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Empirics of the Median Voter Hypothesis in Japan

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Abstract

This paper offers a test of the median voter hypothesis in Japan. We have comprehensively studied the hypothesis in Japanese local finance for first time. Analyzing the hypothesis in Japan is important to investigate whether local expenditures reflects voter's preference or not. Unfortunately, we cannot obtain official data on the median (voter's) income in Japan. Therefore data by prefecture is constructed in this paper. Using this, we estimate the demand functions of local public goods in order to test the hypothesis. We obtain the result that the median voter hypothesis is supported by prefectural finance. This result is a reasonably intuitive interpretation. In centralized local system such as Japan, the hypothesis means that the central government manages local expenditures through interregional grants to reflect the preference of the median voter in its jurisdiction.

Key words: Median Voter Hypothesis, Local Public Goods, Japanese Local Finance

JEL classification: H72, D72

I. Introduction

The median voter hypothesis plays an important part in analyzing local expenditures. There are many empirical studies of local government finance with the hypothesis in the U.S. etc.. Examples of these are Borcherding and Deacon (1972) Bergstrom and Goodman (1973), Gramlich and Rubinfeld (1982), and Turnbull and Djoundourian (1994). In Japan, however, the hypothesis are not directly used for studies of local spending. This paper provides a direct test of the hypothesis in Japanese local government finance.

Recently, this hypothesis is theoretically used for studies on not only local finance but endogenous growth theory like Perotti (1993), Alesina and Rodrik (1994), Persson and Tabellini (1994), and so forth. In the endogenous growth theory, the median voter theorem is employed to make policies (especially, income redistribution policies) among heterogeneous individuals. Hence in order to examine the relationship between fiscal policy and income distribution, the tests on the median voter hypothesis are meaningful.

A significance of researching the median voter hypothesis in Japan is as follows. Many Japanese consider that the Japanese central government is especially suffering from its unnecessary public expenditures and subsidies now. If the people do not really want such expenditures and subsidies in this region, the central government can reduce them. In this sense, it is very important in Japan that we test the median voter hypothesis, by which we understand whether the Japanese central government disburses expenditures and subsidies to answer the needs of each jurisdiction.

But we have never comprehensively researched it in the case of Japanese local expenditure. Because the data used in testing the hypothesis, such as the median income by Japanese jurisdiction, is not available. So we try to construct the data and check it in Japan, considering Japanese specific institutions.

In tests on the hypothesis, we have assumed that the median voter identifies the person who earns the median income in the society. Several strong assumption must be satisfied in order to prove this identification correct. Examples of this are a one-dimensional policy issue in majority voting, its level of which have a strong (positive) correlation with income, heterogeneity among voters and which are mainly represented by income.

Unfortunately, we cannot obtain official data on the median income in Japan. Therefore data by prefecture needs to be constructed in this paper. In the present circumstances, it is in prefectures that above suppositions may be satisfied. In prefectures, income taxation accounts for more than 70% of the total prefectural tax revenue, and each governor is directly elected under majority rule. In addition, official data on income distribution by prefecture is available.

We conclude by estimations that the hypothesis is held in Japanese prefectures. The interpretation of the median voter hypothesis is usually that local governments determine their expenditure desired by the median voter. This interpretation in a centralized local system such as Japan is, however, different from that in a federal system such as the U.S.. We insist that the hypothesis means the central government decides their expenditure desired by the median voter in Japan. This reason is as follows.

In the Japanese centralized system, each local government may formally decide its expenditures, but the central government makes its decisions substantially and controls the discretion of local governments. The central government can manage local finance without considering the results of local elections, that is, the median voter's preference for expenditures in their prefectures. On the contrary, each prefectural governor, needs to get support from the median voter in order to be reelected. There are many governors who are reelected in Japan. Therefore the central government reflect their preference for prefectural expenditures. The hypothesis suggests this.

This paper is organized as follows: in section II, we introduce the Japanese local finance system. Section III constructs models applied to the Japanese local finance system. Section IV estimates the median and mean income by prefecture in Japan. Section V reports the results of the test of the median voter hypothesis. Section VI closely examines the superiority of the median income as the regressor on local expenditures. Section VII concludes the paper.

II. Japanese Local Finance System

We shall briefly explain the Japanese local finance system.[1] There are three levels of governments in Japan; the national government, prefectural government, and municipal government. As we address prefectural expenditures in this paper, we now focus on the subject of prefectural finance and politics.

First, we explain the prefectural revenues. The total revenue of all prefectures is about 40 trillion yen (equals to about 4,000 billion dollars) as of the early 1990s. They are divided into six categories; Local Taxes, Local Transfer Taxes, Local Allocation Tax, National Government Disbursements, Local Public Bonds, and Miscellaneous Revenue. In Japan, the revenues can be nearly controlled by the central government. Rates and sources of Local Taxes are basically determined by national laws, local governments rarely have discretion over them. Also issues of Local Public Bonds are controlled through the central government. Local Transfer Taxes, Local Allocation Tax, and National Government Disbursements are distributed to local governments by the central government.

Especially, the interregional distribution of National Government Disbursements often affects political pressure, suggested by Doi and Ashiya (1997). Namely the Dietmen and the prefectural governors appeal to the central government to distribute more in their own jurisdictions. Getting more grants is important for them to be reelected.

In the Japanese local election systems, the governor is elected not by indirect election among assemblymen but direct election among the electorate. Hence the party that the governor belongs to may be opposed to the party that shares the majority in the assembly. However, these parties recently are the same in most prefectures. So the gubernatorial election usually substantially reflects voters' requests. Shown in Table 6, it indicates the number of times gubernatorial candidates have been reelected. If the central government ignores the local elections, the incumbent governor may not be reelected, and governors may change in every election. There have been, however, many governors reelected several times. According to Table 6, the share of governors who have not been reelected for some reason are only about 25% of all governors in Japan.

Analyzing the median voter hypothesis in Japan is important to investigate whether local expenditures reflects voter's preference or not. Because the Japanese local system is centralized, hence the central government can control local expenditures with ignoring voter's preference. But if the central government does so, the governor will be able to lose the next election. Therefore he appeals to the central government to reflect voter's requests. Under a centralized local system, the median voter hypothesis is held if the central government urged by the governor controls local expenditures to be preferred by voters. The purpose of our paper is to examine this.

III. Models

In this section, models based on the previous studies on the median voter hypothesis are modified to conform them to the local finance system in Japan.

III-1. Demand function for local public goods with supply side

Borcherding and Deacon (1972) are the pioneering test of the median voter hypothesis that use demand function of local public goods on the assumption that the household maximizes the utility.[2] The model based on Borcherding and Deacon (1972) is as follows.

We presume that household i living in jurisdiction j obtains the utility through consumption of private good (X_j^i) and local public goods (Z_j). Their utility function is

$$U(X_j^i, Z_j), \tag{1}$$

[1] See Shibata (1993) for further details.

[2] Borcherding and Deacon (1972) don't explicitly show the utility function.

where $\dfrac{\partial U}{\partial X_j^i} > 0,\quad \dfrac{\partial U}{\partial Z_j} > 0,\quad \dfrac{\partial^2 U}{\partial Z_j^{\ 2}} < 0$.

Assume that households maximize the utility without considering the effect of the migration across jurisdictions. The local public goods allow for congestion. The relation between consumption and provision (G_j) of local public goods is denoted

$$Z_j = G_j \big/ N_j^{\ \gamma}\ , \tag{2}$$

where N_j is population in jurisdiction j, and γ is its congestion parameter ($\gamma = 0$ when it is purely public, and $\gamma = 1$ when it is purely private). We usually assume $0 \le \gamma \le 1$. Suppose private good is the numeraire. The budget constraint of the household is

$$X_j^i + T_j^i + \tau_j^i = y_j^i \tag{3}$$

where y_j^i is pre-tax income, T_j^i and τ_j^i are respectively local tax and national tax paid by household i in jurisdiction j.

The central (national) government collects taxes from each household in each jurisdiction, and distributes general lump-sum grants (Local Allocation Tax) and matching grants (National Government Disbursements) to each local government (omitting national public goods provided by the central government). Each local government collects (local) taxes, receives grants, and spends provision of local public good. The budget constraint of the local government j is

$$(1 - m_j)E_j = \sum_{i=1}^{N_j} T_j^i + H_j\ , \tag{4}$$

where E_j is expenditure for the provision of local public goods, H_j is a general lump-sum grant (Local Allocation Tax) distributed to local government j, and m_j is the ratio of the matching grants (National Government Disbursements) that it gets total expenditures. Expenditures for local public goods, E_j, are expressed:

$$E_j = qG_j,$$

where q is the unit cost of local public goods.

The central government faces a budget constraint (there are J jurisdictions around the country):

$$\sum_{j=1}^{J}\sum_{i=1}^{N_j}\tau^i_j = \sum_{j=1}^{J}(m_j qG_j + H_j) . \tag{5}$$

It decides H_j, m_j, and the local tax system satisfying equation (5). The central government requested by local governments or the households can H_j (Local Allocation Tax) and local tax systems.[3] In this paper, we focus on their demand for local public goods or revenues.[4]

We shall define the tax share of the household i in jurisdiction j,

$$t^i_j \equiv T^i_j \Big/ \sum_{i=1}^{N_j} T^i_j .$$

Hence the budget constraint of the household i in jurisdiction j is rewritten by it

$$\begin{aligned} X^i_j &= y^i_j - \tau^i_j + t^i_j H_j - t^i_j\{(1-m_j)qG_j\} \\ &= y^i_j - \tau^i_j + t^i_j H_j - t^i_j\{(1-m_j)qN_j{}^{\gamma}\}Z_j . \end{aligned} \tag{6}$$

Define $s^i_j \equiv t^i_j\{(1-m_j)qN_j{}^{\gamma}\}$ in the last term of the right hand side in equation (6), s^i_j is the (local) tax price in terms of consumption of local public good. Now $Y^i_j \equiv y^i_j - \tau^i_j + t^i_j H_j$ denotes after-tax income of household i in jurisdiction j.

The household wishes the quantity of local public goods by maximizing its utility. Under appropriate conditions for utility function, we introduce the formulation that household i's demand function of local public good is

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[3] Under the present system, the distribution of Local Allocation Tax, and the rate and structure of local taxes are prescribed by national laws. Therefore each local government or household is can hardly decide the revenue of Local Allocation Tax and local taxes directly. So local governments or households require appropriate control of the revenue from the central government.

[4] Now, we do not explicitly consider the object function of the central government in this paper. Because we want to focus whether or not the central government disburse subsidies to answer the needs of each jurisdiction. In order to check it, we had better set the object function a priori. But if pressed we would say that its object is that it disburse subsidies required by the median voter in every jurisdiction.

$$Z_j = A(s_j^i)^{\eta}(Y_j^i)^{\delta}, \tag{7}$$

where A is constant, η is its elasticity of tax price (supposing constant), and δ is its elasticity of income (supposing constant). Assume that each household is assessed national and local taxes, but chooses the level of m_j as he desires. In assuming it, Z_j is a monotonic function of Y_j^i (and y_j^i as well). Hence from the supposition of the utility function (1), the median voter hypothesis holds in majority voting on the quantity of local public goods with (7). Namely, the level of local government expenditures in each jurisdiction is optimal for the median voter in its jurisdiction. The hypothesis can be satisfied if the central government manages each local expenditure to reflect the preference of voters in the jurisdiction (e.g. controlling the distribution of National Government Disbursements, after all m_j).[5] This explanation is valid for the suggestion of Doi and Ashiya (1997). Doi and Ashiya (1997) obtain the result that the interregional distribution of National Government Disbursement is affected by the political power of the governing party (i.e., the Liberal Democratic Party).

On the supply side of local public goods, its production function is expressed, using the Cobb-Douglas assumption, by[6]

$$G_j = aL_j^{\beta}K_j^{1-\beta}, \qquad 0 < \beta < 1 \tag{8}$$

where a is constant, L_j, and K_j are respectively labor and capital for its production. Each local government decides the output to minimize cost for production of local public goods,

[5] Each m_j may be different. Though the rate of grant (the ratio of National Government Disbursements to expenditure) for some specific purpose is almost the same across jurisdictions, the quantity of each expenditure varies in each local government. Hence each m_j, the rate of grant in the sense of aggregation, is not same.

[6] This function must be linear homogenous in order to identify parameters in models when we estimate them.

$$L_j = \frac{\beta C_j}{w_j}, \quad K_j = \frac{(1-\beta)C_j}{r},$$

where w_j is wage in jurisdiction j (it varies from one jurisdiction and another), r is rental rate of capital (it equalizes across jurisdictions).[7] From (8), the unit cost function $c_j = C_j / G_j$ is

$$c_j(w_j) = \frac{1}{a}(\frac{w_j}{\beta})^{\beta}(\frac{r}{1-\beta})^{1-\beta} \equiv a' w_j^{\beta}, \tag{9}$$

where $a' \equiv \frac{1}{a}(\frac{1}{\beta})^{\beta}(\frac{r}{1-\beta})^{1-\beta}$.

Here $c_j = q$ (unit cost of local public good).[8]

From (2), (7), and (9), as the result of majority voting on local expenditures, total expenditures in jurisdiction j E_j (= C_j), are chosen the following level preferred by median voter (superscript m denotes median voter).

$$E_j = A'(w_j)^{\beta(\eta+1)}\{t_j^m(1-m_j)\}^{\eta}(Y_j^m)^{\delta}(N_j)^{\gamma(\eta+1)}$$

where $A' \equiv A(a')^{\eta+1}$.

In logarithmic form this becomes [9]

$$\ln E_j = \ln A' + \beta(\eta+1)\ln w_j + \gamma(\eta+1)\ln N_j + \eta \ln\{t_j^m(1-m_j)\} + \delta \ln Y_j^m \tag{A}$$

III-2. Demand function without supply side

The model based on Bergstrom and Goodman (1973) deal with demand side only and tax price explicitly. In addition to Borcherding and Deacon (1972), we posit the marginal rate of transformation of local public for private good is equal to 1 in each jurisdiction.

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[7] The cost minimizing problem is

$\min C_j = w_j L_j + r K_j \quad$ s.t. (7).

We posit that local governments supply public good efficiently. Moreover, we suppose labor is imperfectly mobile across jurisdictions, and capital perfectly mobile.

[8] We allow that not only unit cost function, that is, wage w_j but q differ in each jurisdiction.

[9] In Borcherding and Deacon (1972), the left hand side in the above equation or (A) is not total expenditures but per capita expenditure.

Equations (1), (2), (3), and (7) are the same in this section. Then total expenditure, E_j (= qG_j), is chosen under majority voting on local expenditure. The median voter's demand function for local public goods is represented:

$$Z_j = A[t_j^m\{(1-m_j)qN_j^{\ \gamma}\}]^\eta (Y_j^m)^\delta .$$

Therefore, from (2)

$$\ln E_j = \ln A'' + \gamma(\eta+1)\ln N_j + \eta \ln\{t_j^m(1-m_j)\} + \delta \ln Y_j^m \qquad \text{(B)}$$

where $\quad A'' \equiv Aq^{\eta+1}$.

A, δ, and η are as noted above.

III-3. Demand function with deferent benefit among individuals

The model based on Denzau and Mackay (1976) and used for empirical studies as Gramlich and Rubinfeld (1982), Preston and Ridge (1995), and so on, differs from Borcherding and Deacon (1972) in the relation between consumption and provision of local public good (2). Substituting for (2), we postulate

$$Z_j^i = \rho_j^i \frac{G_j}{N_j^{\ \gamma}} \qquad 0 \le \gamma \le 1 \qquad \text{(2')}$$

where $\quad \rho_j^i \equiv (Y_j^i)^\alpha \Big/ \sum_{i=1}^{N_j} \{(Y_j^i)^\alpha / N_j\}$.

ρ_j^i is the benefit share of household i in jurisdiction j, parameter α "reflects in the some sense the extent to which the distribution of the publicly provided good is biased towards the more affluent groups relative to the situation of equal shares" (Denzau and Mackay (1976) p.72). α = 0 when benefits are distributed to all households equally, i.e., as same as (2), α > 0 when more distributed to higher income households, α < 0 when more distributed to lower income households. We define $Y_j^* \equiv \sum_{i=1}^{N_j} \{(Y_j^i)^\alpha / N_j\}$.

Budget constraint of household i can be rewritten:

$$X_j^i = Y_j^i - \{t_j^i(1-m_j)qY_j^*(N_j)^\gamma / (Y_j^i)^\alpha\} Z_j ,$$

where the unit cost of local public goods, q (= c_j), is represented by (9). Thus demand function for local public goods of the household i (maximizing the utility) is

$$Z_j = A[t_j^i(1-m_j)qY_j^*(N_j)^\gamma \big/ (Y_j^i)^\alpha]^\eta (Y_j^i)^\delta = A(a')^\eta w_j^{\beta\eta}\{t_j^i(1-m_j)\}^\eta (N_j)^{\gamma\eta}(Y_j^*)^\eta (Y_j^i)^{\delta-\alpha\eta}$$

A, δ, and η are as mentioned above.

As for the local expenditures, E_j (= C_j = c_jG_j), chosen in majority voting, we have

$$E_j = A'w_j^{\beta(\eta+1)}[t_j^m(1-m_j)]^\eta N_j^{\gamma(\eta+1)}(Y_j^*)^{\eta+1}(Y_j^m)^{\delta-\alpha(\eta+1)}$$

$$\text{where} \quad A' \equiv A(a')^{\eta+1}.$$

Now we can $Y_j^* \cong \overline{Y}_j^\alpha$ ($\overline{Y}_j$ is mean income in jurisdiction j) from the definition of Y_j^*. The above equation can be rewritten:

$$\ln E_j = \ln A' + \beta(\eta+1)\ln w_j + \gamma(\eta+1)\ln N_j$$
$$+\eta\ln\{t_j^m(1-m_j)\} + \{\delta - \alpha(\eta+1)\}\ln Y_j^m + \alpha(\eta+1)\ln\overline{Y}_j. \qquad \text{(C)}$$

After this, in order to test the median voter hypothesis, we estimate model (A), (B), and (C). The deference among them is shown in Figure 1. Before that, we must estimate the median income as median voter, because we cannot get the data of median income from existing statistics. In the next section, we begin to estimate this.

IV. Estimating Annual Income and Tax Share of Median Voter

In Japan, the data concerning median income (as median voter) is not released explicitly. So we need to estimate it from income distribution. Statistics of income distribution by prefecture are obtained from “Employment Status Survey,” “Housing Survey of Japan,” and “National Survey of Family Income and Expenditure.” These are, however, taken quinquennially, and surveyed independently. Hence we analyze them separately using cross-sectional data in this paper.

We adopt lognormal distribution, a popular specification, as income distribution in Japan.[10] Supposing annual (after-tax) income of a household, Y (omitting

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[10] Previous works on the hypothesis (ex. Romer and Rosenthal (1979)) and on the income distribution Japan have already used this distribution.

indexes), has a lognormal distribution, $\ln Y$ is normally distributed with mean μ and variance σ^2 ($\ln Y \sim N(\mu,\sigma^2)$). In standardizing $z \equiv (\ln Y - \mu)/\sigma$, z is standard normally distributed ($z \sim N(0, 1)$). The cumulative distribution function of z is

$$\varphi = \Phi(z) \equiv \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} \exp(-\frac{t^2}{2})dt .$$

We define the inverse function $z = \Phi^{-1}(\varphi)$, and estimate

$$\Phi^{-1}(\varphi) = \frac{1}{\sigma}\ln Y - \frac{\mu}{\sigma} \tag{10}$$

using these surveys. We can estimate the parameters, μ, σ by prefecture.

$\hat{\mu}$, and $\hat{\sigma}$ respectively denote the OLS estimates of μ, and σ. Median and mean of Y are as follows.

Median income : $Y^m = \exp(\hat{\mu})$, Mean income : $\bar{Y} = \exp(\hat{\mu} + \hat{\sigma}^2/2)$.

The values of these and the ratio of separation between them ($= (\bar{Y} - Y^m)/\bar{Y}$) by prefecture are reported in Table 1.

Table 1 implies that the ratio of separation differ from one prefecture to another, and the difference between maximum and minimum is 5% point and over. In testing the median voter hypothesis, if median income (as median voter) is similarly proportional to mean income in all prefectures, we can substitute the latter for the former. However we can not substitute, because table 1 shows the former is not similarly proportional to the latter.

The income in Table 1 is levied national and municipal taxes and *not* levied prefectural taxes. As Doi (1996) suggests, estimation using simple *pre-tax* income is incorrect. The tax burden is calculated on the condition that all income of the household is earned income, and it consists of the householder earning, an unearning spouse, and dependents under 16 years old.[11] In order to adapt it to above models, a per capita (median or mean) income is derived by estimated income divided by persons per household.

[11] We refer to Ministry of Finance, "Ministry of Finance Statistics Monthly" (various years) for tax rates and various deductions.

V. Estimating These Models

In this section, we estimate models in section III using prefectural data. Except for dependent and independent variables in models, we use the following data as socio-economic characteristics; percentage of population aged 0 to 14 (PC14), percentage of population aged 65 and over (PC65), rate of increase in population (INCPOP), rate of increase in gross prefectural domestic expenditure (at constant prices) (GROWTH), share of gross prefectural domestic expenditure of the primary industry (IND1), share of gross prefectural domestic expenditure of the secondary industry (IND2), rate of change in land price at residential sites (LAND), ratio of high school graduates who advanced to schools of higher grades (ADVANCE), area (AREA), active job openings ratio, and financial capability index (in prefectural finance). We don't report estimates with insignificant coefficients.

Considering the budget process of the local government and the Japanese local tax system, we use the data of the regressand (local expenditure) in *the* year, but that of the regressors (median income, and so on) in the *last* year.[12]

Table 2 shows the results of estimation of model (A)~(C) using the data from the 1984 National Survey of Family Income and Expenditure, the 1989 National Survey of Family Income and Expenditure, the 1992 Employment Status Survey, and the 1993 Housing Survey of Japan. There is no doubt that estimated coefficients differ widely from each other, as median income is estimated using different surveys. However the sets of estimates in Table 2 are close. Therefore it is robust.

First, from estimates of model (A) in Table 2, we obtain the result that each coefficient is significant in 1984 and 1989, but one of $\ln w$ is not significant in 1992 and 1993. Furthermore parameter β, denotes labor share in the production function of local public good, is more than 1 in 1984, 1989, and 1993. In this sense, model (A) is not valid for the demand function of local public goods.

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[12] In Japan, every fiscal years start from March. The budget in the year begin to formulate in Autumn in the last year.

Second, see the result of estimating the model (B). In each year, all coefficients are significant and well-behaved, and the model has good fitness. Thus there is no doubt that we can adopt the model as demand function of local public goods.

Finally, we find that in model (C), there is not a significant coefficient in every year. Especially, the coefficient of $\ln \overline{Y}$ and $\ln w$ characterizing model (C) is not significant. We reject model (C) as demand function of local public goods.

Let us consider the implication of the result obtained in model (A) and (C). Minimizing the cost of production of local public goods is assumed in these models. On the contrary, model (B) is not imposed on it. If provision of the local public goods is not efficient (minimizing the cost), these models may be rejected. Considering the known facts of local governments in Japan, this interpretation is plausible.

The result of model (B) leads to the conclusion that the median voter hypothesis is supported in Japanese prefectural expenditure. Because parameters concerning the median voter are significant and valid economically in model (B). Furthermore this result is robust for it obtains estimation in 1984, 1989, 1992, and 1993, derived from various statistics.

Additionally, we try to test whether the estimation of this model by OLS is correct. we use Hausman (1978) test. The null hypothesis is that the independent variables in the equation are exogenous variables, that is, the least square estimators are BLUEs. From the result shown in Table 3, the null hypothesis cannot be rejected in every year. Therefore it is necessary for us to use the instrumental variable estimation, and so on when we estimate this model.

VI. Superiority of Median Income

Thus we explain the median voter hypothesis holds good in Japanese prefectures. Until now, researchers on local expenditure in Japan have not used median income but mean income (per capita income). We can not yet conclude that median income is more powerful than mean income as an explanation of local spendings. As Mueller (1989) suggests, whether median income is better than mean income in order to explain local expenditures depends on the differences between each other. The separation is shown in Table 1. This implies that estimation using mean income is not appropriate to the test on the hypothesis. To see it in Table 1, however, is not adequate to judge its superiority. Let us test it using the method introduced by Pommerehne and Frey(1976).

Pommerehne and Frey(1976) estimate separately using median and mean income from the same data set (in Switzerland). They appreciate the superiority for the explanation by comparison of fitness and estimates between median and mean. They conclude that the former is superior to the latter as the explanation of local spending, because t-value of the coefficients and coefficient of determinants are almost higher in the model using median income than using mean income.

In this paper, we adopt the method of their test, the estimation using mean income is as follows: in model (B), we substitute mean income ($\bar{Y}$) and its tax share ($\bar{t}$) into median income (Y^m) and its tax share (t^m) respectively. The result on estimation of demand function of local public good is shown in Table 4. This mean income is the one (levied national and municipal taxes) shown in Table 1. [13] From the report in Table 4, the coefficient of $\ln \bar{Y}$ is not significant in 1984, 1989, and 1992, and its t-value is lower than that of $\ln Y^m$ shown in Table 2 (p-value of $\ln \bar{Y}$ is 0.029 and that of $\ln Y^m$ is 0.0021) in 1993.

Furthermore, we directly test whether median income is better than mean income in order to explain local expenditures. We use J test introduced by Davidson and MacKinnon (1981). This specification test is as follows. We first set the hypotheses;

$$H_0: \quad \ln E_j = \ln A_0'' + \gamma_0(\eta_0 + 1)\ln N_j + \eta_0 \ln\{t_j^m(1-m_j)\} + \delta_0 \ln Y_j^m,$$

$$H_1: \quad \ln E_j = \ln A_1'' + \gamma_1(\eta_1 + 1)\ln N_j + \eta_1 \ln\{\bar{t}_j(1-m_j)\} + \delta_1 \ln \bar{Y}_j,$$

$$\text{where} \quad A'' \equiv Aq^{\eta+1}.$$

Suffix 0 or 1 denotes the parameter under the hypothesis 0 or 1. Next, we estimate

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[13] Many previous studies in Japan are often used per capita prefectural income as mean (average) income. In our analysis, however, we use the mean income derived from the same samples (statistics), in order to compare with the result using the median income in section V.

these models (hypotheses). Then we define

$$E0 \equiv \ln \hat{A}_0'' + \hat{\gamma}_0(\hat{\eta}_0 + 1)\ln N_j + \hat{\eta}_0 \ln\{t_j^m(1-m_j)\} + \hat{\delta}_0 \ln Y_j^m,$$

$$E1 \equiv \ln \hat{A}_1'' + \hat{\gamma}_1(\hat{\eta}_1 + 1)\ln N_j + \hat{\eta}_1 \ln\{\bar{t}_j(1-m_j)\} + \hat{\delta}_1 \ln \overline{Y}_j.$$

Overscript ^ denotes the estimator of the parameter. Finally, we estimate for this test

$$\ln E_j = \ln A_0'' + \gamma_0(\eta_0 + 1)\ln N_j + \eta_0 \ln\{t_j^m(1-m_j)\} + \delta_0 \ln Y_j^m + \lambda E1 + \varepsilon_{0j},$$

$$\ln E_j = \ln A_1'' + \gamma_1(\eta_1 + 1)\ln N_j + \eta_1 \ln\{\bar{t}_j(1-m_j)\} + \delta_1 \ln \overline{Y}_j + \omega E0 + \varepsilon_{1j},$$

where ε_0 and ε_1 denote the error terms, and λ and ω denote the parameters. If the hypothesis $\lambda = 0$ is not statistically rejected in the upper equation, H_1 is statistically rejected by H_0. Similarly if the hypothesis $\omega = 0$ is not statistically rejected in the lower equation, H_0 is statistically rejected by H_1. In Table 5, we have t-value of λ or ω, and p-values (probabilities) that it is incorrect that the hypothesis $\lambda = 0$ or $\omega = 0$ is statistically rejected. From the p-values shown in Table 5, the probability of rejecting the mean income's model is higher than the probability of rejecting the median voter's model in every year.

Therefore median income is better than mean income as the regressor of local expenditures in Japan. Incidentally, the coefficient of $\ln \overline{Y}$ is negative in every year.[14]

VII. Conclusion

We show, from what has been said above, that the median voter hypothesis is supported in Japanese prefectures on the assumption that median income identifies median voter. Its interpretation is, however, totally different from a decentralized country like the U.S.. In a decentralized local finance system, the result supporting the hypothesis is interpreted to choose the optimal level of local spending for the median voter in their jurisdiction.

[14] Income elasticity δ becomes negative in this result. This implies that local public good is inferior good.

On the other hand, in a centralized system such as Japan, the result cannot be given the same interpretation as above. In Japan, local governments cannot hardly decide local taxes and expenditure for some purposes freely. It is the central government that substantially controls them. Hence the following explanation is valid under the present institution of politics and public finance. The central government distributes interregional grants to each local government to reflect the result of local elections (preference of median voter in the jurisdiction), even if local governments impose financial constraints. If the central government ignores the local election (and preference of median voter as well), the incumbent governor may not be reelected, and governors (winners) may change every election. There have been, however, many reelected governors several times. Shown in Table 6, the share of governors who have not been reelected for some reason are only about 25% of all governors in Japan. This fact supports the median voter hypothesis.

In the conclusion, we should note the following. We posit in these models that each household-voter is only interested in the quantity of local public good (Total Expenditure). However we have no stylized evidence that this assumption is correct. In order to test the median voter hypothesis, we can use the expenditure for specific purposes (e.g. Ordinary Construction Works Expenditure, Social Welfare Expenditure, and so on). The spending which becomes an issue in an election is not always the same in every jurisdiction. In a cross-section analysis, unless we verify it, a test using the specific spending may be incorrect. When the issue in voting is Ordinary Construction Works Expenditure in one jurisdiction, or Social Welfare Expenditure in another jurisdiction, the test across jurisdictions using Ordinary Construction Works Expenditure is not meaningful. Therefore we can avoid this problem in testing the hypothesis of total expenditures.

Data Sources

E_j : Total Expenditures

H_j : Local Allocation Tax + Local Transfer Taxes

m_j : National Government Disbursements / Total Expenditures

Ministry of Home Affairs, "Annual Statistical Report on Local Government Finance"

N_j : Population

Ministry of Home Affairs, "Basic Resident Registers "

w_j : Average monthly salary of prefectural employees: All occupation

Ministry of Home Affairs, "Survey on Wage of Local Government Employees"

${t^m}_j$: (prefectural taxes paid by median household / persons per median household) / Prefectural Taxes:

Ministry of Finance, "Ministry of Finance Statistics Monthly," and

Ministry of Home Affairs, "Annual Statistical Report on Local Government Finance"

Percentage of population aged 0 to 14, and Percentage of population aged 65 and over:

Statistics Bureau, Management and Coordination Agency, "Monthly Report on Current Population Estimates "

Rate of increase in gross prefectural domestic expenditure (at constant prices),
Share of gross prefectural domestic expenditure of the primary industry, and
Share of gross prefectural domestic expenditure of the secondary industry:

Economic Planning Agency, "Annual Report on Prefectural Accounts"

Rate of change in land price at residential site:

National Land Agency, "Prefectural Land Price Survey"

Active job openings ratio:

Ministry of Labor, "Annual Report on Labor Market"

Ratio of high school graduates who advanced to schools of higher grade:

Ministry of Education, "School Basic Survey"

Area (in 1990):

Statistics Bureau, Management and Coordination Agency, "Population Census"

Financial capability index (in prefectural finance):

Ministry of Home Affairs, “Financial Index Table by Prefecture”

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Figure 1

Models in this paper

Model	Demand Side		Supply Side
	congestion	benefit share	
(A)	**Yes**	**No**	**Yes**
(B)	**Yes**	**No**	**No**
(C)	**Yes**	**Yes**	**Yes**

Table 1
Median and Mean Income by Prefectures

	1984 National Survey of Family Income and Expenditure (all household including one-person household)				1989 National Survey of Family Income and Expenditure (all household including one-person household)			
	Median Income (\10 thousand)	Mean Income (\10 thousand)	Separation (%)	R-square (Adj.)	Median Income (\10 thousand)	Mean Income (\10 thousand)	Separation (%)	R-square (Adj.)
Hokkaido	374.67	417.66	10.29	0.9890	387.92	435.08	10.84	0.9886
Aomori	372.56	419.12	11.11	0.9855	395.67	446.50	11.39	0.9776
Iwate	345.20	395.32	12.68	0.9913	392.71	442.98	11.35	0.9898
Miyagi	400.62	448.37	10.65	0.9802	442.51	500.95	11.67	0.9811
Akita	375.92	423.92	11.32	0.9801	422.84	478.19	11.58	0.9788
Yamagata	396.75	453.01	12.42	0.9768	488.94	552.63	11.53	0.9767
Fukushima	395.47	449.34	11.99	0.9781	443.91	503.13	11.77	0.9766
Ibaraki	415.35	472.48	12.09	0.9817	491.33	560.66	12.37	0.9621
Tochigi	456.35	507.22	10.03	0.9937	480.51	545.53	11.92	0.9618
Gumma	425.36	478.77	11.16	0.9875	450.66	511.58	11.91	0.9868
Saitama	449.99	507.44	11.32	0.9670	511.24	578.54	11.63	0.9836
Chiba	458.38	522.65	12.30	0.9732	490.93	568.52	13.65	0.9636
Tokyo	467.17	527.67	11.46	0.9904	443.52	536.62	17.35	0.9909
Kanagawa	478.79	542.89	11.81	0.9768	492.58	571.95	13.88	0.9759
Niigata	438.42	496.49	11.70	0.9775	462.59	524.33	11.78	0.9692
Toyama	469.00	532.57	11.94	0.9855	510.01	585.77	12.93	0.9453
Ishikawa	461.41	522.69	11.72	0.9723	485.43	551.89	12.04	0.9720
Fukui	476.54	546.67	12.83	0.9815	510.06	589.30	13.45	0.9711
Yamanashi	438.09	484.88	9.65	0.9911	469.49	522.73	10.18	0.9871
Nagano	432.35	482.58	10.41	0.9895	455.89	514.52	11.39	0.9738
Gifu	438.76	489.45	10.36	0.9877	475.12	545.26	12.86	0.9702
Shizuoka	433.34	489.27	11.43	0.9739	496.92	563.19	11.77	0.9832
Aichi	467.84	527.69	11.34	0.9779	475.49	553.61	14.11	0.9719
Mie	435.89	489.52	10.96	0.9815	479.90	558.09	14.01	0.9568
Shiga	467.39	535.87	12.78	0.9613	530.45	600.49	11.66	0.9865
Kyoto	422.07	488.06	13.52	0.9675	434.29	498.98	12.96	0.9587
Osaka	407.38	462.27	11.87	0.9806	439.33	508.98	13.68	0.9853
Hyogo	436.35	492.58	11.42	0.9871	447.34	519.92	13.96	0.9779
Nara	447.08	503.09	11.13	0.9800	501.25	566.15	11.46	0.9816
Wakayama	407.11	460.57	11.61	0.9846	382.00	446.24	14.40	0.9660
Tottori	402.86	462.23	12.84	0.9808	476.88	540.49	11.77	0.9770
Shimane	414.32	476.15	12.99	0.9825	445.72	505.73	11.86	0.9808
Okayama	406.77	463.15	12.17	0.9855	414.20	483.02	14.25	0.9752
Hiroshima	405.56	462.48	12.31	0.9769	418.82	477.51	12.29	0.9709
Yamaguchi	388.14	437.80	11.34	0.9868	410.98	466.31	11.87	0.9588
Tokushima	414.42	479.62	13.59	0.9864	421.38	485.40	13.19	0.9736
Kagawa	400.99	460.57	12.94	0.9873	444.25	500.81	11.29	0.9699
Ehime	364.10	410.81	11.37	0.9906	377.41	430.01	12.23	0.9857
Kochi	349.35	403.03	13.32	0.9942	369.37	433.41	14.78	0.9820
Fukuoka	384.08	438.01	12.31	0.9935	386.30	441.01	12.41	0.9817
Saga	380.71	434.73	12.43	0.9874	414.01	469.53	11.82	0.9781
Nagasaki	330.78	375.93	12.01	0.9834	379.01	423.12	10.43	0.9846
Kumamoto	365.15	408.19	10.54	0.9890	396.28	453.46	12.61	0.9842
Oita	348.19	390.27	10.78	0.9914	382.24	436.88	12.51	0.9819
Miyazaki	312.30	358.16	12.80	0.9962	350.44	400.46	12.49	0.9919
Kagoshima	290.23	324.67	10.61	0.9914	325.38	370.84	12.26	0.9920
Okinawa	278.85	328.25	15.05	0.9948	324.81	380.22	14.57	0.9939

Table 1 (continued)
Median and Mean Income by Prefectures

	1992 Employment Status Survey (all household including one-person household)				1993 Housing Survey of Japan (ordinary household)			
	Median Income (\10 thousand)	Mean Income (\10 thousand)	Separation (%)	R-square (Adj.)	Median Income (\10 thousand)	Mean Income (\10 thousand)	Separation (%)	R-square (Adj.)
Hokkaido	343.26	436.79	21.41	0.9590	333.58	416.81	19.97	0.9699
Aomori	325.80	417.33	21.93	0.9562	304.17	378.94	19.73	0.9721
Iwate	352.16	446.74	21.17	0.9480	326.23	403.20	19.09	0.9685
Miyagi	394.40	514.98	23.42	0.9451	358.83	453.16	20.82	0.9620
Akita	356.90	452.42	21.11	0.9291	331.36	407.01	18.59	0.9669
Yamagata	418.98	535.71	21.79	0.9196	372.26	460.73	19.20	0.9564
Fukushima	393.10	505.51	22.24	0.9402	352.74	440.89	19.99	0.9635
Ibaraki	451.64	584.93	22.79	0.9275	403.93	510.36	20.85	0.9430
Tochigi	425.97	563.04	24.35	0.9168	398.09	504.44	21.08	0.9534
Gumma	411.76	541.83	24.01	0.9332	373.56	475.88	21.50	0.9543
Saitama	505.28	663.03	23.79	0.9197	452.04	574.63	21.33	0.9390
Chiba	493.08	648.98	24.02	0.9343	456.81	588.54	22.38	0.9440
Tokyo	461.78	641.77	28.05	0.9635	417.85	560.57	25.46	0.9686
Kanagawa	491.43	635.04	22.61	0.9631	469.13	608.76	22.94	0.9500
Niigata	421.53	547.21	22.97	0.9177	383.02	478.15	19.89	0.9510
Toyama	473.17	633.88	25.35	0.9077	411.66	519.50	20.76	0.9418
Ishikawa	399.72	549.90	27.31	0.9194	375.85	485.90	22.65	0.9498
Fukui	451.11	628.77	28.26	0.8962	402.60	521.39	22.78	0.9487
Yamanashi	408.26	541.96	24.67	0.9352	356.45	457.57	22.10	0.9514
Nagano	438.13	573.95	23.66	0.9270	377.49	475.28	20.58	0.9477
Gifu	446.58	590.09	24.32	0.9319	397.37	504.87	21.29	0.9492
Shizuoka	468.18	617.75	24.21	0.9403	421.38	533.43	21.00	0.9499
Aichi	465.78	619.09	24.76	0.9440	421.18	545.76	22.83	0.9461
Mie	423.09	571.87	26.02	0.9348	381.20	494.06	22.84	0.9442
Shiga	462.25	609.89	24.21	0.9118	429.55	546.83	21.45	0.9279
Kyoto	381.95	522.06	26.84	0.9368	360.70	480.25	24.89	0.9501
Osaka	404.83	536.80	24.58	0.9470	375.94	490.30	23.32	0.9600
Hyogo	429.58	561.94	23.55	0.9489	397.91	515.30	22.78	0.9539
Nara	432.56	607.78	28.83	0.9196	426.39	565.57	24.61	0.9422
Wakayama	353.97	471.55	24.94	0.9477	316.63	412.80	23.30	0.9637
Tottori	377.83	502.84	24.86	0.9200	343.04	441.28	22.26	0.9558
Shimane	343.12	454.58	24.52	0.9173	333.35	423.50	21.29	0.9575
Okayama	375.42	505.76	25.77	0.9341	351.84	451.77	22.12	0.9495
Hiroshima	390.34	508.16	23.19	0.9494	361.88	466.96	22.50	0.9518
Yamaguchi	347.52	455.49	23.70	0.9353	327.95	415.52	21.07	0.9546
Tokushima	335.77	457.67	26.64	0.9520	297.95	391.97	23.99	0.9637
Kagawa	381.14	511.99	25.56	0.9315	344.57	444.84	22.54	0.9560
Ehime	308.00	401.62	23.31	0.9607	292.94	373.35	21.54	0.9661
Kochi	293.03	389.97	24.86	0.9585	269.21	352.66	23.66	0.9695
Fukuoka	336.01	447.40	24.90	0.9490	323.75	418.76	22.69	0.9623
Saga	365.99	470.86	22.27	0.9407	339.01	424.61	20.16	0.9649
Nagasaki	307.23	402.35	23.64	0.9534	306.01	384.14	20.34	0.9703
Kumamoto	313.49	421.08	25.55	0.9440	305.91	393.16	22.19	0.9689
Oita	302.45	400.28	24.44	0.9488	296.51	378.74	21.71	0.9620
Miyazaki	301.08	393.97	23.58	0.9585	275.52	350.38	21.37	0.9714
Kagoshima	257.39	338.89	24.05	0.9638	242.65	313.13	22.51	0.9732
Okinawa	259.67	340.96	23.84	0.9720	229.94	298.49	22.97	0.9837

Table 2 Estimation of Models using OLS

Dependent Variable : $\ln E$

Year	1984			1989		
Model	(A)	(B)	(C)	(A)	(B)	(C)
Intercept	-12.752	1.577	-13.787	-6.836	0.770	-7.026
	(-1.777)	(0.985)	(-1.965)	(-2.292)	(0.501)	(-2.379)
$\ln w$	1.492		1.567	2.253		2.017
	(2.636)		(2.886)	(3.683)		(3.251)
$\ln N$	0.363	0.260	0.361	0.299	0.248	0.272
	(3.097)	(2.325)	(3.253)	(2.185)	(2.032)	(2.075)
$\ln\{t^m(1-m)\}$	-0.331	-0.500	-0.333	-0.408	-0.489	-0.433
	(-2.960)	(-4.784)	(-3.102)	(-3.163)	(-4.374)	(-3.465)
$\ln Y^m$	0.847	1.200	1.156	1.233	1.110	0.996
	(3.532)	(4.432)	(2.781)	(3.741)	(3.514)	(1.939)
$\ln \overline{Y}$			-0.293			0.450
			(-1.078)			(0.887)
AREA	4.065	4.406	4.000	4.114	4.781	3.754
	(5.852)	(7.842)	(6.104)	(5.734)	(6.897)	(5.017)
IND1						
IND2	-0.012	-0.013	-0.012	-0.010	-0.0092	-0.010
	(-5.123)	(-5.813)	(-5.123)	(5.224)	(-4.129)	(-4.069)
PC14	-0.033		-0.030			
	(-2.499)		(-2.083)			
PC65		0.041		0.045	0.037	0.049
		(3.870)		(-4.064)	(4.324)	(5.595)
ADVANCE		-0.0067				-0.0053
		(-2.925)				(-2.122)
LAND					-0.0037	
					(-2.485)	
INCPOP						
GROWTH	0.013		0.013			
	(2.180)		(2.087)			
NOB	47	47	47	47	47	47
$\overline{R}^2$	0.976	0.972	0.976	0.973	0.969	0.975

the above parentheses indicate the t-values using White's consistent covariance

η	-0.331	-0.500	-0.333	-0.408	-0.489	-0.433
	(0.005)	(0.000)	(0.003)	(0.003)	(0.000)	(0.001)
δ	0.847	1.200	0.862	1.233	1.110	1.446
	(0.001)	(0.000)	(0.028)	(0.001)	(0.001)	(0.569)
γ	0.543	0.520	0.542	0.505	0.486	0.479
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
α			1.734			1.758
			(0.301)			(0.380)
β	2.231		2.352	3.807		3.560
	(0.003)		(0.002)	(0.004)		(0.003)

these parentheses indicate the p-values of the hypothesis: the parameter is equal to zero

Table 2 (continued) Estimation of Models using OLS

Dependent Variable : $\ln E$

Year	1992			1993		
Model	(A)	(B)	(C)	(A)	(B)	(C)
Intercept	1.211	1.968	0.920	-2.108	-0.173	-4.452
	(0.546)	(1.870)	(0.394)	(-0.853)	(-0.085)	(-1.438)
$\ln w$	0.272		0.305	1.042		0.444
	(0.352)		(0.397)	(1.156)		(0.465)
$\ln N$	0.262	0.258	0.264	0.413	0.382	0.306
	(2.799)	(3.016)	(2.746)	(3.634)	(3.044)	(2.663)
$\ln\{t^m(1-m)\}$	-0.443	-0.453	-0.440	-0.358	-0.407	-0.486
	(-4.627)	(-5.677)	(-4.499)	(-3.020)	(-3.395)	(-3.930)
$\ln Y^m$	0.918	0.936	0.853	0.720	1.096	1.074
	(4.087)	(4.614)	(3.318)	(2.405)	(3.294)	(3.704)
$\ln \overline{Y}$			0.103			0.464
			(0.511)			(2.049)
AREA	6.431	6.367	6.459	5.883	4.657	4.530
	(7.966)	(8.240)	(7.885)	(10.920)	(6.822)	(7.424)
IND1						0.043
						(3.796)
IND2	-0.0056	-0.0057	-0.0058		-0.0057	
	(-2.306)	(-2.390)	(-2.297)		(-2.072)	
PC14						
PC65	0.033	0.033	0.034	0.070	0.056	0.054
	(6.670)	(6.871)	(6.851)	(5.128)	(5.082)	(5.443)
ADVANCE						
LAND	-0.014	-0.013	-0.014	-0.037		
	(-2.513)	(-2.475)	(-2.272)	(-2.042)		
INCPOP	-0.128	-0.132	-0.131			
	(-4.101)	(-4.748)	(-3.991)			
GROWTH						
NOB	47	47	47	47	47	47
$\overline{R}^2$	0.977	0.977	0.976	0.967	0.967	0.971

the above parentheses indicate the t-values using White's consistent covariance

η	-0.443	-0.453	-0.440	-0.358	-0.407	-0.486
	(0.000)	(0.000)	(0.000)	(0.004)	(0.001)	(0.000)
δ	0.918	0.936	0.956	0.720	1.096	1.538
	(0.000)	(0.000)	(0.055)	(0.021)	(0.002)	(0.057)
γ	0.470	0.472	0.472	0.644	0.644	0.595
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
α			1.523			2.089
			(0.607)			(0.117)
β	0.488		0.545	1.624		0.863
	(0.716)		(0.681)	(0.196)		(0.622)

these parentheses indicate the p-values of the hypothesis: the parameter is equal to zero

Table 3 Specification Test
(Hausman Test)

Null Hypothesis:
independent variables are exogenous.

Year	Statistics	p-value
1984	0.613	0.736
1989	1.290	0.525
1992	2.402	0.301
1993	0.014	0.907

Table 4
Demand Functions of Local Public Goods Using Mean Income
(OLS)
Dependent Variable : $\ln E$

Year	1984	1989	1992	1993
Intercept	5.457	8.320	8.516	8.080
	(4.387)	(7.271)	(10.038)	(8.476)
$\ln N$	0.314	0.708	0.717	0.773
	(2.257)	(15.323)	(19.222)	(16.595)
$\ln\{\bar{t}(1-m)\}$	-0.456	0.442	0.499	0.430
	(-3.250)	(3.891)	(4.057)	(3.333)
$\ln \overline{Y}$	0.170	-0.258	-0.335	-0.419
	(1.105)	(-1.076)	(-1.727)	(-2.265)
AREA	4.334	5.137	5.198	4.045
	(6.252)	(6.664)	(7.322)	(4.744)
IND2	-0.014	-0.012	-0.013	-0.011
	(-4.560)	(-4.362)	(-4.257)	(-3.447)
PC65	0.052	0.023	0.029	0.035
	(4.071)	(2.518)	(4.903)	(3.504)
ADVANCE	-0.0087			
	(-3.048)			
LAND		-0.0041		
		(-2.785)		
NOB	47	47	47	47
$\overline{R}^2$	0.964	0.968	0.967	0.961
η	-0.456	0.442	0.499	0.430
	(-3.250)	(3.891)	(4.057)	(3.333)
δ	0.170	-0.258	-0.335	-0.419
	(1.105)	(-1.076)	(-1.727)	(-2.265)
γ	0.578	0.490	0.478	0.541

Figures in parentheses indicate the t-values using White's consistent covariance

Table 5 Specification Test
(J Test)

	t-value	
	Hypothesis:	
Year	$\lambda=0$	$\omega=0$
1984	-0.032	3.240
	(0.975)	(0.003)
1989	0.988	1.593
	(0.329)	(0.119)
1992	1.488	4.909
	(0.145)	(0.000)
1993	2.752	3.981
	(0.009)	(0.000)

p-values are in parentheses.

Table 6
The Number of Times of Gubernatorial Reelection Until June, 1994

	One	Two	Three	Four	Five	Six	Seven	Eight	Total
Hokkaido			4						4
Aomori		1	1	2					4
Iwate	1	2		2					5
Miyagi	6	2			1				9
Akita	2			1		1			4
Yamagata	1	1			2				4
Fukushima	1	3	1	1					6
Ibaraki	1		1	1	1				4
Tochigi	1	1	2	1					5
Gumma	3	1		2					6
Saitama	2	1		1	1				5
Chiba	2	1	2	1					6
Tokyo		1	1	1					3
Kanagawa		1		1	1				3
Niigata	2	4		1					7
Toyama	1	1	1	2					5
Ishikawa		2						1	3
Fukui	1	3			1				5
Yamanashi	2		2	1					5
Nagano			1	1		1			3
Gifu		2	3						5
Shizuoka	2	2	1	1					6
Aichi	1	1	1			1			4
Mie		1			1	1			3
Shiga	1	3	2						6
Kyoto	1	1	1				1		4
Osaka	1	1	2	1					5
Hyogo		4		1					5
Nara	2	1						1	4
Wakayama			1		2				3
Tottori	1	1	2	1					5
Shimane	2	2	2						6
Okayama	1	1		1		1			4
Hiroshima	2	1	3	1					7
Yamaguchi		2		1	1				4
Tokushima	3		2	1					6
Kagawa	1	1	1			1			4
Ehime	1	1		1	1				4
Kochi	2	1		1	1				5
Fukuoka	1	2	1	1					5
Saga	2	1	1		1				5
Nagasaki	1	1	2	1					5
Kumamoto	1	1	3						5
Oita		2		2					4
Miyazaki	3			1		1			5
Kagoshima		2	3						5
Okinawa	2	1	1						4
Total	57	61	48	34	14	7	1	2	224
Share	25.45	27.23	21.43	15.18	6.25	3.13	0.45	0.89	

Data Source: "Successive Governors in Japan"