Small Group Dominance in the Competition between Interest Groups for lobbying the Government

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Abstract: This paper investigates the theoretical robustness of "small group dominance" in the political arena. Since Olson's pioneering work, it is widely known that free riding problem in the interest group will get worse as group size increases. In this paper, the interest group considered is the one in which the decision-making process of lobbying is decentralized. This study also considers a typical political economy model in which a political equilibrium is attained by the forces of competition between various interest groups. Thus, the transfer to the interest group which is the political outcome of lobbying is also affected by other groups' lobbying. The case that the relationship between the amount of transfer and the monetary value of lobbying is uncertain is a general case. It will be shown that "small group dominance" in the political arena might be the characteristic of the case when the political outcome is certain. This indicates it will be proved that when the political outcome is certain, the Nash equilibrium political expenditure for a special interest group with noncooperative structure will not attain Pareto efficiency and the greater is the number of members, the greater is the suboptimality of the equilibrium. However, when the political outcome is uncertain, efficiency can be achieved in some limited cases, which implies the hypothesis of "small group dominance" is not always relevant. We find the possibility of attaining efficiency when the political outcome is fully distributed by the sharing rules designed by some coordinator. We also find that there exists a case that efficiency can be achieved even if the political outcome is not completely distributed by sharing rules. These results imply that free-riding can be prevented by the optimal design of the sharing rules and there exist a countervailing force against "small group dominance" and then might exist an "optimal" group size for some special interest group.

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The political efficiency of an interest group means this group's ability to produce the required political pressure to lobby the government for obtaining the given political outcome. Here the form of lobbying the government is limited to political contribution. Thus, the group's ability to collect the required political contribution for the given political outcome is the political efficiency of this group. In his pioneering book, "*The Logic of Collective Action*," Olson emphasized that small groups are effective at achieving the objectives. Since the outcome of political behavior of the group will be the public good to each member, the contribution that each member will make toward achieving this public good will become smaller as group size increases. The public good property of political outcome will cause free-riding. Thus the political efficiency of an interest group depends on its ability of controlling free-riding and the larger the group, the larger the cost of controlling free-riding. This implies that small groups are advantaged in the competition between interest group for lobbying the government. Here it is called "small group dominance."

Since Olson(1965), the notion of "small group dominance" has been accepted as one of the distinguished aspects of competition among interest groups for political influence. Peltzman(1976) and Becker(1983) carefully considered the numbers in an interest group. Becker argued that political efficiency is negatively affected by the size of a group but small groups may not be able to take advantage of scale economies. The hypothesis of "small group dominance" in the political economy model has been tested and confirmed empirically in several studies such as Gardner(1987) and Trefler(1993).

The main goal of this study is to investigate the theoretical robustness of "small group dominance." As group size increases, the cost of organization will increase. And if informational problem exists within a group, this problem will get worse as group size increases. Thus, to limit the problem caused from ex ante organization and private information within a group, it is assumed that decision-making process of lobbying is decentralized and there is no private information within a group. In this study the focus is on the relationship between the political outcome that is the amount of transfer and the political contribution, monetary value of lobbying. The cases of both certain and uncertain political outcome will be taken into account.

This study is organized as follows. Section 1 analyzes the role of group size in the political efficiency of an interest group when the political outcome is certain. In Section 2, the hypothesis of "small group dominance" will be explored when the political outcome is uncertain and there exists some ex post coordinator for setting up the sharing rules.

1. A Theory of Political Efficiency of an Interest Group: A Case of Certain Outcome

Consider a special interest group which is lobbying the government to further their own interests. In a typical political economy model, a political equilibrium is attained by the forces of competition between various interest groups. Thus, the transfer to the interest group which is the political outcome of lobbying is also affected by other groups' lobbying. So, when individual members of the group decide their contribution to lobby the government, the relationship between the amount of transfer and the monetary value of lobbying would be uncertain. This implies that the uncertain political outcome is a general case. However, we start from the more restrictive and special case of certain political outcome in this section. The result of this section will be compared to that of the general case later in this study.

The other assumption made in this section is that the decision-making process of lobbying is decentralized in an interest group. So the question is whether the equilibrium level of political expenditure for each member will achieve Pareto efficiency for the group whose decision-making process of lobbying is decentralized. It might be the general idea that the interest group which is decentralized in political decision-making process will behave inefficiently in the political process. However, this idea is meaningful only when it is checked theoretically in a rigorous fashion.

Let us now establish some notation. Let $X = h(G)$, where X is the level of transfer by the government to this special interest group and G is total political expenditure of this group to lobby the government. h is an increasing function of G and also concave on G and $G = \sum_{i=1}^{n} g_i$, where g_i is political expenditure of member i.

Assume that there are n members (n>1) in this group. It is also assumed that every member is self-interested with utility being a function of net income as follows.

$$U_i = U_i(\Pi_i + h(G) - g_i),$$

where Π_i is the market-determined profit, U_i is the utility function for i, which is increasing, continuously differentiable and concave, and the political expenditure of i is $g_i \in [0, \Pi_i], i = 1, \cdots, n.$

Each member is assumed to act simultaneously and independently, and know that other members will act in the same fashion. All elements of the game which are the payoff functions, the number of members and the set of strategies are common knowledge. Then, the Nash equilibrium political expenditure profile is as follows.

$$\hat{g}_i = \arg\max_{g_i \in [0, \Pi_i]} \{U_i(\Pi_i + h(g_i + \hat{G}_{-i}) - g_i)\}, \quad i = 1, \cdots, n,$$

where $\hat{G}_{-i} = \sum_{j=1, j \neq i}^{n} \hat{g}_j$.

In order to check if the above Nash equilibrium political expenditure profile is Pareto efficient one, we define the Pareto frontier following Bullock (1995, 1996). Let U be the vector of members' utility functions:

$U = (U_1 \cdot \quad \cdot \quad \cdot U_n)$.

Let g be the vector of members' political expenditures as follows.

$g = (g_1 \cdot \quad \cdot \quad \cdot g_n)$

Then the Pareto frontier is defined as

$$PF^* = \{U \mid \text{for some } g \in S, \text{i) } U = U(g), \text{and ii) there does not exist } g' \in S \text{ s.t.} U(g') > U(g)\}.$$

Call g^* the vector of Pareto efficient political expenditures. Then g^* simultaneously satisfies the following n constrained maximization problems[1].

$$\underset{g_1 \in [0,\Pi_1],\cdots,g_n \in [0,\Pi_n]}{Max} U_i(\Pi_i + h(g_1 + \cdots + g_n) - g_i)$$

$$\text{s.t. } U_j(\Pi_j + h(g_j + \cdot G_{-i}^*) - g_j) \geq U_j(\Pi_j + h(g_1^* + \cdots + g_n^*) - g_j), \forall j \neq i,$$

$$i = 1, \cdots, n.$$

Using the above constrained maximization problems the necessary condition for Pareto optimality can be derived. The Lagrange of the above is

$$Z = \underset{g_1 \in [0,\Pi_1],\cdots,g_n \in [0,\Pi_n]}{Max} U_i(\Pi_i + h(g_1 + \cdots + g_n) - g_i)$$
$$+ \sum_{j \neq i} \lambda_j [U_j(\Pi_j + h(g_1^* + \cdots + g_n^*) - g_j) - U_j(\Pi_j + h(g_j + \cdot G_{-i}^*) - g_j)]$$

[1] For the proof of this, see Bullock(1996).

The first-order conditions can be written as following matrix form.

$$\begin{bmatrix} \frac{\partial U_1(g^*)}{\partial g_1} & \cdot & \cdot & \frac{\partial U_{i-1}(g^*)}{\partial g_1} & \frac{\partial U_{i+1}(g^*)}{\partial g_1} & \cdot & \cdot & \frac{\partial U_n(g^*)}{\partial g_1} \\ \frac{\partial U_1(g^*)}{\partial g_2} & \cdot & & & & & & \cdot \\ \cdot & & \cdot & & & & & \cdot \\ \cdot & & & \cdot & & & & \cdot \\ \cdot & & & & \cdot & & & \cdot \\ \cdot & & & & & \cdot & & \cdot \\ \cdot & & & & & & \cdot & \cdot \\ \frac{\partial U_1(g^*)}{\partial g_n} & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \frac{\partial U_n(g^*)}{\partial g_n} \end{bmatrix} \begin{bmatrix} \lambda_1(g^*) \\ \lambda_2(g^*) \\ \cdot \\ \lambda_{i-1}(g^*) \\ \lambda_{i+1}(g^*) \\ \cdot \\ \cdot \\ \lambda_n(g^*) \end{bmatrix} = \begin{bmatrix} -\frac{\partial U_i(g^*)}{\partial g_1} \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ -\frac{\partial U_i(g^*)}{\partial g_n} \end{bmatrix}$$

The above is equivalent to $\lambda_1(g^*)\begin{bmatrix} \frac{\partial U_1(g^*)}{\partial g_1} \\ \cdot \\ \cdot \\ \cdot \\ \frac{\partial U_1(g^*)}{\partial g_n} \end{bmatrix} + \cdot \quad \cdot \quad \cdot + \lambda_n(g^*)\begin{bmatrix} \frac{\partial U_n(g^*)}{\partial g_1} \\ \cdot \\ \cdot \\ \cdot \\ \frac{\partial U_n(g^*)}{\partial g_n} \end{bmatrix} = \begin{bmatrix} 0 \\ \cdot \\ \cdot \\ \cdot \\ 0 \end{bmatrix}$, where $\lambda_i(g^*) = 1$. Let the Jacobian matrix of U at g^* be $J(g^*)$. Then

$$J(g^*) = \begin{bmatrix} \frac{\partial U_1(g^*)}{\partial g_1} & \cdot & \cdot & \cdot & \frac{\partial U_1(g^*)}{\partial g_1} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \frac{\partial U_1(g^*)}{\partial g_1} & \cdot & \cdot & \cdot & \frac{\partial U_1(g^*)}{\partial g_1} \end{bmatrix}.$$

Note that first-order conditions imply that some linear combination of the rows of $J(g^*)$ will obtain the zero vector. If all λ_j's, $j = 1, \cdots, n$, are equal to zero, then $J(g^*)$ is linearly independent and has full rank. But in our case, $\lambda_i(g^*) = 1$. This implies that $J(g^*)$ is singular. Therefore the necessary condition for g^* to lead to an outcome on the Pareto frontier is that $rank[J(g^*)] < n$.[2]

Next we analyze whether our noncooperative Nash equilibrium will attain Pareto efficiency. We can check it by investigating if this equilibrium will satisfy the necessary condition for Pareto optimality discussed immediately. We claim the following proposition.

Proposition 1. For a special interest group with noncooperative structure and complete information, the equilibrium level of political expenditure per capita ($\hat{g}$) will not attain Pareto efficiency.

Proof. In order to obtain a Nash equilibrium, the following *n* maximization problems have to be solved simultaneously.

$$\underset{g_i \in [0,\Pi_i]}{Max} \left\{ U_i \left(\Pi_i + h\left(g_i + \hat{G}_{-i}\right) - g_i \right) \right\}, \quad i = 1, \cdots, n .$$

The first-order condition is

$$U_i^{'}(\Pi_i + h(\hat{g}_1 + \cdots + \hat{g}_n) - \hat{g}_i)[h'(\hat{g}_1 + \cdots + \hat{g}_n) - 1] = 0 , \quad i = 1, \cdots, n .$$

Let the vector of equilibrium political expenditure be $\tilde{g} = (\hat{g}_1 \quad \cdot \quad \cdot \quad \cdot \quad \hat{g}_n)$. Then $\frac{\partial U_i(\tilde{g})}{\partial g_i} = 0, \forall i$ and $\frac{\partial U_i(\tilde{g})}{\partial g_j} = U_i^{'}(\Pi_i + h(\tilde{g}) - \hat{g}_i)\frac{\partial h(\tilde{g})}{\partial g_j} \neq 0, \forall j \neq i$. So the Jacobian matrix of U at $\tilde{g}$, $J(\tilde{g})$, is as follows.

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[2] This condition was derived by Bullock(1995, 1996) when analyzing the efficient redistribution hypothesis. In the case of the efficient redistribution hypothesis, the question is if redistribution from government policy attains Pareto optimality. However, our concern is if the set of equilibrium choice of political expenditure attains Pareto optimality in a political pressure group in which the decision-making for political contribution is decentralized.

$$J(\tilde{g}) = \begin{bmatrix} 0 & U_1' \frac{\partial h(\tilde{g})}{\partial g_2} & \cdot & \cdot & \cdot & U_1' \frac{\partial h(\tilde{g})}{\partial g_n} \\ U_2' \frac{\partial h(\tilde{g})}{\partial g_1} & 0 & U_2' \frac{\partial h(\tilde{g})}{\partial g_3} & \cdot & \cdot & U_2' \frac{\partial h(\tilde{g})}{\partial g_n} \\ \cdot & & \cdot & & & \cdot \\ \cdot & & & \cdot & & \cdot \\ U_{n-1}' \frac{\partial h(\tilde{g})}{\partial g_1} & \cdot & \cdot & U_{n-1}' \frac{\partial h(\tilde{g})}{\partial g_{n-2}} & 0 & U_{n-1}' \frac{\partial h(\tilde{g})}{\partial g_n} \\ U_n' \frac{\partial h(\tilde{g})}{\partial g_1} & \cdot & \cdot & \cdot & U_{n-1}' \frac{\partial h(\tilde{g})}{\partial g_{n-1}} & 0 \end{bmatrix}$$

Each row of $J(\tilde{g})$ is linearly independent. Then $rank\left[J\left(g^*\right)\right] = n$, which violates the necessary condition for Pareto optimality. Therefore, the equilibrium political expenditure profile for the group will not attain Pareto efficiency. Q.E.D.

This proposition implies that an uncoordinated interest group will not attain Pareto efficiency in the process of lobbying the government. That is, free-riding among members cannot be controlled in an interest group in which the decision-making about political contribution is decentralized. Thus we can confirm the general idea that an interest group with a noncooperative structure will not be politically effective when obtaining policies that favor its interests. Next we will investigate how group size will affect the degree of suboptimality of the equilibrium by claiming the following proposition.

Proposition 2. For an interest group with a noncooperative structure, the greater is the number of members, the greater is the suboptimality of the equilibrium.

Proof. Define the degree of suboptimality as the distance between the Pareto optimal outcome and the Nash equilibrium outcome. Then this proposition can be proved by investigating how the Pareto optimal outcome of political contribution will change as group size increases, to compare the result with the case of Nash equilibrium.

The first-order conditions for Pareto optimal political contribution profile are as follows.

$$U_i^{'}\left(\Pi_i + h\left(g_1^* + \cdots + g_n^*\right) - g_i^*\right)\left[h'\left(g_1^* + \cdots + g_n^*\right) - 1\right]$$
$$+ \sum_{j \neq i} \lambda_j U_j^{'}\left(\Pi_j + h\left(g_1^* + \cdots + g_n^*\right) - g_i^*\right) h'\left(g_1^* + \cdots + g_n^*\right) = 0, \quad i = 1, \cdots, n.$$

From this, the following can be derived.

$$h'\left(g_1^* + \cdots + g_n^*\right) = \frac{U_i^{'}\left(\Pi_i + h\left(g_1^* + \cdots + g_n^*\right) - g_i^*\right)}{\sum_{j=1}^{n} \lambda_j U_j^{'}\left(\Pi_j + h\left(g_1^* + \cdots + g_n^*\right) - g_j^*\right)}$$

The Pareto optimal political contribution profile g^* satisfies the above condition. The above condition indicates that as group size increases $h'\left(g_1^* + \cdots + g_n^*\right)$ will decrease. This implies that as group size increases, the outcome of Pareto optimal political contribution, $X\left(G^*\right)$, will increase.

Next the relationship between the group size and the outcome of noncooperative equilibrium political contribution will be investigated. We know that the first-order condition is as follows.

$$U_i^{'}\left(\Pi_i + h\left(\hat{g}_1 + \cdots + \hat{g}_n\right) - \hat{g}_i\right)\left[h'\left(\hat{g}_1 + \cdots + \hat{g}_n\right) - 1\right] = 0, \quad i = 1, \cdots, n.$$

From this, the following can be derived.

$$h'\left(\hat{g}_1 + \cdots + \hat{g}_n\right) = 1.$$

The noncooperative equilibrium political contribution profile $\tilde{g}$ satisfies the above condition. The same first-order condition for all members indicates the symmetry between members. Thus the amount of political contribution of each member is the same in equilibrium. Then the above condition can be changed as $h'\left(n\hat{g}\right) = 1$.

Differentiate it with respect to the group size, *n*. The following is obtained.

$$h''(n\hat{g})\left[\hat{g} + n\frac{\partial \hat{g}}{\partial n}\right] = 0 .$$

Since $h''(n\hat{g}) < 0$ holds by the concavity of $X = h(G)$, then $\left[\hat{g} + n\frac{\partial \hat{g}}{\partial n}\right] = 0$ holds. Thus it can be derived that $\frac{d\hat{X}}{dn} = h'(n\hat{g})\left[\hat{g} + n\frac{\partial \hat{g}}{\partial n}\right] = 0$ holds. Therefore, as group size increases, the outcome of noncooperative equilibrium political contribution will not be changed.

Given $n > 1$, $h'(\hat{g}_1 + \cdots + \hat{g}_n) = 1$ and $h'(g_1^* + \cdots + g_n^*) < 1$. Then $X(G^*) > X(\hat{G})$ holds by the properties of *h*. Thus the suboptimality of the noncooperative equilibrium can be confirmed. Also by comparing the first-order conditions between Pareto optimal and noncooperative equilibrium, it is found that as group size increases, the outcome of Pareto optimal political contribution will increase but that of noncooperative equilibrium political contribution will not be changed. Thus, the distance between the noncooperative equilibrium outcome and Pareto optimal outcome will increase as group increases. So the suboptimality of the noncooperative equilibrium outcome will be greater as group size increases. Q.E.D.

This proposition confirms the idea of small group dominance in the political arena because free-riding problem will get worse as group size increases for the uncoordinated interest group. Thus, the notion that small group is advantaged in the political game of redistribution can be approved only when the amount of redistribution, political outcome, of the interest group will be completely determined by the members' total political contributions and the political contribution of the group is collected voluntarily.

2. A Theory of Political Efficiency of an Interest Group: A Case of Uncertain Outcome

Here in this chapter, the equilibrium in the interest group in which the decision-making is decentralized will be characterized when the assumptions of the last chapter are relaxed. One of the most important assumptions of the last chapter is that the per-capita outcome of political behavior is the same for all members. The other important assumption of the last chapter is that the amount of redistribution, political outcome will be completely determined by the members' total political expenditures. If the equilibrium attains efficiency when these two assumptions are relaxed, then the group size will not affect the political efficiency of this interest group and the hypothesis of "small group dominance" is not the complete reflection of the reality in the political battle field. For questioning this hypothesis, the explanation of the reasons for relaxing the assumptions will be needed.

The assumption that the per-capita outcome of political behavior is the same for all members is to emphasize the public good's property of political outcome. However, that each member of one political pressure group will obtain the same level of subsidy is not common unless every member is homogeneous. And it is likely that the government will be considering the total amount of subsidy when it decides to subsidize some industry. In this case a group's total political contributions will influence the level of total political outcome for this group. Thus, this political outcome will be distributed to each member by some sharing rule. Since the total political outcome should be shared by every member, the political outcome to each member is non-excludable but rival. Then the political outcome of each member is an impure public good. The sharing rules for this political outcome will either be fixed or designed by some designer or the agreements of every member. However, it is unlikely that the sharing rules for this case will be fully designed by some designer. Therefore, the sharing rules will partially or fully depend on the environments as initial profits, policy instruments, and market structure etc.

The relationship between the political outcome and the political contributions[3] is deterministic in the last chapter. However, the outcome of political behavior for an interest group might not be completely determined by the political contributions of this group. Other factors such as the market structure related to this group and the competition between interest groups will influence the level of political outcome for this group. Then the political process which links the political contribution to the political outcome will be a random process, that is, the uncertainty of the political outcome can be considered.

Here the objective is to check if the hypothesis of "small group dominance" can be accepted with no exception. In the next section the following two cases will be considered. The first case is when the political outcome is the same for every member but the political process is a random process. In this case the first assumption will still hold but the second assumption will be relaxed. The second case is when the political outcome is completely determined by political contributions of this group but every

3 Alchian and Demsetz (1972) defined the metering problem as the relationship between rewards and productivity. A political pressure group with the decentralized decision-making process meters poorly, with outcome (reward) for each member and contribution (productivity) of each member loosely correlated. Then free-riding will occur even if the relationship between total outcome and total contribution is explicit and deterministic. We are looking for the possibility of resolving the metering problem for a political pressure group when the relationship between total outcome and total contribution is random.

member needs not receive the same political outcome[4]. In this case the first assumption will be relaxed but the second assumption will still hold. For both cases it will be investigated if the efficiency can be achieved. It will be shown that efficiency cannot be attained for both cases. Then group size will matter and the hypothesis of "small group dominance" will not be easily denied.

The case that the political process is a random process and the political outcome for the interest group is the total outcome will be also taken into account. This case implies that the outcome should be distributed to each member and then each member will not receive the same political outcome. It will be also probed if efficiency can be achieved for this case. In this case the achievement of efficiency will depend upon the sharing rules. If the sharing rules can be completely designed by the mechanism designer[5], efficiency can be attained as Williams and Radner(1995) did. Williams and Radner(1995) assumed transferable utility but here it will be shown that efficiency can be achieved even in the case of non-transferable utility. However, if the sharing rules are fixed, it cannot be assured that efficiency can be achieved. It will be proved that if the sharing rules can be partially designed, then efficiency can be achieved under some limited condition.

That efficiency can be achieved in some limited case implies that free-riding can be cured by the optimal design of the sharing rules. Thus it will be uncovered that the hypothesis of "small group dominance" is not always right and is incomplete. This

4 The objective of this case is to find the sharing rule which also satisfies efficiency. It is almost the same as Holmstrom (1982).

5 It is assumed that the mechanism designer has no power over the decision-making process for political contribution. The mechanism designer is assumed to just design a mechanism or rule for sharing the political outcome for a group.

entails that there exists a countervailing force against "small group dominance" and then might be an "optimal" group size for an interest group or industry.

A. *The Case of Inefficiency*

Here the general case that political outcome is uncertain will be taken into account when decision-making for political contribution in an interest group is decentralized. The model is as follows. There is an interest group which consists of $n > 1$ members. Each member has the same initial profit, Π_0. Member i 's choice is his political contribution g_i, where $g_i \in [0, \Pi_0]$. Let $g = (g_1 \cdots g_n)$ denote a contribution profile. When members choose their political contributions, it is assumed that $m \geq 2$ different levels of political outcome can be obtained[6]. Let $\Gamma = (X_1 \cdots X_m)$ denote the set of possible political outcomes. A probability distribution over the different levels of political outcome will be assigned to each choice of the members' political contributions. Denote the conditional cumulative distribution function (CDF) of X, given the contribution profile g, by $F(X, g)$ and the corresponding conditional density function by $f(X, g)$. Assume that the partial derivatives $F_i(X, g) = \dfrac{\partial F(X, g)}{\partial g_i}$ and $f_i(X, g) = \dfrac{\partial f(X, g)}{\partial g_i}$ for all i and (X, g). These are common knowledge. Member i 's utility function is assumed to be as follows.

[6] This could be interpreted that the set of possible outcome levels is an interval on the real line. But it is assumed that there are finite outcome levels.

$$U_i\left(\Pi_0+E\left(X\,|\,g\right)-g_i\right), \qquad\qquad i=1,\cdots,n,$$

where U_i is concave and increasing in its arguments.

Every member is assumed to have the same preference ordering, that is, the same utility function, $U_i(\cdot)=U(\cdot),\forall i$. So member i's objective is as follows.

$$\underset{g_i\in[0,\Pi_0]}{Max}\,U\left(\Pi_0+E\left(X\,|\,g_i,\hat{g}_{-i}\right)-g_i\right)\quad, \qquad\qquad i=1,\cdots,n,$$

Where $\hat{g}_{-i}=\left(\hat{g}_1\cdots\hat{g}_{i-1}\hat{g}_{i+1}\cdots\hat{g}_n\right)$.

The intent of this section is to ensure if the equilibrium contribution profile ($\hat{g}$) will achieve efficiency. Under uncertainty the equilibrium contribution profile will be compared with the ex ante Pareto optimal contribution profile. The set of the ex ante Pareto optimal contribution profiles will be obtained by simultaneously solving the following maximization problems.

$$\underset{g_1,\cdots,g_n}{Max}\,U\left(\Pi_0+E\left(X\,|\,g\right)-g_i\right)+\sum_{k\neq i}\lambda_k\left[U\left(\Pi_0+E\left(X\,|\,g^*\right)-g_k^*\right)-U\left(\Pi_0+E\left(X\,|\,g\right)-g_k\right)\right],$$

$$i=1,\cdots,n$$

The first-order conditions of the above problems are as follows.

$$U'\left(\Pi_0+E\left(X\,|\,g^*\right)-g_i^*\right)\left[\sum_{j=1}^{m}X_j f_p\left(X_j,g^*\right)\right]+\lambda_p U'\left(\Pi_0+E\left(X\,|\,g^*\right)-g_p^*\right)\left[\sum_{j=1}^{m}X_j f_p\left(X_j,g^*\right)-1\right]$$
$$+\sum_{k\neq p,k\neq i}\lambda_k U'\left(\Pi_0+E\left(X\,|\,g^*\right)-g_k^*\right)\left[\sum_{j=1}^{m}X_j f_p\left(X_j,g^*\right)\right]=0,$$

when $p\neq i$ ………… (1)

$$U'\left(\Pi_0+E\left(X\,|\,g^*\right)-g_i^*\right)\left[\sum_{j=1}^{m}X_j f_i\left(X_j,g^*\right)-1\right]+\sum_{k\neq i}\lambda_k U'\left(\Pi_0+E\left(X\,|\,g^*\right)-g_k^*\right)\left[\sum_{j=1}^{m}X_j f_i\left(X_j,g^*\right)\right]=0$$

when $p=i$.

Here we claim the following proposition.

Proposition 3. When each member independently decides his own political contribution in an interest group, if every member receives the same political outcome but this outcome is uncertain, then the equilibrium contribution profile cannot attain efficiency.

Proof. Suppose that the equilibrium contribution profile ($\hat{g}$) which satisfies (1) is Pareto optimal. Then $\hat{g}$ should satisfy (2) and $\hat{g} = g^*$. In this case

$\sum_{j=1}^{m} X_j f_p\left(X_j, g^*\right) = 1, \forall p = 1, \cdots, n$. So (2) will be changed as follows.

$$\sum_{k \neq p} \lambda_k U'\left(\Pi_0 + E\left(X \middle| g^*\right) - g_k^*\right) = 0, \forall p .$$

U is strictly increasing in its argument. So in order for the above to hold, for each p, $\lambda_k = 0, \forall k \neq p$. However, this condition is not satisfied because $\lambda_i = 1$.

Therefore, the equilibrium contribution profile ($\hat{g}$) cannot be Pareto optimal. Q.E.D.

By the same reasoning of the first section, the equilibrium contribution profile ($\hat{g}$) cannot attain efficiency. This implies that when every member faces the same level of political outcome, uncertainty plays no role for overcoming free-riding problem caused from moral hazard in an interest group.

Consider the second case. In this case the political outcome is given for this interest group and it should be distributed to each member. It is assumed that the political outcome is completely determined by the total political contributions of this group. So every member needs not share the same level of outcome and there is no uncertainty. Here it is not assumed that every member is homogeneous. Member i's utility consists of his initial profit (Π_i) plus the share ($s_i(X)$) he receives minus his political contribution (g_i). That is,

$$U_i = \Pi_i + s_i\left(X\left(g\right)\right) - g_i, \qquad i = 1,\cdots,n.$$

Where X is strictly increasing, concave and differentiable,

$$g_i \in \left[0,\Pi_i\right] = S_i, S = \underset{i}{X}\, S_i, \text{ and } X : S \rightarrow \Re.$$

The sum of the share of every member is assumed to be equal to the total political outcome and the sharing rule is completely designed by some mechanism designer Here the question is whether there exists a sharing rule which satisfies the budget constraint so that Nash equilibrium is Pareto efficient. So the objective of member i is as follows.

$$\underset{g_i \in \left[0,\Pi_i\right]}{Max}\, \Pi_i + s_i\left(X\left(g_i, \hat{g}_{-i}\right)\right) - g_i, \qquad i = 1,\cdots,n.$$

The first-order condition is as follows.

$$s_i^{'}\left(X\left(\hat{g}\right)\right)\frac{\partial X\left(\hat{g}\right)}{\partial g_i} - 1 = 0, \qquad i = 1,\cdots,n.$$

Since the utility is transferable, Pareto efficient contribution profile (g^*) will solve the following maximization problem.

$$\underset{g_1,\cdots,g_n}{Max}\, X\left(g\right) - \sum_{i=1}^{n} g_i.$$

The first-order conditions are as follows.

$$\frac{\partial X\left(g^*\right)}{\partial g_i} - 1 = 0, \quad i = 1,\cdots,n.$$

Assuming that there exists a solution (g^*) in the interior of S, then g^* will satisfy the above condition. If $g^* = \hat{g}$, then the sharing rule will be designed as $s_i^{'}\left(X\left(g\right)\right) = 1, \forall i$. The next step is to check whether this sharing rule will satisfy the budget constraint. Since the sum of the share every member receives should be equal to the political outcome, then the budget constraint is as follows.

$$\sum_{i=1}^{n} s_i\left(X\right) = X \ .$$

If we differentiate it with respect to X, then we obtain

$$\sum_{i=1}^{n} s_i^{'}\left(X\right) = 1 \, .$$

But it is conflict with the fact that $s_i^{'}\left(X\left(\hat{g}\right)\right) = 1, \forall i$, for a Nash equilibrium to satisfy the condition for Pareto efficiency. Thus, there is no way to attain efficiency even if the mechanism designer is able to completely design the sharing rule.

In this section two cases have been analyzed. In each case one of the two important assumptions for the last section is relaxed. The results find that efficiency cannot be attained for both cases. Thus the case when those two assumptions are relaxed will be probed in the rest of this study. If there is any possibility of attaining efficiency for that case, the acceptance of the hypothesis of “small group dominance” can be reserved.

B. *The Possibility of Attaining Efficiency*

Let's describe the model when these two assumptions will be relaxed. In this case the political outcome is uncertain and the outcome will be distributed to each member by some sharing rule. Consider an interest group which consists of $n>1$ members and each member has his own initial profit (Π_i). Member i chooses his political contribution g_i from the interval $[0,\Pi_i]=S_i$. Let $g=(g_1\cdots g_n)$ be a contribution profile and then the contribution profile excluding member i can be described as $g_{-i}=(g_1\cdots g_{i-1}\ g_{i+1}\cdots g_n)$.

If the members choose their contributions, one of *m* levels of outcome will result, where $m>2$. As in the last section, $\Gamma=(X_1\cdots X_m)$ is the set of the possible political outcomes. The same assumptions about $F(X,g)$, $f(X,g)$, $F_i(X,g)$, and $f_i(X,g)$ hold as in the last section. Member i's utility is represented as follows.

$$U_i\left(\Pi_i+E\left(s_i(X)\middle|g\right)-g_i\right),\ \ i=1,\cdots,n.$$

Here every member is not assumed to be homogeneous and it is assumed for a moment that the sharing rules will be completely devised by the mechanism designer.

Pareto efficiency for this case will be defined. As seen in the above, utility is not transferable. So given the sharing rule and a vector of initial profits of the members Pareto optimal contribution profile will be obtained by simultaneously solving the following n problems.

$$\underset{g_1,\cdots,g_n}{Max}\,U_i\left(\Pi_i+E\left(s_i(X)\middle|g\right)-g_i\right)-\sum_{k\neq i}\lambda_k\left[U_k\left(\Pi_k+E\left(s_k(X)\middle|g\right)-g_k\right)-U_k\left(\Pi_k+E\left(s_k(X)\middle|g^*\right)-g_k^*\right)\right]$$

$$i=1,\cdots,n. \qquad (\square)$$

Assume that there exists a solution to this maximization problem in the interior of $\underset{i}{X}\, s_i$. Member i's objective is as follows.

$$\underset{g_i}{Max}\,U_i\left(\Pi_i + E\left(s_i(X)\,\middle|\, g_i, \hat{g}_{-i}\right) - g_i\right), \quad i = 1,\cdots,n. \qquad (\square)$$

The main concern is if there exists a sharing rule which can make the efficient contribution profile, g^*, into the solution of each member's problem. In addition to this, the sharing rule should satisfy the following budget constraint

$$\sum_{i=1}^{n} s_i(X) = X. \qquad (\square)$$

So, here the objective is to check whether there exists a sharing rule or the mechanism designer can devise a sharing rule which satisfies (i) ,(ii), and (iii). Satisfying the condition (ii) implies that the necessary and sufficient condition for Pareto efficiency will be satisfied. But showing that there exists a case when efficiency will be attained will be sufficient to prove that there exists a sharing rule. Thus a particular kind of social welfare functions[7] for an interest group can be used to define Pareto efficiency. The following is the social welfare function for this group.

$$W = \sum_{i=1}^{n} \lambda_i U_i\left(\Pi_i + E\left(s_i(X)\,\middle|\, g\right) - g_i\right),$$

$$\text{Where } \lambda_i = 1 \Big/ \frac{\partial U_i(M)}{\partial M}, \forall i. \qquad (\square)$$

Define the weights, λ_i's, as reciprocals of marginal utilities of income. This

[7] The weighted utilitarian social welfare function is used here. The optimal choice of this social welfare function is always Pareto efficient since every Pareto efficient point can be selected for some legitimate social welfare function. See Proposition 5.2 and 5.3 in Kreps (1990).

implies that the member who has a large income will have small marginal utility of income and large weight in the social welfare function of this group. Then consider the interest group in which each member's relative status within this group will be determined by his income levels[8]. Thus our objective is to check whether there exists a sharing rule which satisfies (i), (ii), and (iv). This is the first order problem which Williams and Radner (1995) called. The following proposition will claim that the first order problem is solvable when utility is nontransferable. That means efficiency can be attained.

Proposition 4. When there are several (more than two) levels of political outcome for the interest group whose social welfare function is (iv), there exist the sharing rules which can attain efficiency given that members' utilities are nontransferable

Proof. The objective of this group is to maximize the social welfare function, (iv), as follows.

$$\underset{g_1,\cdots,g_n}{Max}\sum_{i=1}^{n}\lambda_i U_i\left(\Pi_i + E\left(s_i\left(X\right)\middle| g\right) - g_i\right).$$

The first-order conditions are as follows.

$$\lambda_i U_i^{'}\left(\Pi_i + E\left(s_i\left(X\right)\middle| g^*\right) - g_i^*\right)\left[\sum_{j=1}^{m} s_i\left(X_j\right) f_i\left(X_j, g^*\right) - 1\right]$$

$$+\sum_{k\neq i}\lambda_k U_k^{'}\left(\Pi_k + E\left(s_k\left(X\right)\middle| g^*\right) - g_k^*\right)\left[\sum_{j=1}^{m} s_k\left(X_j\right) f_i\left(X_j, g^*\right)\right] = 0, \qquad i = 1,\cdots,n. \quad (□)$$

8 It does not reflect the power structure of an interest group but represents one of the possible structure of the interest group. So λ_i is not the marginal strength of power of i in Zusman and Rausser (1994).

The contribution profile (g^*) which satisfies the above conditions is Pareto efficient. Here consider the budget balance constraint. Since $s_i\left(X_j\right) = X_j - \sum_{k \neq i} s_k\left(X_j\right)$ by the budget balance constraint, then (v) will be changed as follows.

$$\lambda_i U_i^{'}\left(\Pi_i + E\left(s_i\left(X\right) \middle| g^*\right) - g_i^*\right)\left[\sum_{j=1}^{m} X_j f_i\left(X_j, g^*\right) - 1\right]$$

$$+\sum_{k \neq i}\left[\lambda_k U_k^{'}\left(\Pi_k + E\left(s_k\left(X\right) \middle| g^*\right) - g_k^*\right) - \lambda_i U_i^{'}\left(\Pi_i + E\left(s_i\left(X\right) \middle| g^*\right) - g_i^*\right)\right]\left[\sum_{j=1}^{m} s_k\left(X_j\right) f_i\left(X_j, g^*\right)\right]$$
$$= 0 .$$

Since $\lambda_i U_i^{'} = 1, \forall i$, by the property of the social welfare function of this group, then the above will become as follows.

$$\sum_{j=1}^{m} X_j f_i\left(X_j, g^*\right) = 1, \qquad i = 1, \cdots, n . \quad (\square)$$

The above shows that if the budget balance constraint is satisfied, then the efficiency condition for the social welfare function of this group is reduced to the above condition which is the same as the efficiency condition for the case of transferable utility. Suppose that for (ii) there is a Nash equilibrium contribution profile which also satisfies the above condition. Then ask whether there exist sharing rules sustaining a Nash equilibrium which is efficient. Let g^* be the contribution profile which satisfies (vi). Thus the question is if there exist sharing rules which satisfy the following condition.

$$\sum_{j=1}^{m} s_i\left(X_j\right) f_i\left(X_j, g^*\right) = 1, \qquad i = 1, \cdots, n .$$

The above is the system of n linear equations. Let

$$Q^T = \left[s_1(X_1) \cdots s_1(X_m) s_2(X_1) \cdots s_2(X_m) \cdots s_n(X_1) \cdots s_n(X_m) \right]_{1\times mn}.$$

Then the above system of linear equations can be written as follows.

$$PQ = B, \text{ where } B \text{ is } n\times 1 \text{ matrix and } B = \left[1 \quad 1\cdots\cdots 1\right]^T.$$

Here P is an $n\times mn$ matrix and consists of n blocks in a row, $P = P_1 P_2 \cdots P_n$, where P_i is the $n\times m$ matrix as follows.

$$P_i = \left(f_i \begin{pmatrix} Z_{i-1,m} \\ X_j, g^* \\ Z_{n-i,m} \end{pmatrix} \right)_{1\le j\le m}$$

where $Z_{l,m}$ denotes the $l\times m$ zero matrix.

Here there are n equations which reflect the condition for equating the marginal expected share for each member to the marginal disutility of his political contribution. So the question is if there exists a solution for these n equations. For these n equations to be solvable the rank of P should be n. Since P is the $n\times mn$ matrix and $B\in\Re^n$, then if rank(P) = n, the solution set forms a $(mn-n)$ dimensional affine space as $A^{mn-n} = \{Q | PQ = B\}$.

Let's check $rank(P) = n$. To check this, it has to be shown that there exist at least n linearly independent columns in P. Since $\sum_{j=1}^{m} f(X_j, g) = 1$, then $\sum_{j=1}^{m} f_i(X_j, g) = 0$. So given this fact, by using the column operation, the last column of each P_i can be made as the column with all zero entries. Denote the first column of each P_i as C_i. Then

i th entry of C_i is $f_i\left(X_1, g^*\right)$ and other entries of C_i are all zero. So the set $\left\{C_{1,} \cdots, C_n\right\}$ is linearly independent. Therefore, $rank\left(P\right) = n$ should hold. Q.E.D.

As in Williams and Radner (1995), efficiency plays minor role in the above proof. The above proof shows that it is possible to solve the first-order condition of each member's problem for sustaining efficient contribution profile as a Nash equilibrium with the budet-balancing sharing rules. Thus it cannot be always guaranteed that efficiency will be attained but there can be the possibility of attaining efficiency. The possibility of attaining efficiency implies that it's possible to have the case when group size won't matter. Then, for that case, the hypothesis of "small group dominance" is not appropriate.

The above proposition is based on the assumption that the sharing rules are completely designed by the coordinator. There might be the case that the political outcome of some interest group will be fully distributed by the sharing rules designed by some coordinator. However, there might be also the case that the whole or some part of political outcome for some group will be distributed by some fixed rule which depends on either the market structure or the type of policy instrument. If nobody can devise the rule for sharing the political outcome for some political pressure group, which means that the welfare change of each member caused from the government policy for this group cannot be affected by the rule devised by some coordinator or the agreement of members within this group, then efficiency cannot be achieved given that each member decides his political contribution independently[9]. However, there might

[9] In this section one of the important assumptions is that the decision-making process for an interest

exist government policies which partially determine each member's welfare change, which means that some part of the political outcome is distributed to each member by some fixed rule but other part of it can be distributed by some scheme or rule devised within this group. Consider the case that there is some industry and for this industry the government has two policy instruments which are the restriction of production capacity and the direct subsidy to this industry. In this case it needs to find if efficiency can be attained. If the sum of welfare change from the restriction of production capacity is zero, then efficiency can be attained[10]. This is the only case which is consistent with Proposition 3 when the political outcome will not be completely distributed to each member by the sharing rule designed by the coordinator within an interest group. For this, we have the following example.

Example 1. Consider an interest group which consists of two members (1,2). There are three possible outcome levels $\left(X_1 = 0, X_2 = 2, X_3 = 4\right)$. Members 1 and 2 have their own initial profits, Π_1 and Π_2, respectively. Member i 's choice is his political

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group is decentralized. However, if there is a coordinator or mechanism designer who rules the decision-making process, then it is possible that efficiency can be attained provided that the fixed sharing rule is common knowledge and there is no private information.

[10] It is different from the case of linear sharing rules. Williams and Radner (1995) showed that if a sharing rule, $s_1\left(X\right),\cdots,s_n\left(X\right)$ is linear, that is, $s_i\left(X\right)$ has the form $s_i\left(X\right)=\tau_i\left(X\right)+\varepsilon_i$, then the Nash equilibrium under a linear sharing rule is inefficient. In our case the sharing rule will depend not only on the outcome level. But also on the other environment, this sharing rule has the form as $s_i\left(Q,X\right)=\delta_i\left(Q\right)+p_i\left(X\right)$, where $\sum_{i=1}^{n}\delta_i\left(Q\right)=0$. So in this case Proposition 4 will not be altered.

contribution g_i, where $g_i \in [0, \Pi_i]$. The density $f(X, g)$ is

$$f(X_1, g) = 1 - \frac{4}{5}\frac{g_1}{\Pi_1} - \frac{2}{3}\frac{g_2}{\Pi_2},$$
$$f(X_2, g) = \frac{2}{5}\frac{g_1}{\Pi_1} + \frac{1}{6}\frac{g_2}{\Pi_2},$$
$$f(X_3, g) = \frac{2}{5}\frac{g_1}{\Pi_1} + \frac{1}{2}\frac{g_2}{\Pi_2}.$$

Member i's utility is represented as

$$U_i = \ln\left(\Pi_i + E\left(s_i\left(X|g\right)\right) - g_i^2\right), \qquad i = 1, 2.$$

This group's social welfare function is

$$\lambda_1(g)\ln\left(\Pi_1 + E\left(s_1\left(X|g\right)\right) - g_1^2\right) + \lambda_2(g)\ln\left(\Pi_2 + E\left(s_2\left(X|g\right)\right) - g_2^2\right).$$

So the optimal contribution profile for this social welfare function is

$$\left(g_1^*, g_2^*\right) \in \arg\max_{g_1, g_2}\left[\lambda_1(g)\ln\left(\Pi_1 + E\left(s_1\left(X|g\right)\right) - g_1^2\right) + \lambda_2(g)\ln\left(\Pi_2 + E\left(s_2\left(X|g\right)\right) - g_2^2\right)\right]$$

At $\left(g_1^*, g_2^*\right)$,

$$\lambda_1(g^*) = 1 \Big/ \frac{1}{\Pi_1 + E\left(s_1\left(X|g^*\right)\right) - g_1^{*2}},$$

$$\lambda_2(g^*) = 1 \Big/ \frac{1}{\Pi_2 + E\left(s_2\left(X|g^*\right)\right) - g_2^{*2}}$$

That's the nature of this group's social welfare function. So, if the budget balance constraint is satisfied, then $\left(g_1^*, g_2^*\right)$ will satisfy the following condition.

$$\sum_{j=1}^{3} X_j f_i\left(X_j, g^*\right) = 2g_i^*, \qquad i = 1, 2. \quad (\square)$$

Thus, $g_1^* = \dfrac{6}{5\Pi_1}, g_2^* = \dfrac{7}{6\Pi_2}$. The sharing rule is as follows.

$$s_i\left(\Pi, X_j\right) = \alpha\left(\Pi_i - \overline{\Pi}\right) + P_i\left(X_j\right), \qquad i = 1, 2, \text{ and } j = 1, 2, 3,$$

where $0 \le \alpha \le 1$ which is exogenously given and $\overline{\Pi} = \dfrac{\Pi_1 + \Pi_2}{2}$.

The first term is the fixed sharing rule which is dependent upon the income distribution of this group and the second term is the sharing rule which can be devised by the coordinator. Since $\sum_{i=1}^{2} \alpha\left(\Pi_i - \overline{\Pi}\right) = 0$, then the condition (vii) will be reduced as

$$-4P_1\left(X_1\right) + 2P_1\left(X_2\right) + 2P_1\left(X_3\right) = 12$$

$$-4P_2\left(X_1\right) + P_2\left(X_2\right) + 3P_2\left(X_3\right) = 14.$$

This is the system of two linear equations with the six unknowns, $P_i\left(X_j\right)$, $i = 1, 2,$ and $j = 1, 2, 3.$ So the set of all solutions is the four-dimensional space as follows.

1) $s_1\left(\Pi, X_1\right) = \alpha\left(\Pi_1 - \overline{\Pi}\right) + r_1$ $\qquad$ $s_2\left(\Pi, X_1\right) = \alpha\left(\Pi_2 - \overline{\Pi}\right) - r_1$

$s_1\left(\Pi, X_2\right) = \alpha\left(\Pi_1 - \overline{\Pi}\right) + 9 + r_1$ $\qquad$ $s_2\left(\Pi, X_2\right) = \alpha\left(\Pi_2 - \overline{\Pi}\right) - 7 - r_1$

$s_1\left(\Pi, X_3\right) = \alpha\left(\Pi_1 - \overline{\Pi}\right) - 3 + r_1$ $\qquad$ $s_2\left(\Pi, X_3\right) = \alpha\left(\Pi_2 - \overline{\Pi}\right) + 7 - r_1$

2) $s_1\left(\Pi, X_1\right) = \alpha\left(\Pi_1 - \overline{\Pi}\right) - 9 + r_2$ $\qquad$ $s_2\left(\Pi, X_1\right) = \alpha\left(\Pi_2 - \overline{\Pi}\right) + 9 - r_2$

$s_1\left(\Pi, X_2\right) = \alpha\left(\Pi_1 - \overline{\Pi}\right) + r_2$ $\qquad$ $s_2\left(\Pi, X_2\right) = \alpha\left(\Pi_2 - \overline{\Pi}\right) + 2 - r_2$

$$s_1(\Pi, X_3) = \alpha(\Pi_1 - \overline{\Pi}) - 12 + r_2 \qquad s_2(\Pi, X_3) = \alpha(\Pi_2 - \overline{\Pi}) + 16 - r_2$$

3) $s_1(\Pi, X_1) = \alpha(\Pi_1 - \overline{\Pi}) + 3 + r_3 \qquad s_2(\Pi, X_1) = \alpha(\Pi_2 - \overline{\Pi}) - 3 - r_3$

$$s_1(\Pi, X_2) = \alpha(\Pi_1 - \overline{\Pi}) + 12 + r_3 \qquad s_2(\Pi, X_2) = \alpha(\Pi_2 - \overline{\Pi}) - 10 - r_3$$

$$s_1(\Pi, X_3) = \alpha(\Pi_1 - \overline{\Pi}) + r_3 \qquad s_2(\Pi, X_3) = \alpha(\Pi_2 - \overline{\Pi}) + 4 - r_3$$

4) $s_1(\Pi, X_1) = \alpha(\Pi_1 - \overline{\Pi}) - 7 - r_4 \qquad s_2(\Pi, X_3) = \alpha(\Pi_2 - \overline{\Pi}) + 4 - r_4$

$$s_1(\Pi, X_2) = \alpha(\Pi_1 - \overline{\Pi}) + 2 - r_4 \qquad s_2(\Pi, X_2) = \alpha(\Pi_2 - \overline{\Pi}) + r_4$$

$$s_1(\Pi, X_3) = \alpha(\Pi_1 - \overline{\Pi}) - 10 - r_4 \qquad s_2(\Pi, X_3) = \alpha(\Pi_2 - \overline{\Pi}) + 14 + r_4$$

The choice of $(r_1, r_2, r_3, r_4) \in \Re$ will determine a particular solution.

The above example shows that there exists a case that efficiency can be attained even if the political outcome for some interest group is not completely distributed to each member by the sharing rules designed by the coordinator of this group. From the above proposition and example it can be assured that efficiency can be achieved, which means that free-riding problem can be overcome for some political pressure group even when the decision-making process for this group is decentralized. For the case that efficiency is attained, group size will not affect the organizational efficiency of this group. So the hypothesis of "small group dominance" is not relevant for this case. Thus from the result of this study, it is recognized that the hypothesis of "small group dominance" is incomplete and cannot be generalized. However, the cases where efficiency can be attained are very limited. Thus the hypothesis of "small group dominance" cannot be completely denied.

3. Conclusions

Usually, the nature of the outcome of political behavior of an interest group will cause free-riding behavior of its members. So attaining efficiency is dependent upon whether free-riding problem can be overcome. If it is impossible to attain efficiency given the informational and organizational structure, then free-riding problem will be getting worse as group size increases, which is the hypothesis of "small group dominance." This study shows that it is possible to have the case that efficiency can be attained. Therefore the hypothesis of "small group dominance" is hard to be generalized.

The difficulty of analyzing the organizational efficiency of an interest group is in the fact that there are various kinds of groups and the properties of political outcome will depend upon the policy instruments chosen by the government. So attaining efficiency will depend on the organizational and informational structure of the interest group and the property of political outcome. According to this study, in many cases efficiency cannot be attained and then the hypothesis of "small group dominance" is verified but in some limited case efficiency can be achieved and the group size does not matter. Thus, in real political arena there exist these two conflicting forces, which means that under some conditions the smaller is the group, the better is gaining favor from the government but under other conditions group size makes no difference. Therefore, there might be an "optimal" group size for gaining benefit from the government.

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