Economics of Politics
Lec.3: Buying public policy with private money

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Special interest groups

- What are special interest groups (hereafter, SIGs for short)?
  - People or organizations who share policy preferences form an SIG.
  - The interests on which SIGs are formed have wide varieties, e.g.,
    - industrial interests: doctors, farmers, big companies, etc.
    - regional interests: rural residents, city residents, etc.
    - generational interests: old generations, etc.
    - other interests: gun lovers, consumer, taxpayers, gays, races, etc.
- What do special interest groups do in politics?
  - Exercise power to influence policy choices, using bribes, campaign contributions, vote mobilization, demonstration, etc.
  - Transmit information about the economy, the effects of policies, and their own views to the government or to the public.
  - SIG's political actions taken to affect policy choice are often called "lobbying."

Formation of a SIG

- How can special interest groups collect members and keep them taking collective actions?
- No satisfactory model has been invented in the literature.
- Olson's (1965) seminal analysis
  - The outcome of collective action is public good, the benefit of which can be enjoyed by those who did not participate (non-excludability).
  - Taking collective actions incurs costs to participants, and thus they want to free ride on other member's actions.
  - Providing "selective incentives" may be helpful.
- Repeated-game point of view
  - Recall the folk theorem in repeated games.
  - If members have a long-term relationship with each other and one's defection is easy to detect, then their cooperation may be induced.
  - It is difficult to form an effective SIG with too many members or with members who change frequently, e.g., consumers, city residents.

Issues considered in this lecture

- We will specifically focus on the SIGs' political influences on policy choices through giving money to government (political contributions) and the consequences.
- Do SIGs' political contributions lead to government failure?
  - If they do, under what conditions?
  - If they don't, under what conditions?
- To describe competition across SIGs with conflicting policy preferences, we will use the common agency model of special interest politics, pioneered by Grossman and Helpman (1994).

Common agency

- The common agency game, invented by Bernheim and Whinston (1985), is now quite often used to analyze policy choices in special interest politics.
- This is a variant of principal-agent relationship, where many special interest groups are principals and government (or a politician in office) is their common agent.
  - The principals are supposed to have conflicting interests over the actions taken by the agent.
  - The agent may also have his own preferences over his actions.
  - The principals compete to induce the agent to act in their favor by tailoring a reward schedule.
- Common agency model takes no uncertainties into account, in contrast to the usual principal-agent model, which assume that the principal can observe only the outcome of the agent's unobservable effort.

The general model of common-agency special interest politics

- Government chooses a policy, $\boldsymbol{p} = (p_1, p_2, \cdots, p_K)$ from a policy space $\mathcal{P} \subset \Re^K$.
- There are n SIGs, each of which consists of homogeneous members. A representative member of SIG i has a money-measured utility function $U_i(\boldsymbol{p}) - c_i$, where $U_i(\cdot)$ is strictly concave and c_i is the money that SIG i gives to government.
- Government has a utility function, $U_g(\boldsymbol{p}) + \theta \sum_{i=1}^{n} c_i$, where $U_g(\cdot)$ expesses its own preferences over policy and θ is the weight on the money it receives from SIGs.
    - The money can be interpreted as bribes or as campaign contributions.
    - $\theta > 1$ is assumed, the reason of which will become clear later.

Timing of the game

1. SIGs simultaneously choose and commit themselves to contribution schedules, $c_i = r_i(\boldsymbol{p})$ for SIG $i = 1, 2, \cdots, n$.
   - The contribution schedule is an implicit promise of each SGI, saying that SGI i will pay $r_i(\boldsymbol{p})$ to government when it implements $\boldsymbol{p}$.
   - SGI's strategy is not an amount of money but a function that specifies the amount of money conditional on each possible choice of policy.
   - Let $\mathcal{R}$ be the set of contribution functions that each SIG can offer. Of course, $c_i(\cdot) \geq 0$ for all $\boldsymbol{p} \in \mathcal{P}$. Legal constraints may restrict the set $\mathcal{R}$ as well.
2. Given SGIs' contribution schedules, government chooses a policy $\boldsymbol{p} \in \mathcal{P}$ to maximize $U_g(\boldsymbol{p}) + \theta \sum_{i=1}^{n} r_i(\boldsymbol{p})$.

Solve for SPNE 1

- We will use the concept of subgame-perfect Nash equilibrium (SPNE for short) and solve the game backward.
- Given a combination of contribution schedules, $\boldsymbol{r} = (r_1, r_2, \cdots, r_n)$, government chooses a policy $\boldsymbol{p} \in \mathcal{P}$ to maximize

$$U_g(\boldsymbol{p}) + \theta \sum_{i=1}^{n} r_i(\boldsymbol{p}).$$

- Let us denote the government's choice by $\boldsymbol{p}(\boldsymbol{r})$. Then, it must be an element of $\mathcal{P}(\boldsymbol{r})$. That is,

$$\boldsymbol{p}(\boldsymbol{r}) \in \mathcal{P}(\boldsymbol{r}) \equiv \arg\max_{\boldsymbol{p} \in \mathcal{P}} \; U_g(\boldsymbol{p}) + \theta \sum_{i=1}^{n} r_i(\boldsymbol{p}).$$

  - Because multiple $\boldsymbol{p}$'s may maximize government's utility, the set of such solutions is denoted by $\mathcal{P}(\boldsymbol{r})$.

Solve for SPNE 2

- At the first stage, SIG i anticipates that government chooses $\boldsymbol{p}(r_i, \boldsymbol{r}_{-i})$ at the second stage when it offers r_i and the others $\boldsymbol{r}_{-i}$.
- Expecting what the rival SIGs will offer and taking account of government's best responses, SIG i chooses $\boldsymbol{p}$ and r_i to maximize

$$U_i(\boldsymbol{p}) - r_i(\boldsymbol{p}) \text{ s.t. } \boldsymbol{p} \in \mathcal{P}(r_i, \boldsymbol{r}_{-i}).$$

- Let $\boldsymbol{r}^* = (r_1^*, r_2^*, \cdots, r_n^*)$ be offered and $\boldsymbol{p}^*$ be accordingly chosen in a SPNE. Then, the necessary and sufficient condition is that

$$U_i(\boldsymbol{p}^*) - r_i^*(\boldsymbol{p}^*) \geq U_i(\boldsymbol{p}) - r_i(\boldsymbol{p})$$
$$\text{for all } \boldsymbol{p} \in \mathcal{P}(r_i, \boldsymbol{r}^*_{-i}) \text{ and } r_i \in \mathcal{R}.$$

holds for all $i = 1, 2, 3, \cdots, n$.

Example 1-1

- Government is now considering which policy to implement, Y or N. That is, $p \in \mathcal{P} = \{Y, N\}$.
- There are three SIGs, $i = 1, 2, 3$. Their money-measured utilities are shown in the following table.

p	SIG1	SIG2	SIG3	Surplus
Y	$100 - c_{Y1}$	$30 - c_{Y2}$	$150 - c_{Y3}$	280
N	$80 - c_{N1}$	$70 - c_{N2}$	$120 - c_{N3}$	270

  c_{pi} is the amount of money that SIG i promises to pay when p is chosen.

- Suppose that government is interested only in money, i.e., $U_g(\cdot) = 0$.
- SIG i's contribution function is expressed as $r_i = (c_{Yi}, c_{Ni})$. We will assume that the only restriction on r_i is $c_{p_i} \geq 0$ for all p.

Example 1-2

- Government's best response is

$$\mathcal{P}(r_1, r_2, r_3) = \begin{cases} \{\, Y \,\} & \text{if } \sum_{i=1}^{3} c_{Yi} > \sum_{i=1}^{3} c_{Ni} \\ \{\, Y,\ N \,\} & \text{if } \sum_{i=1}^{3} c_{Yi} = \sum_{i=1}^{3} c_{Ni} \\ \{\, N \,\} & \text{if } \sum_{i=1}^{3} c_{Yi} < \sum_{i=1}^{3} c_{Ni} \end{cases}$$

- Let $r_i^* = (c_{Yi}^*, c_{Ni}^*)$ and p^* be the outcome of a SPNE and denote the difference in contributions by $\Delta c_i^* = c_{Yi}^* - c_{Ni}^*$.
- The following properties are found.

1. $\sum_{i=1}^{3} \Delta c_i^* = 0$
   - Suppose $\sum_{i=1}^{3} c_{Yi}^* > \sum_{i=1}^{3} c_{Ni}^*$. Then, $c_{Yi}^* > c_{Ni}^*$ should hold for some i. Marginally reducing c_{Yi}^* raises SIG i's utility without changing policy choice. The same reasoning applies when $\sum_{i=1}^{3} c_{Yi}^* < \sum_{i=1}^{3} c_{Ni}^*$

Example 1-3

2. Both $c^*_{Yi} > 0$ and $c^*_{Ni} > 0$ do not hold. Why?
3. If $p^* = Y$, then

$$100 - c^*_{Y1} \geq 80 - c^*_{N1} \ (\leftrightarrow \Delta c^*_1 \leq 20),$$

$$30 - c^*_{Y2} \geq 70 - c^*_{N2}, \ (\leftrightarrow \Delta c^*_2 \leq -40)$$

$$150 - c^*_{Y3} \geq 120 - c^*_{N3} \ (\leftrightarrow \Delta c^*_3 \leq 30).$$

4. Combining the above conditions characterizes an equilibrium outcome with $p^* = Y$, in which contribution functions satisfy $c^*_{Y1} \leq 20$, $c^*_{N1} = 0$, $c^*_{Y2} = 0$, $c^*_{N2} \geq 40$, $c^*_{Y3} \leq 30$, and $c^*_{N3} = 0$.

- Applying the same technique, we can show that no equilibrium exists with $p^* = N$.
- We can generalize the result of the example: in SPNE, only the policy that maximizes the surplus will be realized. In this example, policy Y yields surplus equal to 280, while N does 270.

Characterization and Refinement of SPNE 1

- As shown before, a SPNE outcome, (p^*, r^*), is characterized by

$$\boldsymbol{p}^* \in \mathcal{P}(\boldsymbol{r}^*) \equiv \arg\max_{\boldsymbol{p}\in\mathcal{P}} \; U_g(\boldsymbol{p}) + \theta \sum_{i=1}^{n} r_i^*(\boldsymbol{p}) \text{ and}$$

$$U_i(\boldsymbol{p}^*) - r_i^*(\boldsymbol{p}^*) \geq U_i(\boldsymbol{p}) - r_i(\boldsymbol{p}) \text{ for all } \boldsymbol{p} \in \mathcal{P}(r_i, \boldsymbol{r}_{-i}^*) \text{ and } r_i \in \mathcal{R}.$$

- To be more specific, suppose SIG i offers $r_i(\boldsymbol{p}) = 0$ for all $\boldsymbol{p}$, which is a severest punishment that it can impose on the government.
- Let the government's choice be $\boldsymbol{p}_{-i}^*$ and its utility be

$$U_{-i} \equiv U_g(\boldsymbol{p}_{-i}^*) + \sum_{j\neq i} r_j^*(\boldsymbol{p}_{-i}^*).$$

- Then SGI i can induce the government to choose any policy $\boldsymbol{p}$ by giving money c_i as long as they guarantee the reservation utility, i.e.,

$$U_g(\boldsymbol{p}) + c_i + \theta \sum_{j\neq i} r_j^*(\boldsymbol{p}) \geq U_{-i}.$$

Characterization and Refinement of SPNE 2

- Thus, $\boldsymbol{p}^*$ must be the policy that maximizes SIG i's utility, $U_i(\boldsymbol{p}) - c_i$ subject to $U_g(\boldsymbol{p}) + c_i + \theta \sum_{j \neq i} r_j^*(\boldsymbol{p}) \geq U_{-i}$, for all i.
- $\boldsymbol{p}^*$ and r^* are characterized such that for all $i = 1, 2, \cdots, n$,

$$\boldsymbol{p}^* \in \arg\max_{\boldsymbol{p} \in \mathcal{P}} U_g(\boldsymbol{p}) + U_i(\boldsymbol{p}) + \theta \sum_{j \neq i} r_j^*(\boldsymbol{p}) \text{ and}$$

$$U_g(\boldsymbol{p}^*) + \sum_{i=1}^{n} r_i^*(\boldsymbol{p}^*) = \max_{\boldsymbol{p} \in \mathcal{P}} U_g(\boldsymbol{p}) + \theta \sum_{j \neq i} r_j^*(\boldsymbol{p}).$$

- Diagrammatic exposition and remarks
  1. Infinitely many contribution functions for each SIG can sustain the choice of $\boldsymbol{p}^*$.
  2. They are truthful, i.e., representing marginal increases in payoffs, only locally around $\boldsymbol{p}^*$.
  3. Because of such degree of freedom in the choice of contribution functions, even equilibrium policies are not unique (multiple SPNEs).

Example 2-1

- In the previous example, only Y is realized in the SPNE, but there are many r^*'s that sustain the equilibrium.

p	SIG1	SIG2	SIG3	Surplus
Y	$100 - c_{Y1}$	$30 - c_{Y2}$	$150 - c_{Y3}$	280
N	$80 - c_{N1}$	$70 - c_{N2}$	$120 - c_{N3}$	270

- For example,
  - $r_1^* = (20, 0)$, $r_2^* = (0, 50)$, $r_3^* = (30, 0)$
  - $r_1^* = (20, 0)$, $r_2^* = (0, 40)$, $r_3^* = (20, 0)$
  - $r_1^* = (10, 0)$, $r_2^* = (0, 40)$, $r_3^* = (30, 0)$
- The surplus-maximizing property of lobbying in the previous example is limited to the case when the # of policy alternatives is only two.
- With more than two policy alternatives, the surplus-maximizing policy need not be implemented in a SPNE.

Example 2-2

- Consider an example with three policy alternatives and two SIGs.

p	SIG1	SIG2	Surplus
T	$90 - c_{T1}$	$90 - c_{T2}$	180
M	$70 - c_{M1}$	$100 - c_{M2}$	170
B	$80 - c_{B1}$	$80 - c_{B2}$	160

- There exists a SPNE that achieves T. For example,
  - $r_1^* = (10, 0, 0)$ and $r_2^* = (0, 10, 0)$
  - $r_1^* = (20, 0, 0)$ and $r_2^* = (0, 20, 0)$
- There also exists a SPNE that achieves M. For example,
  - $r_1^* = (0, 0, 20)$ and $r_2^* = (0, 20, 0)$

Refinement: the compensating equilibrium

- Given multiple equilibria, which one is more plausible?
- Bernheim and Whinston (1985) proposes a concept of *compensating* (or *truthful*) equilibrium, in which SIGs are supposed to use only *compensating* contribution functions.
- Definition of a compensating contribution function: Let v_i be a fixed level of SIG i's utility (net of contributions). Then, its contribution function is compensating if it satisfies

$$r_i(\boldsymbol{p}) = \max\{U_i(\boldsymbol{p}) - v_i,\ 0\} = \begin{cases} U_i(\boldsymbol{p}) - v_i & \text{if } U_i(\boldsymbol{p}) > v_i \\ 0 & \text{otherwise.} \end{cases}$$

- The compensating contribution function offers the amount of SIG i's willingness to pay, relative to $\overline{v}_i$, for the government's choosing $\boldsymbol{p}$.
- In a compensating equilibrium, since the functional form of a contribution schedule cannot be changed, only $\boldsymbol{p}^*$ and the distribution of SIGs' payoffs, $v_1^*, v_2^*, \cdots, v_n^*$ are determined.

Example 3

- In Example 2-1, the followings are part of a compensating SPNE.
  - $r_1^* = (20, 0)$, $r_2^* = (0, 40)$, $r_3^* = (20, 0)$
  - $r_1^* = (10, 0)$, $r_2^* = (0, 40)$, $r_3^* = (30, 0)$
- In Example 2-2, only
  - $r_1^* = (10, 0, 0)$ and $r_2^* = (0, 10, 0)$

  can constitute a compensating SPNE.
- These examples suggest that in a compensating SPNE,
  - only the surplus-maximizing policy is implemented (Example 2-2), but
  - the distribution of SIGs' payoffs is not uniquely determined (Example 2-1).

Justification for the concept of compensating equilibrium

- Why is it plausible to restrict contribution functions to those which are compensating?
- Bernheim and Whinston (1985) pointed out three reasons;
  1. It is simply defined, using utility functions.
  2. It is always in each SIG's set of best responses.
  3. A compensating equilibrium is *coalition-proof*.
- A Nash equilibrium is *coalition-proof* if no sustainable coalition of any players cannot Pareto-improve the equilibrium payoffs of its members.
  - This (roughly) means that a compensating equilibrium induces no unilateral deviation by a single SIG or group deviation by a coalition of some SIGs.

Policy choice and payoff distribution in compensating equilibria

- In a compensating equilibrium, $\boldsymbol{p}^*$ is uniquely determined to maximize the joint utility across the government and SIGs, i.e.,

$$\boldsymbol{p}^* \in \arg\max_{\boldsymbol{p}\in\mathcal{P}} U_g(\boldsymbol{p}) + \theta \sum_{i=1}^{n} U_i(\boldsymbol{p}).$$

  - Proof: Let v_i^* be the equilibrium payoff to SIG i. Then, from government's optimization,

$$\begin{aligned} U_g(\boldsymbol{p}^*) \ &+\theta \sum \max\{U_i(\boldsymbol{p}^*) - u_i^*, 0\} \\ &\geq U_g(\boldsymbol{p}) + \theta \sum \max\{U_i(\boldsymbol{p}) - u_i^*, 0\}, \text{ for all } \boldsymbol{p} \in \mathcal{P}. \end{aligned}$$

    Because $c_i^* \geq 0$, $\max\{U_i(\boldsymbol{p}^*) - u_i^*, 0\} \geq U_i(\boldsymbol{p}^*) - u_i^*$. By definition, $\max\{U_i(\boldsymbol{p}) - u_i^*, 0\} \geq U_i(\boldsymbol{p}) - u_i^*$. Then, it follows that

$$U_g(\boldsymbol{p}^*) + \theta \sum_{i=1}^{n} U_i(\boldsymbol{p}^*) \geq U_g(\boldsymbol{p}) + \theta \sum_{i=1}^{n} U_i(\boldsymbol{p}), \text{ for all } \boldsymbol{p} \in \mathcal{P}.$$

- However, the equilibrium payoff distribution is not unique in general.