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An Empirical Study on the Optimal Size of Revenue Sharing: The Case of Korea

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This paper attempts to present an indirect approach which can estimate the optimal size of local revenue sharing. Two types of functions are specified to represent the positive and negative effects of revenue sharing system in Korea. Based on these functions, the associated parameters are estimated using the data for 11 local autonomies during 1970-1986. Estimating results suggest the existing rate of revenue sharing be optimal only when equalizing effect is more imprtantly regarded rather than fixing effect.

I. Introduction

In many countries fiscal imbalances among local governments is a prevailing phenomenon due to interregional economic inequalities. To alleviate such imbalances Korea has implemented the local revenue sharing system which is a kind of financial aid from the central government to the local governments without any restrictions to its use.[1]

The size of revenue sharing has been set by the local Shared Tax Law as a certain portion of the internal national tax revenues, but its specific rate has been changed several times since 1960. For example, during 1969-1972, 17.6% had been set as a legal ratio of revenue sharing while 13.27% after 1982.

One of the interesting research questions regarding the size of revenue sharing is whether the present legal ratio, 13.27%, is really optimal. In

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1 Subsidies is another type of intergovernmental transfer of which use is assigned to some specific projects.

fairly standardized formula constituted by several factors such as standard fiscal demand and revenues, coefficient of adjustment, unit cost, and unit of measurement. Thus equation (1) can be rewritten as equation (2) under the assumption of ceteris paribus:

$$(2) \qquad V_t = V(r_t) \quad , \quad r_t \geq 0$$

Furthermore it is assumed that equation (2) satisfies two conditions: positive first derivative ($dV_t/dr_t > 0$), and negative second derivative ($d^2V_t/dr_t^2 < 0$). These conditions suggest the equalizing effect (V_t) increases with decreasing rate as the amount of revenue sharing (r_t) increases.

Equation (3) is an explicit functional form of equation (2) satisfying such restrictions.

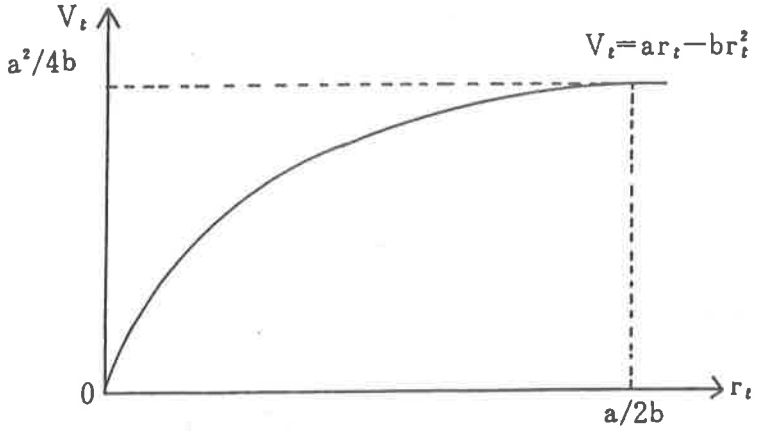
$$(3) \qquad V_t = a\, r_t - b\, r_t^2$$

where $0 \leq r_t \leq a/2\ b$[6] and $a, b \geq 0$

Equation (3) and its marginal form can be represented as Figure (1)

Figure 1

Equalizing-Effect Curve



5 For more detailed explanation about the distribution formula, refer to Ahn (1988) or Lee (1987).

6 This inequality constraint is obtained from the condition of positive first derivative; $dV_t/dr_t = a - 2b\ r_t \geq 0$.

Figure 3

Fixing-Effect Curve

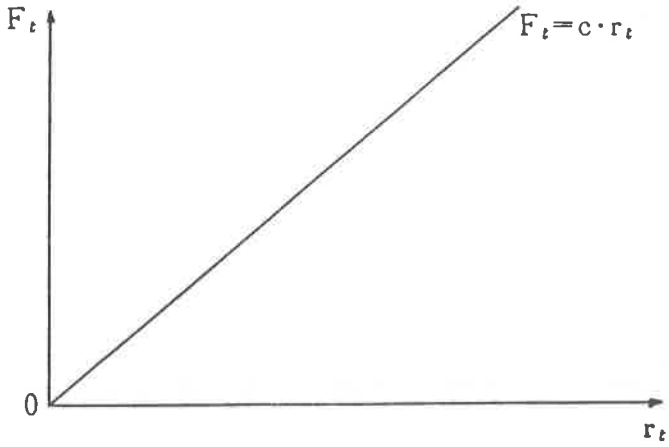
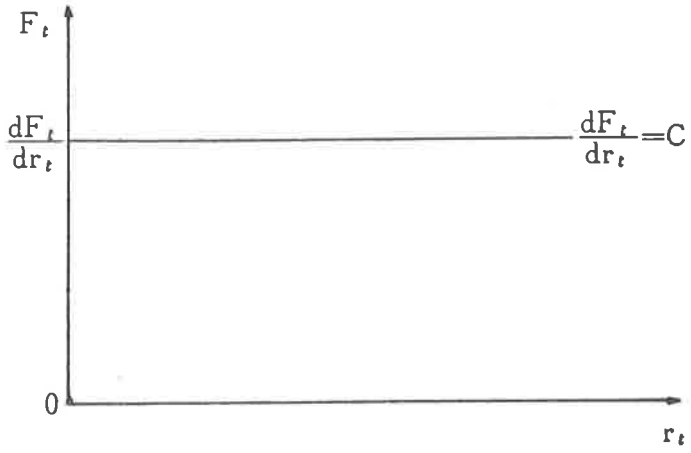


Figure 4

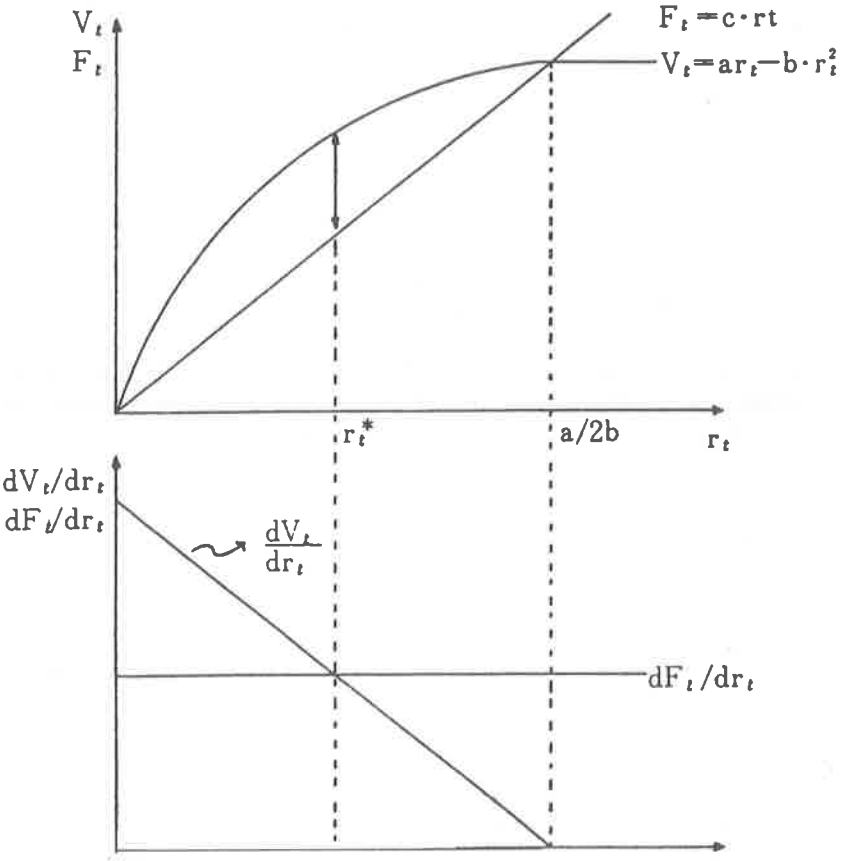
Marginal Fixing-Effect Curve



system have been assumed; positive effect reducing intergovernmental fiscal disparities (i.e., V_t) and negative effect increasing the portion of fixed expenditures in national budget (i.e., F_t). Under this population it is logical to define the optimal size of revenue shating as a rate r_t^* maximiz-

Figure 5

Optimal Rate of Revenue Sharing ($\omega = 0.5$)



III. Estimating Results

The most difficult problem that we are facing is what kind of data should be used to properly represent equalizing effect, V_t, and fixing effect, F_t, when estimating the parameters required for computing the optimal rate of revenue sharing, r_t^*.

In this research the data for V_t and F_t were obtained according to following methods:

(10) $\quad V_t = I_t^b - I_t^a / I_t^b$

The table shows the empirical results are quite satifactory. That is, all the signs of coefficients are consistent with the theoretical prediction, and the estimated parameters are all statistically significant. Furthermore the Durbin-Watsons's d statistics suggests there are no auto-correlation problem.

The R^2 value, however, of equalizing-effect function is relatively low as 0.36. This is because V_t was measured by aggregated regional data. Since various countervailing effects are working together in case of aggregated data, equalizing effect turns out to be weaker rather than the case of disaggregated regional data.

Computed optimal rates are reported in Table 2, which is based on equation (10) using the estimated results of Table 1.

Table 2

COMPUTED OPTIMAL RATES OF LOCAL REVENUE SHARING

	Higher weight to equalizing effect			Equal Weights	Higher Weight to fixing effect	
Weights (ω)	0.8	0.7	0.6	0.5	0.4	0.3
Optimal rate (%)	14.6	13.7	12.45	10.72	8.11	3.76

The table shows how the optimal rate should be changed as the relative importance of each effect differs. From this result, we may say the existing rate of revenue sharing, 13.27%, can only be optimal under the assumption that the central government, explicitly or implicitly, regards equalization effect more important than fixing effect in operating local revenue sharing system. Therefore if the government perceives fixing effect as important as equalization effect, the existing rate may be lower to 10-11%.

IV. Concluding Remarks

Although the necessity of study on the optimal size of revenue sharing has been emphasized by many scholars in Korea, no research has been made in this subject. With this in mind this paper attempted to present a theoretical model by which the optimal size of revenue sharing can be indirectly computed and to examine the policy implications of the estimating results.

The empirical results were statistically significant and their policy im-

plications were also interesting. However, this research still has several shortcomings associated with data and methodology.

First of all note the specified functional forms of both equalizing effect and fixing effect are too simple. Hense more rigorous specifications are needed to enhance the reliability of empirical estimation.

Next, as mentioned earlier, since the use of the aggregated regional data is likely to lower the statistical confidence, it is more desirable to use the disaggregated regional data in a future study.

Finally, and perhaps most importantly, note that the method introduced so far is in essence an indirect approach. In other words, we have not specified the underlying causal mechanism among the associated variables. While such an indirect approach can make the problems in question very simple, it is conceptually preferable to develop a direct approach such that we may understand how the change of one variable such as rate of revenue sharing affects other variables, in depth.

In this respect, the results presented in this paper should be interpreted as tentative rather than conclusive.

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