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Lobbying Game between the Government with Private Information and the Lobbyist

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This paper presents an examination of a lobbying game between a government with informational superiority and a special interest group (SIG), which is a lobbyist. This informational superiority of the government allows the application of an analytical method of ordinary contract theory in this game. Results of these analyses show that, for a SIG whose population is sufficiently small, although the government has informational superiority to the SIG, the government is unable to prevent the SIG from distorting policy excessively by endowing a political contribution to the government. However, for a SIG whose population is sufficiently large, the government's informational superiority can stanch the SIG inducement of a larger policy by endowing a political contribution to the government. In this case, government disclosure is not always socially desirable.

KEYWORDS: lobby, informational superiority, political contribution, information rent

1. Introduction

Money is essential for politics. We can consider several reasons for this. The first is that politicians or political parties need money to win electoral competitions by addressing policies of the voters that support them. The second reason is that some costs are incurred by politicians to study what policies benefit voters. These costs are essential for running a representative democracy efficiently; voters cannot help accepting these costs. If politicians cannot procure funds to meet these costs, politicians are not willing to research public opinion for agenda setting. This may lead to lower welfare among voters compared with cost absorbance. Therefore, government procurement is essential to implement politics for voters. Subsidies are provided from nations to political parties and both individual and firms are approved to endow political contributions to political parties.

Nevertheless, such political contributions by specific firms or individuals cause adhesion between politicians and those firms or individuals. In fact, many politicians have been arrested for receiving illegal contributions. In a representative democracy, politicians are a small minority of the citizenry. To bribe this minority of politicians makes it easier to induce desirable policies for specific firms. Moreover, aside from serving the benevolent interests for voters, politicians generally desire political contributions as their private benefits. Accordingly, the input of money to politics causes a trade off effects: a welfare-increasing effect by reflecting public opinion and a welfare decreasing effect by inducing inefficient policies by adhesion among politicians and firms.

Although politicians desire private benefits from contributions, if they ignore public opinion too much, they may lose the next electoral competition and thereby lose office. For that reason, politicians must determine a policy that reflects public opinion and revenues of the contribution. Such a balance of the contribution and the reflection of public opinion is a very important problem of new political economics.

As a recent notable outcome of theoretical analysis, we note the work of Grossman and Helpman (2001) and Persson and Tabellini (2000). Especially, Grossman and Helpman (2001) analyzed a lobbying game with informational and monetary lobbying in detail, but they did not analyze a lobbying game with informational superiority of the government. Regarding information acquisition of the government or lobby, we note Laffont and Zantman (2002), Bennedsen (2000), and Bennedsen and Feldmann (2000). Laffont and Zantman (2002) analyzed the information acquisition of political parties in an electoral competition and Bennedsen and Feldmann (2000) analyzed a lobbying game in which the lobbyist does informational and monetary lobbying to the government, which has authority to decide policy that changes its benefit with the state of the world.

In this paper, we analyze a situation in which government acquires information of public opinion and in which a special interest group (SIG), acting as a lobbyist, attempts to induce their desired policy from such a government. This SIG does not know the information that the government has acquired: it is a case of informational superiority of the government. In this paper, we consider this information of public opinion as indicating the citizens' bliss point to the level of public works. To determine the level of public works and to know public opinion, the government often must investigate citizens' demand for public infrastructure and acquire information related to citizens' incomes. Information acquisition is an important government task. However, this information that the government investigates is not always disclosed because the disclosure of these informations might involve invasion of citizens' privacy or, sometimes, there is no requirement of disclosure to citizens or others. Viewed in this context, situations of governments' informational superiority are not unusual. Regarding informational superiority of the government, we can apply an analytical method for ordinary contract theory to such a lobbying game. If this superiority can prevent the SIG from inducing a larger policy, we think that excessive disclosure by government is not always desirable.

In these motivations, we analyze as follows. First, as a benchmark, we analyze a situation in which the contribution is infeasible and for which no informational difference exists between government and the SIG. From this benchmark, in Sections 2 and 3, we address the basic policy making mechanism through political contributions from the SIG to the government.

In the following Section 4, we discuss a case of a government's informational superiority, namely, asymmetric information. In this section, we obtain four patterns of equilibria according to the population of the SIG and the valuation of the government to contribution. The first is an equilibrium in which the SIG can induce equilibrium in complete information. In this case, a government's informational superiority does not affect the result. The second one is a separate equilibrium in which the government gains no information rent. The third one is a separate equilibrium in which the government gains some information rent. The last one is a pooling equilibrium. Especially, in the separating equilibrium with some and no information rent, the government's informational superiority is advantageous for the government; then policy induced by the SIG decreases. Therefore, in this case, the government's disclosure is not socially undesirable.

Finally, we summarize the discussion in concluding remarks.

2. The Model

The economy comprises citizens whose population is $1-\beta$ and a special interest group (SIG) whose population is β. The SIG is the lobbyist and we consider the SIG as the firm or individuals relate to public works.[1] In this economy, the government determines the level of public works as a one dimensional policy. The level of benefit of the SIG from this policy differs from that of the citizens. Therefore, the objectives of these two groups are different; these two groups are heterogeneous.

Citizens have a bliss point regarding policy p. We define this as θ. This bliss point is private information of the citizens. Here, we can interpret this θ as public opinion. Now, the utility of members of the citizenry U_c is defined as

$$U_c = -(\theta - p)^2.$$

In the ex-ante stage, we assume that all players have uncertainty about the value of θ $(=\{\underline{\theta}, \bar{\theta}\})$. Furthermore, the probability that each θ occurs is equivalent: $\mathrm{Prob}(\theta = \bar{\theta}) = \frac{1}{2}$. Moreover, we suppose that this distribution is common knowledge for all players.

The SIG can induce his desirable policy by the payment of a political contribution to the government. This contribution is designed as a schedule of contributions that is contingent on the level of feasible policy.

We call this schedule *contribution schedule*. The SIG prefers higher p; we define the following linear function as the SIG's utility U_l

$$U_l = U(p) - c = ap - c.$$

In this equation, c denotes a political contribution from the SIG to the government and a (>0) does SIG's marginal utility for policy. Accordingly, the utility of a SIG member is $\frac{ap-c}{\beta}$.[2]

Finally, the government can acquire information regarding citizens' bliss point by absorbing the information acquisition cost k. We assume that government obtains utility comprising the sum of citizens' utility and the SIG's benefit from policy (we call this summation "public benefit"), the government's self-valuation of the contribution, and the information acquisition cost. We can interpret public benefit as social welfare. Consequently, we define the government's objective function U_g as

$$U_g = (ap - (1-\beta)(\theta - p)^2) + \lambda c - k.$$

Here, λ denotes the government's marginal valuation of the contribution and is assumed $\lambda \geq 0$. So, the higher λ is, the more easily the government is affected by the SIG.

3. Benchmark (A Case of Complete Information)

In this section, we consider that the government's acquired information becomes public information. Accordingly,

[1] We presume these public works as the construction of large-scale public infrastructure. These public works derive large profit to the firms that are related to these works. Consequently, collusion is common among these firms, politicians and bureaucrats.

[2] The SIG and the citizen consist of homogeneous individuals in each group; decision-making of the whole of a group is equivalent to that of a member of the group. Moreover, we consider the SIG's benefit ap to be a monetary one. This benefit denotes the SIG's increased profit from being chosen to benefit by public works. In such a case, this benefit is divided among the SIG members.

the SIG also has information that the government has acquired.

3.1 Contribution is infeasible

Here, we analyze a case in which the SIG cannot give a political contribution to the government. Thereupon, the government maximizes public benefit in its own district because it cannot obtain a contribution from the SIG. Therefore, the maximization problem of the government is as follows.

$$\max_p (ap - (1-\beta)(\theta - p)^2) - k$$

Solving this problem, we obtain the following first condition to p,

$$p^* = \frac{a}{2(1-\beta)} + \theta \equiv P^*(\theta). \tag{1}$$

It is obvious that p^* is higher than the citizens' bliss point θ. Even though the SIG cannot send a contribution to the government and even though policy is not distorted by monetary factors, the government infers that the SIG prefers higher p. Furthermore, from the perspective of social welfare, government determines a p that is higher than the citizens' desirable level.

Moreover, this equilibrium policy level increases with the SIG's population β and the citizens' bliss point θ. The increase of population of the SIG β means the decrease one of citizen. The social benefit in this district depends on populations of each group. Therefore, the increase of SIG's population implies an increase in the proportion of the SIG's utility for public benefit in this district. In that situation, even though a contribution is infeasible, the larger β is, the stronger the incentive for government to implement a policy that the SIG prefers. Moreover, the increase of θ implies that a citizen wants more public works; then it is intuitive that government will decide to increase such spending.

Next, we express the government's utility in this equilibrium: in the case of $p = p^*$ and $c = 0$, as U_g^*.

3.2 Contribution is feasible

In this situation, the political contribution is feasible: the SIG has an incentive to give a political contribution to the government to induce the SIG's desired policy from the government. Then the SIG must design a contribution schedule contingent to the implemented policy to induce its desired policy. The distortion of the policy by the political contribution implies that the implemented policy is distant from the citizens' bliss point and that it decreases the public benefit.

Therefore, the SIG must design a contribution schedule such that it compensates the loss in government's utility caused by this distortion that decreases public benefit.[3]

Here, we are able to obtain the equilibrium that the SIG wants to induce by solving the following maximization problem that the SIG faces.

$$\max_{p,c} \frac{1}{\beta}(ap - c) \quad \text{subject to} \quad (ap - (1-\beta)(\theta - p)^2) + \lambda c - k = U_g^* \tag{2}$$

Let us consider the meaning of this constraint. When the government rejects the SIG's contribution, it will implement p^* and obtain U_g^*. In order to induce the government to accept the contribution, the SIG must guarantee the government U_g^*. We can interpret this constraint as a participation constraint of the government or threat point of the government in bargaining game between the SIG and government.

Solving this problem, we can obtain the equilibrium policy and the contribution. First, from the first order condition, the equilibrium policy satisfies the following equation.

$$\hat{p} = \frac{1+\lambda}{2(1-\beta)} a + \theta \equiv \hat{p}(\theta) \quad (> p^*(\theta)) \tag{3}$$

When the contribution is feasible, the equilibrium policy $\hat{p}$ is larger than p^*. The degree of this distortion increases with the government's marginal valuation of the contribution λ. In addition, this equilibrium policy $\hat{p}$ increases with β and θ.

Next, as for the equilibrium contribution $\hat{c}$,

$$\hat{c} = \frac{\lambda a^2}{4(1-\beta)}. \tag{4}$$

[3] In this paper, the government faces a choice. It may accept the contribution from the SIG or it may reject it. In other words, the SIG offers a take-it-or-leave-it offer to the government. Therefore, the SIG has the sole ability to bargain. However, in the setting of this paper, the government also has some or all bargaining power. The equilibrium policy is not affected by any allocation of these bargaining powers because it is sufficient for the SIG to maximize its utility by raising the equilibrium contribution along with the increase in the government's bargaining power without changing the policy it wants to induce. For detailed analysis of bargaining power between a government and a SIG in these lobbying games, see Grossman and Helpman (2001).

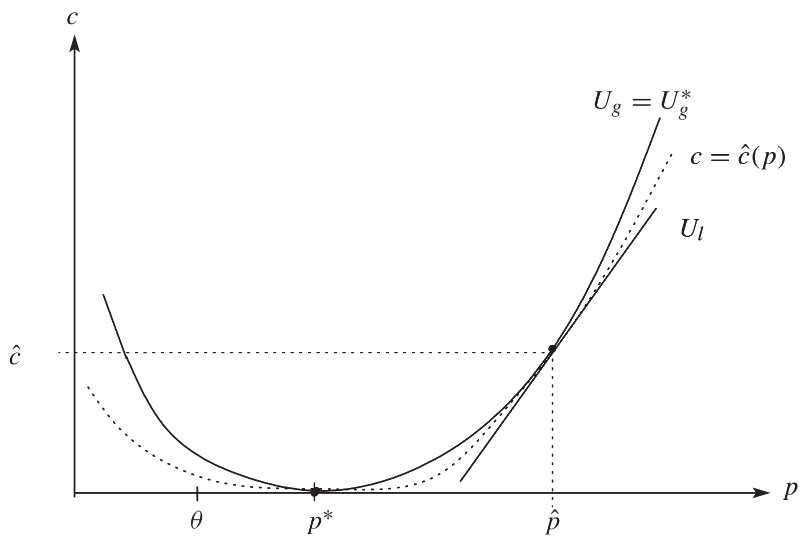

Fig. 1.

This $\hat{c}$ increases with the population of SIG β. When the SIG's population increases, a SIG member can induce the same level of policy through granting a lower contribution. Two factors explain why an increased SIG population can make an equilibrium policy larger. The first that rising β increases the proportion of a SIG's utility as a component of public benefit: the government comes to view the SIG's utility more importantly because the government considers it to represent public opinion more and more. We call this effect a "direct effect". The second is that, because rising β engenders the decrease in the contribution per capita for a SIG member, the contribution is less costly for a SIG member. Therefore the SIG can induce a larger policy without increasing the contribution. We call this an "indirect effect".

In addition, this equilibrium contribution increases with λ. This is an intuitive inference. Under a higher contribution, because the government has higher valuation to the contribution, the government is an easy opponent to bribe for the SIG.

Moreover, note that, in the case of $\beta = 0$ and $\beta = 1$, this equilibrium contribution equals zero. When $\beta = 0$, it is natural that nobody gives a contribution to the government because no SIG exists in this economy. Furthermore, when $\beta = 1$, the SIG can induce its desired policy without any contribution because all individuals in this economy belong to the SIG and public benefit consists only of the SIG's utility. However, we must be careful that there is no contribution when $\beta = 0$ or $\beta = 1$ differs from the equilibrium contribution when β is brought close to 0 or 1 in Eq. (4).[4]

Now, we reconsider these arguments using Fig. 1.

The curve in Fig. 1 denotes an indifference curve of the government that is congruent with the government's utility level when contribution is infeasible because this curve passes $(p, c) = (p^*, 0)$; the line denotes SIG's indifferent curve. Moreover, curve $c = \hat{c}(p)$ denotes the contribution schedule that the SIG offers to the government.

Accordingly, the equilibrium that the SIG can induce locates on the domain on or above this indifference curve. We call this domain the "feasible domain". In this feasible domain for SIG, selection of $(\hat{p}, \hat{c})$ maximizes the SIG's utility. This point is the equilibrium in this game. Subsequently, if we restrict the feasible contribution as non-negative, the contribution schedule that can induce this equilibrium must locate below the feasible domain and $c > 0$.

However, numerous contribution schedules can be drawn to satisfy these constraints. Therefore, an equilibrium point is unique, but its associated equilibrium contribution schedule is not unique. Any equilibrium contribution schedule must satisfy $(p^*, 0)$ and $(\hat{p}, \hat{c})$. Therefore, the necessary condition of equilibrium contribution schedule is to pass these two points.[5]

4. Asymmetric Information

This section presents analysis of a situation in which the SIG has no information about the citizens' bliss point θ, but the government has this information by virtue of an information acquisition activity that costs k. This situation is a case of asymmetric information. The SIG knows that government has citizens' information, but does not know what

[4] When β approaches 1, that is, when β is sufficiently large, the SIG may face a free-rider-problem to lobbying activity.

[5] Grossman and Helpman (2001), in reference to the restriction of an equilibrium contribution schedule, note the idea of a compensating contribution schedule for which the different contributions for two different policies equal the difference of the SIG's utility for these policies. Needless to say, because a schedule belonging to the set of equilibrium contribution schedules induces an identical equilibrium, we do not focus on a specific contribution schedule, but on the equilibrium point that is induced.

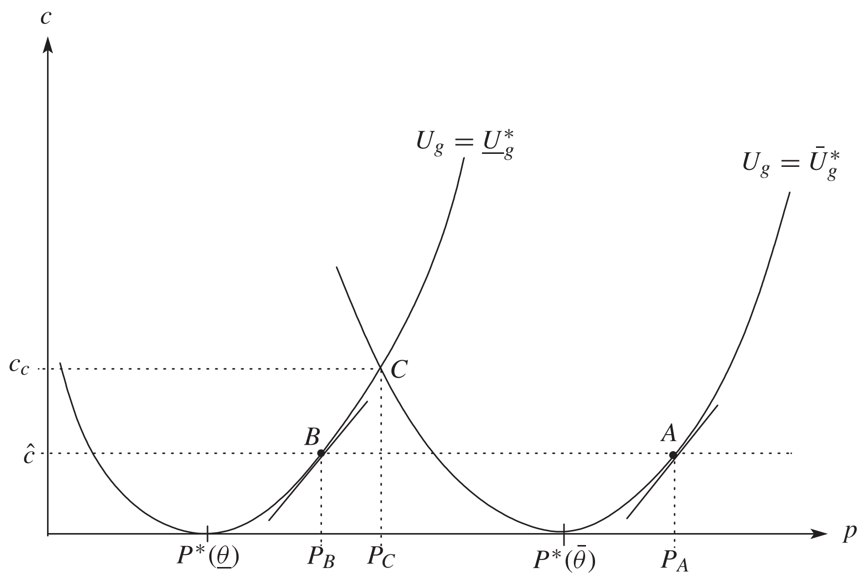

Fig. 2.

information the government has; consequently, the SIG's decision making is based on an *a priori* belief $\mathrm{Prob}(\theta = \bar{\theta}) = 1/2$. In this situation, the SIG must design the contribution schedule considering both situations in which the information the government has is $\underline{\theta}$ or $\bar{\theta}$.

Here, to begin to analyze an equilibrium of this asymmetric information game, we consider an equilibrium policy with complete information $\hat{p}(\underline{\theta}) \equiv P_B$, $\hat{p}(\bar{\theta}) \equiv P_A$ and define P_C as the intersection point of $U_{\mathrm{g}} = U_{\mathrm{g}}^*(\underline{\theta})$ and $U_{\mathrm{g}} = U_{\mathrm{g}}^*(\bar{\theta})$. Then, in the case of asymmetric information, three patterns of separate equilibria and pooling equilibria are realized. The first pattern is the equilibrium for which complete information is sustained in spite of asymmetric information. The second (third) pattern is an equilibrium for which complete information is not sustained and the government can (not) gain information rent in the equilibrium.

4.1 Equilibrium in which complete information is sustained ($P_B < P_C$)

Now we consider whether the SIG can induce the equilibrium with complete information in spite of asymmetric information. For example, consider that the SIG offers the following contribution schedule.

$$\hat{c}(p) = \begin{cases} \hat{c} & \text{if } p = P_B \text{ or } p = P_A \\ 0 & \text{otherwise} \end{cases} \tag{5}$$

We present Fig. 2 to illustrate this case.

Under such a contribution schedule, if the government acquires $\theta = \underline{\theta}$, the government can obtain a higher level of utility when he selects $(P_B, \hat{c})$ than when he selects $(P_A, \hat{c})$. This is clear because the lower indifference curve of the SIG signifies lower utility. Moreover, if the government selects points aside from P_A and P_B, then it obtains no contribution. Therefore, the only way for the government to maximize its utility is to choose P_B. Conversely, if $\theta = \bar{\theta}$, applying same argument, it appears to be optimal for the government to choose P_A. Under this contribution schedule, with asymmetric information, the SIG can induce the equilibrium in complete information $(P_A, \hat{c})$ and $(P_B, \hat{c})$ while satisfying the government's participation constraint and incentive compatibility constraint.

The conditions of contribution schedules that can induce these equilibria are to pass these two equilibrium points, $c \geq 0$, and to locate below $U_{\mathrm{g}} = U_{\mathrm{g}}^*(\underline{\theta})$ and $U_{\mathrm{g}} = U_{\mathrm{g}}^*(\bar{\theta})$. The only difference between a case of complete information and a case of asymmetric information is that the SIG must design a contribution schedule considering the government's incentive compatibility condition not to make off-path in a case of complete information on-path in a case of asymmetric information.

Therefore, if $P_B < P_C$, the SIG can design a contribution schedule that can induce an equilibrium with complete information in asymmetric information. In other words, in this case, informational superiority of the government does not affect results of the game.

Now, P_C satisfies the following equation.

$$\begin{cases} (ap - (1-\beta)(\bar{\theta} - p)^2) + \lambda c - k = \bar{U}_{\mathrm{g}}^* \\ (ap - (1-\beta)(\underline{\theta} - p)^2) + \lambda c - k = \underline{U}_{\mathrm{g}}^* \end{cases} \tag{6}$$

From this equation,

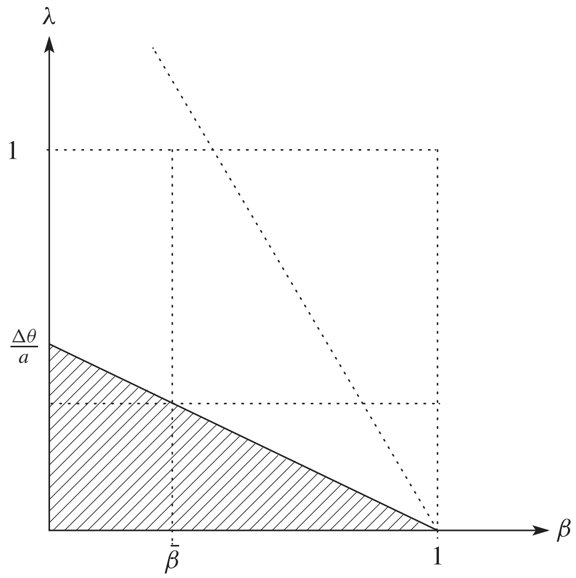

Fig. 3.

$$P_C = \frac{1}{2}\left((\underline{\theta} + \bar{\theta}) + \frac{a}{1-\beta}\right). \tag{7}$$

Similarly, the equilibrium contribution is

$$\hat{c}_c = \frac{(1-\beta)\Delta\theta^2}{4\lambda}. \tag{8}$$

Defining $\bar{\theta} - \underline{\theta} \equiv \Delta\theta$, we obtain the following inequality as a condition that satisfies $P_B < P_C$.

$$\lambda < \frac{\Delta\theta}{a}(1-\beta) \tag{9}$$

This inequality is drawn as follows.

In Fig. 3, the shaded area denotes a domain that can attain an equilibrium in complete information regardless of asymmetric information. For large β, if λ is sufficiently small, that is, if it is difficult for the SIG to bribe the government, the SIG can induce an equilibrium that includes complete information. Such a government is so benevolent that it does not have a strong incentive to take information rent from the SIG. Rising β leads to an expansion of distortion between the public benefit maximizing policy and the decided policy by contribution. Therefore, if β is sufficiently small, because this distortion is also small, the government may as well accept the SIG's offer without any information rent.

Alternatively, if β is large, the SIG can increase the aggregated contribution to induce larger policy without too much of an increased contribution per capita for a SIG member. A sufficiently small λ increases the cost of contributing to the SIG. The relationship of these two effects is a trade-off. Even if β is large, a sufficiently small λ makes it possible to induce the equilibrium in complete information without paying any information rent.

Moreover, if the marginal valuation of the SIG to policy a is sufficiently small for the variance of citizens' bliss point $\Delta\theta$, the SIG can induce an equilibrium in complete information for any λ. The decline of a makes the contribution more costly and induces the policy that the SIG would like to decrease. Because such a SIG is not an antisocial lobbyist, his offer is acceptable for the government with any λ if the government obtains no information rent.

From these arguments, we derive the following proposition.

Proposition 1. *Under asymmetric information,*

- *the SIG can induce equilibrium in an environment of complete information if* $\lambda < \frac{\Delta\theta}{a}(1-\beta)$
- *there exists an upper limit of the SIG's population* $\bar{\beta}$ *that makes it possible for the SIG to induce an equilibrium in complete information for any* λ *that satisfies* $\lambda < \frac{\Delta\theta}{a}$.

4.2 A case equilibrium in complete information is not sustained ($P_B > P_c$)

In this case, the SIG cannot induce an equilibrium in complete information any longer. In this situation, the SIG does not know what information the government has. All the SIG must consider is whether or not the desired equilibrium

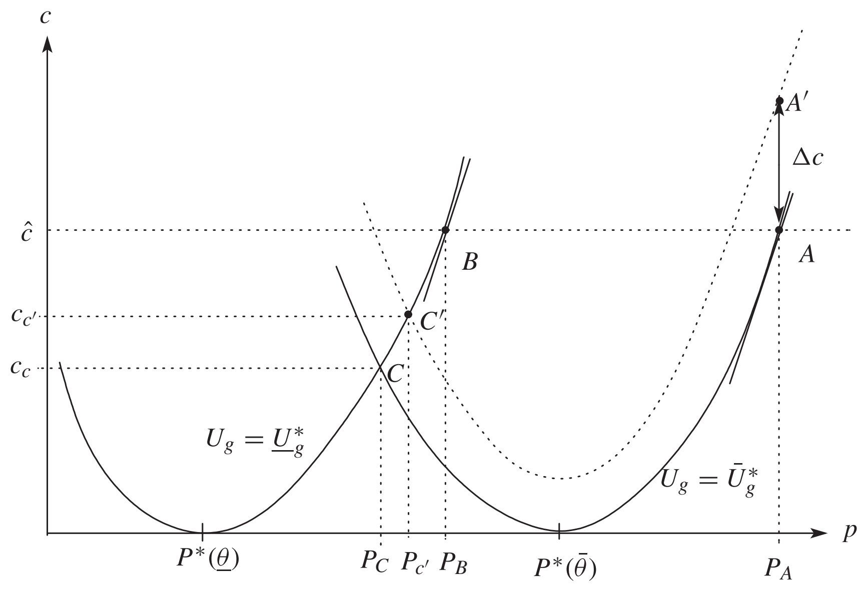

Fig. 4.

satisfies the government's incentive compatibility condition. The designed contribution schedule is always off-path on all points except equilibrium points for both cases of θ. As is often the case in ordinary contract theory, in this situation, the government can acquire information rent using informational superiority.

We discuss this case using Fig. 4.

We can see that points A and B, which are induced in the complete information case, do not satisfy the government's incentive compatibility. To confirm that observation, consider a contribution equal to zero for any policy except these points A and B. Under this contribution schedule, we assume the information the government acquired was $\underline{\theta}$. Then, if the government chooses point A, its utility is less than one when it chooses point B. Therefore, in this case, the government behaves as the SIG expects it to.

However, if the information the government acquired was $\bar{\theta}$, the government chooses B against SIG's desire because the government can achieve a higher utility by choosing point B instead of A. Whatever the information the government acquires, it always chooses point B. As a result, these two points are not incentive-compatible.

Then the SIG searches for the equilibrium points that satisfy incentive compatibility and maximizes its expected utility. Here, the equilibrium points that are incentive-compatible and give no information rent are points A and C. However, by offering an equilibrium, the SIG yields an information rent to the government instead of A and C. The SIG may make it possible to generate higher expected utility. To give information rent to the government implies that the SIG must compensate the higher government's utility when $\theta = \bar{\theta}$.

When $\theta = \bar{\theta}$, P_A is optimal for the SIG. This optimal policy for the SIG is not affected by the utility level that the SIG must compensate to the government. Next, we consider a case in which the SIG increases its contribution by Δc additionally. We define a set of policies and contributions in this case as A'. The point that is incentive compatible with A' and maximizes the SIG's expected utility is C' in this figure.

Then $P_{c'}$ and $\hat{c}_{c'}$ in point C' is

$$P_{c'} = \frac{1}{2}\left((\underline{\theta} + \bar{\theta}) + \frac{a}{1-\beta} + \lambda \Delta c\right), \tag{10}$$

$$c_{c'} = \frac{(\Delta\theta + \lambda \Delta c)^2 (1-\beta)}{4\lambda}. \tag{11}$$

From (10) and (11), when the SIG induces A' and C', the SIG's expected utility EU_1^s is as follows.

$$\begin{aligned} EU_1^s &= \frac{1}{2}(ap_{c'} - c_{c'}) + \frac{1}{2}(a\hat{p}(\bar{\theta}) - (\hat{c} + \Delta c)) \\ &= \frac{1}{2}\left(\frac{a}{2}\left((\underline{\theta} + \bar{\theta}) + \frac{a}{1-\beta} + \lambda \Delta c\right) - \frac{(1-\beta)(\Delta\theta + \lambda \Delta c)^2}{4\lambda}\right) \\ &\quad + \frac{1}{2}\left(a\left(\frac{(1+\lambda)a}{2(1-\beta)} + \bar{\theta}\right) - \left(\frac{\lambda a^2}{4(1-\beta)} + \Delta c\right)\right) \end{aligned} \tag{12}$$

The optimal information rent to induce a separating equilibrium that the SIG gives to the government is given by solving the SIG's following problem.

$$\max_{\Delta c} EU_1^s \quad \text{subject to} \quad \Delta c \geq 0 \tag{13}$$

From the first order condition, although Δc is

$$\Delta c = \frac{1}{\lambda}\left(\frac{a\lambda - 2}{1-\beta} - \Delta\theta\right),$$

considering constraint $\Delta c^* \geq 0$,

$$\Delta c^* = \max\left\{0, \frac{1}{\lambda}\left(\frac{a\lambda - 2}{1-\beta} - \Delta\theta\right)\right\}. \tag{14}$$

In addition, from (14), the condition in which this equilibrium information rent is positive is

$$a > \frac{(1-\beta)\Delta\theta + 2}{\lambda} \quad (> 2). \tag{15}$$

We can readily confirm that the right hand side of (15) is greater than two. Unless the SIG's marginal utility a is sufficiently large, the equilibrium information rent is not positive for any β and λ; consequently, an induced equilibrium by the SIG are points A and C.

In this separating equilibrium with no information rent, when $\theta = \underline{\theta}$, the induced policy approximates the socially optimal one $P^*(\underline{\theta})$. Therefore, in this case, if the government discloses the information that it has to the SIG, social welfare decreases and the government's disclosure is socially undesirable.

On the contrary, if a is sufficiently large such that it satisfies (15), an equilibrium information rent is positive and the SIG induces A' and C' as an equilibrium. Moreover, this equilibrium information rent has the characteristic that it increases with a, β and λ.

Finally, we investigate the possibility of a pooling equilibrium. For point A, because the SIG can increase its expected utility by designing an incentive compatible menu, a pooling equilibrium is not A. Accordingly, if a pooling equilibrium actualizes, it is point B. Now, defining the SIG's utility in a pooling equilibrium EU_1^p, the condition of realization of a pooling equilibrium is $EU_1^p > EU_1^s$. From this inequality,

$$a\hat{p}(\underline{\theta}) - \hat{c} > \frac{1}{2}(ap_{c'} - c_{c'}) + \frac{1}{2}(a\hat{p}(\bar{\theta}) - (\hat{c} + \Delta c^*)).$$

We rewrite this condition as

$$\lambda > \frac{1}{\beta}\left(\frac{\Delta\theta}{a}(1-\beta) + 1\right). \tag{16}$$

The boundary of realization of a pooling equilibrium passes through $(\beta, \lambda) = (1, 1)$ and decreases with β in $0 \leq \beta \leq 1$. Therefore, if $\lambda \leq 1$, it does not realize a pooling equilibrium.

To summarize this discussion, we can categorize the class of equilibrium on β–λ space.

In Fig. 5, domain A denotes the one in which the SIG can induce an equilibrium with complete information in spite of asymmetric information. Domain B denotes that in which separating equilibrium is induced without any information rent; domain C is the one in which separating equilibrium is induced with some information rent. Moreover, domain D is that for which a pooling equilibrium is realized.

For sufficiently large λ, a pooling equilibrium is realized. The increase of λ has the effect of decreasing the SIG contribution to the equilibrium. For sufficiently large λ, instead of leaving point A with information rent as a separating equilibrium, the SIG takes only point B with a small contribution and without information rent as a pooling equilibrium. In addition, the boundary between domain B and C is never crossed with the boundary between domain C and D in $0 \leq \beta \leq 1$; boundary C–D locates in the upper domain of the boundary B–C. Therefore, for some β, with increasing λ, the order of realized equilibrium is: equilibrium with complete information, separating equilibrium without information rent, separating equilibrium with information rent, and a pooling equilibrium.

Results of these analyses suggest the following proposition.

Proposition 2. *In the case of asymmetric information:*

- *it is realized for a separating equilibrium without information rent that if* $\frac{\Delta\theta}{a}(1-\beta) < \lambda < \frac{\Delta\theta}{a}(1-\beta) + \frac{2}{a}$.
- *it is realized for a separating equilibrium with information rent that if* $\lambda > \frac{\Delta\theta}{a}(1-\beta) + \frac{2}{a}$.
- *if* $\lambda < 1$*, a pooling equilibrium is never realized, but there exists a domain that is realized for* $\lambda > 1$.

5. Concluding Remarks

This paper has presented discussion about a lobbying game that takes place between a government with informational superiority and a SIG. The lobbying game with government's informational superiority is different from an ordinary lobbying game from the perspective of the SIG's design of the contribution schedule. For both cases of θ,

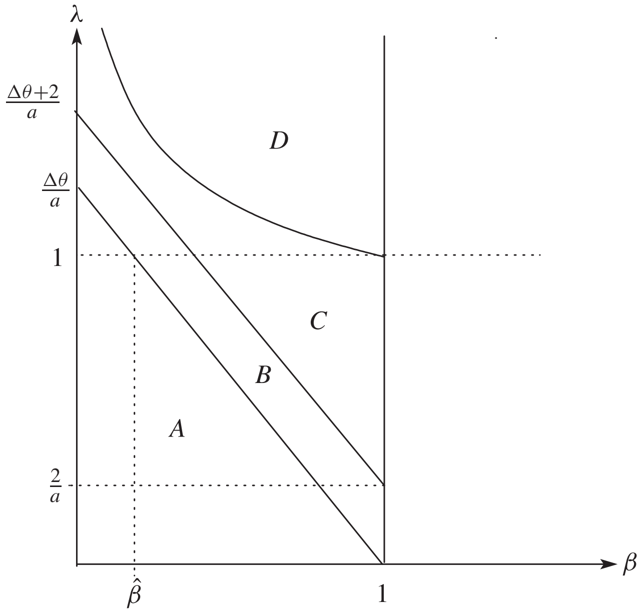

Fig. 5.

the SIG must design a contribution schedule to be off-path on all points except the equilibrium points it would like to induce. Even if the SIG designs it to be off-path only in $\bar{\theta}$, it may be on-path on some points aside from the equilibrium point it wants to induce when $\theta = \underline{\theta}$. Consequently, the SIG must produce a design considering the government's incentive compatibility constraint.

Different from ordinary contract theory, this asymmetric information presents the possibility that equilibrium in a complete information environment is sustained. This is true because the government, which acts as an is agent in this paper, has single-bottomed indifference curves that satisfy the single crossing property. In this case, the government cannot gain information rents through its informational superiority. It cannot do so because the SIG population is sufficiently small, rendering its contribution more costly for the SIG; consequently, it cannot induce a higher policy. From the vantage of social welfare, a government's informational superiority cannot prevent the SIG from inducing a higher policy in this case.

Furthermore, a sufficiently small λ creates conditions for this case. A government with these small λ is benevolent: the SIG has difficulty bribing this government. Nevertheless, this government accepts the SIG's offer without any information rent. At first sight, this seems paradoxical, but a sufficiently small λ makes the SIG's contribution costly. As a result, the SIG's incentive to induce a higher policy is weakened. Thereby, this SIG's offer is not antisocial. In this case, the government accepts the SIG's offer with no information rent, but it is not willing to accept the SIG.

On the contrary, if an equilibrium in complete information is not sustained in the case of $\theta = \underline{\theta}$, the government's informational superiority can stanch the SIG's effort to induce a higher policy.

In this situation, disclosure by the government is socially undesirable because it leads to an excess level of policy. Asymmetric information of the government and the SIG improves the distortion of policy when $\theta = \underline{\theta}$. However, this distortion expands with increasing marginal utility of the government to policy a because rising a causes the policy that the SIG induces to approximate the policy that government induces with complete information.

We cannot always say that all disclosure is socially undesirable. Information about the citizens' bliss point may be connected with individuals' incomes or results of investigation of citizens' demands for public works. Such information should not be disclosed because of inherent problems connected to social welfare and individual privacy. Other information that the government has ought to be disclosed. For that purpose, government disclosure of information should be carried out carefully and the sort of information the government discloses should be selected discreetly.

Moreover, when λ is sufficiently large ($\lambda > 1$), information rent is so expensive that the SIG gives up inducing a separating equilibrium. As a result of this, the SIG induces a pooling equilibrium with no information rent. In this case, when $\theta = \underline{\theta}$, policy distortion is not improved; when $\theta = \bar{\theta}$, the policy that the SIG seeks to induce can be less than the socially optimal one.

From these arguments, considering the lobbying game between the government and the SIG in a view of contract theory, we have obtained several interesting results that differ from those of ordinary contract theory. However, some analyses have eluded this discussion.

The government's informational superiority is not the only way to improve policy distortion. For example, citizens may reject the incumbent government in the subsequent election if the government chooses an excess level of policy compared with the socially optimal policy level. An analysis including elections is essential for analyses of new political economics.

Furthermore direct regulation of political contributions, *e.g.*, setting an upper limit of contributions, might improve policy distortion. Such analyses are the proper domain of law and economic analysis.

To clarify the interaction between political contributions, elections and law will greatly aid more detailed and realistic analysis of the policy-making process.

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