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General Grants System in Korea: Toward Horizontal Equity and Tax Effort*

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Much concern has been expressed whether the local autonomy system will be effectively settled down in Korea. This paper focuses on the distribution formula of general grants which composes a part of prevailing discussions.

It has been widely recognized that Korea's distribution formula has many problems. Among those we deal with the horizontal equity and the tax effort. A desirable general grants system would be the one that offsets the fiscal disadvantages arising from the lack of tax bases (or resources) and/or higher cost of providing local public services. In this paper we examine the problems of the existing general grants system in Korea and present new distribution formulas to enhance horizontal equity and to induce tax effort using the data set of 49 cities in 1985.

This research has found that; 1) the existing general grants system is inversely related to tax effort, 2) the new grants system suggested in this paper tends to increase tax effort, 3) under the existing system per capita public services benefits in a big city are relatively small even though there exist many public bads on a large scale.

I. Introduction

There have been a lot of discussions whether the local autonomy system will be settled down without many troubles in Korea. This paper focuses on the distribution formula of general grants, which composes a part of those prevailing discussions.

The general grants are a kind of financial support from the central government to the local governments without any assignment to their use. These amounts are set by the law, which are 13.27% of the internal tax

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revenues. Major roles of the general grants are:

(1) Adjustment of horizontal fiscal imbalances among local governments.[1] Horizontal inequity means that, for example, residents of two different localities who both have the same rate of tax burden receive different public services benefits.

(2) Adjustment of vertical imbalances between the central and the local governments. The vertical inequity means that residents of the relatively rich community receives the same or higher public services benefits than the residents of the relatively poor community even though the former bear the lower burden of taxation.

(3) Inducement of the local governments' self-reliance effort and expansion of the self-support basis to attain the healthy local autonomy system.[2]

However in the real world the fact that each community has different tax basis (or resources) and cost factors to provide local public services has an adverse effect on the improvement of equity. Therefore, a desirable general grants system would be the one that offsets the fiscal disadvantages arising from the lack of tax bases (or resources) and/or from higher cost of providing local public services. In this paper we examine the problems of the existing general grants system in Korea and present new distribution formulas to enhance horizontal equity and to induce tax effort using the data set of 49[3] cities in 1985. In section II, Korea's current general grants system and its problems are reviewed. Section III suggests a method of constructing cost indexes to eliminate cost disadvantages among cities and methods to enhance tax effort. Section IV describes the empirical results. In the final section policy implications are drawn.

II. Korea's General Grants System and Its Problems

The current general grants system in Korea can be summarized as follows:

$$(1) \qquad G_i = G \frac{Q_i}{\sum_i Q_i}$$

1 See Kim (1977) and Ahn (1988) for more details.

2 See Lee (1987).

3 We excluded big cities like Seoul Special City, 3 Direct Jurisdiction Cities (Pusan, Taegu, Inchon), and also excluded 9 cities (Kuri, Pyongtaek, Samchok, Kongju, Taechon, Onyang, Kwangyang, Sangju, Chomchon) which lack in some statistical data.

(2) $Q_i = D_i - R_i$

(3) $D_i = \sum_j \alpha_i r_{ij} X_{ij}$

(4) $R_i = 0.8\ TAX_i$

where G_i : amount of the general grants distributed to community i,

G : total amount of the general grants which is 13.27% of total internal tax revenues,

Q_i : community i's requested amount of the general grants,

D_i : community i's amount of standard fiscal demand,

R_i : community i's amount of standard fiscal revenues,

α_i : community i's coefficient of adjustment

r_{ij} : community i's unit cost of the public expenditure j,

X_{ij} : community i's unit of measurement of the public expenditure j[4],

TAX_i : community i's local tax revenues.

The problems of this system are summarized as follows.[5]

First, the current system is a kind of rationing in the sense that the total amount is determined as a 13.27% of the internal tax revenues and then this amount is distributed to each local government.

Second, since this system finances the differences between a community's demanded amount and its tax revenues, it attaches weight to correct vertical fiscal imbalances but lacks in the horizontal fiscal equalization.

Third, although one of the important objectives of the general grants is to relate the amount of a community's general grants with its tax revenues so that the general grants system induces the community's self-support ability or its tax effort, the existing system in Korea does not lead to increase the distributed amount of general grants as the community increases its tax effort but vice versa.

III. Designing New Distribution Formulas to Offset Cost Disparities and to Induce Tax Effort

[4] Since the unit of measurement is determined differentially by Seoul Special City, Direct Jurisdiction Cities, provinces, cities, counties, only cities were chosen in this anlaysis to maintain its consistency.

[5] See Lee (1987) for more details.

As was mentioned in the previous section, the current general grants system, ignoring the fact that there exist differences in the cost of providing local public services among communities, calculates the amount of fiscal demand by multiplying each category of public expenditure by its unit cost and then summing up all the categories of public expenditure. Therefore we cannot compare the level of public services in a community with others by this method. Moreover it is also impossible to compare each community's public service level by its public expenditure level, because the level of public expenditure implies merely the size of local public budget on the other hand public services, for example police protection, education, sanitation, etc., are the result of public expenditure. Since the level of public services depends not only on the level of public expenditure but also on the various environmental factors internal to each community, a community with higher cost cannot provide the same level of public services as another with lower cost, if the amounts of public expenditures are same in the two communities. Therefore we should consider cost differences among communities in order to provide the same level of public services to all the residents. To offset these cost disparities, let's introduce cost index to each community as follows.

Much of the literature on the local government expenditure, including Inman (1979), has shown that the level of local government expenditure of a community is a function of the community's endowment of resources, cost variables, and variables which indicate the preferences of public services such as residents' income level. To calculate cost indexes, first of all public expenditures per capita are regressed on the community's fiscal resources, environmental cost variables, and other variables.[6] If we think the cost disparities among communities are due to environmental factors which are uncontrollable to local government officials, then we can calculate the predicted level of public expenditure per capita by inserting a community's actual values in the environmental variables and average values in other independent variables in the regression equation. Therefore, the variation of the communities' predicted levels of public expenditure per capita is due to differences in the environmental cost factors. When we divide the predicted level of public expenditure per capita by average predicted level of public expenditure per capita which is obtained by substituting average values for all the independent variables in the regression equation, we get each community's cost index. A community's cost index implies the proportionate increase in expenditure due to environmental cost factors.

[6] See Bradbury, et al. (1984) for more details.

General grants distribution formula in Korea consists of three factors; total amount of general grants distributed to local governments (13.27% of total internal tax revenues), community i's amount of standard fiscal demand, community i's amount of standard fiscal revenues. This paper focuses on how the general grants should be distributed among communities given the total amount of general grants. As was mentioned previously, since the current system fails to equalize the level of public services in each community, we correct the amount of standard fiscal demand as follows.

Let us define first the amount of standard fiscal demand of a community as the amount of money for the community to provide fundamental public services. If we want all the communities to provide the average level of public services, then the first step is to calculate the average level of public expenditure per capita ($\overline{\text{EXPER}}$) of all communities and the second is to multiply $\overline{\text{EXPER}}$ by C_i, community i's cost index. Then resulting $\overline{\text{EXPER}}\ C_i$ is the amount of community i's public expenditure to maintain average level of public services.

As was mentioned in section II, community i's amount of standard fiscal revenues is 80% of its local tax revenues. With this formula, each community's tax effort is impeded, which runs counter to the role of general grants system. In other words, as a community increases its tax revenue by enhancing tax effort, the resulting general grants distributed to this community will be reduced and vice versa.

To introduce the tax effort explicitly in the formula, there must exist various tax bases such as property values, residents' income levels and so on. However, by lack of such data we tried to introduce tax effort in a roundabout manner. First, we estimate the simple regression equation of local tax revenues on the number of households of all cities.[7] By inserting a community's number of households in the regression equation, we obtain the community's predicted level of local tax revenues. And then we introduce tax effort in the distribution formula in two different ways.

A. "Partial" Tax Effort

If the predicted level of tax revenues of a community is greater (less) than the actual level of its tax revenues, then we consider the

7 Strong positive correlations exist between the number of households and the property tax, and the inhabitant tax, and the automobile tax. Those taxes contribute large share in the city tax. And the adjusted coefficient of determination resulting from regression of local tax revenues on the number of households in 1985 greater than 0.8 (see section IV for more details).

community's tax effort is weak (strong) and insert the former (latter) instead of the latter (former) in the distribution formula of general grants. The reason is that a community which has weaker tax effort should receive less amount of the general grants, as a kind of penalty, by inserting the predicted level instead of the actual level.

B. "Total" Tax Effort

We insert the predicted level of tax revenues for all cities in the formula regardless of the actual level of tax revenues. As will be mentioned in detail in section IV, the tax effort is obstructed with the existing system but the degree to which the tax effort is hindered is considerably mitigated with the newly proposed systems.

IV. Empirical Results

We used the data set of 49 cities in 1985 for this analysis.[8]

The independent variables included in the multiple regression equation are as follows: cost variables due to environmental factors (population density, number of elementary & secondary-school students per capita, road extension per capita, number of employees in the areas of the wholesale and retail trade and restaurants and hotels per capita), fiscal resources variables (local tax revenues per capita, subsidy per capita), and other variables (rate of population change, rate of population change squared).

The regression equation is

$$
\begin{aligned}
(5)\qquad \mathrm{EXPER} = {} & 7317^{**} - 0.0108^{**}\ \mathrm{DEN} + 393\ \mathrm{STUD} - 13.3\ \mathrm{ROADPER} \\
& (7.47)\ (-4.25) \qquad\quad (1.99) \qquad (-1.83) \\
& + 1349^{*}\ \mathrm{TRADPER} + 1.21^{**}\ \mathrm{TAXPER} \\
& \quad (2.25) \qquad\quad (3.18) \\
& + 1.73^{**}\ \mathrm{SUBSPER} - 14574^{**}\ \mathrm{POP} + 7257^{**}\ \mathrm{POP}_2 \\
& \quad (5.87) \qquad\quad (-7.59) \qquad\quad (7.83) \\
& \text{Adjusted } R^2 = 0.741
\end{aligned}
$$

where t-statistics are given in parentheses, * denotes signifidance at 5% level, ** at 1% level, and

[8] The Ministry of Home Affairs (1986).

EXPER : city public expenditure per capita (unit: 1,000 won)
DEN : population density (unit: person/km^2)
STUD : number of elementary & secondary-school students per capita
ROADPER : road extension per capita (unit: m)
TRADPER : number of employees in the areas of the wholesale and retail trade and restaurants and hotels per capita (unit: person)
TAXPER : local tax revenues per capita (unit: 1,000 won)
SUBSPER : subsidy per capita (unit: 1,000 won)
POP : rate of population change defined as 1985 population divided by 1984 population
POP_2 : rate of population change squared.

Predicted level of expenditure per capita ($\widehat{EXPER}$) is calculated by inserting a city's own values in the environmental cost variables, and average values in the other variables. Then the cost index of city i is

$$(6) \qquad C = \frac{\widehat{EXPER}}{\widetilde{EXPER}}$$

where $\widetilde{EXPER}$ is the level of expenditure when all the independent variables have the average values. The calculated cost indexes range from 1.29220 (Yongchon) to 0.26438 (Puchon).

The distribution formula without considering tax effort is as follows:

$$(7) \qquad G_i^1 = G \frac{(\overline{EXPER}\ C_i - 0.8\ TAXPER_i)\ N_i}{\sum_{j=1}^{49} (\overline{EXPER}\ C_j - 0.8\ TAXPER_j)\ N_j}$$

where G_i^1 is the amount of general grants distributed to city i when only the cost disparities are considered, and G is the total amount of general grants distributed to 49 cities, N_i is 1985 population of city i.

When we also consider the tax effort, we have to correct not only the standard fiscal demand but also the standard fiscal revenues. The regression result for calculating the predicted level of the standard fiscal revenues is as follows:

$$(8) \qquad TAX = -204666 + 90.2^{**}\ HOUS$$
$$(-0.55) \quad (15.76)$$
$$\text{Adjusted } R^2 = 0.837$$

where TAX: local tax revenues (unit: 1,000 won)
HOUS: number of households.

The predicted levels of the local tax revenues ($\hat{TAX}$) of all cities are obtained by inserting the cities' own values of HOUS in equation (8).

The distribution formula with "partial" tax effort is as follows:

$$(9) \qquad G_i^2 = G \frac{(\overline{EXPER}\ C_i - 0.8\ \text{Max}(TAXPER_i,\ \hat{TAXPER}_i)\ N_i}{\sum_{j=1}^{49} (\overline{EXPER}\ C_j - 0.8\ \text{Max}(TAXPER_j,\ \hat{TAXPER}_j))\ N_j}$$

where G_i^2 is the newly calculated amount of general grants distributed to city i, and $\hat{TAXPER}i$ is the predicted level of local tax revenues of city i per capita, which is equal to $\hat{TAX}_i/N_i$, and Max (a,b) means the greater value between a and b. As was mentioned in section III, this Max (.,.) term reflects the "partial" tax effort in the following sense. If a city's actual level is greater than its predicted level, then the city's tax effort is considered to be relatively high and the actual level itself is inserted in the formula. On the other hand, when the actual level is less than the predicted one, the city is thought to have relatively low tax effort and the predicted level is inserted in the formula as a penalty. Therefore a city which has low tax effort receives less amount of general grants than it does without tax effort.

The distribution formula reflecting "total" tax effort is:

$$(10) \qquad G_i^3 = G \frac{(\overline{EXPER}\ C_i - 0.8\ \hat{TAXPER}_i)\ N_i}{\sum_{j=1}^{49} (\overline{EXPER}\ C_j - 0.8\ \hat{TAXPER}_j)\ N_j}$$

where G_i^3 is the amount of city i's general grants once "total" tax effort is employed. Now let's investigate the relationship between the tax effort discussed in this paper and the amount of current general grants, the general grants with "partial" tax effort, the general grants with "total" tax effort. First of all, let's define the tax effort(TE) as follows:

$$(11) \qquad TE \equiv TAX - \hat{TAX}.$$

If a city's value of TE is greater than another's, then the former is considered to have greater tax effort than the latter. The correlation coefficient between the actual general grants (G_i^0) and TE was −0.673, which supported one of the well-known criticisms on the current general grants system that it impedes the tax effort. The correlation coefficients between

G_i^2 (with "partial" tax effort) and TE, between G_i^3 (with "total" tax effort) and TE were −0.079, −0.016 respectively. This implies that the degree to which tax effort is impeded is considerably alleivated with the new distribution formulas. Values of G_i^0, G_i^1, G_i^2, G_i^3 of all 49 cities in 1985 are listed in Table 1. The relative magnitudes of G_i^0, G_i^1, G_i^2, G_i^3 are as follows:

$G_i^2 > G_i^0$; 17 cities,
$G_i^3 > G_i^0$; 18 cities,
$G_i^3 > G_i^1$; 16 cities.

Table 1

AMOUNTS OF GENERAL GRANTS OF 49 CITIES IN 1985

City Name	G_i^0	G_i^1	G_i^2	G_i^3
Suwon	350,000	5,866,312	6,005,097	6,073,171
Songnam	5,070,000	7,065,395	6,817,721	6,660,331
Uijongbu	3,214,000	2,844,986	2,794,689	2,730,172
Anyang	140,000	3,014,032	3,085,337	3,191,676
Puchon	196,000	1,173,925	1,064,230	1,039,662
Kwangmyong	3,226,000	1,918,259	1,801,191	1,759,610
Songtan	2,543,000	1,266,533	1,263,916	1,234,738
Tongduchon	3,239,000	1,330,679	1,285,863	1,256,178
Ansan	0	1,112,992	1,139,323	1,382,917
Kwachon	0	1,025,384	1,049,642	1,069,622
Chunchon	4,428,000	2,637,906	2,642,335	2,581,336
Wonju	3,707,000	3,038,629	3,028,448	2,958,535
Kangnung	3,609,000	3,097,421	3,082,021	3,010,872
Tonghae	3,772,000	1,522,229	1,558,241	1,531,851
Taebaek	3,917,000	2,701,292	2,631,428	2,570,680
Sokcho	3,546,000	1,552,223	1,528,298	1,493,017
Chongju	3,821,000	5,381,534	5,338,224	5,214,988
Chungju	3,662,000	2,057,886	2,001,846	1,955,632
Chechon	3,432,000	1,926,055	1,883,269	1,839,793
Taejon	6,460,000	12,188,111	12,476,455	12,196,481
Chonan	2,949,000	2,923,256	2,920,734	2,853,307

Table 1 (continued)

City Name	G_i^0	G_i^1	G_i^2	G_i^3
Chonju	4,203,000	7,394,457	7,420,648	7,249,339
Kunsan	5,477,000	3,723,032	3,811,111	3,781,411
Iri	3,718,000	3,843,731	3,861,410	3,772,268
Chongju	3,455,000	1,795,445	1,780,013	1,738,921
Namwon	2,990,000	1,282,060	1,286,357	1,256,661
Kwangju	9,014,000	14,803,834	14,741,602	14,401,285
Mokpo	5,331,000	3,151,294	3,000,960	2,931,681
Yosu	5,198,000	3,164,161	3,114,852	3,042,944
Sunchon	4,404,000	2,786,831	2,742,891	2,679,570
Naju	2,991,000	1,328,670	1,349,013	1,317,870
Yochon	0	615,961	630,533	1,064,341
Pohang	450,000	3,551,179	3,635,193	4,207,100
Kyongju	4,897,000	2,592,403	2,615,643	2,555,260
Kimchon	2,839,000	1,562,131	1,543,636	1,508,000
Andong	3,323,000	2,505,626	2,439,361	2,383,047
Kumi	2,120,000	1,932,865	1,978,593	2,277,567
Yongju	3,369,000	1,937,105	1,894,359	1,850,627
Yongchon	2,821,000	1,289,080	1,291,274	1,261,464
Changwon	1,373,000	2,129,754	2,180,140	2,466,303
Ulsan	500,000	8,017,240	8,206,910	8,916,986
Masan	2,378,000	4,716,106	4,827,678	4,739,428
Chinju	3,414,000	3,613,550	3,593,653	3,510,692
Chinhae	3,029,000	2,548,366	2,530,456	2,472,039
Chungmu	3,326,000	1,610,002	1,605,717	1,568,649
Samchonpo	3,551,000	1,382,145	1,354,086	1,322,826
Kimhae	2,633,000	1,351,404	1,383,375	1,395,256
Cheju	4,359,000	3,447,448	3,467,419	3,387,372
Soguipo	2,787,000	1,510,075	1,545,800	1,567,518

As is shown in Table 1, the allocation ratios which are the total amounts of all cities' need-revenue gaps (or required amount of general grants) divided by actual total amount of general grants of 49 cities in 1985 were; a) 0.16 in case of G_i^1, b) 0.17 in case of G_i^2, c) 0.16 in case of G_i^0, which implies the actual amount of general grants comprises 16-17% of the total required amount of general grants. Moreover, in case of bigger cities, the newly calculated levels of general grants are greater than those of smaller cities in population.[9] Since one of the important objectives of the new formula is to equalize public services benefits per capita, the amount of general grants of a city with relatively large population size will be increased. In other words, under the existing system public services benefits per capita in a bigger city must have been smaller even though there have been many public bads such as crimes, garbage, air pollution, traffic congestion and so forth.

V. Policy Implications

In this paper we tried to suggest a new distribution formula of general grants in case of Korea which would be more efficient and equitable. Of course we agree that there exist many limitations involved in this study. However until now there have been no active regression-based researches on the economic factors related to local finance and a few related studies have been lack of consistent economic considerations. Therefore we have focused only on two topics among many problems which the existing general grants system has. First, the general grants should enhance the horizontal equity in the sense that all residents should receive same public services benefits. Second, the general grants system should induce tax effort so as to support self-reliance effort of a local government. To achieve the first objective, the regression-based cost indexes of all cities were calculated so as to offset the production cost disparities among cities. To attain the second goal, we introduced the tax effort indirectly and devised a new distribution formula so as to induce tax effort.

Seveal caveats on this new general grants system should be noted. First, with the suggested formula, we only secure a local government's fiscal capacity to provide the average level of public services but cannot

9 The correlation coefficients between the number of population and G_i^2, and G_i^3 in 1985 were 0.924, 0.926 respectively. On the other hand, the correlation coefficient between the number of population and G_i^1 in 1985 was 0.299. Though we should study whether the new grants system which tends to enhance the horizontal equity impedes the vertical equity or not, it is impossible to test such a hypothesis now because of lack of data such as residents' income levels of all cities which are necessary to check the vertical equity.

compel the government to provide it.[10] Second, we can alleivate the degree to which the tax effort is impeded with the new system, which does not mean all the residents' welfare is increased. As Fisher (1979) has proved, a local government which prefers public services over the private consumption wold be better off with the tax effort-related grants system, but vice versa to a local government which prefers private consumption over public services.

Researches on Korea's local finance including general grants system have been restricted by lack of relevant data. Once we have data set of per capita income, various tax bases, and of other variables which reflect local fiscal capacity and economic characteristics, a more consistent and concrete policy could be suggested.

10 Oates (1977).

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