

プロジェクト報告

The Local Government Expenditure in South Korea

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Abstract

This paper examines the impact of government investment by the local government to stimulate the local economy and social security expenditure to protect the poor in the local economy. Unlike government expenditure by the central government, the local government expenditure may suffer from efficiency loss due to the absence of nationwide 'planning' and 'coordination.' This paper, using the Korean panel data, empirically show that the government investment to stimulate the local economy incurs efficiency loss due to 'coordination failure,' while the social security expenditure does not. The result requires us a cautious and precise approach to 'decentralization of public finance unlike decentralization of political power.

Keywords: Local Government Expenditures, Government Investment, Social Security Expenditure, Coordination Failure,

JEL Classification: H72, H77, H79

1. Introduction

Although political science recognizes 'decentralization of political power' as a

desirable goal for realizing direct democracy, economics asks for a cautious and precise approach to 'decentralization of public finance,' which is necessary for supporting local autonomy. Indeed, it is often observed that localizing government expenditures hinders exploiting economies of scale and enhancing social welfare. Motivated by it, this paper empirically examines the performance of local government expenditure in South Korea and searches for a practical criterion for the plausible degree and scope of localizing government expenditure.

In accordance with the political movement to enlarge local autonomy in South Korea, the ratio of the central government expenditure to the whole government expenditure has sharply fallen, for example, from 60 percent in 2015 to 55 percent in 2020. As a result, the central government expenditure is about 296 trillion KRW, and the sum of all local governments' expenditure is 239.7 trillion KRW as of the 2020 budget. Despite the plausible goal to support local autonomy, it is still questionable whether such rapid structural changes in government expenditure improves or deteriorates social welfare due to the weakening of nationwide 'planning' and 'coordination.'

Local government expenditure comprises 13 detailed items, each of which has its own purpose. Given that the exposure of each item to risk of 'coordination failure' is different depending on its own purpose, we have grouped them into three categories by its own purpose: government investment to boost up the local economy, social security expenditure to protect the poor, and government consumption to maintain the government function. Then, we examine to what extent the regional GDP and local income inequality are affected by each category of its own local government expenditure and the other local governments' expenditures as well. Furthermore, by extending the framework in Lundberg and Squire (2003), we also evaluate the side effect of government investment (social security expenditure) on income inequality (regional GDP) as well.

We, using the province-level data of South Korea, find that i) the (real) regional GDP is significantly increased by government investment of the local government in recession, but ii) it is adversely affected by government investment of the other local governments. In other words, an increase in government investment by the local government boosts the province's economic growth but dampens economic growth in the other regions. In addition, iii) income inequality is significantly mitigated by the

social security expenditure of the local government, but it is not affected by the other local governments' expenditure. These results suggest a significant efficiency loss due to coordination failure, at least in the local government's investment.

An extensive literature¹⁾ has attempted to estimate the multiplier of government expenditure. However, it often ignores that government expenditure consists of multiple items, the goals of which are not necessarily restricted to economic growth. Furthermore, it needs to pay more attention to the fact that a substantial portion of the government budget given to local governments may result in efficiency loss in the absence of centralized planning and coordination. Consistent with it, this paper empirically shows that the local government's investment to stimulate the local economy may end up with efficiency loss due to 'coordination failure,' while social security expenditure is free from that concern.

The paper proceeds as follows. Section 2 provides data description and summary statistics. Section 3 and Section 4 present our estimation strategy and estimation results, respectively. We conclude in Section 5 with the implication of our findings and limitations of the present study.

2. Data

For the analysis at the province level, we include 16 provinces out of 17 provinces, excluding Sejong. Sejong was established in 2013, so early fluctuations such as GRDP or population could affect the panel analysis. For example, the annual growth rate in population from 2013 to 2020 in Sejong was 16.5 percent while the annual growth rate in population in the other 16 provinces was 0.01 percent on average during the same time period. As a result, Sejong's GRDP per capita is quite distinct from the other 16 provinces. Sejong's average annual growth rate of GRDP per capita is -5.8 percent, while the average annual growth rate of GRDP per capita in the other 16 provinces is 3.1%, which enforces us to remove Sejong from our sample.

The local government expenditure, which is our key variable, is divided into three sectors: expenditure for investment, expenditure for social security, and expenditure for government consumption. Since the data for local government expenditure is

1) See Blanchard and Perotti (2002) and Lee and Hur (2017).

available from 2008 at Localfinance365, we construct the time period from 2008 to 2020. The expenditure for investment is the local government expenditure for boosting their local economies, which consists of culture and tourism, agriculture, forestry maritime affairs and fisheries, industry· small and medium firms and energy, transportation and logistics, national land and regional development, and science and technology. The expenditure for social security is the sum of social welfare and health. Finally, the expenditure for government consumption is the sum of general public administration, public order, and safety. Education and environmental expenditures were excluded from the analysis as the nature of the expenditures do not clearly fall into any of the three sectors, and expenditures categorized as other expenditures were also excluded from the analysis.

Interestingly, the expenditures for social security have steadily increased, accounting for about one-third of total local government expenditures. Over the 12 years, the government expanded the beneficiary gradually, launched several pro-natal policies to increase the total fertility rate since 2005, and began the basic pension system for the elderly in 2014, etc. As a result, the proportion of expenditure for economy reduces from 44.02 percent in 2008 to 35.41 percent in 2020, and the proportion of expenditure for social welfare increases from 17.95 percent to 32.29 percent.

Given the significant differences in population size across the 16 provinces, we analyze government expenditure per capita as the main variable instead of total expenditure. As of 2020, Jeju is the smallest province with a population of 674,635 and Gyeonggi is the largest with a population of 13,427,014, a 20-fold difference in size. Government expenditure per capita has been steadily increasing from 2.34 Million KRW in 2008 to 5.45 Million KRW in 2020. Of the 5.45 million KRW government expenditure in 2020, economic expenditure accounts for 1.93, and social welfare expenditure accounts for 1.76.

The first dependent variable, we use GRDP per capita instead of GRDP to reflect the difference in population size at the province level. The data is available at Statistics Korea. There are persistent increases in GRDP per capita from 2008 to 2020, as shown in Table 1. The GRDP per capita increased from 23,778 (1,000 KRW) in 2008 to 36,593 (1,000 KRW) in 2020.

To obtain the inequality measure, which is the second dependent variable, we use

the Local Employment Survey from Statistics Korea. The sample includes household members who are over the age of 15 and are living in South Korea. The survey interviews twice a year (first half, second half). We take the data from the first halves of 2008-2020. In the questionnaire, people who are working for wages are asked how much they earned during the last 3 months before tax. Using the wage data, we construct the decile wage distribution at the province level and compute the decile dispersion ratio which is defined as the tenth decile wage divided by the first decile wage.

For the main analysis, we use the residual values after detrending the log variables such as GRDP per capita, inequality measure, and the local government expenditures in each region to remove the year trend linearly.

We also create a dummy variable for the expansion period to examine whether the local government expenditures in each sector have different effects on GRDP per capita and inequality in expansion and recession periods. For each province level, we define the expansion period as equal to one if the residual value in GRDP per capita is greater than zero.

Finally, GRDP and inequality can be affected by local government spending in its own province, but they can also be affected by local government spending in other provinces. By creating a variable for the sum of other local government expenditures, we analyze how GRDP and inequality are affected by not only local government expenditure in its own province but also the expenditures of other local governments.

Table 1 Summary Statistics

	2008	2012	2016	2020
GRDP per capita (1,000 KRW)	23,778.75 (8,578.89)	29,304.00 (11,299.35)	34,139.19 (10,986.46)	36,593.19 (10,097.79)
Decile dispersion ratio	9.67 (1.30)	10.92 (1.34)	12.26 (3.18)	13.41 (4.43)
Government expenditure per capita	2.34 (1.01)	2.83 (1.15)	3.49 (1.40)	5.45 (1.88)
Government expenditure for investment per capita (Million KRW)	1.03 (0.60)	1.12 (0.68)	1.29 (0.81)	1.93 (1.09)
Government expenditure for social security per capita (Million KRW)	0.42 (0.12)	0.62 (0.13)	0.94 (0.18)	1.76 (0.29)

Government expenditure for government consumption per capita ((Million KRW)	0.26 (0.15)	0.33 (0.18)	0.37 (0.21)	0.61 (0.27)
Government expenditure for investment in other regions per capita	15.44 (0.60)	16.79 (0.68)	19.40 (0.81)	28.92 (1.09)
Government expenditure for social security in other regions per capita	6.35 (0.12)	9.23 (0.13)	14.08 (0.18)	26.43 (0.29)

Data : KOSIS, Localfinance365

3. Model

This section addresses the estimation method that is borrowed and developed from Lundberg and Spire (2003). First, it presents two linearized regression equations, one for economic growth and the other for income inequality. Then, it shows that how to develop an auxiliary model by combining those regression equations and how to estimate the true impact of government expenditure using the auxiliary model.

Denote by y_{jt} and e_{jt} the gross regional domestic product (GRDP) and the 10-90 ratio of individual income, respectively, in region $j \in J = \{1, 2, \dots, 16\}$ at time $t \in T = \{0, 1, 2, \dots, 11\}$. Let $X_{jt} = (x_{1jt}, x_{2jt}, x_{3jt})'$, where x_{1jt} represents the social security expenditure to reinforce social protection, x_{2jt} represents government investment to develop the local economy, and x_{3jt} represents government consumption to maintain government functions in region $j \in J = \{1, 2, \dots, 16\}$ at time $t \in T = \{0, 1, 2, \dots, 11\}$.

Auerbach and Gorodnichenko (2012) show that the impact of fiscal policy shocks is crucially affected by business cycle fluctuations. To reflect on this, we define $\tilde{x}_{ijt} = x_{ijt}$ if $y_{jt} > 0$, $\tilde{x}_{ijt} = 0$ otherwise. In addition, we define $\hat{x}_{ijt} = \sum_{k=1}^{16} x_{ikt} - x_{ijt}$ in order to capture the impact of government expenditure by local government other than government j on jurisdiction j . Then, we estimate the following regression equation.

$$y_{jt} = \beta_0 + \beta_1 y_{jt-1} + \sum_{i=1}^3 \beta_{1+i} x_{ijt} + \sum_{i=1}^2 \beta_{4+i} \tilde{x}_{ijt} + \sum_{i=1}^2 \beta_{6+i} \hat{x}_{ijt} + \beta_9 e_{jt} + \varepsilon_{jt} \quad (1)$$

where $\varepsilon_{jt} \sim N(0, \sigma_{y_j})$. Along the same way, we construct another regression equation for the regional evolution of economic inequality.

$$e_{jt} = \gamma_0 + \gamma_1 e_{jt-1} + \sum_{i=1}^3 \gamma_{1+i} x_{ijt} + \sum_{i=1}^2 \gamma_{4+i} \tilde{x}_{ijt} + \sum_{i=1}^2 \gamma_{6+i} \hat{x}_{ijt} + \gamma_9 y_{jt} + \xi_{jt} \quad (2)$$

where $\xi_{jt} \sim N(0, \sigma_{e_j})$. We estimate equations (1) and (2) by assuming region-specific random effect.

Unfortunately, the ordinary least square estimator of equations (1) and (2) is

tackled by the multicollinearity issue between y_{jt} and e_{jt} . For example, the government investment in region $j \in J = \{1, 2, \dots, 16\}$ at time $t \in T = \{0, 1, 2, \dots, 11\}$ may have an indirect effect on e_{jt} through equation (2) as well as the direct effect on y_{jt} through equation (1), which may result in under- or over-estimation on the impact of x_{jt} . To resolve this issue, we build an auxiliary model as follows by combining equations (1) and (2) and isolating y_{jt} and e_{jt} on the left-hand side.

$$y_{jt} = \delta_0 + \delta_1 y_{jt-1} + \sum_{i=1}^3 \delta_{1+i} x_{ijt} + \sum_{i=1}^2 \delta_{4+i} \tilde{x}_{ijt} + \sum_{i=1}^2 \delta_{6+i} \hat{x}_{ijt} + \delta_9 e_{jt-1} + \varepsilon'_{jt} \quad (3)$$

$$e_{jt} = \eta_0 + \eta_1 y_{jt-1} + \sum_{i=1}^3 \eta_{1+i} x_{ijt} + \sum_{i=1}^2 \eta_{4+i} \tilde{x}_{ijt} + \sum_{i=1}^2 \eta_{6+i} \hat{x}_{ijt} + \eta_9 e_{jt-1} + \xi'_{jt} \quad (4)$$

Notice that while y_{jt} in equation (1) depends on not e_{jt-1} but e_{jt} , y_{jt} in equation (3) depends on not e_{jt} but e_{jt-1} . Along the same reasoning, e_{jt} does not depend on y_{jt-1} but does depend on y_{jt} . We take advantage of it as exclusion restriction.

We call equations (3) and (4) an auxiliary model, because estimating equations (3) and (4) yields $(\widehat{\delta}_1, \widehat{\delta}_2, \dots, \widehat{\delta}_9)$ and $(\widehat{\eta}_1, \widehat{\eta}_2, \dots, \widehat{\eta}_9)$, which allows us to make an inference on the estimates of $(\beta_1, \beta_2, \dots, \beta_9)$ and $(\gamma_1, \gamma_2, \dots, \gamma_9)$. Let us denote the inferred estimates of $(\beta_1, \beta_2, \dots, \beta_9)$ and $(\gamma_1, \gamma_2, \dots, \gamma_9)$ by $(\widetilde{\beta}_1, \widetilde{\beta}_2, \dots, \widetilde{\beta}_9)$ and $(\widetilde{\gamma}_1, \widetilde{\gamma}_2, \dots, \widetilde{\gamma}_9)$. Then, we obtain that for all $k \in \{0, 1, \dots, 8\}$, $\widetilde{\beta}_k = \widehat{\delta}_k - \widehat{\eta}_k \widetilde{\beta}_9$ and $\widetilde{\gamma}_k = \widehat{\eta}_k - \widehat{\delta}_k \widetilde{\gamma}_9$, where $\widetilde{\beta}_9 = \widehat{\delta}_9 / \widehat{\eta}_9$ and $\widetilde{\gamma}_9 = \widehat{\eta}_1 / \widehat{\delta}_1$. In addition, the standard errors of $(\widetilde{\beta}_1, \widetilde{\beta}_2, \dots, \widetilde{\beta}_9)$ and $(\widetilde{\gamma}_1, \widetilde{\gamma}_2, \dots, \widetilde{\gamma}_9)$ can be obtained through boots trapping.

3. Estimation Results

Table 2. The Impact of Local Government Expenditure on Economic Growth

	(1)	(2)	(3)	(4)
	y_{jt}	y_{jt}	y_{jt}	y_{jt}
y_{jt-1}	0.360*** (0.069)	0.310*** (0.051)	0.314*** (0.070)	0.270*** (0.067)
e_{jt}	0.017 (0.018)	0.019 (0.018)	0.016 (0.017)	0.018 (0.018)
x_{1jt}	-0.229*** (0.043)	-0.132* (0.074)	-0.132*** (0.027)	-0.048 (0.078)
x_{2jt}	0.009 (0.021)	0.021 (0.020)	0.075*** (0.027)	0.084*** (0.032)
x_{3jt}	0.003 (0.007)	0.005 (0.007)	0.001 (0.008)	0.003 (0.009)
$\widetilde{x}_{1jt}$	0.198***	0.146**	0.111**	0.067

	(0.068)	(0.060)	(0.046)	(0.046)
$\widetilde{x}_{2jt}$	-0.077***	-0.084***	-0.072***	-0.078***
	(0.022)	(0.026)	(0.023)	(0.027)
$\widehat{x}_{1jt}$		-0.119		-0.106
		(0.086)		(0.089)
$\widehat{x}_{2jt}$			-0.157***	-0.155***
			(0.043)	(0.044)
_cons	0.004**	0.003	0.002	0.001
	(0.002)	(0.002)	(0.001)	(0.001)
<i>N</i>	192	192	192	192

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3. The Impact of Local Government Expenditure on Income Inequality

	(1)	(2)	(3)	(4)
	e_{jt}	e_{jt}	e_{jt}	e_{jt}
y_{jt}	0.177	0.265	0.179	0.264
	(0.214)	(0.231)	(0.243)	(0.256)
e_{jt-1}	0.289***	0.296***	0.289***	0.296***
	(0.100)	(0.104)	(0.101)	(0.105)
x_{1jt}	-0.242	-0.520**	-0.244	-0.519**
	(0.163)	(0.241)	(0.158)	(0.254)
x_{2jt}	0.161**	0.127	0.159	0.128
	(0.081)	(0.082)	(0.106)	(0.106)
x_{3jt}	-0.004	-0.008	-0.003	-0.008
	(0.036)	(0.036)	(0.036)	(0.036)
$\widetilde{x}_{1jt}$	0.379**	0.511***	0.381**	0.509**
	(0.163)	(0.186)	(0.181)	(0.210)
$\widetilde{x}_{2jt}$	-0.332***	-0.310***	-0.332***	-0.310***
	(0.092)	(0.091)	(0.092)	(0.091)
$\widehat{x}_{1jt}$		0.343		0.343
		(0.234)		(0.233)
$\widehat{x}_{2jt}$			0.004	-0.003
			(0.137)	(0.131)
_cons	-0.008*	-0.005	-0.008*	-0.005
	(0.004)	(0.005)	(0.005)	(0.005)
<i>N</i>	192	192	192	192

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 and Table 3 show the estimation results of Equations (1) and (2) using panel regressions with random effects. As is noted above, the estimated coefficients

would not capture the unbiased effects of government expenditures due to the multicollinearity issue. However, these estimations still provide useful information regarding the direction of correlations between the government expenditures and the local economic fluctuations and inequality.

In Table 2, the dependent variable is the linearly de-trended residual of real regional GDP, i.e. the cyclical component of real GRDP after taking out the linear trend for each province. The independent variables are also linearly de-trended. The coefficients on the social security expenditure are estimated negative, while the investment expenditure's coefficients are positive. Spending higher-than-usual amount of social security expenditures seems to be negatively correlated with local economy's growth, which might suggest some degree of inefficiency in government interventions. On the other hand, spending higher-than-usual amount of investment expenditures seems to be positively correlated with local economy's growth, which suggests that the local government's stimulus has some effects in the intended direction. These positive effects seem to work better in recessions, because the investment expenditures in boom times are estimated to be negatively correlated with local economy's growth. For the coefficients on the investment spending, the estimates are statistically significant at 1% level in Models (3) and (4), where the investment expenditures of "the rest" – all the other provinces' local governments – are also included as an independent variable. The coefficients on the rest's investment expenditures are estimated negative and statistically significant. This suggests some degree of competition between local governments – if the rest are spending more in investments than the i -th province, the economic growth of the i -th province is weaker than the trend. It may be worthwhile to note that the coefficient of the first lag of the dependent variable is estimated around 0.3 and statistically significant at 1% level for every model, which suggests a strong autocorrelation.

In Table 3, the dependent variable is the linearly de-trended residual of regional S90/S10, the inter-decile income share ratio for each province. Again, this variable shows a strong autocorrelation. The social security expenditures of local governments have negative correlation with the inequality in the province, which is as expected. When a local government spend higher-than-usual amount in social securities, the income inequality gets less severe, promoting more equal distribution of labor income. However, the coefficients are estimated positive and significant for the social security

expenditures in boom times. Considering that the estimated coefficients on the social security expenditures for all-time periods and for boom-time periods are of similar magnitude with opposite signs, it suggests that the social security spending works better in recessions in reducing inequality, while it doesn't have much effect on inequality in boom times. On the other hand, the coefficient on boom-time investment spending is estimated negative and significant at 1% level, suggesting that the local governments' stimulus spending may work in the direction of reducing poverty and enhancing equality during the boom times.

Table 4. The Impact of Local Government Expenditure on Economic Growth

	y_{jt-1}	e_{jt-1}	x_{1jt}	x_{2jt}	x_{3jt}
y_{jt}	0.269**	-0.021	-0.063	0.089*	0.003
	(0.122)	(0.202)	(0.143)	(0.048)	(0.010)
	$\widetilde{x}_{1jt}$	$\widetilde{x}_{2jt}$	$\widehat{x}_{1jt}$	$\widehat{x}_{2jt}$	Constant
	-0.091	0.083	-0.098	-0.156***	0.001
	(0.091)	(0.153)	(0.119)	(0.053)	(0.004)
e_{jt}	y_{jt-1}	e_{jt-1}	x_{1jt}	x_{2jt}	x_{3jt}
	-0.094	0.293***	-0.514*	0.167	-0.006
	(1.495)	(0.079)	(0.291)	(0.204)	(0.046)
	$\widetilde{x}_{1jt}$	$\widetilde{x}_{2jt}$	$\widehat{x}_{1jt}$	$\widehat{x}_{2jt}$	Constant
	-0.346*	0.514*	0.272	-0.054	-0.005
	(0.202)	(0.272)	(0.261)	(0.143)	(0.010)

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Tables 4 show the estimation results of Equations (3) and (4), which show the whole effects, both direct and indirect, of the government expenditures on local economy's production and inequality. Model (1) shows that local government's investment spending is estimated to have a positive total effect on the province's economic growth. But the investment spending of the other provinces is estimated to have a negative effect on the i -th province's economic growth, which is also statistically significant at 1% level. We suspect that there is a strong competition between province-level local governments in Korea, trying to attract businesses and employees using better-than-others stimulus packages. While this kind of economic stimulus can be beneficial to the Korean economy in general, the cost of inefficient spending may become too large if this beggar-thy-neighbor type of policy competition gets too fierce. It seems that the social security expenditures have no particular effect

on local economic growth when both the direct and indirect effects are correctly estimated. We cannot find any coefficient significantly different from zero with regard to the social security spending – the all-time spending, boom-time spending, and the spending of the rest of provinces.

Model (2) shows that local government's social security spending is estimated to have a negative and significant total effect on the province's inequality measure, the S90/S10 decile ratio. When a local government spends higher-than-usual amount in social security, it is successful in reducing inequality in the province. As is the case in Table 2, this inequality-reducing effect works better in recessions, because the coefficient on boom-time social security spending is estimated positive and significant with a similar magnitude. The social security spending of the rest of the provinces does not show any significant effect on the province's inequality. The boom-time spending on investment is estimated to have a negative and significant effect on local income inequality, suggesting that local government's stimulus spending has been working in the direction of reducing poverty and enhancing income distribution at the province level in Korea.

4. Conclusion

We, using the province-level data of South Korea, find that unlike social security expenditure to protect the poor, government investment to stimulate local economy has a significant effect especially in recession, but the effect is partially offset by the other local governments' investment. It implies that a fiscal policy expansion of one local government may stimulate its own local economy but may adversely affect the other regions.

During recent several years, many local governments in South Korea have issued the coupons at discounted prices under the name of 'local currency' that can be used only in their own jurisdiction. The gap between the face value of the coupon and the actual payment is subsidized by the local government. This is a typical example that the government expenditure by one local government has a positive effect on its own region but a negative effect on the other regions. In the viewpoint of the central government, this is a clear evidence of efficiency loss due to the absence of coordination.

We acknowledge that this paper does not consider tax adjustment which is another fiscal policy instrument. It is because this paper focuses on the impact of the local government expenditure on its own local economy and the other local economies. We leave it for future research to determine whether this shortcoming has led us to overestimate or underestimate the effect of the local government expenditure.

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