

Intergovernmental Allocation of Tax Bases in Korea

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Abstract

Our paper, as a part of a trial to explore the issue of decentralization, focuses on the reallocation of tax bases within a hierarchy of multi-tier governments, aiming to suggest timely policy recommendations for the future tax reform in Korea. For this purpose, we analyze the current situation by providing summary statistics from tax revenues, expenditures and gross regional domestic product data during 1992-2001. In addition we provide a few simulation results, which measure the impact of possible changes in the intergovernmental tax allocation on the local fiscal dependence.

I. Introduction

A rationale for fiscal decentralization consists in achieving the efficiency of resource allocation through a mechanism of connecting local autonomy with accountability. For the purpose, the central government should grant both administrative and fiscal discretion to each local government as well as assign her own fiscal functions to the local governments. Needless to say, the expanding fiscal discretion of local governments should be balanced with the increased supervision of the central government over them.

Reflected on the past experience in Korea that the central government driven resource allocation was an axis of regional disparity, it is inferred that discretionary resource allocation by local governments will induce the competition of regional development among the local governments. However, a mere expansion of local fiscal capacity without considering regional disparity may aggravate the existing heavy concentration of economic power and population on Seoul metro area. Thus, the central government should come up with an Equal Regional Development Plan at the same time in order to alleviate the disparities.

Our research deals with intergovernmental exchange or sharing of tax bases within a hierarchy of multi-tier governments. Distant from the traditional approach, which checks the possible benefits from the transfer of an individual tax item, our paper aims to provide a holistic framework for analyzing the advantages and disadvantages from any arbitrary packages of tax bases allocation. Through the framework, more practicable policy alternatives are expected to come out. However, our approach remains still limited in that it does not stem from a general equilibrium setup, such as the Ramsey model. Instead it resorts to the rules-of-thumb-like criteria for growth and stability of local fiscal

independence¹).

The contents of the paper are organized in the following order. In section II, the allocation pattern of national and local taxes under the current tax system are introduced. In section III, the literature survey on the topic is followed by the theoretical discussion based on simple Markowitz type models and the calibrations using the Korea data during 1992-2001. Section IV provides a reform plan for intergovernmental tax bases assignment. Finally, section V concludes.

1) The exact definition of "(local) fiscal independence (ratio)" is given later. Roughly speaking, local fiscal independence ratio is a proportion of the resources raised by a local government from total usable resource of the local government.

II. Current Intergovernmental Allocation of Taxes

1. Overall Evaluation

Recent changes in national and local taxes includes:

- Tobacco spending tax (2.5 trillion won in 2001) and regional development tax (0.54 trillion won) was introduced in 1989.
- Motor fuel tax was introduced in 2000.
- Local education tax was introduced in 2001, replacing the previous education tax (national tax).
- Telephone tax was inserted into VAT in 2001.
- Horse race tax was renamed as leisure tax in 2002.

In the above, only a few contributes to improving fiscal independence of local governments: tobacco spending tax, regional development tax, and motor fuel tax.

Overall, the current local fiscal system in Korea is characterized by (i) high concentration of tax revenues on national taxes, (ii) huge regional variations of tax revenues due to heavy concentration of population in urban areas, and (iii) the mitigation of these concentrations through the local fiscal transfer system. The ratio of national tax revenue to local tax revenue is 80 : 20 whereas that of central government expenditure to local government expenditure is 45 : 55. The huge gap between these two ratios are filled with the local fiscal transfer system.

The size of transfer from the central government to the local governments

is not a direct indicator of local fiscal dependence on the central government ²⁾. Rather, the dependence of local finance on the central government results from the poorly designed process of transfer and the allocation mechanism, which causes inefficient competition under information asymmetry between the central and the local governments and among the local governments ³⁾. However, these figures can be good proxies for fiscal dependence.

The current tax system in Korea is regarded very complicated: it consists of total 31 tax items, among which 14 are national tax items, 7 tax items are under the control of Metro-cities or provinces, and the rest 10 tax items under the control of counties, cities, and wards. In addition to a variety of taxes many exemption and reduction clauses complicate Korea tax system further. This reflects that Korea needs a tax reform, which touches not only the allocation of tax bases among the governments but also the change in the whole tax system.

2) The share of local tax revenue in the *UK* in relation to national tax revenue is smaller than that of Korea.

3) The central government has also her own incentive to exploit the local fiscal transfer system in controlling local governments.

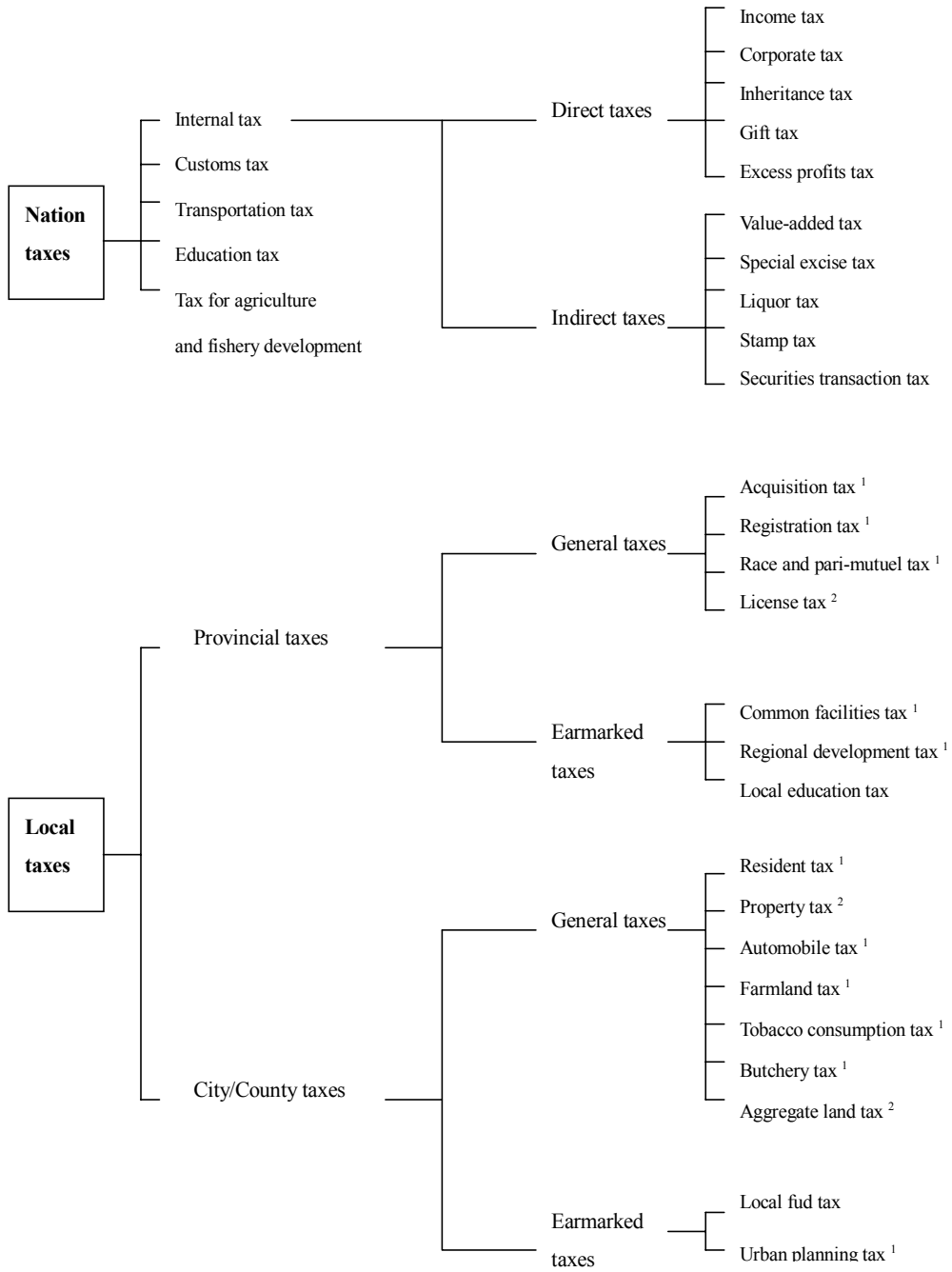
Table 1. Size comparison of the central government and the local governments

(Unit: W 100mil., %)

| | Central | | | Local | | | Raio | | |
|------|----------------|----------------|-----------------|------------------|----------------|-----------------|-------|-------|-------|
| | Tax rev (A) | Revenue (B) | Spending (C) | Local tax (D) | Revenue (E) | Spending (F) | D/A | E/B | F/C |
| 1995 | 622,098 | 720,875 | 710,518 | 153,160 | 523,789 | 366,643 | 24.62 | 72.66 | 51.60 |
| 1996 | 723,856 | 842,724 | 838,410 | 173,947 | 630,855 | 444,447 | 24.03 | 74.86 | 53.01 |
| 1997 | 784,338 | 921,451 | 991,499 | 184,057 | 695,716 | 509,590 | 23.47 | 75.50 | 51.40 |
| 1998 | 783,100 | 954,821 | 1,124,350 | 171,497 | 691,207 | 516,047 | 21.90 | 72.39 | 45.90 |
| 1999 | 876,660 | 1,058,546 | 1,181,488 | 185,861 | 731,257 | 539,794 | 21.20 | 69.08 | 45.69 |
| 2000 | 1,077,326 | 1,340,480 | 1,267,859 | 206,006 | 771,761 | 561,079 | 19.12 | 57.57 | 44.25 |
| 2001 | 1,133,312 | 1,422,137 | 1,322,452 | 266,649 | 939,956 | 675,049 | 23.53 | 66.09 | 51.05 |

Source: Central government-Consolidated Fiscal Balance, Local Government-Annual Report of Local Finance, Local Tax Revenue-Annual Report of Local Tax Revenue

Figure 1. The Tax System in Korea



¹ Special Metropolitan City and Metropolitan Cities taxes.

² Autonomous District taxes.

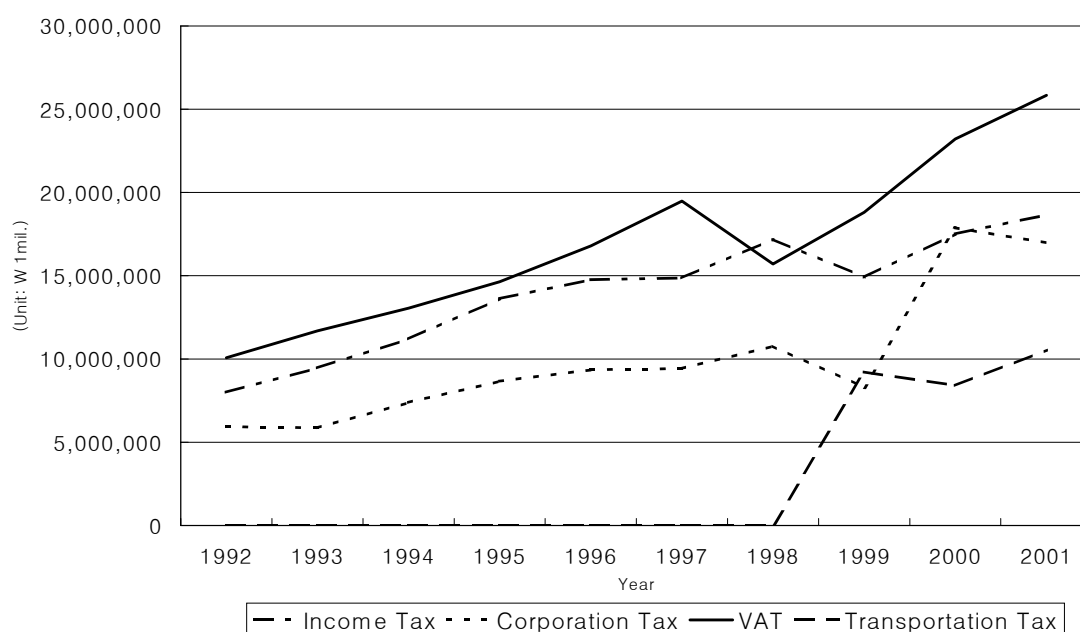
Source: Korean Taxation 2002, Ministry of Finance and Economy.

2. National Tax System

2.1 Recent Trend

In 2001, VAT, Income tax, corporation tax, transportation tax are four major sources of national tax revenues, whose sum takes 81% of national tax revenues. Such high revenue concentration on a few tax items necessitates a reform for simplifying the tax system.

Figure 2. Annual National Tax Revenues



2.2 Regional Distributions for National Tax Revenues

We decompose national tax data in order to see a regional distribution for national tax revenues. However, since each individual tax code may stipulate time and places of tax payment differently for the convenience of tax administration, distribution of revenues officially collected from an individual national tax item may under- or over-estimate the real tax

revenues arising in a specific region. For instance, in 2001, the corporate tax revenues of Woolsan (6.5 trillion won) was higher than Kyonggi (6.3 trillion won), which is related with the fact that the headquarter of a specific company is located in Woolsan area. In addition, the fourth largest tax item, transportation tax is also heavily concentrated on specific areas because it is levied not by petroleum consumption within a prefecture but by the locations of petroleum companies. Hence, more caution is required when the distributions of national tax revenues are applied in the analysis of regional disparities.

Table 2. Regional Distributions for National Tax Revenues

| | Domestic | Income | Corporate | VAT | Liquor | Transport |
|----------|----------|----------|-----------|----------|----------|-----------|
| Central | 21.10424 | 0 | 0 | 62.48171 | 7.123598 | 3.393965 |
| Seoul | 36.19451 | 55.98651 | 65.97124 | 22.11187 | 0.061301 | 0 |
| Pusan | 2.812328 | 5.279293 | 2.076312 | 2.956443 | 1.927547 | 0.000683 |
| Taegu | 1.398353 | 3.019533 | 0.460832 | 1.448794 | 2.630661 | 0 |
| Inchon | 2.732951 | 2.934407 | 2.107357 | 1.106762 | 1.400272 | 7.238187 |
| Kwangju | 1.166863 | 1.662261 | 0.571424 | 1.364752 | 5.706997 | 0 |
| Daejon | 1.596689 | 1.800819 | 1.36638 | 2.565357 | 0.719888 | 0 |
| Woolsan | 8.264066 | 2.015629 | 1.447816 | -0.51716 | 0.011912 | 49.20582 |
| Kyonggi | 9.477179 | 13.0467 | 16.39723 | 1.956804 | 27.2384 | 0 |
| Kangwon | 1.12101 | 1.366048 | 0.433057 | 0.894331 | 11.91433 | 0 |
| Chungbuk | 1.313155 | 1.408989 | 0.745225 | 1.185517 | 12.74875 | 0 |
| Chungnam | 2.271253 | 1.760027 | 1.025057 | -0.31695 | 0.037315 | 8.801092 |
| Chunbuk | 1.286573 | 1.598959 | 0.357393 | 0.928274 | 13.01433 | 0 |
| Chunnam | 5.244657 | 1.31484 | 0.504591 | 0.656578 | 0.901399 | 31.36006 |
| Kyungbuk | 1.812207 | 3.01119 | 4.980563 | 0.169543 | 1.358055 | 0 |
| Kyungnam | 1.886957 | 3.152974 | 1.410898 | 0.675862 | 12.81423 | 9.49E-05 |
| Cheju | 0.317007 | 0.641822 | 0.144629 | 0.331507 | 0.39102 | 9.49E-05 |

Table 3. Regional Distributions for Per Capita National Tax Revenues

| | Income Tax | Corporate Tax | VAT | Transportation |
|----------|------------|---------------|---------|----------------|
| Seoul | 3.89265 | 6.15483 | 3.68472 | 0 |
| Pusan | 1.00163 | 0.52859 | 1.34436 | 4.2E-05 |
| Taegu | 0.85407 | 0.1749 | 0.98214 | 0 |
| Inchon | 0.81649 | 0.78681 | 0.73808 | 0.65321 |
| Kwangju | 0.86065 | 0.39699 | 1.69354 | 0 |
| Daejon | 0.91819 | 0.93483 | 3.13493 | 0 |
| Woolsan | 1.36541 | 1.31603 | -0.8397 | 10.8109 |
| Kyonggi | 0.97499 | 1.64426 | 0.35048 | 0 |
| Kangwon | 0.63026 | 0.2681 | 0.98894 | 0 |
| Chungbuk | 0.6727 | 0.47742 | 1.35657 | 0 |
| Chungnam | 0.6557 | 0.51243 | -0.283 | 1.06345 |
| Chunbuk | 0.57031 | 0.17105 | 0.79353 | 0 |
| Chunnam | 0.44888 | 0.23115 | 0.53723 | 3.47237 |
| Kyungbuk | 0.77178 | 1.7129 | 0.10415 | 0 |
| Kyungnam | 0.72495 | 0.43529 | 0.37244 | 7.1E-06 |
| Cheju | 0.84135 | 0.2544 | 1.04153 | 4E-05 |

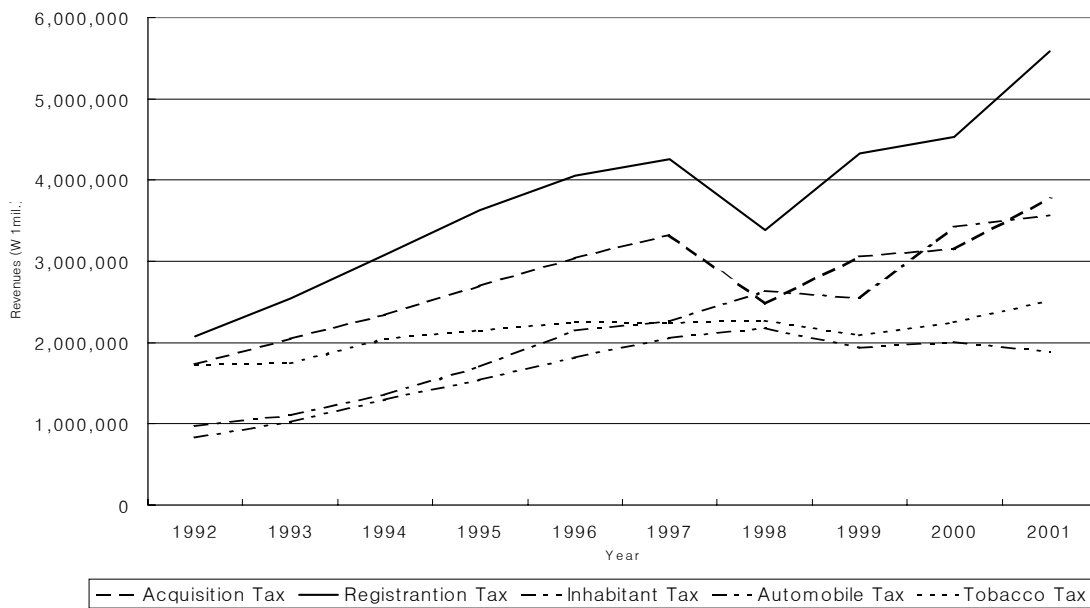
Note: Each cell=per capita regional national tax revenue/per capita national tax revenues

3. Local Tax System

3.1 Recent Trends

In 2001, Registration, Acquisition tax, local education tax, tobacco spending tax, automobile tax, and aggregate(synthesis) land tax are important revenue sources of local governments, sum of which takes 70% of total local revenues. In comparison with national tax revenues, local tax revenues exhibits less concentration on a few tax items. However, considered that the revenues from the above 6 tax items out of 17 items takes 70% of total local tax revenues, reduction and integration of tax items is considerable for the local taxation system, too.

Figure 3. Annual Local Tax Revenues



The current local tax system in Korea is characterized by the following two points. First, there is no locality in local taxes. Elastic tax rate adjustments to most local tax items are allowed under the discretion of local governments⁴). The degree of freedom is positioned between 30~

50% of the standard rate (set by the central government). However, the elastic tax rate program were rarely used in the reality. Many economists suspect that the infrequent use of elastic tax rate adjustments results from the current opaque distribution mechanism of local shared tax(LST).

According to Kim (2003), per capita local tax revenues are negatively correlated with per capita LST. This phenomenon implies not only that LST works as a vehicle of alleviating regional disparities but also that it discourages tax collection efforts of local governments.

Second, small part of local expenditures are afforded by the local tax revenues. As seen in the graph below, per capita expenditure seems not related to per capita local tax burden, which implies that the current system does not support benefit principle.

Furthermore, the plots from the data of year 2001 indicates that population size and per capita local tax burden seems negatively correlated on the level of city and ward. From the observations, we infer that the central government sets the fixed cost of producing local public goods at a high level under the assumption of economies of scale (Kim(2001))⁵.

4) For the three tax items, leisure tax, license tax, and farm-land tax, elastic adjustment of tax rates are not allowed.

5) The existence of economies of scale in the production of public goods is critical in distributing LST. Despite the importance, in our knowledge, there are very few papers regarding production technologies of public goods.

Figure 4. Per capita expenditure vs. per capita local tax burden in 2001
(16 prefectures)

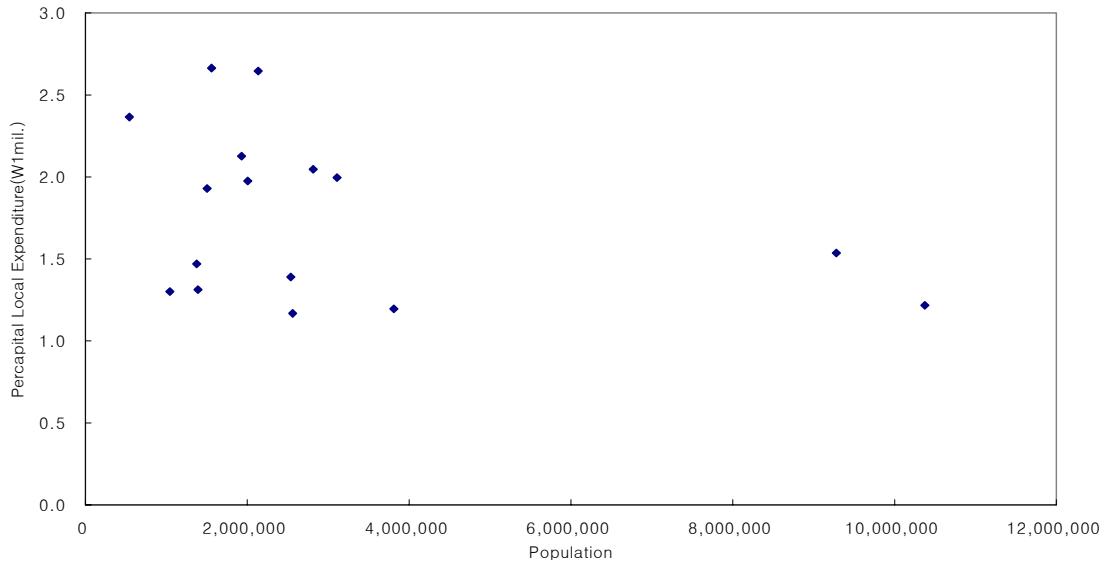


Figure 5. Per capita expenditure vs. per capita local tax burden in 2001
(wards, counties, and cities)

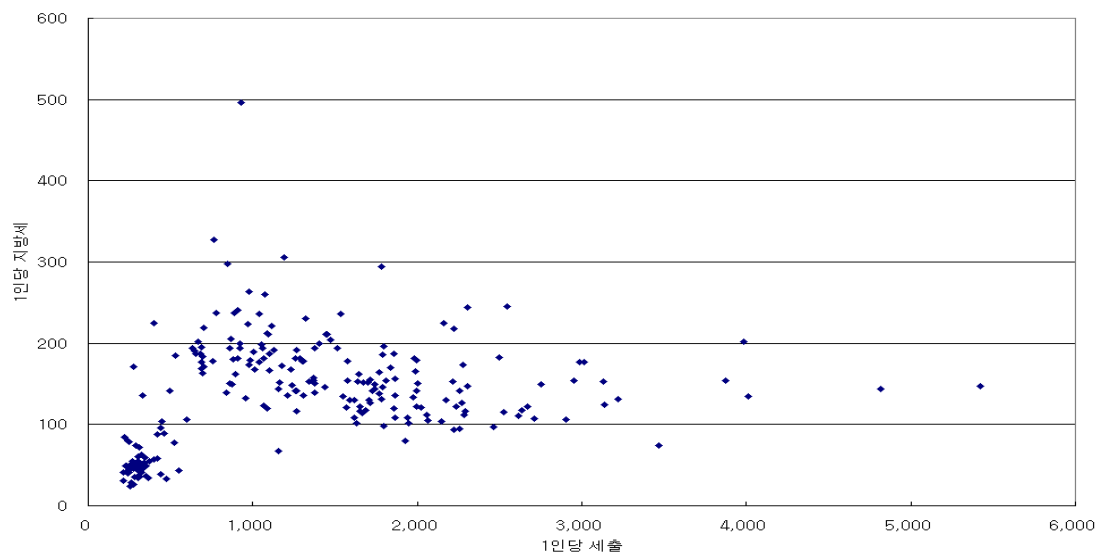


Figure 6. Population size and Per capita local tax burden in 2001
(16 prefectures)

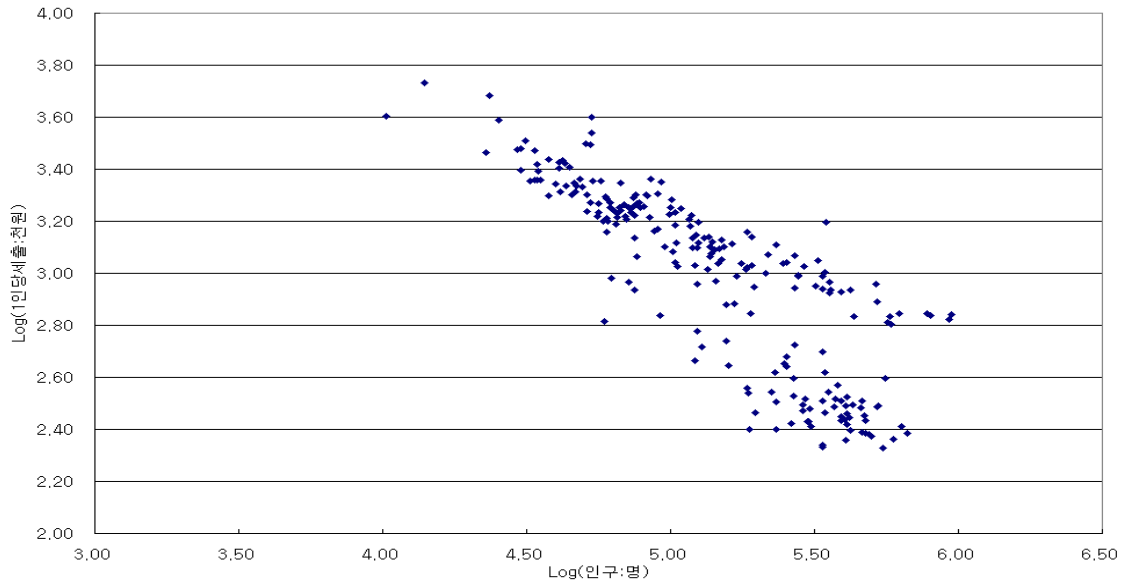
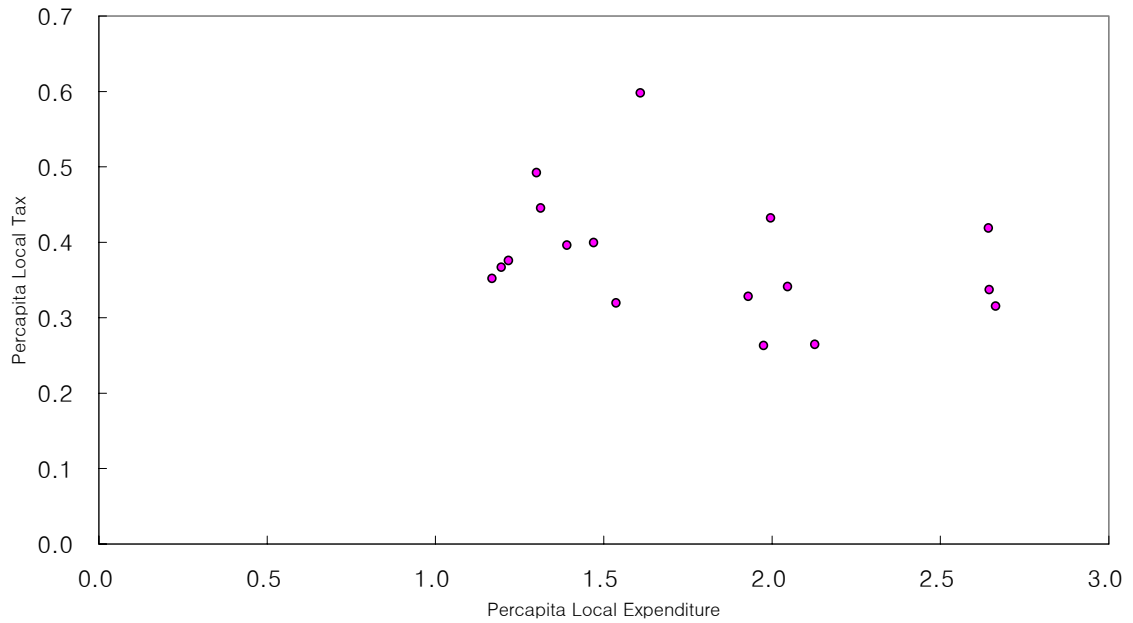


Figure 7. Population size and Per capita local tax burden in 2001
(wards, counties, and cities)

(Unit: W 1mil.)



3.2 Regional Distribution for Local Tax Revenues

Concentration of economic power and population on Seoul metro area, Kyonggi, and Incheon area brings about heavy dependence of tax revenues (national and local) on these regions. To make it worse, the demographic composition in Near-Seoul area has much lower dependence rate than the rest of Korea, which foreshadows deepening of the regional disparities in the long run(Figure 5⁶).

Table 4. Seoul Metro City Concentration Indices

| | Near-Seoul Area/Nation | | | |
|------|------------------------|-------|--------------|-----------|
| | Population | GRDP | National Tax | Local Tax |
| 1997 | 54.43 | 54.29 | 40.19 | 45.17 |
| 1998 | 54.36 | 53.62 | 37.17 | 45.59 |
| 1999 | 54.09 | 53.68 | 37.77 | 44.12 |
| 2000 | 53.7 | 52.78 | 35.76 | 42.75 |
| 2001 | 53.35 | 52.99 | 38.65 | 41.29 |

Note: Near-Seoul Area=Seoul, Incheon, Kyonggi

Source: Population, GRDP- National Statistics Office, National Tax-Annual Report of National Tax Revenue Statistics, Local Tax-Annual Report of Local Tax Revenue

Under the circumstances, the effectiveness of intergovernmental tax bases allocation is limited in alleviating regional differences, which makes it clear that the reform of tax system should be considered jointly with local fiscal transfer system.

6) The definitions of the measures in the table are:

Dependence ratio=(number of persons older than 65)/(number of persons between 15-64)

Aged-child ratio=(number of persons older than 65)/(number of persons between 0-15).

Table 5. Aging of population- national level and Seoul metro city

| Dependence Ratio(old) | Total | Seoul | Aged-child Ratio | Total | Seoul |
|-----------------------|-------|-------|------------------|-------|-------|
| 1992 | 7.7 | 5.1 | 1992 | 21.7 | 15.9 |
| 1993 | 7.9 | 5.3 | 1993 | 22.7 | 16.9 |
| 1994 | 8.1 | 5.5 | 1994 | 23.9 | 18.1 |
| 1995 | 8.3 | 5.6 | 1995 | 25.2 | 19.5 |
| 1996 | 8.6 | 5.9 | 1996 | 26.9 | 21.1 |
| 1997 | 8.9 | 6.1 | 1997 | 28.6 | 22.9 |
| 1998 | 9.3 | 6.4 | 1998 | 30.4 | 24.7 |
| 1999 | 9.6 | 6.7 | 1999 | 32.3 | 26.7 |
| 2000 | 10.1 | 7 | 2000 | 34.3 | 28.8 |
| 2001 | 10.6 | 7.5 | 2001 | 36.3 | 30.8 |
| 2002 | 11.1 | 7.9 | 2002 | 38.5 | 33 |

In terms of per capita tax revenues, tobacco spending and motor fuel taxes are quite evenly distributed in comparison with other local taxes (see Table 7). Inhabitant tax revenue varies substantially region by region due to the concentration of corporate taxpayers on the urban area.

Table 6. Regional Distributions of Local Tax Revenues

| | Local Tax | Acquisition | Registration | Inhabitant | Automobile | Tobacco | Synthesis land tax |
|----------|-----------|-------------|--------------|------------|------------|----------|--------------------|
| Seoul | 29.7548 | 27.61941 | 31.13793 | 41.96943 | 23.40185 | 22.22304 | 32.82117 |
| Pusan | 6.732246 | 6.877319 | 6.75297 | 5.427541 | 6.557254 | 7.016578 | 8.896728 |
| Taegu | 4.151822 | 3.898738 | 4.000059 | 3.127744 | 5.705775 | 5.058163 | 4.54342 |
| Inchon | 4.871431 | 5.711267 | 5.619539 | 3.456467 | 5.159523 | 4.802837 | 4.946428 |
| Kwangju | 2.188445 | 2.164147 | 2.162917 | 1.306423 | 2.775615 | 2.534403 | 2.385447 |
| Daejon | 2.579656 | 2.539057 | 2.810924 | 2.245403 | 3.208923 | 2.726067 | 2.022806 |
| Woolsan | 2.151943 | 1.773137 | 1.678317 | 2.986991 | 2.674896 | 2.206008 | 2.083979 |
| Kyonggi | 24.12572 | 28.62737 | 26.35208 | 17.03748 | 21.19345 | 19.5478 | 19.82286 |
| Kangwon | 2.414866 | 2.125522 | 2.041951 | 1.827377 | 3.154409 | 4.014376 | 2.473507 |
| Chungbuk | 2.261732 | 1.946117 | 1.913788 | 2.240776 | 2.941327 | 3.284914 | 2.019143 |
| Chungnam | 3.008674 | 2.924543 | 2.594355 | 3.14524 | 3.642442 | 4.154855 | 2.978494 |
| Chunbuk | 2.466128 | 2.172766 | 2.052565 | 1.94312 | 3.545217 | 3.882229 | 2.283981 |
| Chunnam | 2.33038 | 2.091206 | 1.93593 | 0.718233 | 3.342721 | 4.353256 | 2.46728 |
| Kyungbuk | 4.010475 | 3.439836 | 3.355614 | 2.994421 | 5.549907 | 6.293254 | 4.027737 |
| Kyungnam | 5.247593 | 4.858737 | 4.672087 | 5.298424 | 6.100235 | 6.5369 | 4.48276 |
| Cheju | 1.704088 | 1.230824 | 0.918974 | 4.274937 | 1.046459 | 1.365326 | 1.744268 |

Table 7. Regional Distributions of Per Capita National Tax Revenues

| | Acquisition | Registration | Inhabitant | Property | Automobile | Tobacco | Synthesis land tax | Motor fuel |
|----------|-------------|--------------|------------|----------|------------|---------|--------------------|------------|
| Seoul | 1.55389 | 1.80839 | 2.07278 | 1.35853 | 1.1217 | 1.02813 | 1.73765 | 1.07248 |
| Pusan | 1.05583 | 1.0702 | 0.73146 | 1.01922 | 0.85766 | 0.8858 | 1.28531 | 0.95541 |
| Taegu | 0.89232 | 0.94506 | 0.62841 | 1.08441 | 1.11258 | 0.95197 | 0.97854 | 1.07619 |
| Inchon | 1.28591 | 1.3061 | 0.68316 | 1.04845 | 0.98971 | 0.88922 | 1.04802 | 0.95885 |
| Kwangju | 0.90669 | 0.93542 | 0.48047 | 1.00777 | 0.99072 | 0.87314 | 0.94046 | 0.95471 |
| Daejon | 1.04756 | 1.19716 | 0.81323 | 1.15867 | 1.12794 | 0.92487 | 0.78535 | 0.98393 |
| Woolsan | 0.97194 | 0.94966 | 1.4373 | 1.2298 | 1.24918 | 0.99436 | 1.07496 | 1.07402 |
| Kyonggi | 1.73111 | 1.64496 | 0.90441 | 1.14244 | 1.09186 | 0.97203 | 1.12801 | 1.13227 |
| Kangwon | 0.79353 | 0.78694 | 0.59888 | 0.87457 | 1.00331 | 1.2324 | 0.86898 | 1.11203 |
| Chungbuk | 0.75185 | 0.76322 | 0.75993 | 0.91916 | 0.96811 | 1.04357 | 0.73406 | 0.9884 |
| Chungnam | 0.88164 | 0.80734 | 0.83234 | 0.83562 | 0.9355 | 1.02997 | 0.84495 | 0.8969 |
| Chunbuk | 0.62709 | 0.61152 | 0.4923 | 0.7777 | 0.87173 | 0.92137 | 0.62031 | 0.91679 |
| Chunnam | 0.5777 | 0.55206 | 0.17417 | 0.74357 | 0.78673 | 0.9889 | 0.64139 | 0.90804 |
| Kyungbuk | 0.7134 | 0.7184 | 0.54516 | 0.89905 | 0.98063 | 1.07327 | 0.78607 | 1.0413 |
| Kyungnam | 0.90397 | 0.8973 | 0.86535 | 0.95896 | 0.96694 | 1.00009 | 0.78483 | 0.93035 |
| Cheju | 1.30558 | 1.00625 | 3.98063 | 0.94206 | 0.94569 | 1.19091 | 1.74109 | 0.99834 |

Note: Each cell=per capita regional national tax revenue/per capita national tax revenues

III. Assignment of National and Local taxes

1. Literature

1.1. Review

There have been various literatures on the intergovernmental allocation of tax bases. Most of them (Kim(2002), Kuhk(2002), Lee(2003), Won(2003), Bird(1999), McLure(2001), and etc) consistently claim a direction of tax bases allocation in the perspectives of efficiency and equity as follows.

First, from the perspective of efficiency, it is desirable that local taxes should work as price signals for local public goods. Retrieving or strengthening the function of local tax as a price signal, it will induce local governments to be more accountable for their residents and provide local public goods in a more efficient way. Thus, it is recommendable to assign tax items, which are good proxies for the amount of welfare from consuming local public goods, to local governments and in return assign tax items, which make regional income redistribution less even, to the central government. The expansion or the reduction of local tax revenues is achievable by transferring additional fraction of tax bases between local governments and the central government (for instance, the introduction local VAT and local proportional income tax) or creating new tax items (such as local environment tax). In the paper, we focus on the first option.

Currently, in Korea, tax-sharing for certain tax items are favorably considered. Against this policy option, it is worried that transfer of tax bases to local governments may worsen the regional disparities. However, as is known in the case of Germany, tax-sharing does not merely involve the sharing rules of tax revenues between the central and the

corresponding local governments. Rather extensively, it covers transfer of resources from a region to another. Though it is still debatable whether transfer of tax bases to local governments may worsen the regional disparities, it indicates that the design of intergovernmental tax bases allocation should be considered in concord with local fiscal transfer system.

As a means of achieving efficiency and regional equity simultaneously, the concept of asymmetric decentralization has been devised (Kim(2002)). The essence of asymmetric decentralization lies in that each local government makes a bilateral contract regarding the degree of functional devolution and tax bases allocation with the central government. This contract binds only the involved two sides. Hence, the system of asymmetric decentralization system is advantageous in that local governments can practice a decentralization program that fit best them. In contrast, asymmetric decentralization may lead to the efficiency loss due to moral hazard under the incomplete information.

1.2. Evaluation

In the whole, the existing literature concentrates on analyzing the impact of transferring an individual tax item to local governments. In details, the existing literature is not successful in showing why elastic tax rate systems are infrequently used and what restricts the exercise of the autonomy in local taxation. Furthermore, the literature addresses the application of the benefit principle to the allocation of tax bases based on the fiscal devolution, which in return depends on the ambiguous division of labor between the central and the local governments for the production of various public goods. It is still not clear what the differences are in

the public goods supplied by the local and the central governments.

Our paper extends the setup to include packages of transferring multi tax items. Though, we admit that our models do not stem from a general economic setup and they cannot provide an explanation as to how the fiscal function devolution should be made within a hierarchy of governments.

2. Theoretical Issues

The models introduced below discuss intergovernmental allocation of tax bases without referring to a consumer's preference. By nature, such simplification allows a coherent and general viewpoint of exploring the issue of intergovernmental tax bases allocation in return for omitting detailed realistic features.

Had we adopted a consumer's preference and a production function over various public goods, we would have to solve product specialization among the governments. In such an environment, we could introduce competition among the public good producers leading the efficiency loss. Despite its more realistic features, the generalization toward this direction would result in complication and would not provide any qualitative results.

In the paper, we assume that the current fiscal functional devolution and the production of public goods are determined at optima and focus on designing an optimal tax revenue allocation mechanism between the central and the local governments.

2.1. Model-I

Under this first model, we assume the followings:

(A-0) There exist one central government and one local government.

This one-to-one relationship seems unrealistic. However, it reflects a situation in which a representative of all the local governments bargains with the central government. Sequentially after the allocation of tax bases with the central government is made, the local governments gather and make a multi-lateral bargaining over tax revenues. Thus, the model does not have to concern the regional disparity. Only it critically evaluates how steadily the fiscal independence ratio of the local governments grows over time.

(A.1) Tax allocation and a local fiscal transfer system is defined as follows. (β, α, δ) are the rates of the LST adjustment, the inclusion of local tax revenues, and tax-sharing respectively. C is a vector of tax revenues from various tax items. C multiplied by δ or $(1-\delta)$ is equal to local tax revenues (R) or national tax revenues (T). N stands for the demand for local public goods admitted by the central government.

$$\beta \max [N - \alpha R, 0] = \gamma T, T = (1 - \delta') C, R = \delta' C$$

(A.2) The tax revenue process C is stochastic and not controlled by any participants. In reality, the process C is controlled by the adjustment of tax rates. However, we assume that the tax rates are set at optima.

(A.3) Total usable resources of a local government is defined to be sum of local tax revenue and LST. Though it is one of various channels of distributing the resources of the central government to the local government, LST takes the biggest portion of the total transferred resources and a distribution criteria of LST is believed to influence decisions made by local government critically. Another reason for excluding other fiscal transfer measures is that the inclusion of all the measures would complicate our analysis and provide no qualitative results.

(A.4) A social objective function is influenced by mean and variance of fiscal

independence ratio of the local government. More, specifically, Markowitz style mean-variance utility function are introduced. Such mean-variance utility function has an advantage of deriving First Order Conditions in a system of linear equations. Hence, exact closed form solutions are available and numerical calculation provides reasonably stable solutions.

$$\max \lambda_1 E[((\delta' C)/(\gamma(1' - \delta')C + \delta' C))] + \lambda_2 Var [((\delta' C)/(\gamma(1' - \delta')C + \delta' C))]$$

where $1'$ is a vector consisting of 1s. In addition, the above objective function is assumed to be risk-averse by the restrictions of $\lambda_1 > 0, \lambda_2 < 0$. We do not know what are the exact values of (λ_1, λ_2) , but we can grasp a rough picture of optimal tax bases allocations by assigning different values to (λ_1, λ_2) .

$$\gamma(1' - \delta')C + \delta' C = k$$

For brevity we introduce a new variable k and define $c=C/k$. Then the original maximization program is rewritten as

$$\max \lambda_1 E[\delta' c] + \lambda_2 Var[\delta' c], \gamma(1' - \delta')c + \delta' c = 1$$

Plugging the budget constrain into the new objective function, we obtain

$$\begin{aligned} & \max \lambda_1 E[1 - \gamma(1' - \delta')c] + \lambda_2 Var[1 - \gamma(1' - \delta')c] \\ & = \max - \lambda_1 E[\gamma(1' - \delta')c] + \lambda_2 Var[\gamma(1' - \delta')c] \\ & = \max - \lambda_1 \gamma(1' - \delta')\mu + \lambda_2 \gamma^2(1' - \delta')V(1 - \delta) \end{aligned}$$

where $\mu=E[c]$, $V=Var[c]$.

Rearranging FOCs with respect to the vector δ , we can represent δ in a function of μ and V .

$$\lambda_1 \gamma \mu = 2 \lambda_2 \gamma^2 V (1 - \delta)$$

$$\rightarrow 1 - \delta = \lambda_1 / (2 \lambda_2 \gamma) \text{Inv}(V) \mu$$

$$\rightarrow \delta = 1 - \lambda_1 / (2 \lambda_2 \gamma) \text{Inv}(V) \mu$$

Proposition1. In (δ, μ, V) , the following comparative static results hold.

$$(1) \partial \delta_i / \partial \mu_i > 0$$

$$(2) \partial \delta_i / \partial \mu_j = 0$$

(1) implies that tax items with high average annual growth rate should be assigned to the local taxes. On the other hand, (2) implies that the average annual growth rate of a tax item does not influence the optimal tax-sharing rate of another.

Proposition2. In (δ, μ, V) , the following comparative static results hold if V is a diagonal matrix.

$$(1) \partial \delta_i / \partial v_{ii} < 0$$

$$(2) \partial \delta_i / \partial v_{jj} = 0$$

(1) implies that tax items with lower volatilities should be assigned to the local taxes. On the other hand, (2) implies that the volatility of a tax item does not influence the optimal tax-sharing rate of another. The intuition behind these are that tax items with should be distributed to the central government for the stability of local finance because the central government is less susceptible to fluctuations

Example 1. Suppose that V is a 2×2 matrix with 0 off diagonal elements. Then, an optimal tax sharing rule suggests

$$\delta_1 = 1 - \lambda_1 / (2\lambda_2\gamma)(\mu_1/v_{11}^2)$$

$$\delta_2 = 1 - \lambda_1 / (2\lambda_2\gamma)(\mu_2/v_{22}^2)$$

Furthermore, the equality $\delta_1 = \delta_2$ holds (a uniform tax sharing rule) when the ratio of the average annual growth rate of the tax items is equal to the ratio of the variances, i.e. $\sigma_2^2/\sigma_1^2 = \mu_2/\mu_1$.

So far we haven't yet put any restrictions on the tax sharing rule vector δ . Of course, we may interpret negative δ to be a tax rate, following which each local government(not its residents) should pay to the central government and δ bigger than 1 to be a subsidy in the opposite direction. However, it is politically almost impossible to have a negative sign or a value greater than 1 in any of its components. Hence, for a more practical alternative, it is desirable to transform the above unconstrained maximization program to the following maximization program with constraints.

$$\max \lambda_1 E[1 - \gamma(1' - \delta')c] + \lambda_2 Var[1 - \gamma(1' - \delta')c], \quad 0 \leq \delta_i \leq 1$$

The new maximization program, unlike the previous, is not easy to represent an optimal tax sharing rule vector δ in a function of other parameters. Furthermore, increase in the dimension of δ raises the number of grids to search explosively, and the computing time may take forever.

2.2. Model-II

The next model is a cross-sectional version of the previous model. Thus, existence of an arbitrary number of local governments are supposed. Additional changes in notations and the setup are as follows.

(B.1) LST is distributed to n local governments based on the following formula.

$$\beta \left(\sum_{i=1}^n \max [N_i - \alpha R_i, 0] \right) = \gamma T, T = \sum_{i=1}^n (1 - \delta) C_i, R_i = \delta C_i$$

(B.2) The social objective function depends on the cross-sectional mean and variance of fiscal independence ratio. Unluckily, the FOCs of this case consist of a system of third order equations. Hence, an explicit closed form solution is not available and computing load will be substantial (especially so, when there are 31 elements in the tax sharing vector δ).

$$\begin{aligned} & \max \lambda_1 \sum_{i=1}^n w_i \left((\delta C_i) / (S_i + \delta C_i) \right) \\ & + \lambda_2 \sum_{i=1}^n w_i \left[\left((\delta C_i) / (S_i + \delta C_i) \right) - \sum_{i=1}^n w_i \left((\delta C_i) / (S_i + \delta C_i) \right) \right]^2 \end{aligned}$$

where w_i measures the weight of each municipality and usually population weight is used for its proxy.

$$\begin{aligned} S_i + \delta C_i &= \left((\gamma (N_i - \alpha R_i) \sum_{i=1}^n (1 - \delta) C_i) / (\sum_{i=1}^n N_i - \alpha \sum_{i=1}^n R_i) \right) + \delta C_i \\ &= \left((\gamma (N_i - \alpha \delta C_i) \sum_{i=1}^n (1 - \delta) C_i) / (\sum_{i=1}^n N_i - \alpha \sum_{i=1}^n \delta C_i) \right) + \delta C_i \\ &= k_i \end{aligned}$$

Gross local revenue of the i -th local government (k_i) is defined to be a sum

of local tax revenues(R_i) and LST(S_i) within the same administrative area. Normalizing all the variables by k_i ($c_i = C_i/k_i, S_i = S_i/k_i, n_i = N_i/k_i$), we can represent the objective function and the budget constraints of all the local governments as follows.

$$\max \lambda_1 \sum_{i=1}^n w_i \delta c_i + \lambda_2 \sum_{i=1}^n w_i [\delta c_i - \sum_{i=1}^n w_i \delta c_i]^2$$

$$((\gamma (n_i - \alpha \delta c_i) \sum_{i=1}^n (1 - \delta) c_i) / (\sum_{i=1}^n n_i - \alpha \sum_{i=1}^n \delta c_i)) + \delta c_i = 1$$

Plugging the budget constrain into the objective function and rearranging it, we obtain

$$\max \lambda_1 \sum_{i=1}^n w_i (1 - ((\gamma (n_i - \alpha \delta c_i) \sum_{i=1}^n (1 - \delta) c_i) / (\sum_{i=1}^n n_i - \alpha \sum_{i=1}^n \delta c_i)))$$

$$+ \lambda_2 \sum_{i=1}^n w_i [1 - ((\gamma (n_i - \alpha \delta c_i) \sum_{i=1}^n (1 - \delta) c_i) / (\sum_{i=1}^n n_i - \alpha \sum_{i=1}^n \delta c_i))]^2$$

$$- \sum_{i=1}^n w_i (1 - ((\gamma (n_i - \alpha \delta c_i) \sum_{i=1}^n (1 - \delta) c_i) / (\sum_{i=1}^n n_i - \alpha \sum_{i=1}^n \delta c_i)))^2$$

Example 2. When $w_i=1/n$, the objective function is simply reduced to

$$\max - \lambda_1 \gamma \sum_{i=1}^n (1 - \delta) c_i$$

$$- \lambda_2 \gamma^2 (\sum_{i=1}^n (1 - \delta) c_i)^2 \sum_{i=1}^n ((n_i - \alpha \delta c_i) / (\sum_{i=1}^n n_i - \alpha \sum_{i=1}^n \delta c_i) - 1)^2$$

The above maximization program consists of two components. The first part measures the cross-sectional average of national tax revenues and the second part measures the cross-sectional volatility of the LST proportions. Notably, the whole maximization program is a quadratic function of the first part.

Example 3. Under an asymmetric decentralization region, the tax sharing rule vector δ differs from a region to another.

It is worth mentioning that growth and volatility of a tax base across time do not always match with those across regions, as the tables in the next section show. For instance, acquisition and registration taxes have big variances across time but small variances across regions.

3. Principles of Intergovernmental Tax Allocation

The following three principles of intergovernmental allocation of tax bases are not derived from theoretical reasoning. However, these rules of thumb are beneficial in comprehending what to be considered in designing a tax system towards fiscal decentralization

- (1) Matching Principle: Assignment of tax bases should match with expenditure allocation or functional devolution. Accordingly, we may consider to guarantee voluntary determination of tax rates and tax items at the level of local governments as well as collection and use of local taxes (As of April 1st, 2001, Japan allows this with prior acceptance by the central government)

Basically the matching principle is consistent with the commonly cited benefit principle. Local public goods, by nature, give service to relatively homogenized group of people and it is natural that the incurred production cost should be shared not by ability-to-pay but by willingness-to-pay. In the context, to match local taxes with the fiscal functions of local governments induce its residents'

attention to spendings of the local government. As a free-rider's problem is often the case with the provision of public goods, the division of revenue between the central and the local governments causes a similar problem. In our paper, we assume that the current intergovernmental functional allocation is optimal and we try to find a combination of tax bases allocation (or sharing rules) matching best with the functional allocation.

- (2) Insurance Principle: This principle prescribes that a more volatile or a more business-cycle sensitive tax item should be transferred to the central government. A basic premise behind this principle is that the central government has advantage over the local governments in diversifying or absorbing fiscal and economic risk. The central government has more policy options against economic shocks, such as debt financing in government bond markets and loosening or tightening money supply. The availability of these policy options also make the central government hedge regional risks more efficiently than the local governments.

For small countries or countries with heavy concentration of population on certain areas, like Korea, cross-sectional risks (or regional risks) tend to be aggregate ones than idiosyncratic ones. This rationalizes why further discussion about the insurance principle will be made in a time domain.

- (3) Equity Principle: Tax items with huge regional disparities or with a progressive taxation scheme should be transferred to the central government. Considered that there is a on-going debate as to how

much regional disparity can be alleviated through a tax reform, the future tax reform should be complemented by a new local fiscal transfer system. Additionally, for a long-term policy measure, the central government is advised to initiate a Regional Equal Development program.

Basically, regional difference is a local-to-local problem arising from information asymmetry and moral hazard. The central government works as a mediator among the local governments. Accordingly, the central government should change the role of local fiscal transfer system from the equalizer of regional differences to a insurance mechanism guaranteeing a minimum level of local public goods, which will eliminate the socially inefficient competition among the local governments. Coupled with the reform in local fiscal transfer system, the central government, from a long term perspective, should carry out a plan for equal regional development. We will not mention further about local transfer system and equal regional development programs because they are beyond the scope of this paper.

The equity principle is related to the above two principles in the following points. First, the mechanism guaranteeing a minimum level of local public goods is consistent with the matching principle because under the principle the extra provision of local public goods beyond the minimum level is afforded by the revenue of the local government. Second, it differs from the insurance principle in that it deals with the systematic regional difference or regional risks, but not with stochastic risks across time.

4. Policy Implications

Based on the models and the principles introduced in the previous sections, we deduce a reform package of intergovernmental tax bases allocation for Korea.

4.1. Data

We use a 10 year data set of national tax revenues, local tax revenues, LST, Local Transfer Fund, and National Treasury Subsidy in Korea. The data set is gathered at the level of prefectures during 1992-2001 due to the absence of national tax revenue at a lower level. To make it worse, the models determining functional devolution and tax bases allocation simultaneously are not applicable due to the absence of unified and itemized expenditure data.

4.2. Anticipated Outcomes

Using the data, we investigate the following. First, various summary statistics for describing the current tax bases allocation are provided, which include the growth rates of tax revenues, the cross-time correlations between a tax revenue and the economic growth rate, and the Gini coefficients of per capita tax revenues. Second, we measure the policy effects of a few commonly cited reform plans both across time and across regions. Third, we deduce an optimal tax sharing rule based on the aforementioned models, which enables us to analyze the anticipated benefits from a package of tax reform rather than from the transfer of an individual tax item.

4.3. Intergovernmental tax bases allocation in Korea

The average growth rates of corporate income tax and transportation tax are high whereas those of VAT and income tax fall below the average GDP growth. In terms of stability, the standard deviations of VAT and income tax growth rates are relatively smaller than those of acquisition and registration tax, which reflects that self-employers take smaller portion of total tax payers than employees.

In relation with economic fluctuations, the growth rates of income, corporate, and tobacco spending taxes tend to have low correlations with the GDP growth. The growth rates of transportation and motor fuel taxes have even negative correlation.

It is natural that the GDP growth rate should be generally positively correlated with the growth rates of tax revenues, but the problem is how much they are positively correlated. Especially, Table-9 shows that local tax revenue has low correlation with the GDP growth, which in return implies that the average growth rates of local taxes are relatively lower than those of national taxes. Then does that mean the demand for local public goods is inelastic with respect to income? Probably not! As a raise in income induces consumer to consume a broader set of consumption bundles, the diversified demands for local public goods follow income increase. Furthermore, local public goods, compared with pure public goods, are relatively close to private goods, but tend to have the low correlation with local tax revenues. Thus, the GDP growth rate is an indirect evidence that local tax does not function fully as price signals.

Table 8. Summary statistics of the GDP and the tax revenues growth rates(1993-2001)

| Classification | Mean | Median | Maximum | Minimum | Standard Deviation |
|--------------------------|----------|----------|----------|----------|--------------------|
| GDP | 9.399018 | 8.636497 | 16.6795 | -1.96567 | 5.87607 |
| Gross Tax revenue | 12.48202 | 13.6004 | 19.76454 | 5.474825 | 4.983673 |
| Domestic Taxes | 12.05646 | 11.59376 | 22.83526 | -3.046 | 8.550714 |
| Local Taxes | 12.67014 | 13.57244 | 32.71653 | -6.82381 | 10.88065 |
| Incom Tax | 10.4026 | 15.64531 | 21.50672 | -13.3191 | 11.18716 |
| Corporation Tax | 16.95992 | 8.005339 | 115.7728 | -23.1076 | 39.71901 |
| Value Added Tax | 11.73813 | 14.70699 | 23.41772 | -19.4026 | 12.32997 |
| Special Excise Tax | 4.203665 | 7.014184 | 32.53784 | -32.1977 | 22.03105 |
| Liquor Tax | 7.730484 | 10.35546 | 25.76672 | -14.1119 | 11.95664 |
| Transportation Tax | 18.97605 | 17.24932 | 43.07013 | -8.83037 | 19.31258 |
| Asquisition Tax | 10.08723 | 14.76689 | 23.61381 | -25.2947 | 14.59965 |
| Registration Tax | 12.58115 | 17.72215 | 27.68803 | -20.4084 | 14.79629 |
| License Tax | 1.935974 | 6.999964 | 30.5695 | -75.9127 | 33.15771 |
| Inhabitant Tax | 16.1528 | 16.81237 | 34.46717 | -3.44789 | 12.41107 |
| Property Tax | 9.037429 | 8.64671 | 18.21437 | -3.06923 | 6.414117 |
| Automobile Tax | 10.3392 | 12.95462 | 25.96188 | -10.9652 | 13.05624 |
| Tobacco Spending Tax | 4.458738 | 4.786112 | 17.16182 | -7.90853 | 7.279454 |
| Synthesis Land Tax | 8.646832 | 3.568525 | 24.77667 | -6.26328 | 11.29135 |
| Motor Fuel Tax | 12.61361 | 0 | 113.5225 | 0 | 37.84084 |

Table 9. Correlations of the GDP growth rate with the growth rates of tax revenues (1993-2001)

| Classification | GDP |
|--------------------------|-------|
| Gross Tax revenue | 0.666 |
| Domestic Taxes | 0.815 |
| Local Taxes | 0.446 |
| Incom Tax | 0.27 |
| Corporation Tax | 0.027 |
| Value Added Tax | 0.608 |
| Transportation Tax | -0.03 |
| Asquisition Tax | 0.658 |
| Registration Tax | 0.661 |
| Inhabitant Tax | 0.308 |
| Property Tax | 0.024 |
| Automobile Tax | 0.638 |
| Tobacco Spending Tax | 0.28 |
| Synthesis Land Tax | 0.819 |
| Motor Fuel Tax | -0.32 |

From the standpoint of reasonal inequality, the Gini coefficients of corporate tax and VAT are high whereas those of acquisition, registration, property taxes are low. Regional concentration of VAT is related to a stipulation defining a point of taxation and refund. Accordingly, if the place of taxation is legally changed from the place of production to the place of whole sales and retails, the inequality of tax revenue will get lower dramatically.

On the other hand, the low Gini coefficients of acquisition, registration, property taxes are related to the fact that the local governments do not make proper efforts to raise the tax revenues by setting the real estate tax base to the real market price. Thus, we can see that the direct application of raw tax data can be misleading.

Summing up, the current intergovernmental allocation of tax bases is evolving in a different direction from the recommendations of the previous studies,

which reminds us of the second best theorem. A reform of intergovernmental tax basis allocation should be accompanied by the reform in tax system as a whole.

Table 10. Gini coefficients of per capita regional tax revenues (prefectures)

| Classification | 1999 | 2000 | 2001 |
|-----------------------|----------|----------|----------|
| Grand Total | 0.31801 | 0.35699 | 0.35037 |
| Domestic Taxes | 0.41727 | 0.45408 | 0.45745 |
| Incom Tax | 0.3041 | 0.29451 | 0.27977 |
| Corporation Tax | 0.61969 | 0.58111 | 0.55383 |
| Value Added Tax | 0.480627 | 0.606378 | 0.582434 |
| Special Excise Tax | 0.61821 | 0.67664 | 0.68784 |
| Transportation Tax | 0.86757 | 0.88143 | 0.87844 |
| Local Taxes | 0.14092 | 0.15346 | 0.15470 |
| Asquisition Tax | 0.12905 | 0.14925 | 0.17022 |
| Registration Tax | 0.14622 | 0.16178 | 0.17888 |
| License Tax | 0.18543 | 0.18051 | 0.11294 |
| Inhabitant Tax | 0.37439 | 0.37021 | 0.37003 |
| Property Tax | 0.09778 | 0.09370 | 0.09098 |
| Automobile Tax | 0.06790 | 0.06486 | 0.06280 |
| Tobacco Spending Tax | 0.05711 | 0.04782 | 0.05346 |
| Synthesis Land Tax | 0.17805 | 0.17564 | 0.17197 |
| Motor Fuel Tax | N.A. | 0.07532 | 0.04143 |

4.4. Scenario Analysis

In order to evaluate the impacts of variations in intergovernmental tax bases allocation on the fiscal status(or fiscal independence ratio) of local governments, we pick the two angles- cross-time and cross-sectional.

To begin with, the cross-time scenario analysis is carried out with 11

different allocation systems to measure the changes of national average of local fiscal independence ratios, the ratio of total local tax revenue to total national tax revenue, and the ratio of total local resources to total national resources during 1992-2001.

On the other hand, the cross-sectional analysis deals with 5 different allocations and provides cross-sectional means and variances of local fiscal independence ratios and the total local resources using 2001 national and local tax revenue data.

(1) Cross-time Analysis

With 11 hypothetical scenarios of change in tax bases allocation systems, we measure the changes of national average of local fiscal independence ratios, the ratio of total local tax revenue to total national tax revenue, and the ratio of total local resources to total national resources during 1992-2001. Of course, the adopted scenarios are so far widely claimed as alternatives of the current system. For brevity, we present a summary table of cross-time means and variances below.

From Table 11-12, we see that scenarios 8-11 from the 11 scenarios perform better than the others. These alternatives assume the transfer of VAT or local transportation tax to local governments, which we believe contributes to raising national average of fiscal independence ratios and reduces its variances across time. Especially, scenario 11, which assumes the transfer of 30% transportation tax revenue to local governments, exhibits the smallest volatility, which is mainly due to the cross-time stability of transportation tax revenue.

On the other hand, in terms of available resources, scenario 7-11 seems desirable. Among them, scenario 7 shows the least variances and the

highest mean.

Table 11. Contents of scenarios (cross-time)

| | Specification |
|-------------|--|
| Scenario 1 | <ul style="list-style-type: none">◦ Transfer 5% of VAT to local◦ Transfer acquisition and registration tax to central |
| Scenario 2 | <ul style="list-style-type: none">◦ Transfer 10% of VAT to local◦ Transfer acquisition and registration tax to central |
| Scenario 3 | <ul style="list-style-type: none">◦ Transfer 15% of VAT to local◦ Transfer acquisition and registration tax to central |
| Scenario 4 | <ul style="list-style-type: none">◦ Transfer 20% of VAT to local◦ Transfer acquisition and registration tax to central |
| Scenario 5 | <ul style="list-style-type: none">◦ Transfer 10% of Transportation tax to local◦ Transfer acquisition and registration tax to central |
| Scenario 6 | <ul style="list-style-type: none">◦ Transfer 20% of Transportation tax to local◦ Transfer acquisition and registration tax to central |
| Scenario 7 | <ul style="list-style-type: none">◦ Transfer 30% of Transportation tax to local◦ Transfer acquisition and registration tax to central |
| Scenario 8 | <ul style="list-style-type: none">◦ Transfer 10% of VAT to local |
| Scenario 9 | <ul style="list-style-type: none">◦ Transfer 20% of VAT to local |
| Scenario 10 | <ul style="list-style-type: none">◦ Transfer 15% of Transportation tax to local |
| Scenario 11 | <ul style="list-style-type: none">◦ Transfer 30% of Transportation tax to local |

Table 12. Analysis of scenarios (cross-time)

| | Fiscal independence of index | | Ratio of Domestic Taxes and Local taxes | | Ratio of living capacity | |
|----------------|------------------------------|--------------------|---|--------------------|--------------------------|--------------------|
| | Mean | Standard Deviation | Mean | Standard Deviation | Mean | Standard Deviation |
| Current System | 0.67055898 | 0.02343512 | 0.20925256 | 0.01207676 | 0.60134413 | 0.02134191 |
| Scenario 1 | 0.62777001 | 0.02292804 | 0.13741103 | 0.00795968 | 0.56780829 | 0.02082579 |
| Scenario 2 | 0.63454548 | 0.0228125 | 0.14800266 | 0.00799782 | 0.572748 | 0.02067651 |
| Scenario 3 | 0.64115442 | 0.02271122 | 0.15859428 | 0.00808919 | 0.57768771 | 0.02053254 |
| Scenario 4 | 0.64760293 | 0.02262248 | 0.1691859 | 0.00823202 | 0.58262742 | 0.02039399 |
| Scenario 5 | 0.62447439 | 0.02138838 | 0.1323222 | 0.00878191 | 0.56541432 | 0.02139089 |
| Scenario 6 | 0.62806434 | 0.01987291 | 0.13782499 | 0.01067634 | 0.56796005 | 0.02190435 |
| Scenario 7 | 0.63159312 | 0.01853302 | 0.14332778 | 0.01319834 | 0.63159312 | 0.01853302 |
| Scenario 8 | 0.68194783 | 0.02325801 | 0.23043581 | 0.01266305 | 0.61122355 | 0.02115917 |
| Scenario 9 | 0.69283197 | 0.02310843 | 0.25161906 | 0.01335301 | 0.62110297 | 0.02099988 |
| Scenario 10 | 0.67511816 | 0.02113799 | 0.21750675 | 0.01116258 | 0.60516274 | 0.02169287 |
| Scenario 11 | 0.67957017 | 0.0190634 | 0.22576094 | 0.0124858 | 0.60898134 | 0.02228355 |

(2) Cross-sectional Analysis

As seen in Table 13-14, we carry out the following 5 hypothetical scenarios of intergovernmental tax bases allocation and measure what their cross-sectional effects on regional means and variances of fiscal independence ratios would be in 2001 at the level of prefectures.

According to Table 14, the one-directional transfer of tax bases as in scenario 3-5 will worsen regional disparity. Thus, it indicates that the exchange of tax bases is more desirable than one-sided transfer.

Table 13. Contents of scenarios (cross-section)

| | Specification |
|------------|--|
| Scenario 1 | ◦ Transfer 50% of VAT (raised in local) to local ◦ Transfer acquisition and registration tax to central |
| Scenario 2 | ◦ Transfer 15% of Transportation tax to local ◦ Transfer acquisition and registration tax to central |
| Scenario 3 | ◦ Transfer 50% of VAT (raised in local) to local |
| Scenario 4 | ◦ Transfer 15 of Transportation tax to local |
| Scenario 5 | ◦ Transfer 30% of Transportation tax to local |

Table 14. Analysis of scenarios (cross-section)

| Fiscal independence of index | Current | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 | Scenario 5 |
|---------------------------------|-----------|------------|------------|------------|------------|------------|
| Mean | 0.6905181 | 0.6367904 | 0.5885265 | 0.6108542 | 0.7057418 | 0.7199843 |
| Standard Deviation | 0.272261 | 0.2567 | 0.2511754 | 0.2929038 | 0.3259087 | 0.4009183 |
| Ratio of living capacity(Local) | 38615749 | 34771369 | 31982077 | 33312202 | 39945875 | 41276000 |

As mentioned earlier, the regional distributions of national taxes may differ from our intuition due to the stipulations on the timing and the place of taxation. VAT is a typical example for this case. Hence, in Table 15-16, we analyze the effect of intergovernmental tax bases exchange including VAT under a new sharing scheme. Under the new scheme, the amount of VAT revenues shared by each local government is proportional to the amount of wholesales and retails. As in Table 14, the one-directional transfer of tax bases is shown to aggravate the regional disparity in Table 16.

Table 15. Contents of cross-sectional scenarios (distribution of VAT according to regional whole/retail sales)

| | Specification |
|------------|--|
| Scenario 1 | ◦ Transfer 15% of VAT to local ◦ Transfer acquisition and registration tax to central |
| Scenario 2 | ◦ Transfer 20% of VAT to local ◦ Transfer acquisition and registration tax to central |
| Scenario 3 | ◦ Transfer 5% of VAT to local |
| Scenario 4 | ◦ Transfer 10% of VAT to local |

Table 16. Analysis of cross-sectional scenarios (distribution of VAT according to regional whole/retail sales)

| Fiscal independence of index | Current | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 |
|---------------------------------|----------|------------|------------|------------|------------|
| Mean | 0.690518 | 0.617064 | 0.63225 | 0.701814 | 0.712439 |
| Standard Deviation | 0.272261 | 0.234205 | 0.245513 | 0.281452 | 0.289477 |
| Ratio of living capacity(Local) | 38615749 | 34309073 | 35528114 | 39834790 | 41053831 |

IV. Reform of Intergovernmental Tax Allocation System

The following policy recommendations consider exchanges of tax bases with the revenue neutrality maintained. Any revenue non-neutral reform packages should be based on a premise that further adjustment in functional devolution among the governments is required. To make it worse, optimal fiscal function devolution is not achievable in absence of demand and production functions for various public goods. Hence, due to physical and time constraints we will not go further in the direction.

1. Transfers from the Central Government

1.1 Local income tax

The introduction of local income tax is appropriate from the standpoint of benefit principle and the income tax portion of the current inhabitant tax does the role. However, regional concentration of the inhabitant tax revenue is severe. For example, Seoul metro city raise 42% of total inhabitant tax(heavy concentration), whereas Seoul's local Tax revenue are 21.2% of total local tax revenue.

Accordingly, it is considerable to transfer non-labor income and corporation income portions of inhabitant tax to the central government in order to adjust regional differences (in 2000, 50% of Seoul's inhabitant tax revenue) Northern European Countries (Norway) have adopted a similar dual tax system and the local tax rates on corporate income and capital gains have been decreasing for the last years.

1.2 Local consumption tax

Table-10 indicates that VAT revenues are relatively unequally distributed. We suspect that the big Gini coefficient number results from stipulations regarding the timing and the place of taxation. To eliminate such a factor of bias, we collect the regional data for wholesales and retails during 1998-2000 and calculate Gini coefficients of per capita regional sales data. The new measurement confirms our intuition that local consumption tax has low regional differences and low volatility across time. Furthermore, it is often claimed that the amount of benefit from local public goods is not much correlated with income. Based on these, we claim that the introduction of local consumption tax (or Local VAT) is desirable.

A recommendable procedure of introducing LVAT is a tax-sharing type as is practiced in Japan. LVAT in Japan is based on a fraction of the VAT revenue collected by the central government, which is distributed to local governments according to the amount of wholesales and retails within each area. Such sales based distribution rule has advantage of avoiding concentration of VAT revenues on areas with less industrial facilities ⁷⁾. In contrast, waste of costs in institutional and administrative perspectives are worried if the local consumption tax is introduced in the form of an independent tax.

Hence, first, we recommend that Korea introduce a Japanese type local consumption tax. Depending on the future progress, then we may discuss the transition to an independent VAT system.

7) The VAT revenues from areas with industrial clusters are underestimated due to VAT refund clause.

1.3 Local Transportation tax

Local transportation tax reveals a similar problem of regional disparity in Table-10. The disparity comes from the fact that locations of oil refineries are places of taxation. The use of motor fuel tax⁸⁾ revenue as a proxy guarantees very even distribution of local transportation tax revenue among the local governments.

Considering 1 trillion won of its revenue size and relatively low regional differences, it also can be considered as an alternative to local consumption tax.

Table 15. Gini coefficients of whole sales and retails during 1998-2000

| | 1998 | 1999 | 2000 |
|--|---------|---------|---------|
| Regional per capita wholesale/retails | 0.19208 | 0.25294 | 0.24829 |
| Regional per capita auto and fuel sales | 0.11558 | 0.11129 | 0.10754 |
| Regional per capita retails(excluding auto sales) | 0.13242 | 0.15846 | 0.15711 |

2. Transfers from the Local Governments

2.1. Acquisition · Registration Tax

Table-10 shows that acquisition and registration tax revenues are with low regional disparities, which is against our intuition. This phenomenon does not imply that acquisition and registration taxes are suitable for local

8) Motor fuel tax has the same tax basis with transportation tax. They differ in determining a place of taxation.

taxation. Rather, it indicates lack of tax collection incentives by local governments.

Another explanation to this story is that most areas of high population density are those with high real estate price. In the crowded areas, such as in Seoul metro area, the proportion of residents holding real estate is smaller than that in rural areas. This also explains why the Gini coefficients of per capita regional acquisition and registration tax revenues in Table-10 are so small.

Taking all these into account, we can see that acquisition and registration tax revenues are not evenly distributed across regions. Hence, transfer of acquisition and registration tax revenues to the central government is advisable.

Furthermore, since acquisition and registration tax revenues take substantial portions of gross local government revenues, the local governments tend to permit excessive land development (environmental issues) for collection of bigger tax revenues.

Thus, the transfer of Acquisition · Registration tax to the central government should be considered with the transfer of consumption tax in the opposite direction.

2.2 Property · Aggregate Land Tax

Property and aggregate land tax should also be transferred to the central government for the same grounds applied to acquisition and registration taxes. Alternatively, in order to solve information asymmetry between the central and the local governments, a dual tax system as follows is considerable: Properties of a certain amount (in value) should be taxed at

a proportional rate by the local governments and the amount beyond the value will be taxed (possibly progressively) by the central government.

Figure 8. The ratio of income tax (real estate transactions) to acquisition and registration taxes

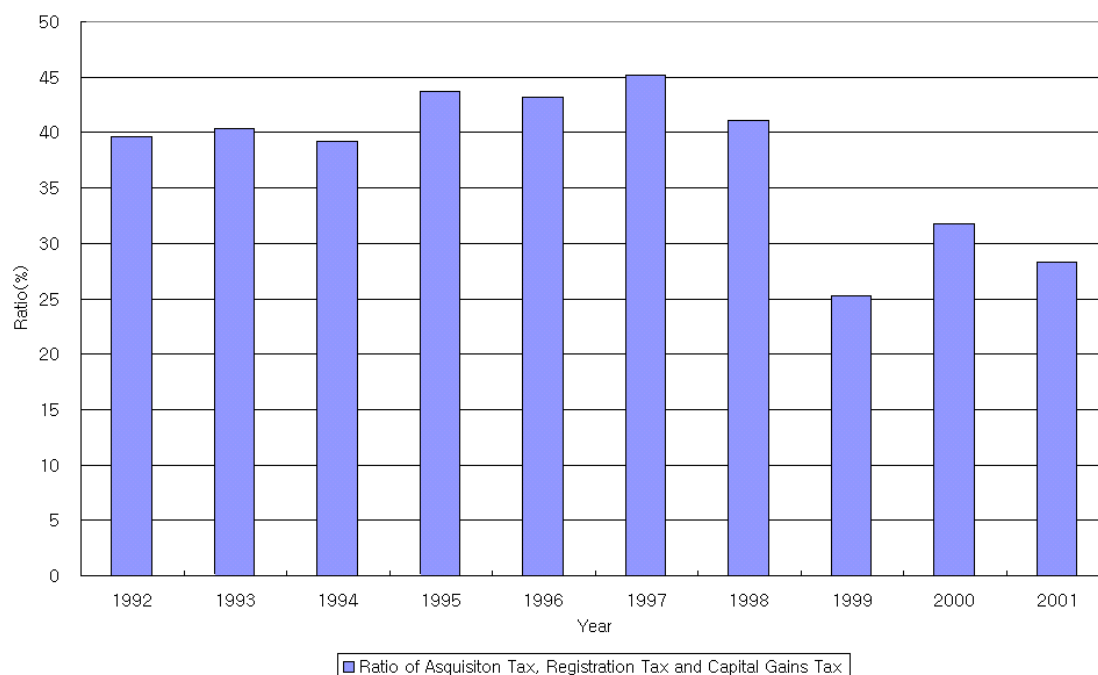


Table 16. Gini coefficients of per house-owners regional tax revenues

| | 1999 | 2000 | 2001 |
|-------------------------|---------|---------|---------|
| Acquisition Tax | 0.2117 | 0.2117 | 0.23541 |
| Registration Tax | 0.21607 | 0.2279 | 0.24775 |
| Property Tax | 0.16542 | 0.16097 | 0.15809 |

* The number of house owners within an area is not available and we use the number of residents multiplied by the ratio of house owning households to total households as a proxy.

3. Reform in Tax Administration System

For more efficiency of tax administration, collection should be assigned to a central organization, which will replace the current National Tax service.

The grounds for this claim are

First, NTS is more cost efficient than tax collection counterparts in local governments. For example, the collection cost per 100 won collected is 0.8won in 2000 with downward time trend, and the figure is believed to be much lower than the collection costs of local governments. In addition, by using the existing local branches of NTS, the expansion of the new tax administrative organization will be maintained at a minimum.

Second, the economy of scale can be realized through the integration of database and the specialized human resources. Especially, the integration of database will improve the current under-report of self-employed(current 20.3%~50% estimated). In addition, the unification and the mark-to-market of various real estate related tax bases, which are distant from the market values, are expected.

From the standpoint of check and balance within the whole government system, the current dual tax collection system consisting of NTS and tax collection division of local governments may perform better than the new unified tax collection agency. Also, the anticipated excessive expansion of the existing NTS or the lack of specialties within the unified organization are worried.

However, these worries stems from the underestimation of the synergy effect the unified organization brings about. Special expertise of officials working for local government tax division is not satisfactory, either. Furthermore, local tax items and national tax items are not distant from each other. Hence, specific knowledge about a tax item helps understand another tax item, and the arguments against the unification of tax collection agencies on grounds of specialization or division of labor are not valid.

Table 17. Cost Efficiency of NTS

(Unit: Won)

| Year | Collection cost per W100 collected |
|------|------------------------------------|
| 1991 | 0.99 |
| 1992 | 0.98 |
| 1993 | 0.97 |
| 1994 | 0.92 |
| 1995 | 0.91 |
| 1996 | 0.93 |
| 1997 | 0.91 |
| 1998 | 0.91 |
| 1999 | 0.84 |
| 2000 | 0.80 |

Source: NTS

V. Concluding Remarks

The primary objective of fiscal decentralization consists is to enhance the efficiency of resource allocation through a mechanism of autonomy and accountability. Our paper concerns the intergovernmental allocation of tax bases as a means of improving local autonomy and fiscal accountability.

By and large, the current local fiscal system of Korea characterized by the high proportion of national tax revenues with respect to the local tax revenues and the huge size of local fiscal transfer system, exposes several problems, such as huge regional disparities coming from concentration of population in Seoul metro areas and the low fiscal independence of local governments from the central government.

Considering the situation, intergovernmental allocation of tax bases should be balanced with fiscal functional devolution and mitigate regional disparities. Specifically, these principles are put into practice by:

First, the introduction of local income tax is appropriate from the standpoint of benefit principle and the income tax portion of the current inhabitant tax takes the role. However, considering severe regional concentration of the inhabitant tax revenue on Seoul metro area, it is considerable to transfer non-labor income and corporation income portions of inhabitant tax to the central government in order to adjust regional differences.

Second, Japanese type local consumption tax should be introduced. This will avoids worsening the regional inequality of tax revenues.

Third, considering 1 trillion won of its revenue size and relatively low regional differences, transportation tax can also be considered as an alternative to local consumption tax.

Fourth, acquisition, registration, property, and aggregate land taxes should be transferred to the central government due to the big regional differences. Especially, property and aggregate land taxes can be shared by both the central government and the local governments.

In addition, for the improvement in tax administration, the integration of tax and real estate databases as well as improvement in the expertise of tax officials are necessary.

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