Institute of Social Science

Discussion Paper Series No. F-72

New Evidence on the Median Voter Hypothesis in Japan

Takero DOI*

August 1998

*Research Associate, Institute of Social Science, University of Tokyo,
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan. E-mail: tdoi@iss.u-tokyo.ac.jp

I wish to thank Toshihiro Ihori for helpful suggestions. I am also grateful for the comments of two anonymous referees. Any remaining errors are mine.

New Evidence on the Median Voter Hypothesis in Japan

Takero DOI

Abstract

This paper provides an additional test of the median voter hypothesis in Japanese prefectures. We investigate relation between the preference of the median voter and the elected governor. We use data on the preference of the median voter in Doi (1998) that comprehensively studies the hypothesis in Japanese prefectural finance. We estimate a probit model, that is, relation between the probability of reelection and degree of difference between actual level of expenditure and required level of the median voter. We obtain the result that the smaller the difference between actual level of expenditure and the (estimated) level desired by the median voter is, the higher the probability of reelection for the incumbent governors is. It supports the following interpretation proposed in Doi (1998). In centralized local system such as Japan, the result and the hypothesis mean that the median voter affects the gubernatorial election, the elected governor petitions the central government as a agent of the median voter, and 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, Gubernatorial Elections, Probit Model

JEL classification: H72, D72

I. Introduction

Doi (1998) tests the median voter hypothesis in Japanese prefectural finance. However we cannot obtain official data on the median (voter's) income in Japan. Therefore the data by prefecture is constructed in the paper. Using this, Doi (1998) estimates the demand functions of local public goods in order to test the hypothesis, and obtains the result that the median voter hypothesis is supported by prefectural finance. Moreover Doi (1998) shows that the median (voter's) income is more suitable to explain prefectural expenditure than the mean income.

Doi (1998) proposes a following interpretation from this result. In the Japanese centralized system, each local government may formally determine its expenditures, but the central government can control revenues of local governments.[1] 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 reflects their preference for prefectural expenditures. Doi (1998) only refers the above interpretation but doesn't provide a direct test of this interpretation.

Now we try to check whether or not this interpretation is valid in this paper. We must investigate relation between the preference of the median voter and the elected governor. So we provide its test using data on gubernatorial elections and the preference of the median voter. We use data on the preference of the median voter in Doi (1998). Thus this paper has relevance to Doi (1998).

The plan of this paper is as follows. In Section II, we introduce the test results in Doi (1998). Section III explains an estimation in order to examine relation between the preference of the median voter and the elected governor, and reports the result. Section IV concludes the paper.

II. Test of the Median Voter Hypothesis in Japanese Prefectures

Doi (1998) constructs models conformed to Japanese local finance system in order to test the median voter hypothesis. Before the test, Doi (1998) estimates data on the median (voter's) income using data in 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.

A model based on Bergstrom and Goodman (1973) deals with demand side only and derives a demand function of local public goods from the household utility maximization. A model in Doi (1998) is as follows.[2]

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

where E_j is expenditure for the provision of local public goods, N_j is population in jurisdiction j, Y_j^m is after-tax income of the median voter in jurisdiction j, t_j^m is tax share of the median voter in jurisdiction j, and m_j is the ratio of the matching grants (National Government Disbursements) that it gets total expenditures. Also η is its elasticity of tax price (supposing constant), δ is its elasticity of income (supposing constant), γ is its congestion parameter ($\gamma = 0$ when it is purely public, and $\gamma = 1$ when it is purely private), and A" is a constant.

Table 1 shows the results of estimating model (C). Except for dependent and independent variables in models, Doi (1998) uses the following data as socio-economic characteristics; the percentage of population aged 0 to 14 (PC14), the percentage of population aged 65 and over (PC65), the rate of increase in population (INCPOP), the rate of increase in gross prefectural domestic expenditure (at constant prices) (GROWTH), the share of gross prefectural domestic expenditure of the primary industry (IND1), the share of gross prefectural domestic expenditure of the secondary industry (IND2), the rate of change in land price at residential sites (LAND), the ratio of high school graduates who advanced to schools of higher grades (ADVANCE), the area (AREA), the active job openings ratio (JOB), and the financial capability index (in prefectural finance).

---

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

[2] See Doi (1998) for further details.

The result in Table 1 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 (C). Furthermore this result is robust for it obtains estimation in 1984, 1989, 1992, and 1993, derived from various statistics.

Furthermore Doi (1998) directly tests whether median income is better than mean income in order to explain local expenditures with J test introduced by Davidson and MacKinnon (1981), and concludes that median income is more powerful than mean income as an explanation of local spending. Hence these results mean that the median voter hypothesis is supported in Japanese prefectures.

III. Preference of Median Voter and Probability of Reelection

We find that the median voter affects the level of prefectural expenditure in Japan. Why the median voter hypothesis is held in Japanese prefectures? In a centralized local system such as Japan, the central government can control local expenditures with ignoring voter's preference. If the central government does so, however, 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.

These are descriptively supported by Reed (1986). Reed (1986) concludes that Japanese local governments have less authority than in federal states but more authority than in other unitary states from case studies. Moreover Reed (1986) indicates that Japanese central bureaucrats find it extremely difficult to deal with citizens' movements that take up local problems, and governors and mayors tend to emerge in conflicts between the central government and citizens' movements (p.61).

We, however, have never confirmed relation between the median voter (or his preference) and the governor (or gubernatorial election). If the governor requests to the central government with reflecting preference of the median voter, the probability of reelection for the incumbent governors raises as the difference

between actual level of expenditure and the level required by the median voter becomes closer. We must test the relation econometrically.

Probit model is suitable for this test. We consider the following probit model:

$$\Pr(REELE_j = 1) = \Phi(const. + \beta_1 RES_j + \sum_i \beta_i \text{other variables})$$

$$\text{where} \quad REELE_j = \begin{cases} 1 & \textit{if the incumbent is reelected} \\ 0 & \textit{if the incumbent is not reelected} \end{cases},$$

RES_j = |(actual value of $\log(E_j)$) - (fitted value of $\log(E_j)$)| in model (C).

β_i: the coefficient of explanatory variable i

We take RES_j as absolute value of the difference between actual and fitted values of $\log(E_j)$ in model (C) of Section II. Because fitted value of $\log(E_j)$ means theoretical level reflected the preference of the median voter, and absolute value of the difference between them means degree of difference between expenditure level preferred by the median voter and actual level.

We must obtain adequate data on gubernatorial elections and the governor not reelected in them after the year when those surveys are examined. We show the data on gubernatorial elections and the governor reelected or not in Table 2. In the election that the incumbent doesn't stand as a candidate, if the candidate who is supported by the same parties that support the incumbent wins the election, such an election is classified into the election that the incumbent is reelected (R). It is difficult to obtain enough data on the governor not reelected, but it is data on elections in 1994 and 1995 after examining the 1993 Housing Survey of Japan that are suitable for our test. Samples of the governor not reelected are sufficient in the years.[3] Thus we make $REELE_j$ based on 1994 and 1995 elections and RES_j based on the estimation of Model (C) in 1993 reported in Table 1.

We estimate the probit model using those data. The result is reported in Table 3. We try to estimate including socio-economic characteristics and the number of

[3] The 1993 Housing Survey of Japan was examined in October 1993. Almost all gubernatorial election in 1993 had been held until October. We exclude elections in 1993 from observations in the test.

candidate in the election (CAND) as other variables. Especially, we use the rate of increase in gross prefectural domestic expenditure (at constant prices) (GROWTH) and active job openings ratio (JOB), associated with studies on political business cycle, as other variables.[4] But their coefficients are not significant. Then we omit those variables. As shown in column (I) of Table 3, the coefficient of RES_j is significantly negative. It means that the smaller the difference between actual level of expenditure and the (estimated) level desired by the median voter is, the higher the probability of reelection for the incumbent governors is. Thus we confirm the above-mentioned relation econometrically.

IV. Conclusion

We analyze relation between the preference of the median voter and the gubernatorial election. We use data on the preference of the median voter in Doi (1998). We estimate a probit model, that is, relation between the probability of reelection and degree of difference between actual level of expenditure and required level of expenditure of the median voter. We obtain the result that the probability of reelection for the incumbent governors increases as the difference between actual level of expenditure and the (estimated) level desired by the median voter decreases. It means that the median voter affects the gubernatorial election.

We consider connection between the result and the median voter hypothesis. In centralized local system such as Japan, both mean that the median voter affects the gubernatorial election, the elected governor petitions the central government as a agent of the median voter, and the central government manages local expenditures through interregional grants to reflect the preference of the median voter in its jurisdiction. It supports the interpretation proposed in Reed (1986) and Doi (1998). In other words, the median voter hypothesis is held in Japanese prefectures because there are many reelected governors several times.

---

[4] JOB is a proxy of the unemployment rate because we cannot obtain it by prefecture in each

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 "

t^m_j : prefectural taxes paid by median household / Prefectural Taxes:

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

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

The percentage of population aged 0 to 14, and The percentage of population aged 65 and over:

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

The rate of increase in gross prefectural domestic expenditure (at constant prices), The share of gross prefectural domestic expenditure of the primary industry, and The share of gross prefectural domestic expenditure of the secondary industry:

Economic Planning Agency, "Annual Report on Prefectural Accounts"

The rate of change in land price at residential site:

National Land Agency, "Prefectural Land Price Survey"

The active job openings ratio:

Ministry of Labor, "Annual Report on Labor Market"

The ratio of high school graduates who advanced to schools of higher grade:

Ministry of Education, "School Basic Survey"

The area (in 1990):

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

---

year.

The financial capability index (in prefectural finance):

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

References

Bergstrom, T.C. and R.P. Goodman, 1973, Private demands for public goods, *American Economic Review* 63, 280-296.

Davidson, R. and J.G. MacKinnon, 1981, Several tests for model specification in the presence of alternative hypotheses, *Econometrica* 49, 781-793.

Doi, T., 1998, Empirics of the median voter hypothesis in Japan, *Institute of Social Science Discussion Paper Series* No. F-69, University of Tokyo.

Reed, S.R., 1986, *Japanese Prefecture and Policymaking*, University of Pittsburgh Press.

Shibata, T. ed., 1993, *Japan's Public Sector: How the Government Is Financed*, University of Tokyo Press.

Table 1 Estimation of Models using OLS

Dependent Variable : $\ln E$

Year	1984	1989	1992	1993
Model	(C)	(C)	(C)	(C)
Intercept	1.577	0.770	1.968	-0.173
	(0.985)	(0.501)	(1.870)	(-0.085)
$\ln w$				
$\ln N$	0.260	0.248	0.258	0.382
	(2.325)	(2.032)	(3.016)	(3.044)
$\ln\{t^m(1-m)\}$	-0.500	-0.489	-0.453	-0.407
	(-4.784)	(-4.374)	(-5.677)	(-3.395)
$\ln Y^m$	1.200	1.110	0.936	1.096
	(4.432)	(3.514)	(4.614)	(3.294)
$\ln \overline{Y}$				
AREA	4.406	4.781	6.367	4.657
	(7.842)	(6.897)	(8.240)	(6.822)
IND1				
IND2	-0.013	-0.0092	-0.0057	-0.0057
	(-5.813)	(-4.129)	(-2.390)	(-2.072)
PC14				
PC65	0.041	0.037	0.033	0.056
	(3.870)	(4.324)	(6.871)	(5.082)
ADVANCE	-0.0067			
	(-2.925)			
LAND		-0.0037	-0.013	
		(-2.485)	(-2.475)	
INCPOP			-0.132	
			(-4.748)	
GROWTH				
NOB	47	47	47	47
$\overline{R}^2$	0.972	0.969	0.977	0.967

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

h	-0.500	-0.489	-0.453	-0.407
	(0.000)	(0.000)	(0.000)	(0.001)
d	1.200	1.110	0.936	1.096
	(0.000)	(0.001)	(0.000)	(0.002)
g	0.520	0.486	0.472	0.644
	(0.000)	(0.001)	(0.000)	(0.000)
a				
b				

These parentheses indicate the p-values of the hypothesis: the parameter is equal to zero.
Source: Doi(1998)

Table 2

Gubernatorial Election

Prefecture	1989	1990	1991	1992	1993	1994	1995
Hokkaido			R				R
Aomori			R				N
Iwate			R				N
Miyagi	N				R,N		
Akita			R				R
Yamagata	R				N		
Fukushima				R			
Ibaraki			R		N		
Tochigi				R			
Gumma			R				R
Saitama				N			
Chiba	R				R		
Tokyo			R				N
Kanagawa			R				R
Niigata	R			R			
Toyama				R			
Ishikawa			R			R	
Fukui			R				R
Yamanashi			N				R
Nagano				R			
Gifu	R				R		
Shizuoka		R			R		
Aichi			R				R
Mie				R			N
Shiga		R				R	
Kyoto		R				R	
Osaka			R				N
Hyogo		R				R	
Nara			R				R
Wakayama			R				R
Tottori			R				R
Shimane			R				R
Okayama				R			
Hiroshima	R				R		
Yamaguchi				R			
Tokushima	R				R		
Kagawa		R				R	
Ehime		R					R
Kochi			N				R
Fukuoka			R				R
Saga			R				R
Nagasaki		R				R	
Kumamoto			R				R
Oita			R				R
Miyazaki			R				R
Kagoshima	R				R		
Okinawa		R				R	
Number of election	8	8	23	9	10	7	23
Number of reelection	7	8	21	8	7	7	18

R: The Gubernatorial Election was held and the incumbant was reelected in the year.
N: The Gubernatorial Election was held and the incumbant was not reelected in the year.
Blank: The Gubernatorial Election was not held in the year.
Data Source: National Association of Prefectural Election Management Commission, "Senkyo (Election)," Various issues.

Table 3

Probit Estimates, 1993

Dependent Variable: Pr($REELE_j$=1)

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Intercept	1.904	4.677	2.045	1.618	5.816	5.175	1.829	9.202
	(3.574)	(2.659)	(3.094)	(1.397)	(2.220)	(1.941)	(1.398)	(1.410)
RES	-14.439	-12.195	-16.498	-13.749	-14.488	-12.798	-15.966	-16.762
	(-2.383)	(-1.570)	(-2.259)	(-2.116)	(-1.582)	(-1.567)	(-2.055)	(-1.615)
CAND		-0.787			-1.035	-0.823		-1.490
		(-1.969)			(-1.702)	(-1.892)		(-1.385)
GROWTH			0.432		0.513		0.431	0.656
			(1.546)		(1.414)		(1.542)	(1.383)
JOB				0.361		-0.491	0.264	-2.007
				(0.272)		(-0.265)	(0.187)	(-0.659)
Log likelihood	-10.144	-7.289	-8.561	-10.106	-5.980	-7.253	-8.543	-5.734

The above parentheses indicate the t-values.
5% Critical Values: t(25)=2.060, t(26)=2.056, t(27)=2.052, t(28)=2.048

Sample	All	REELE=1	REELE=0
NOB	30	25	5
Mean of RES	0.050	0.039	0.112
Mean of CAND	3.300	2.960	5.000
Mean of GROWTH	0.499	0.695	-0.483
Mean of JOB	0.721	0.747	0.592