# Economics of Politics Lec. 6: Political Economy of Fiscal Federalism

#### Hideki Konishi

Graduate School of Economics, Waseda University

Spring semester, 2012

### Centralization versus Decentralization I

- There is a pile of literature in economics at least dating back to Tiebout (1956) about the debate over the relative efficiency of federalism in the provision of public goods.
- Samuelson (1954) first formulated the problem of optimal provision of public goods and derived the well-known *Samulelson* condition, which states that the sum of the marginal benefits all over the households in the economy should be equal to the marginal costs of provision.
- O However, the households' marginal benefits are private information. In some cases, so are the marginal costs. How can government collect such information?
- Samuelson's seminal work gave birth to two strands of new research. One is called the *mechanism design*. In this field, researchers analyze whether or not it is possible to construct a system or an institution that induces people to voluntarily tell their true preferences to the (central) government, provides public goods at the efficient levels, and gives government necessary and sufficient financial resources.

# <sup>•</sup> Centralization versus Decentralization II

- The other strand is pioneered by Tiebout (1956), who insisted that most of public goods are provided by local governments (called *local public goods*), not by central government as formulated in Samuelson's original framework.
- Examples of local public goods are education, police, residential environment, water supply, etc., which mostly or exclusively benefit residents in each region.
- Tiebout considered a framework of fiscal federalism, called voting with one's feet, in which citizens chooses communities to live in and local governments compete for residents as private firms do for customers in the market economy.

Iebout argued that through competition across local governments,

- Segregation of citizens. Citizens with the same preferences for public goods construct their own communities, and citizens with different preferences live in different communities.
- *Efficient provision of public goods*. Local public goods are provided efficiently, with the social marginal benefits being equalized to the social marginal costs in each community.

- Tiebout's story is like consumers who are selecting favorite restaurants, walking along a gourmet street and taking a look at the menus shown at their entrances.
  - Restaurants compete for customers by showing attractive dishes at prices as reasonable as possible. In equilibrium, those who like Chinese foods choose a Chinese restaurant, those who want Korean foods settle in a Korean restaurant, and so on, which is segregation by preferences.
- Intuitively, citizens reveal private information about their preferences by choosing residential places, and competition leads local governments to provide public goods efficiently.
- As Bewley(1981) pointed out, for the validity of Tiebout's hypotheses, there must hold many stringent or unrealistic conditions, such as
  - Citizens pay no cost for changing their communities to live in.
  - Citizens' working places are separated from their living places.
  - No economies of scale in the provision of public goods.
  - Local governments are utility-takes, i.e., they maximize *net tax revenues*, taking citizens' reservation utilities as given.
  - The number of communities are at least as many as the varieties of citizens' preferences.

#### Success and Failure of Tiebout's hypothesis I

- Consider a society with n homogeneous citizens. Each has a utility function, u(x, g), where x is consumption of private goods and g is that of public goods. Each has w units of private goods as initial endowments.
- Ohere are two regions, 1 and 2. Region i provides gi units of public goods and imposes taxes by ti units of private goods to provide public goods.
- The cost of pubic goods provision is c<sub>i</sub> = c(g, n<sub>i</sub>), where n<sub>i</sub> is the population in region i. Of course, c(g, n<sub>i</sub>) is convex in (g, n<sub>i</sub>).
- We assume that public goods provision exhibits economies of scale. That is, the per capital cost, c<sub>i</sub>/n<sub>i</sub>, is U-shaped for any given g<sub>i</sub>.
- In what follows, subscripts attached to functions mean partial derivatives like u<sub>x</sub> = ∂u/∂x, c<sub>g</sub> = ∂c/∂g, etc.
- Public goods that can be supplied exclusively to a group of people are often called *local public goods* or *club goods*. As compared to pure public goods, whose consumption is non-rival and non-excludable, the consumption of club goods is non-rival but excludable.

 Given n<sub>i</sub>, the optimal provision of public goods in region i is obtained by maximizing a representative resident's utility,

$$u_i = u\left(w - \frac{c(g, n_i)}{n_i}, g\right).$$

From  $\partial u_i/\partial g = 0$ , the foc is obtained as

$$n_i \frac{u_g}{u_x} = c_g,$$

which exactly means Samuelson condition.

- Only Note that u<sub>g</sub>/u<sub>x</sub> is the marginal rate of substitution between public and private goods, meaning the marginal benefits of public goods measured in terms of private goods.
- Let g(n<sub>i</sub>) be the optimal level of public goods provision when the population is n<sub>i</sub>, and v(n<sub>i</sub>) be the associated utility of a representative resident in region i, i.e.

$$v(n_i) = u\left(w - \frac{c(g(n_i), n_i)}{n_i}, g(n_i)\right).$$

### Success and Failure of Tiebout's hypothesis III

Examine how v(n<sub>i</sub>) changes in response to a change in n<sub>i</sub> and derive the condition that the optimal population should satisfy. By differentiation, because of the envelope theorem,

$$v'(n_i) = \frac{u_x}{n_i} \left(\frac{c}{n_i} - c_n\right),$$

which means that region i's representative citizen has his utility maximized when the population is the level at which the per capita cost of public goods provision is minimized.

A simple example. Let u(x, g) = x + b(g) and c(g, n<sub>i</sub>) = ĉ(n<sub>i</sub>)g, where ĉ(n<sub>i</sub>)/n<sub>i</sub> is U-shaped with its minimum achieved at n<sub>i</sub> = n\*. n\* is the population that satisfies ĉ'(n\*) = ĉ(n\*)/n\*. Given, n<sub>i</sub>, a representative citizen's utility in region i is maximized when g<sub>i</sub> = g(n<sub>i</sub>) such that n<sub>i</sub>b'(g<sub>i</sub>) = ĉ(n<sub>i</sub>). With this level of public goods, his utility is v(n<sub>i</sub>) = b(g(n<sub>i</sub>)) - ĉ(n<sub>i</sub>)g(n<sub>i</sub>).

Then, since

$$v'(n_i) = \frac{g(n_i)}{n_i} \left( \hat{c}'(n_i) - \frac{\hat{c}(n_i)}{n_i} \right),$$

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### Success and Failure of Tiebout's hypothesis IV

- Let us examine if citizens' residential choice leads to efficient provision of public goods.
- **②** Note that  $v(n_i)$  is reverse U-shaped with its peak being achieved at  $n_i = n^*$ .
- O The game proceeds as follows.
  - Citizens decide which region to live in.
  - Given the population, public goods are provided in each region to maximize its representative citizen's utility.
- Focus on the subgame-perfect Nash equilbirium.
- Oppending on the shape of v(n<sub>i</sub>) and the size of n\* relative to n, there occur many patterns of equilibrium, some of which are efficient and some are not.
- In some cases, there occur multiple equilibria, in which efficient equilibria may be unstable.

# Oates' Decentralization Theorem 1

- Tiebout's theory of voting with one's feet addresses a *positive* aspect of fiscal federalism, i.e. whether or not competition among local governments leads to efficient provision of public goods.
- Oates (1972) considered, on the other hand, a *normative* aspect of fiscal federalism, regarding how the authorities in policy making should be allocated between central and local governments, in other words, when policy making should be decentralized, from the point of social welfare.
- Oates' argument is now known as the *decentralization theorem* in the literature of fiscal federalism.
  - Unlike Tiebout's hypothesis, the decentralization theorem does not consider competition across local governments.
  - Nor does it assume the presence of economies of scale in public goods provision.
  - Instead, it assumes that governments, central or local, are motivated to maximize the welfare of citizens living within their jurisdictions, i.e., the regions under their own control.
  - And, it focuses on the trade off in inefficiencies related inherently to policy making under centralization and decentralization.

- The decentralization theorem assumes that local governments are well-informed about the policy preferences of local citizens and therefore
  - local governments choose policies that are in the best interests of citizens within their jurisdictions.
- O However, some of their policies give benefits or damages to citizens living outside their jurisdictions. Some local policies have spillover effects, and
  - local governments fail to internalize the spillover effects in their policy making.
- In contrast, the decentralization theorem assumes that the central government faces asymmetric information about local preferences and as a result,
  - central government can only choose policies that are uniform across regions and thus do not necessarily match respective local needs.
- However, because its jurisdiction is nation-wide, central government is motivated to take account of the spillover effects in policy making, that is,
  - central government can internalize the spillover effects across regions in its policy making.

- When allocating authorities of policy making between central and local governments, the trade off in inefficiencies coming from uniform policy making under centralization and from neglected spillover effects under decentralization should be taken into account.
- O The decentralization provides the following quite useful policy implications.
  - Local government should hold authority over policies with small spillover effects across regions but with large differences in local needs.
  - Central government should hold authority over policies with large spillover effects across regions but with small differences in local needs.
- A question arise; why can't central government know local preferences?
  - It is costly to collect information of local citizens' preferences. But there seems no convincing reason why central government fail to collect the same amount of information as local governments do by spending the same amount of resources.
  - If there is no technological gap in information collection between central and local governments, what explains the difference?

- An answer to the question is in the government's *incentives*. Even with the same technologies of information collection being available, central government has a different incentive for it than local governments do.
- ② Central government is less motivated to collect information about local needs tan local governments. Why?
- Such a difference may come from the fact that they want to cater to different types of voters, owing to the difference in the electoral system that they belong to.
- Seabright (1996) first analyzed this issue, applying the framework of incomplete contracts to policy making.

## Seabright's model

- There are n homogeneous regions. n is odd. A politician appointed in region i chooses a effort level e<sub>i</sub> for policy administration there, at the cost of c(e<sub>i</sub>).
- Oppending on the effort level, a stochastic policy outcome y<sub>i</sub> is realized such that y<sub>i</sub> = e<sub>i</sub> + ˜e<sub>i</sub>, where e<sub>i</sub> is deterministic and e<sub>i</sub> is stochastic.
- Under centralization, a politician holds control over all regions. Under decentralization, a different politician is appointed and chooses an effort level in each region.
- An election will be held in each region at the same time after voters observe policy outcomes. It is assumed that voters cannot observe effort levels directly but can only policy outcomes.
- Politicians want to get reelected. Under decentralization, each local politician will be reelected if he wins the local election. Under centralization, the central politician will be reelected if he wins the majority of local elections.

- Suppose that in each local election voters take a retrospective voting strategy, by which they will vote for the incumbent if only if y<sub>i</sub> ≥ ȳ. We assume for simplicity that ȳ is fixed and common across regions.
- **2** Given  $e_i$ , the probability that the incumbent wins election in region i is

$$p_i = p(e_i) := \mathsf{Prob}(\varepsilon_i \ge \overline{y} - e_i) = 1 - F(\overline{y} - e_i),$$

where  $F(\cdot)$  is the CDF of  $\varepsilon_i$ .

 Without discounting, the expected payoff to the politician in region i is p(ei)r - c(ei),

where r > 0 is the ego rent from holding office in a local government.

 The payoff maximization gives the 1st order condition holding in equilibrium,

 $p'(e_i)r = c'(e_i)$  for all *i*.

We assume that the 2nd order condition is satisfied.

- Suppose n = 3 and votes take the same retrospective voting strategy as under decentralization.
- **②** Then, the probability that the central politician gets reelected is given by  $P(e_1, e_2, e_3) = p(e_1)p(e_2)p(e_3) + \sum_{i \neq i \neq k} p(e_i)p(e_j)[1 - p(e_k)],$

and the expected payoff to the central politician is

$$P(e_1, e_2, e_3)R - c(e_1) - c(e_2) - c(e_3),$$

where R > 0 is the ego rent from holding office in central government.

 The payoff maximization gives the 1st order condition holding in equilibrium,

$$R\{p(e_j)[1-p(e_k)] + [1-p(e_j)]p(e_k)\} p'(e_i) = c'(e_i) \text{ for all } i$$

We assume that the 2nd order condition is satisfied.

- Compare the equilibrium conditions between decentralization and centralization. There are two differences.
- In the ego rents may differ between decentralization and centralization.
  - If R < r, decentralization always induces larger effort in every region than under centralization, because  $p(e_j)[1 p(e_k)] + [1 p(e_j)]p(e_k) \le 1$ .
  - Nonetheless,  $R \ge r$  may seem reasonable.
- **()** The term,  $p(e_j)[1 p(e_k)] + [1 p(e_j)]p(e_k)$ , is the probability that region *i* is *pivotal* in the incumbent's reelection.
  - The incumbent has an incentive to implement larger effort in a region as it is more likely to be pivotal.
  - Conversely, if the incumbent wins elections in region 2 and 3, then he will have no incentive to make effort in region 1.

- **()** From these considerations, we will obtain following policy implications.
- Policies for which making effort is likely to guarantee electoral victory in each region should be decentralized.
  - Central government will implement no effort or differentiate effort across regions for such polices, because a high probability of victory in a region reduced effort incentives in another.
  - Central government has a tendency to target the provision of public services to some limited number of regions.
- Policies for which making effort is not likely to guarantee electoral victory in each region should be centralized.
  - Local governments have no incentive to implement effort for such policies, because .
  - Central government may have an incentive to do so in every region since it has a sound probability of being pivotal in its reelection.

- Two symmetric regions, 1 and 2,
- 2 Two effort levels,  $e_H$  and  $e_L$ , with  $e_H > e_L$ .
- **③** Probability of winning election in each region with effort  $e_t$ :

$$p_t = \mathsf{Prob}(e_t + \varepsilon \ge \overline{y}), \ t = H, L, \ \text{with} \ p_H > p_L.$$

• Define 
$$\Delta c = c(e_H) - c(e_L) > 0.$$

**(**) Under decentralization,  $e_H$  is chosen in both regions if and only if

$$r(p_H - p_L) \ge \Delta c.$$

Otherwise,  $e_L$  is chosen in both regions.



- Under centralization, suppose that the government is reelected if it wins election at least in one of the two regions. Then, we have following observations.
- 2  $e_H$  is chosen in both regions if and only if

 $R(1-p_H)(p_H-p_L) \ge \Delta c.$ 

 $\bullet$   $e_H$  is chosen in one region and  $e_L$  is in the other if and only if

 $R(1-p_H)(p_H-p_L) < \Delta c \text{ and } R(1-p_L)(p_H-p_L) \ge \Delta c.$ 

•  $e_L$  is chosen in both regions if and only if

$$R(1-p_L)(p_H-p_L) < \Delta c.$$

### A simple two-region model of the incomplete contract approach 4

• Suppose  $\frac{R-r}{R} > \frac{\Delta c}{r}$ . The picture below explains the pattern of effort choice under centralization, comparing it to one under decentralization.



# Yardstick competition among local governments 2

- Otters in each region can compare the policy outcome realized in their own region with those in the others when determining whether or not to vote for the incumbent.
  - For example, voters in region i voter for the incumbent if and only if the policy outcome in region i, y<sub>i</sub>, is larger than the one in region j, y
    <sub>j</sub>.
- Onder decentralization, if voters' decision depends on relative performance evaluation, there occurs competition across local governments through the spillover of information, which is in a sharp contrast to Tiebout's story of voting with one's feet.
- Generally, yardstick competition refers to competitive environment produced by comparison of outcomes between agents who originally do not engage in competition.
- An example is the regulation of locally-monopolistic public utilities such as electric power companies and gas companies. When government gives rewards to them based on relative performance evaluation, they are involved into yardstick competition.

- Ocontinue the model with two regions, i = 1, 2. Voters in region i vote for the incumbent if and only if y<sub>i</sub> ≥ y<sub>j</sub>, i.e., e<sub>i</sub> − e<sub>j</sub> ≥ ε<sub>j</sub> − ε<sub>i</sub>.
- 2 The probability of the incumbent's victory in region i is

$$p_i(e_i, e_j) = \mathsf{Prob}(e_i - e_j \ge \varepsilon_j - \varepsilon_i).$$

**9** Under decentralization, the incumbent in region *i* chooses  $e_i$  to maximize  $p_i(e_i, e_j)r - c(e_i)$ , yielding the first order condition,

$$\frac{\partial p_i(e_i, e_j)}{\partial e_i} r = c'(e_i).$$

 Suppose that ε<sub>i</sub> and ε<sub>j</sub> follow a normal distribution with mean 0 and variance σ<sup>2</sup>. Then, owing the recursive property of a normal distribution, ε<sub>j</sub> − ε<sub>i</sub> also follows a normal distribution whose mean is 0 and variance is ν<sup>2</sup> = Var(ε<sub>j</sub> − ε<sub>i</sub>) = 2σ<sup>2</sup> − 2Cov(ε<sub>j</sub>, ε<sub>i</sub>) = 2σ<sup>2</sup>(1 − ρ),

where  $\rho \in [0,1]$  is the correlation coefficient.

Under the assumption of normal distributions,

$$p_i(e_i, e_j) = \int_{-\infty}^{e_i - e_j} f(x) dx, \quad f(x) = \frac{1}{\sqrt{2\pi\nu^2}} \exp\left[-\frac{x^2}{2\nu^2}\right].$$

**2** Assume that equilibrium is symmetric, i.e.,  $e_i = e_j = e^*$ . Then, the equilibrium condition is  $f(0)r = c'(e^*)$ , which is reduced to

$$\frac{r}{2\sigma\sqrt{\pi(1-\rho)}} = c'(e^*).$$

Thus, the incumbent has a greater incentive for effort as the variance is smaller and the correlation is larger.