,245	10,969,862
Inhabitant Tax	2393	10,165	67655	2	1,788,485
Population growth rate	2393	-0.0172	0.1848	-0.35	9,813,154
Land area	2393	708	3861	2.79	156,059
Tax-benefit ratio	2393	0.5448	0.3919	0.0539	4.59
Local expenditure share	2393	0.0053	0.0186	0.00074	0.2215
Subsidy	2393	91,958	346,596	798	6,383,644
Local shared tax	2393	40,213	145,843	2	2,088,344

Per Capita

(Unit: won)

Inhabitant tax	2393	20,527	27,229	3,527	262,829
Local shared tax	2393	286,439	377,655	586	964,524
Subsidy	2393	413,027	565,079	1,901	1,073,007

Population and land area are based on MOGAHA statistics. While given literature let dependent variable be per capita regional income growth, this estimation does not use GRDP data in Korea. Since the reliability of the regional statistics would be very weak to represent the locality as widely known, the results might induce bias information. For the accurate measurement of regional income, this paper takes *per capita inhabitant tax* as a regional income proxy (Kim, 2003). Inhabitant tax in Korea is collected proportionally based on personal income tax and corporate income tax. This paper considers the income-source based tax can capture the sustainable change in regional income pattern. Two fiscal variables are included in the regression model as explanatory variables, one is *Local shared tax* and the other is *Subsidy*. The definition of *Subsidy* in the estimation includes *Local transfer fund* and other transfers. Also, the 30% change in comparison with previous year in population is excluded.

The key distinction of this paper is the investigation of *tax-benefit ratio* as well as *local expenditure ratio.* For the comparison with given literature, local expenditure ratio is defined as the share of total public expenditure(central + local). The specification of local expenditure ratio should be identified since the local expenditure part is getting larger and faster than other developed countries. Also, this study sheds light on the welfare effect for residents by using tax-benefit ratio. The amount of per tax in denominator is attributed as the contribution of fiscal responsibility and per expenditure in numerator is expressed as the welfare benefit with public services.

Local expenditure = each jurisdiction's expenditure/(local expenditure + central expenditure)

Tax-benefit ratio = per capita jurisdiction's expenditure/(per capita local tax + per capita national tax)

Table 1 All jurisdictions' average of Fiscal variables

YEAR	Tax-benefit ratio	Local expenditure ratio

1990	39.1847	0.535155
1991	47.44839	0.548182
1992	47.06009	0.560361
1993	48.82158	0.558373
1994	51.72448	0.551584
1995	49.69435	0.544983
1996	53.26934	0.543225
1997	58.4398	0.539685
1998	61.97013	0.585578
1999	58.563	0.527012
2000	52.33887	0.529464
2001	62.09431	0.517712
2002	62.5231	0.55852
2003	73.5051	0.567021

Table 2 Fiscal data description at Province level

	Tax-benefit ratio	Local expenditure ratio
Min	36.2035236(Seoul)	0.80676643(Ulsan)
Max	103.868566(Kangwon)	18.4488471(Seoul)
Average	61.542384	6.94320973

Fiscal data description shows some salient characteristics of 'capital area concentration' in Korea. In per capita base among *Metropolitan cities and Provinces*, the amount of tax amount dominates benefit level in Seoul. Half of people in Korea dwell on Capital area, mainly Seoul. Therefore, expenditure level in Seoul is extremely greater than others. Ulsan is special-district area with heavy industry. The figure of less than 1 in local expenditure level says that the national tax level is much more higher in Ulsan area.

3. Empirical tests and results

(1) Econometric issues in Panel data

With panel data, this analysis focus on asymptotic properties of estimator, where the time dimension, T is fixed and the cross section dimension, N, grows without bound. As Wooldridge(2002) points out the difference between macro-panel(N<T) and regional panel(N>T), the regional panel in Korea has 184 regions(N) and 14 years(T). The

asymptotic properties in balanced panel provide suitable for geographical regions. Panel unit root test and Cointegration test are seen. While stationary issues are not examined with regional data, this paper touches the time-series problem. Panel unit root test considers cross section features as much as stationary problems. Conventionally, the test employs AR(1) process like following;

$$y_{it} = \rho_i y_{it-1} + \mathrm{X}_{it}\delta_i + \in_{it} \quad (3.\ 1).$$

Table 3 Panel unit-root test

Variables	Null Hypothesis	Test	Level		I(0) or I(1)
			statistics	p-value	
Per capita inhabitant tax	H_0 : ρ_i=1	IPS	-0.60	0.2722	I(1)
		ADF-Fisher	35.90	0.2906	I(1)
		PP-Fisher	63.99	0.0007	I(1)
Tax-benefit ratio	H_0 : ρ_i=1	IPS	-2.71	0.0033	I(0)
		ADF-Fisher	59.79	0.0021	I(0)
		PP-Fisher	60.44	0.0017	I(0)
Local expenditure ratio	H_0 : ρ_i=1	IPS	0.89	0.8120	I(1)
		ADF-Fisher	29.42	0.5976	I(1)
		PP-Fisher	28.44	0.6475	I(1)

The results are reported by using three methods (IPS: Im, Pesaran and Shin W-stat, ADF-Sfisher, PP-Fisher) in this paper. Except tax-benefit ratio, other variables have unit root with I(1). Unlike Province level, variables in local level do not have unit-root in the same test. The number of observation in local level might be enough to overcome stationary issue(N>T). In order to see linear relationship between dependent and explanatory variables, Panel-Cointegration test is required. By using Banerjee(1999) and Pedroni(1999)'s way, ADF unit-root test of residuals is examined. The test result conveys a consistent story that there might be the linear relationship between dependent variable and independent variables.

Table 4 Panel Cointegration test

	Null Hypothesis	Alternative Hypothesis	Statistics
Provinces	$H_0 : \gamma_i = 1, \forall i$	$H_1 : \gamma_i < 1, \forall i$	-3.35***
Local	$H_0 : \gamma_i = 1, \forall i$	$H_1 : \gamma_i < 1, \forall i$	-19.32***

(2) Specification of empirical model and econometric issues

$$y_{it} = \alpha_0 + \alpha_1 Decentralization_{it} + \mathrm{X}_{it}\beta + \in_{it},\ i = 1,....,248,\ t = 1990,....,2003 \quad (4.1)$$

Two econometric issues are summarized in Iimi (2005). It is noteworthy that the characteristics of regional (geographical) panel data have been mentioned. As pointed out by Akai and Sakata (2002), a critical problem with cross sectional data is that it is difficult to quantify enormous differences among regions. At first, this following empirical model incorporates region-specific fixed effects and Feasible GLS for heteroskedasticity. Also, time-series macro variables employs endogeneity problem. Previous lag variables of dependent variables are used to mitigate endogeneity issue.

Decentralization includes tax-benefit and local expenditure share in this analysis. With the level variables, decentralization may affect economic growth at both province and local area. In this case, the decentralization effect on economic growth cannot be decomposed between macro economic growth and regional income increase. To see marginal effect on regional income, first differencing variable might be used as a dependent variable.

$$\Delta y_{it} = \alpha_0 + \alpha_1 Decentralization_{it} + \mathrm{X}_{it}\beta + \in_{it} \quad (4.2)$$

As a result, the first differencing variable is not explained by independent variable except trend variable with equation (4.2). In this case, econometrics doubts conventional spurious regression. In order to obtain robustness, previous one of dependent variables(Yt-1) may be used one of the independent variables. Miller and Russek(1997) used this way to figure out misspecification. The undertaken assumption of previous time variables means that it might explain almost all of marginal effect on economic growth.

$$y_{it} = \alpha_0 + \gamma y_{it-1} + \alpha_1 Decentralization_{it} + \mathrm{X}_{it}\beta + \in_{it}$$

$$\Rightarrow \quad \ln(y_{it}) = \alpha_0 + \gamma \ln(y_{it-1}) + \alpha_1 Decentralization_{it} + \ln(\mathrm{X}_{it}\beta) + \in_{it}$$

$$\Rightarrow \quad \ln(y_{it}) - \ln(y_{it-1}) = \alpha_0 + (\gamma - 1)\ln(y_{it-1}) + \alpha_1 Decentralization_{it} + \ln(\mathrm{X}_{it}\beta) + \in_{it}$$

(4. 3)

Helms(1985) and Mofidi and Stone(1990) uses this structure. Coefficient of $(\gamma - 1)$ states the convergence speed to the balanced equilibrium. This paper will note whether the convergence level is achieved or not. Finally, equation (4.3) is used for this empirical analysis.

In regard to regression model, fixed effect is mainly used since regional difference should be captured. Fixed effect is often superior to be pooled OLS or random effect for application where participation in a program is determined by preprogram attributes that also effect y_{it}. Hausman(1978) suggested a test based on the difference between random effects and fixed effects estimates. In policy wise for the interpretation, random effects estimates are interpreted as OLS estimates. For this rational, Hausman test is used to determine whether pooled OLS and fixed effect regression in this empirical study. It is common argument that distinctive locality is very different in Korea. The results of Hausman statistics response those regional differences.

The selection of exogenous control variables in previous literature is like following. The first-year lagged variables of the independent variables are used as a control marginal effect on the estimation (Iimi, 2005). Others are for control region specific effects.

Table 1 Empirical setup in given literature

	Data	Variables
Davoodi and Zou (1998)	Cross-country 1970~1989 OLS	*Dependent* : Per Capital GDP Growth Rate *Independent* : Average tax rate, Fiscal Decentralization Year effect, Population growth rate, Investment, Share of GDP
Xie and Zou (1999)	U.S. economy, 1995~1991 (two level government)	*Dependent* : Per Capital GDP Growth Rate *Independent* : Average tax rate, Expenditure ratio of state and local government, Population growth, Openness, Inflation, Gini-coefficient
Akai and Sakata (2002)	U.S. 1992~1996	*Dependent*: Per Capital GSP Growth Rate *Independent* : Educational Level, Gini-coefficient, Population growth rate

Atsush Iimi (2005)	Cross-country 1997~2001 OLS and IV	*Dependent* : GDP, GDP Growth Rate *Independent* : Average tax rate, Fiscal Decentralization, Political Freedom, population growth rate, Regional and year dummy
Arzaghi and Henderson(2005)	Cross-country 25years	*Dependent* : Federal index *Independent* : per capita GDP, population, area, etc.

(2) Results

Table 5 Regional income with fiscal impact at local areas

Dependent variable: log(per capita Inhabitant Tax)			
	Model 1	Model 2	Model 3
log(GDP)	1.87(52.64)***	1.79(62.23)***	1.84(81.45)***
log(population)	-0.36(-6.91)***	-0.33(-6.12)***	-0.35(-6.36)***
Tax-benefit ratio	-	0.05(1.99)**	0.07(3.10)***
Local expenditure share	5.16(2.06)***	-	4.63(1.89)**
Local autonomy	1.22(5.44)***	1.28(5.61)***	1.27(5.56)***
log(per capita LST)	-0.02(-1.61)	-0.04(-1.70)	-0.02(-1.64)
log(per capita Subsidy)	0.13(6.17)***	0.13(6.39)***	0.12(6.06)***
$\log(\text{per capita LST})_{\text{autonomy}}$	0.04(3.16)***	0.05(3.66)***	0.04(3.20)***
$\log(\text{per capita Subsidy})_{\text{autonomy}}$	-0.13(-5.14)***	-0.14(-5.53)***	-0.14(-5.26)***
Capital area	-0.03(-1.83)**	-0.04(-1.62)	0.02(1.23)
Kyoungsang area	-0.05(-3.34)***	-	0.01(0.84)
Jeolla area	-0.07(4.19)***	-0.02(1.89)***	-
Other areas	-	0.05(3.10)***	0.06(3.87)***
Constants	-68.95(-2.98)***	-108.04(-4.66)***	-104.99(-4.55)***
R^2	0.93	0.93	0.93
Regression Model	Fixed effect	Fixed effect	Fixed effect
N	2296	2296	2296
Hausman Statistic	733.19		

In local areas, the estimation results indicate that the extension of local expenditure is generally useful for stimulating regional income. Even if tax burden is considered in tax-benefit per capita base, per capita expenditure still affects the regional income. In comparison with provinces, the size of intergovernmental transfer is heavily greater. In

the respect of decentralization, conjunction of the theory is confirmed in this setup. Therefore, the increase in local expenditure shares seems to gear up regional income.

Clearly, local autonomy seems to be one of the factors to increase regional income in local base. After local autonomy from 1995, local shared tax as equalization grant plays an important role on regional income after autonomy. However, subsidy does not lead economic growth in the same period. It is noteworthy that the characteristics of intergovernmental grants between equalization grant and project-base grant in Korea. Mainly, local shared tax is key source of local budget especially poor area. After 1995, the speed of growth in subsidy has been rapidly fast. The distribution standard of project-based subsidy should be population, land area and other demand of public provision. So, subsidy impact in local area seems to be weaker than province level. That is why negative coefficient of subsidy has been expressed in local level.

Table 6 Regional income with fiscal impact at province level

Dependent variable: log (per capita Inhabitant Tax)			
	Model 1	Model 2	Model 3
log(GDP)	2.04(20.84)***	1.96(22.14)***	2.07(15.54)***
log(Population)	-0.50(-2.34)***	-0.70(-3.14)***	-0.91(-3.40)***
Tax-benefit ratio	-	0.29(1.25)	0.05(1.21)
Local expenditure ratio	4.01(2.09)***	-	4.74(1.91)**
Local autonomy	0.69(0.71)	0.54(0.60)	0.44(0.51)
log(per capita LST)	-0.02(-1.55)	-0.02(-1.75)	-0.03(-1.11)
log(per capita Subsidy)	-0.18(-3.54)***	-0.14(-2.79)***	-0.13(-2.51)***
$\log(\text{per capita LST})_{\text{autonomy}}$	0.03(0.74)	0.02(1.65)	0.01(0.49)
$\log(\text{per capita Subsidy})_{\text{autonomy}}$	0.23(2.70)***	0.17(2.15)***	0.03(2.44)***
Capital area	-0.01(0.16)	-0.05(-1.09)	-0.06(-0.98)
Kyoungsang area	0.04(1.10)	-	0.12(2.51)***
Jeolla area	-0.04(-1.10)	-0.06(-1.76)**	-
Other areas	-	-0.01(-0.32)	0.06(1.80)**
Constants	-98.11(-4.51)***	-101.92(-3.98)***	-109.12(-4.81)***
R^2	0.85	0.85	0.85
Regression model	Fixed effect	Fixed effect	Fixed effect
N	199	199	199
Hausman Statistic	25.63		

Tax-benefit ratio effect does not seem to cause the expansion of regional income as the paper assumed in province level. Positive coefficient has been shown but not with statistical significance. The implication of this result that tax burden is quite similar to public services to each resident. Local expenditure ratio makes it powerful for provincial government to stimulate regional income. The significant coefficients on provincial government expenditure shares are interpreted to mean that further decentralization in public spending is beneficial to growth in Korea context. However, local autonomy cannot be a reason for income expansion in province level. Autonomy is more directly effective in small jurisdiction level in Korea. Local government has promoted fiscal reform with distribution of intergovernmental grants after autonomy. As mentioned above, the relationship between subsidy in province level and regional income becomes significant after autonomy. Equalization grant as expressed local shared tax in province level does not move regional income level. Mainly, local shared tax is main fiscal source for local level. For the endogeneity problem, previous lag variables of dependent variables might be used in explanatory variables.

Table 2 Growth rate of regional income

Dependent variable: Growth rate of regional income($g = Y_{it} - Y_{it-1}$)		
	Local	Province
log(*per capita Inhabitant tax*)t-1	-0.67(-34.35)***	-0.49(-7.23)***
log(population)	-0.37(-10.24)***	-0.83(-3.46)***
Year dummy	-0.07(-7.16)***	0.02(0.79)
log(GDP)	1.97(15.21)***	0.62(1.94)**
Tax-benefit ratio	0.05(1.39)***	-0.36(-2.10)***
Local expenditure ratio	6.98(3.07)***	5.88(2.90)***
Local autonomy	-0.27(-9.85)***	-0.14(-2.30)***
Constants	125.49(6.97)***	-26.82(-0.64)
R^2	0.40	0.39
Model	Fixed effect	Fixed effect
N	2140	201
Hausman Statistic	213.84	44.51

The coefficients of previous lag variables of dependent variables are –0.5 and –0.6 at province and local level respectively. These are greater than US data (-0.2) measured by absolute value. These results imply that the convergence speed to the optimal growth

path assumed is quite faster than US State data. When there happens regional income difference, the equilibrium path has been chosen at local government in Korea.
In summary, local expenditure ratio is effective tool to grow regional income base in both local and province level. However, tax-benefit ratio only causes local level of income in this analysis. When previous-lag variables are considered in explanatory variables, the coefficient of tax-benefit ratio in province level is negative. It means that local tax burden of metropolitan area transfers to local level directly.

4. Summary and Limits

It is still arguable that the sizable intergovernmental transfer from central government may encourage the regional income bases. The belief that the linkage between tax revenue and expenditure is desirable for efficiency to provide public services is based on Oates' theory. In contrast to the fiscal federalism, Miller and Russek(1997) does not support theoretical assumption. They were curious that the increase in intergovernmental transfer from central government may distort the private market mechanism. The empirical analysis confirms this idea. The work of Jin and Zou (World Bank) also suggest that the expansion of local expenditure stimulates income discrepancy even worse in China. From the empirical point of view, this paper contributes these arguments that the increase in local expenditure ratio may be one of the reasons to encourage regional income. The fundamental assumption underlying the belief has been tested with the results of significant positive relationship between the size of local government and regional income base in Korea. Tax benefit ratio explains following. If the size of expenditure is greater than tax burden, then economic growth might be stimulating with significant coefficient. This paper, investigating the impacts of fiscal decentralization on economic growth with panel data from 1990 to 2003, show that there is a significant positive relationship between fiscal decentralization and growth in Korea.
It is hard to decompose between the performance of macro economy and local expenditure. It remains controversial whether there is any relationship between decentralization and economic growth. In current Presidential period, the aim of decentralization has been addressed in many ways especially the devolution of fiscal expenditure. This paper tries to reinforce the evidence. The findings of the empirical results provide the basic interpretation of fiscal policy in the same period.

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