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16. Models of Interest Groups: Four Different Approaches

Jan Potters and Frans van Winden

16.1 Introduction

Many students of political economy have stressed the importance of interest groups for the formation of public policy. Empirical studies seem to confirm this alleged importance. These studies, however, typically focus on the relationship between the presence and characteristics of groups, on the one hand, and the policies that result on the other hand, leaving out the behavior and interaction in between;¹ in this respect they resemble the structure-performance approach in industrial organisation. Neglected are the determinants of the level and kind of activities of groups and the explanation of the influence of these activities on public policy.

Lack of data is, of course, a major obstacle for the incorporation of interest group activity in empirical models. However, in order to gain insight—and to guide the collection of adequate data—one could proceed deductively and develop theoretical models and hypotheses. Since interest group politics refer to situations with strong strategic features, game theory seems a particularly appropriate modelling tool here, *cf.* Elster (1986), Johansen (1979), and van Winden (1988).

The present paper reviews and discusses the game-theoretical literature of interest groups. Attention is focused on two central problems, regarding the way in which these models determine and explain (a) the level and kind of interest group activity, and (b) the influence of interest groups on government policy. In this regard, special attention will be given to formal aspects, in contrast with the more interpretative surveys of Mitchell and Munger (1991) and Tollison (1982).

The relevant literature can by and large be divided into four approaches depending on whether they employ an *influence function*, a *vote function*, or a *composite utility function* or focus on the *transmission of information*. These four approaches will be dealt with in Sections 16.2 through 16.5, respectively, followed by some concluding remarks in Section 16.6. As the last two approaches have received little or no attention in other surveys of interest groups models,² they will play a relatively prominent role in the present survey. Nevertheless, it should be clear that this brief discussion cannot do full

¹See, e.g., Kau and Rubin (1979), Mueller and Murrell (1986), Pincus (1979), Plotnick (1986), Renaud and van Winden (1988), and Salamon and Siegfried (1977).

²See Kolman (1992), Mitchell and Munger (1991), Morton and Cameron (1992), and Tollison, (1982).

justice to all the details and the results of these studies.

16.2 Models with an Influence Function

The basic idea behind most models on interest groups, such as those on rent-seeking, is that the political process can be treated as a kind of market. The 'goods' supplied by politicians and bureaucrats in this 'political market' are certain policies (regulation, transfers, public goods). The interest groups are the demanders of these goods and the 'price' of the goods is the (monetary equivalent of the) amount of pressure by the groups directed towards the polity. A characteristic aspect of these models is the use of an *influence function*, to represent the 'supply' of government policies.³ The following, rather general, setup is inspired by Becker (1983, 1985).

There are two groups (lobbies), L^1 and L^2 , of size n^1 and n^2 , respectively. Regarding a certain governmental decision variable x , it is assumed that L^1 favors an increase of x and L^2 favors a decrease of x .⁴ The level of x is assumed to be determined by an influence function I , which relates the variable x to the pressure ($p^i, i = 1, 2$) produced by the two groups and a vector z of exogenous variables:

$$x = I(p^1, p^2, z)$$

with

$$I_1 := \frac{\partial I}{\partial p^1} > 0,$$

and

$$I_2 := \frac{\partial I}{\partial p^2} < 0.$$

The level of pressure p^i by L^i depends on the amount of resources y^i it spends on the production of pressure and the extent to which it is able to control free riding. It is assumed that a large group has more problems controlling free riding and hence can produce less pressure:

$$p^i = p^i(y^i, n^i),$$

with

$$p_y^i := \frac{\partial p^i}{\partial y^i} > 0,$$

and

$$p_n^i := \frac{\partial p^i}{\partial n^i} < 0,$$

³See, e.g., the models of Congleton (1983), Feenstra and Bhagwati (1982), Findlay and Wellisz (1983), Fisher (1992), Levy (1989), Michaels (1989), Mitra (1989), Rodrik (1986), Tullock (1980), Rogerson (1982), Wellisz and Wilson (1986), and Wong (1989). Furthermore, see Cairns (1989) for a dynamic model and Coggins, *et al.* (1991) for a general equilibrium model.

⁴In the rent-seeking literature x is usually the probability that the rent (e.g., a monopoly right or license) is obtained by L^1 , and $1 - x$ the probability that the rent is given to L^2 . Furthermore, the 'groups' considered usually are individual firms. Consequently, $n^1 = n^2 = 1$, and free-rider problems (see below) can be ignored.

and

$$p_{yn}^i := \frac{\partial p_y^i}{\partial n^i} < 0.$$

Spending resources implies a cost. So, with respect to the utility functions $v^i(x, y^i)$ of the (representative individual of the) groups, $i = 1, 2$, it is assumed that:

$$v_y^i := \frac{\partial v^i}{\partial y^i} < 0;$$

$$v_x^1 := \frac{\partial v^1}{\partial x} > 0;$$

$$v_x^2 := \frac{\partial v^2}{\partial x} < 0.$$

The equilibrium level of resources spent by the groups are now determined by assuming non-cooperative (Nash-Cournot) behavior. Each group maximizes its utility function, taking the action of the other group as given. Hence, for $i = 1, 2$:

$$\frac{dv^i}{dy^i} = v_x^i I_i p_y^i + v_y^i = 0.$$

If the second-order conditions are satisfied, the first-order conditions determine the strategies (best reply functions) σ^i of each group, that is, the resources spent by one group as a function of the resources spent by the other group: $y^1 = \sigma^1(y^2)$ and $y^2 = \sigma^2(y^1)$. Solving for y^1 and y^2 gives the Nash equilibrium.⁵ In turn, the equilibrium values of (y^1, y^2) determine the equilibrium values of pressure (p^1, p^2) and the equilibrium value of $x = I(p^1, p^2, z)$.

In the literature this setup is mainly used to study the social costs of pressure and rent-seeking. Many studies are concerned with understanding to what extent the gain of rents to rent-seekers is dissipated in the competition to obtain the rent.⁶ Although the issue is of great importance from a welfare-theoretic point of view, it does not provide much insight into the positive-theoretic issues addressed in this survey.

An important asset of the model, from a positive-theoretic point of view, is that it nicely disentangles the pressure process by making a meaningful distinction between (1) an individual member's contribution, y^i/n^i , (2) a group's total outlays on the production of pressure, y^i , (3) the actual pressure produced by a group, $p^i(y^i, n^i)$, and (4) the influence resulting from the combination of pressures produced by the two groups, $I(p^1, p^2, z)$. This distinction, for instance, can be used to show that the impact of a group's size on the

⁵ It is noted that an exogenous increase in the amount of resources spent by one group can either increase or decrease the amount of pressure by the other group, as it can be derived that $\text{sign}(d\sigma^1/dy^2) = -\text{sign}(d\sigma^2/dy^1) = \text{sign}(I_{12})$, if I is twice continuously differentiable.

⁶ See, e.g., Delorme and Snow (1990), Hillman and Katz (1984, 1987), Tullock (1980, 1989). Becker (1983, 1985) is mainly concerned with the mutual impact of the deadweight (efficiency) costs due to x and the competition between the interest groups.

pressure process is not at all a trivial matter. This is especially so, if the vector of exogenous variables z contains the size of the groups, that is, if the size of the groups somehow 'counts' in the political process.

As will be shown now, these features of the model allow for the derivation of some interesting comparative-static results regarding the amount of pressure produced by a group. In this regard, it is useful to make a distinction between (a) the case that x is a *private* good (or bad) to the individual members of a group, and (b) the case that x is a *public* good (or bad) to the members of a group. The competition between the groups is not essential for these results but complicates their derivation. To simplify matters it will, therefore, be assumed that $I_{12} = I_{21} = 0$, implying that the best reply function of one group is independent of the level of resources spent by the other group. Furthermore, we shall focus on interest group L^1 , the one that considers x a *good*. The results for the group that considers x a *bad*, L^2 , are similar.

First, case (a) is considered, where x is a private good to the individual members, and it is assumed that the benefits and costs, x and y^1 , are shared equally among them. Furthermore, it is assumed that utility is linear in x and y : $v^1(x, y^1) = x/n^1 - y^1/n^1$ (as in Becker 1983, 1985) where x is the amount of money to be redistributed from L^2 to L^1 . The first-order condition for a Nash equilibrium is simply $I_1 p_y^1 = 1$, and the second-order condition holds if it is assumed that there are decreasing returns in the production of both pressure and influence ($p_{yy}^1 < 0$ and $I_{11} < 0$).

A first comparative-static result is that the level of pressure of a group increases if the group becomes more efficient in its production or if the policymaker becomes more susceptible to its pressure. To see this suppose that there is an exogenous upward shift in p_y^1 or I_1 (inducing not too large a shift in p^1 and I). Then the first-order condition, $I_1 p_y^1 = 1$, implies that y^1 must rise.

The next result concerns the impact of a group's size on the level of pressure. For its derivation it will be assumed that a group's size 'counts' in the political process. Specifically, it is assumed that the marginal influence of the group's pressure is increasing in its size, that is, $I_{1n} := \partial I_1 / \partial n^1 > 0$. Totally differentiating the first-order condition with respect to p^1 and n^1 and rearranging terms gives:

$$\frac{dp^1}{dn^1} = - \frac{(I_{11} p_n^1 + I_{1n}) p_y^1 + I_1 p_{yn}^1}{I_{11} p_y^1 + I_1 p_{yy}^1 / p_y^1}.$$

Since the denominator is negative, it is found that $dp^1/dn^1 > 0$ if and only if $(I_{11} p_n^1 + I_{1n}) p_y^1 + I_1 p_{yn}^1 > 0$. This condition need not hold because $p_{yn}^1 < 0$, due to the free rider problem. However, we could say that pressure by a group is 'more likely' to increase with its size if I_{1n} is large, that is, if the marginal influence of a group's pressure varies significantly with its size. It may perhaps be expected that a group's size has a stronger impact on its marginal influence in the legislative branch of government than in the executive branch, due to the legislature's dependence on electoral support. Therefore, an interesting, albeit somewhat loose, interpretation of this second comparative-static result

is that large groups, contrary to small groups, are more likely to direct their pressure at legislators than at bureaucrats.

To derive a third result, case (b) is considered, where the public good x is consumed equally by all members of L^1 , that is, $v^1(x, y^1) = x - y^1/n^1$. The first-order condition for an equilibrium is $I_1 p_y^1 n^1 = 1$. Differentiating with respect to p^1 and n^1 yields:

$$\frac{dp^1}{dn^1} = - \frac{(I_1/n^1 + I_{11}p_n^1 + I_{1n})p_y^1 + I_1 p_{yn}^1}{I_{11}p_y^1 + I_1 p_{yy}^1/p_y^1}.$$

Now it is seen that $dp^1/dn^1 > 0$ if and only if $(I_1/n^1 + I_{11}p_n^1 + I_{1n})p_y^1 + I_1 p_{yn}^1 > 0$. Since $I_1 p_y^1/n^1 > 0$, $dp^1/dn^1 > 0$ is, *ceteris paribus*, 'more likely' to hold than in case (a) where x is a private good to the members of L^1 . An interesting interpretation of this result is that larger groups are more likely to produce pressure in the pursuit of public goods (*e.g.*, defense, environmental protection, tariffs) than in the pursuit of private goods (such as transfers) that have to be divided among a large number of group members (*cf.* Rodrik 1986).

The models that use an influence function will now be evaluated in light of the problems, mentioned in the introduction, concerning the determination and explanation of the level and kind of activities and their impact on government policy. First of all, it was seen that these models can be used to derive some interesting comparative-static results, regarding the determination of the *level* of pressure activities. An interest group was seen to spend more resources on pressure if it becomes more efficient in the production of pressure and if the policymaker becomes more susceptible to this pressure. Moreover, these models suggest that small (large) groups are more likely to direct their efforts towards the executive (legislative) branch and that they are more likely to vie for rents, that have a private (public) good characteristic.

However, the models exhibit two important limitations. One is that the production process of pressure is treated as a black box, in the sense that it is simply assumed that pressure is produced by spending resources. The *kind* of activities involved are not specified. Another major limitation is that the influence of the pressure by the interest groups is assumed but *not explained*. The government is not modelled as a player but is assumed to behave mechanistically in response to pressure. The focus is solely on the demand side, that is, on the behavior of interest groups.⁷

16.3 Models with a Vote Function and Campaign Contributions

The single activity by interest groups that is most intensively studied is contributing to the political campaigns of parties and candidates. The main reason for this is not the undisputed importance of this activity, but the relative

⁷ An exception is Appelbaum and Katz (1987), where a political candidate in setting the size of a rent x makes a trade-off between the bribes (y_1) received from producers (L_1) and the electoral punishment (y_2) by voters (L_2). In this sense, the model is close to the type of models dealing with campaign contributions, which are discussed in the next section.

abundance of data, in particular on the so-called Political Action Committees in the U.S. These data can and have been employed to test the implications of two competing theoretical models on campaign contributions.

In the first set of models the main behavioral assumption is that contributions by an interest group to a party's campaign elicit a favorable policy position by the party. (See Aranson and Hinich 1979, and Welch 1989.) In the second set of models the crucial assumption is that a particular party will receive more votes in the election when it spends more money on its political campaign. Hence, an interest group contributes to the campaign of a favored party in order to increase the expected number of votes.⁸ The essentials of both types of models will be discussed below. Attention will be focussed on versions of the models with only one interest group. Generalizations to more groups are possible, but do not add much to the issues at stake in the present survey.

A basic version of the first type of models is the following. Let $v(x) - y_1 - y_2$ denote an interest group's utility function, with y_j the contribution to the electoral campaign of party G_j ($j = 1, 2$) and x the extent to which the policy that will be implemented after the elections is favorable to the interest group. It is assumed that $v' > 0$ and $v'' < 0$. The important assumption is that party G_j will implement a policy, x_j , when in office, which is more favorable to the interest group the more the group has contributed to the party's campaign, that is, $x_j = F_j(y_j)$, with $F'_j > 0$, $F''_j < 0$. Furthermore, it is assumed that the probability π_j that party G_j is elected is fixed, with $\pi_1 = 1 - \pi_2$. Hence, the group's expected benefits from contributing to the campaign of party G_j are maximized if $\pi_j v' F'_j = 1$. The model has two main implications: (1) the interest group may contribute to the campaigns of *both* parties; (2) the group's optimal contribution y_j to party G_j is increasing in π_j . A group contributes more to the campaign of a party or candidate if the latter is more likely to win the election:

$$\frac{dy_j}{d\pi_j} = -\frac{v' F'_j}{\pi_j [v'' (F'_j)^2 + v' F''_j]} > 0.$$

Evidently, the use of an influence function (here, F) to represent the transformation of donations into the party's platform makes this type of model very similar to the models presented in the previous section.

In the second type of model, it is assumed that an interest group takes the (expected) policy positions of the parties as given, and that campaign contributions are aimed at influencing the election outcome. The following game-theoretic version has one interest group, L , and two parties or candidates, G_1 and G_2 .

Let the utility function of the interest group again be given by $v(x) - y_1 - y_2$. It is assumed that party G_j implements policy x_j once in office, and that L takes these policy positions as given. Let $\pi_1 = \pi$ be the probability that G_1 wins the election, and $\pi_2 = 1 - \pi$ the probability that G_2 wins. It is

⁸See Austen-Smith (1987), Brock and Magee (1980), Edelman (1992), Hillman and Ursprung (1988), Magee and Brock (1983), Ursprung (1990), and Wilson (1990).

assumed that π is a function of D , the difference in the expected percentage of votes for G_1 and G_2 :

$$\pi = \pi(D),$$

with

$$\pi' > 0,$$

and

$$\text{sign}(\pi'') = -\text{sign}(D).$$

Figure 1. Winning probability and difference in expected percent of votes.

A typical example of the function π is a cumulative distribution function, as illustrated in Figure 1. An important feature of the function is that the impact of a change of D on π is largest when D is close to zero, that is, when π is close to 0.5.

A group contributes to the campaign of a party in order to enable the party to run a good campaign and increase its election chances. This is reflected in the crucial assumption that D is a function of both the platforms of the parties and their campaign spending, $D = D(x_1, x_2, y_1, y_2)$. The function D —or the composite function $\pi(D)$ —can be referred to as a *vote function*. It is assumed that there are positive but decreasing voting returns to campaign spending:⁹

$$\begin{aligned} D_1^y &:= \partial D / \partial y_1 > 0 & D_2^y &:= \partial D / \partial y_2 < 0, \\ D_{11}^y &:= \partial D_1^y / \partial y_1 < 0 & D_{22}^y &:= \partial D_2^y / \partial y_2 > 0. \end{aligned}$$

Finally, expected utility V of L is given by:

$$V = \pi v(x_1) + (1 - \pi)v(x_2) - y_1 - y_2.$$

A first result that follows from this model is called the 'specialization theorem,' which says that an interest group will never contribute to the campaigns of both parties. To see this, note that from

⁹In most models the positive relationship between campaign spending and the expected percentage of votes is *assumed*. Austen-Smith (1987) is an exception. In his model the relationship is *derived* from the assumption that campaign spending enables a party to clarify its policy position to the risk-averse and incompletely informed, voters. His study tries to open up the 'black box of voting' that characterizes many other models.

$$\pi' > 0, D_1^y > 0, D_2^y < 0,$$

and

$$\frac{dV}{dy_j} = \pi' D_j^y [v(x_1) - v(x_2)] - 1,$$

it follows that $dV/dy_1 < 0$ for all y_1 when $x_1 < x_2$ and that $dV/dy_2 < 0$ for all y_2 when $x_1 > x_2$. Hence, an interest group never contributes to the party that it likes least. In the sequel it is assumed that party G_1 is the one with the most favorable policy position for the interest group, $x_1 > x_2$, and, for simplicity, the utility function is normalized such that $v(x_2) = 0$. The first-order condition for the optimal donation y_1 to G_1 then is

$$\pi' D_1^y v(x_1) = 1,$$

assuming that the second-order condition is satisfied, that is,

$$\pi' D_{11}^y + \pi'' (D_1^y)^2 < 0.$$

Given these assumptions, a second result is that the optimal contribution y_1 is increasing in x_1 , $dy_1/dx_1 > 0$, and that we have $y_1 (= y_2) = 0$ if $x_1 = x_2$. This follows from the first- and second-order conditions (when D_{11}^{yx} is not too negative). Hence, a group's contribution to a party is increasing in the attractiveness of a party's platform (relative to the platform of the other party). A third result is that the optimal contribution is increasing in π' . From the shape of the function $\pi(D)$ it follows that π' attains its maximum when $D = 0$. Therefore, this result is usually interpreted as saying that interest groups contribute more to the campaign of their favored party or candidate if the election is expected to be 'close,' (e.g., Mueller, 1989, p. 209).

Finally, the behavior of party G_1 is considered. With respect to the platform x_1 it is assumed that $D_1^x := \partial D / \partial x_1 < 0$ (for $x_1 > x_2$). The idea behind this assumption is that the voters punish a party if it provides special benefits to an interest group. As a consequence, a party has to weigh the direct effect of its platform on the expected vote against the indirect impact of its platform, which runs via the campaign contributions (cf. Denzau and Munger 1986).¹⁰ Assuming that G_1 attempts to maximize π , the first-order condition for an interior optimum of x_1 is: $\pi' [D_1^x + D_1^y (dy_1/dx_1)] = 0$. Phrased in these general terms, however, it is hard to derive additional propositions concerning the problems that are at issue here.

In summary, the two main competing hypotheses that can be derived from the models of the first and second type, respectively, are that an interest group mainly donates to likely winners and that contributions are particularly

¹⁰In models with two parties and two lobbies it is usually assumed that the parties play Nash amongst each other, but act as Stackelberg leaders relative to the campaign donors. Hence, a party takes the platform of the other party as given but takes account of the direct impact of its platform on the expected vote and the indirect impact via the contributions of the lobbies. See Edelman (1992) for a model with similar results, but where the donors act as Stackelberg leaders relative to the parties.

given to the favored candidates, especially in close contests. Welch (1980) mainly finds support for the former proposition, whereas, for instance, Kau, *et al.* (1982), Poole and Romer (1985) and Schlozman and Tierney (1986) find support for both relationships. Therefore, Mueller (1989, p. 213) concludes that lobbies contribute to campaigns of parties and candidates both to elicit a favorable policy from the elected party *and*—simultaneously or at other instances—to affect the election outcome.

The following can be concluded with respect to the problems central to this survey—the determination and explanation of the level and kind of activities of interest groups and the influence of each upon government policy. The first type of models—assuming that interest groups donate in order to affect the candidates' policy positions—are essentially similar to the type of models employing an influence function (Section 16.2). Some interesting results can be derived concerning the *level* of resources spent—in particular that contributions are increasing in a candidate's electoral prospects—, but a major drawback is that it is assumed that, but not explained why, a party's policy position changes in response to campaign contributions.

The second model type assumes that interest groups aim to increase the election chances of favored candidates; hence both interest groups and parties are players in the game. In this sense, these models give a rational foundation for both the demand and the supply side of the policy process. Furthermore, the level of campaign contributions was seen to be increasing in the platform difference between the candidates and the expected closeness of the election. These features are considered interesting assets of the models. There is, however, one major shortcoming, namely, that interest groups take the policy position of the candidates as given. Interest groups take actions to influence the behavior of *voters*—and thereby the (re)election chances of candidates—but not the behavior of *candidates*. Although affecting voting behavior is, of course, a means to influence government policy, it can be argued that the activities alluded to in phrases like 'exerting influence on government' in particular refer to situations in which the aim is to affect the behavior of those presently in power. Those situations, however, are not covered by these models.

16.4 Models with a Composite Utility Function

The models to be discussed in this section exhibit some cooperative features, contrary to the models presented in the previous sections. This cooperative element shows up in the distinctive characteristic of these models, namely that government policy is in accordance with the maximization of a weighted representation of the utilities of different (interest) groups. This feature is best illustrated as follows. There are N groups in society, with $v^i(x)$ the utility function of group L^i . Furthermore, let λ^i denote the 'power weight' of group L^i ($i = 1, \dots, N$). Below, it will be seen how these weights are determined by the political process. The behavioral assumptions underlying the models

imply that the value of x can be determined by the maximization of a *composite utility function*:¹¹

$$x = \arg \max \sum_{i=1}^N \lambda^i v^i(x). \quad (1)$$

The most important differences among models of this class concern the behavioral assumptions that lead to equation (1), and the determination of the power weights λ^i . Three types of models can be distinguished in this respect: models that explicitly use a *cooperative solution concept* (Aumann and Kurz 1977, Zusman 1976), models that use the *interest function approach*, developed by van Winden (1983), and finally models that hypothesize *probabilistic voting* (Coughlin, *et al.*, 1990 and Lindbeck and Weibull 1987).

Both Aumann and Kurz (1977) and Zusman (1976) use (a version of) the so-called Harsanyi-Shapley-Nash value for nontransferable utility games. For the details of this cooperative solution concept the reader is referred to Harsanyi (1977, Ch. 12) or Shapley (1988).¹² An attractive feature of this concept is that the power weights λ^i for each player are determined endogenously. Loosely speaking, the λ^i solve out two conditions: (a) a player receives the sum of his or her expected marginal contributions to any possible coalition of players that can be formed, and (b) the game between a particular coalition C and the coalition of all players outside this coalition ($N \setminus C$), is determined by the 'Nash bargaining solution'.¹³ Underlying this solution are 'maximal threats,' which the coalitions commit themselves to should bargaining break down. A typical feature of cooperative solution concepts, however, is that bargaining (between the coalitions) never breaks down, because all players anticipate on the commitment to carry out threats; Pareto inefficient outcomes are, thus, avoided.

In Aumann and Kurz's (1977) theoretical model of redistribution it is assumed that the income distribution ($x = x^1, \dots, x^N$) is determined by a majority voting rule. The players in the game are all (N) individuals in society, having utility functions $v^i(x^i)$ for income, and a fixed pre-tax income or endowment, denoted by y^i . The feasibility constraint implies that total after-tax income ($\sum_{i=1}^N x^i$) equals total pre-tax income ($\sum_{i=1}^N y^i$). Groups enter the picture because individuals can form a majority coalition, C , and then redistribute all income from the individuals outside the coalition $N \setminus C$ to the

¹¹Hence, these models are in a formal sense essentially equivalent to models that hypothesize a benevolent government. This suggests an interesting link between the 'positive' (political economic, public choice) approach and the more traditional 'normative' (social welfare maximization) approach in public economics.

¹²It must be noted that Harsanyi's and Shapley's versions differ, but the ideas underlying the solution are similar (*cf.* Owen 1982, Ch. 13). The crucial point is that the λ_i make the utilities of the players (locally) transferable, after which the Shapley value for transferable utility games is applicable. Here no full justice can be done to the formidable (technical) details of the models of Aumann and Kurz (1977) and Zusman (1976); only some main features are discussed.

¹³Binmore and Dasgupta (1987) and Binmore, *et al.* (1987) show that it is possible to derive the 'Nash bargaining solution' from an underlying non-cooperative bargaining game.

members of coalition C . The crucial point is that in this game between C and $N \setminus C$ the latter group can threaten to destroy its own pre-tax income $\sum_{i \in N \setminus C} y^i$, leaving nothing to be redistributed to C . The outcome of this game is determined by the Nash bargaining solution. Proceeding in this way for all possible coalitions, an individual's 'power' (Shapley value) can be derived from the (expected) contribution to all possible coalitions. Aumann and Kurz show that an individual's power over the *resulting* income distribution equals $\lambda^i = 1/v^{ii}(x^i)$; that is, an individual's power equals the reciprocal of his or her *ex post* marginal utility. Furthermore, the model implies that the tax t^i an individual has to pay is $t^i = v^i(x^i)/v^{ii}(x^i) - c$, where the first term on the right-hand side of this equation is a measure of risk aversion, called 'fear of ruin,' and c is a positive constant (a tax credit). The more fearful a player, the larger the tax (s)he pays. As noted above, the assumption that commitments are possible implies that the threat—to destroy one's endowments—is never carried out. Furthermore, no coalitions ('interest groups') actually form. Thus, one could say that x results from pressure activities that could, but do not actually arise.¹⁴

In Zusman (1976) government policy x refers to the regulated consumer and producer prices in a regulated market. There are two interest groups: the consumers L^1 , with $v^1(x)$ denoting consumer surplus, and the producers L^2 , with $v^2(x)$ denoting producer surplus. The government G is the third player and its objective $u(x)$ is to minimize subsidy costs. Zusman assumes that the two groups employ threats and promises to influence the government. To that purpose he introduces 'strength functions' $s^i(y^i)$, where y^i denotes the amount of resources spent by L^i ($i = 1, 2$). Zusman shows that the cooperative solution of this game is equivalent to the maximization of $u(x) + \lambda^1 v^1(x) + \lambda^2 v^2(x)$, where λ^i is equal to the 'marginal strength' ds^i/dy^i when L^i uses an optimal amount of resources y^i . A problem with this model is the specification of the strength functions s^i , as it is unclear what kind of activities would be involved to announce or carry out threats and promises. A similar problem was met with the employment of influence functions (Section 16.2).

The *interest function approach* is employed in, for instance, Borooah and van der Ploeg (1983), Drissen and van Winden (1991, 1992), Przeworski and Wallerstein (1988), Renaud and van Winden (1988), van Velthoven (1989), and van Winden (1983). Although the details of the models differ somewhat, the principal ideas are as follows. There are three basic groups or classes in society: public sector workers (politicians and bureaucrats), capitalists, and private sector workers, having utility or interest functions $u(x, y)$, $v^1(x, y)$ and $v^2(x, y)$, respectively (in some models also the 'dependents', that is, the unemployed, disabled and retired, are included as a separate group). The value of x is determined by the public sector workers and $y = (y^1, y^2)$ are the actions taken by groups L^1 and L^2 , the capitalists and private sector workers, respectively. Groups 1 and 2 play a non-cooperative game. Each group L^i maximizes its utility function $v^i(x, y)$, taking the actions of the government

¹⁴ See Gardner (1981) and Petrakis (1990) for the introduction of a government as a player in the game and Peck (1986) for an incorporation of incentive effects of taxation.

(x) and the other group (y^j) as given. This determines the best reply functions of the two groups: $y^1 = \sigma^1(x, y^2)$ and $y^2 = \sigma^2(x, y^1)$. The Nash equilibrium of this game, determines the actions of the two groups as a function of the government's action: $y = (y^1, y^2) = y(x)$. The crucial assumption is that the public sector workers (group G), when deciding upon the value of x , take account—to a greater or lesser extent—of the interests (v^1 and v^2) of the other groups because of pressure (and voting) by these groups. Hence, x is assumed to be in accordance with the maximization of the composite utility (complex interest) function: $u(x, y) + \lambda^1 v^1(x, y) + \lambda^2 v^2(x, y)$. Now, two variants can be distinguished: (1) G does not take account of the impact of x on $y = (y^1, y^2)$, that is, it plays Nash against the private sector, and (2) G does take account of the reactions [$y = y(x)$] of the groups to x , that is, it acts as a Stackelberg leader relative to the private sector. In either case, the decision variables (x, y) can be derived as a function of the 'power weights' λ^i , which are assumed to be built up by pressure.

In principle it is possible, as in Zusman (1976), to estimate the power coefficients λ^i from observed data on government policy (x). In turn, these power weights could then be regressed on group characteristics and activities to provide insight into the factors that determine the influence of groups on government policy.¹⁵ A major problem with such an analysis is that in the composite utility function of equation (1) the parameters of the utility functions of the groups interact with the power coefficients. As a consequence, it is difficult to disentangle (identify) in the estimates the effects which are due to preferences and those which are due to power. For instance, large government spending could be due to little power within groups L^1 and L^2 as well as to a high utility derived from such expenditures by L^1 and L^2 . As a first attempt the numerical strengths of the groups could be taken as an explanatory variable for the λ^i . Such an exercise allows for an interesting (dynamic) interaction between political and economic factors. The power weights determine government policy, whereas government policy in its turn co-determines economic development, in particular the levels of employment in the private and public sector, which again co-determine the relative power of the different groups. Some empirical support for the hypotheses derived from such a theoretical exercise is reported in van Velthoven and van Winden (1985, 1986). Nevertheless, this approach still shows some important lacunae, as, so far, it offers only empirical, but no rigorous behavioral-theoretic, support for the use of numerical strength as proxy for the power of a group (see below, however).

Interest groups are introduced in a *probabilistic voting model* by Coughlin, *et al.* (1990) and Lindbeck and Weibull (1987). It is assumed that an incumbent government or party G has to choose its policy or platform x in a forthcoming election. There are N groups in society and group L^i has n^i members ($i = 1, \dots, N$). Each individual member j of group L^i has the same utility function $v^i(x)$ over G 's policy, but in addition a personal utility 'bias' b_{ij} in favor of ($b_{ij} > 0$), or against ($b_{ij} < 0$), G 's position. It is assumed

¹⁵ See Svenjar (1986) for an interesting estimation along these lines of a cooperative game model of union-firm bargaining.

that b_{ij} is a random variable with uniform distribution over the interval (l^i, r^i) . Normalizing the utility obtained from the challenging party to zero, it is assumed that voter ij will vote for G if and only if $v^i(x) + b_{ij} > 0$. Assuming that $l^i < v^i(x) < r^i$, the following result applies. If G chooses its platform so as to maximize its expected margin of victory then it will set x in accordance with equation (1), with $\lambda^i = n^i / (r^i - l^i)$.

Apart from voting there is no strategic behavior of interest groups in the model. Individual voters are assumed to vote for the party they prefer, but it is not necessarily the case that all members of the same group vote for the same party. Groups enter the picture only in that they determine a systematic part of a voter's preferences, and are as such a focus for parties in determining their platforms. Nevertheless, it is a remarkable result that the assumption that the government cares only about re-election can lead to behavior that is formally similar to a behavioral rule that would apply to a benevolent government caring about the (weighted) welfare of its citizens.¹⁶ A further interesting result is that the extent to which the interests $v^i(x)$ of a particular group L^i are taken account of by G are positively related to the size of the group—thereby providing some theoretical underpinning for the use of size as a proxy for power (see above)—and inversely related to the degree to which there is uncertainty about the preferences of the members of L^i . The representative interests of large homogeneous groups are best represented in the government's policy position.

Finally, the models in this section will be evaluated with respect to the central problems mentioned in the introduction. First, it is concluded that the incorporation of interest group *activities* is not fully satisfactory. The models following the interest function approach do not incorporate any kind of activities, whereas the probabilistic voting models focus solely on voting. The cooperative model of Zusman assumes that the interest groups have the possibility to threaten and reward the government. To do this they have to spend resources, but what activities are involved to establish these sanctions remains unspecified. Only Aumann and Kurz are explicit about the kind of activities which may be involved. They assume that (coalitions of) individuals can threaten to destroy their endowments. The credibility of these threats, however, depends crucially upon the assumption—which is a sort of *deus ex machina*—that binding commitments can be made. This assumption, which is typical to cooperative solution concepts, implies that threats never are (never need to be) carried out.

Regarding the explanation of the impact of interest groups on government policy, it is noted that the cooperative models do *explain why* these interest groups have influence on government behavior. Groups can use threats and they are assumed to commit themselves to carry out these threats in case of a disagreement. This commitment possibility makes the government susceptible to the threats. Also the probabilistic voting models explain why the preferences of groups count in the political process. A government's concern

¹⁶Baldwin (1987) arrives at a similar result for a model with vote maximization and campaign contributions.

to be reelected makes it dependent on the vote potential of interest groups. Moreover, the models quite precisely *determine how* the influence of an interest group on government behavior works out. The government is induced to take account of the interests of the different groups when determining its action. Furthermore, some indicators for the extent to which the interests of a group count were derived. A group's threat potential, and the size and the homogeneity of its membership were seen to be relevant in this respect.

16.5 Games with Asymmetric Information

The models discussed so far show two major shortcomings. First, the very activities involved in influencing government policies are largely implicit. Typically, the spending of resources is the only activity—apart from voting—that is focussed upon. The reason why precisely such spending changes political behavior, such as voting in case of campaign contributions, is not clarified. Second, the policies of political decisionmakers are either taken as given for the interest groups, through the assumption of Stackelberg leadership for the former, or simply assumed to depend on the resources spent by such groups. The former assumption is typical for campaign contribution models, and the latter for influence function models. Certainly, these assumptions have been helpful in gaining knowledge regarding the determinants of interest group activity and the extent to which the interests of such groups will be taken into account by political decisionmakers. What is missing, however, is a model that (a) endogenizes the behavior of political decisionmakers as well as that of interest groups, (b) allows for influence attempts by interest groups, and (c) makes explicit the activities involved. With an influence attempt we mean any action by an agent L intended to change the behavior of a governmental agent G , relative to what this behavior would be, had agent L not acted or acted differently. We believe that influence attempts in this sense are more characteristic for what in common parlance is meant by lobbying, political pressure or the influence of interest groups. Moreover, they are not restricted to elections, which form only one—periodic and formally regulated—channel of political influence.

It can be argued that influence attempts typically involve the intended (costly) transmission of information by L to G on potential sanctions (see Potters, 1992, for a more rigorous definition). This implies that attention should be focussed on situations in which G has incomplete information. A distinction can further be made between situations where the sanction involves an action (reward or punishment) by L , and situations where it involves an action by another agent (including 'nature'; think, for example, of environmental groups). In the former case we will speak of *pressure*, and in the latter case of *lobbying*. In this section models will be discussed that have recently been developed to analyze these situations.

16.5.1 A Basic Model of Lobbying

From a positive-theoretic point of view, the amount of lobbying that is empirically observed is not unproblematic. Assuming that interest groups behave in a self-interested manner, why should policymakers believe their messages? On the other hand, if policymakers cannot simply be assumed to believe such messages, why would interest groups take on the—often substantial—cost or trouble of lobbying? This raises the following questions: (1) is there a scope and rationale for lobbying in a world of self-interested agents with rational expectations?; (2) if such a base exists, when is lobbying more or less likely to occur?; and (3) when is the policymaker's response likely to be advantageous to the interest group?

The following game-model (Ainsworth 1993; Potters and van Winden 1992a) illustrates that these questions can be addressed in a fundamental way by incorporating all of the necessary ingredients for strategic lobbying in a simple setting. There are two players, a policymaker G and an interest group L . G has to select one of two actions, x_1 or x_2 . The payoffs (utilities) the players derive from G 's action depend on the 'state of the world', that can be either of two types, denoted by t_1 and t_2 . Which type prevails is private information to L . The state of the world refers to the reactions to G 's action (sanctions) by agents other than L . Before G selects its action, L can send a message m from a set of feasible messages M . Sending a message bears a fixed cost c to L , whereas not sending a message—denoted by n —is costless. G cannot check the accuracy of a message. G 's prior belief p ($1 - p$) that the state of the world is t_2 (t_1), as well as any other element of the game (except for L 's private information on the state of the world), is common knowledge. The (normalized) payoffs over action-state pairs are:

	t_1	t_2
x_1	$a_1, 0$	$0, 0$
x_2	$0, b_1$	a_2, b_2

where $a_i > 0, i = 1, 2$. Thus, assuming (expected) payoff maximization, a_i denotes the payoff to G of making the best choice (x_i) when the state is t_i . Furthermore, G 's action x_2 gives L a (net) payoff of b_i if its private information is t_i . We will speak of 'type' L_i if the interest group's private information is t_i .

Using the concept of a sequential equilibrium, a number of interesting results can be derived for this 'signaling game.' First of all, it is noted that three basic situations or incentive structures can be distinguished for this game, dependent on b_i : (1) $b_1 < 0 < b_2$, (2) $b_2 < 0 < b_1$, and (3) $b_i > 0$ (or, equivalently, $b_i < 0$). In the first case there is *no* conflict of interest between G and L , because both G and L prefer x_i if the state of the world is t_i . As interests are completely congruent, the interest group never has an incentive to dissemble, and the policymaker has no reason to mistrust a message; consequently, there is no problem for transmission of private information from L to

G in this case.¹⁷ In the second case, there is a *full* conflict of interest between G and L , as G always prefers to play the action that is different from the action preferred by L . Hence, L always has an incentive to dissemble (misinform G), and, due to the rational expectations character of the equilibrium concept, there is no scope for information transfer; consequently, no message will be sent in this case. In the third case ($b_1, b_2 > 0$, or similarly, $b_1, b_2 < 0$) there is a *partial* conflict of interest. Whereas L_2 would like to report truthfully on its private information, since its interests coincide with G 's, L_1 has an incentive to dissemble. The problem of the scope of information transfer and the rationale for sending costly messages is most pertinent, here ($b_1, b_2 > 0$).

A first result in this case shows that nothing changes in terms of equilibrium outcomes when it is assumed that the message space M contains only one element, m say. The intuition is that once L has decided to send a message it bears the fixed cost c independent of the content of the message, which is essentially 'cheap talk' then. It is only the fact that a costly message is received (or not) that can reveal information to G . Another result says that no information transfer can occur if the interest group's preferences carry information in the 'wrong direction,' which is the case if $b_1 > b_2 > 0$. Then, L_1 has a larger stake in persuading G that the state of the world is t_2 rather than L_2 . Knowing this, G is inclined to interpret a message as coming from L_1 rather than L_2 , which is, of course, disadvantageous to L . Consequently, no message is sent and G will behave according to its prior beliefs.

Hence, a necessary condition for informative messages is that $b_1 < b_2$. It requires that there is sufficient congruence of interests, in the sense that L 's stake in persuading G is larger when its private information is such that it justifies persuasion from G 's point of view. Obviously, another necessary condition is that lobbying costs are not prohibitive (that is, at least $b_2 > c$). Now, let σ_i denote L_i 's strategy, that is, the probability that L sends a message (m) when its private information is t_i , and let $\rho(\cdot)$ denote G 's strategy, that is, the probability that G selects x_2 after a message, $\rho(m)$, or no message, $\rho(n)$. Then, the following equilibrium is obtained if $p < a := a_1/(a_1 + a_2)$, that is, if G would select x_1 (which is unfavorable to L) on the basis of its prior belief p :

- (a) if $c < b_1 < b_2$, then

$$\sigma_1 = \alpha := p(1 - a)/(1 - p)a, \sigma_2 = 1, \rho(n) = 0, \rho(m) = c/b_1;$$
- (b) if $b_1 < c < b_2$, then

$$\sigma_1 = 0, \sigma_2 = 1, \rho(n) = 0, \rho(m) = 1.$$

If lobbying costs are prohibitive for type L_1 (regime b) then only L_2 sends a message, which is conclusive evidence that the state is t_2 . If costs are not prohibitive (regime a) then L_2 always sends a message and L_1 plays a mixed strategy. The intuition is that G will select x_2 only if its belief in

¹⁷ Compare in this regard the seminal Crawford and Sobel (1982) model, where costless information transfer (cheap talk) is possible only if the interests of the players are sufficiently alike.

the state t_2 increases, which requires that a message is more likely to come from L_2 than from L_1 . Therefore, L_1 must play a mixed strategy. Although informative, a message still leaves G in doubt about the state of the world as both σ_1 and σ_2 are positive. This uncertainty—more specifically, the fact that G 's Bayesian updated probability belief equals a —induces G to play a mixed strategy, which in turn justifies L_1 's mixed strategy. No message, however, is conclusive evidence that the state is t_1 , in which case G chooses x_1 , as G would have chosen according to its prior belief p ('silence is consent,' one could say).

Coming back to the first question raised in the beginning of this section, these results show that there is a scope for information transfer through lobbying and a rationale for costly lobbying, if the interests of L carry information in the 'right direction' ($b_1 < b_2$) and lobbying costs are not prohibitive ($c < b_2$).

As regards the second question—the expected occurrence of lobbying $[(1-p)\sigma_1 + p\sigma_2]$ —the quite intuitive result is obtained that lobbying is more likely to occur with lower costs and/or a higher potential benefit or stake (through a switch from regime b to regime a). Moreover, the expected occurrence is increasing in p , which implies that lobbying is more likely if G is already more inclined to select the action x_2 (preferred by the interest group) on the basis of its prior beliefs.

Finally, regarding the response to lobbying $[\rho(m)]$ the results show that this is increasing in c and decreasing in b_1 . Thus, G 'discounts' L 's message depending on the stake L_1 has to dissemble, relative to the cost of lobbying. If messages become costless (the 'cheap talk' case), $\rho(m) = 0$ and G acts according to its prior beliefs; there is no scope for information transfer and political influence in that case.

So far it has been assumed that the prior beliefs of G ($p < a$) are such that it would pick the action (x_1) that is unfavorable to the interest group. In the reverse case ($p > a$) it turns out that there are multiple equilibria. No lobbying is always an equilibrium in this case, as one would expect. However, there also exists an equilibrium where both types of L lobby (if costs are not prohibitive, of course), although the response of G is the same (x_2) as in the equilibrium with no lobbying. This shows that lobbying can be a pure social waste. On the other hand, the equilibrium of regime b when $p < a$ shows that there are cases where policymakers as well as interest groups can benefit from the possibility of lobbying.

16.5.2 Extensions and Further Issues

The above lobbying model illustrates that, in case of conflicting interests with policymakers, types of interest groups should somehow be able to distinguish themselves from one another in order to influence policies through information transfer. As shown, fixed positive lobbying costs give such an opportunity. From this perspective it should not be surprising that the scope for information transfer and the response to lobbying increases if there is no restriction on the cost of a message, that is, in case of *endogenous cost*. Suppose that y denotes the (observable) cost that L chooses to invest in the message (with $y = 0$

meaning that L does not send a message). As shown in Potters and van Winden (1992a) this leads to a full revelation of information ('separating') equilibrium for the above lobbying model. Type L_2 invests just enough ($y = b_1$) to make it unprofitable for L_1 —who wants to misinform G —to send a message. Consequently, in equilibrium G selects x_2 if and only if a message is received.

Apart from endogenous costs there are other situations that facilitate the transfer of information. A number of recent studies have shown the importance in this respect of the possibility that messages can be screened, multiple interest groups or policymakers (receivers) are present, or that reputations can be built up through repeated play. Another possibility that has been pointed at is that interest groups may be able to distinguish themselves through sanctions (pressure) instead of messages (lobbying).

In case of *screening of messages* it is assumed that there is some mechanism or institution that enables the policymaker to discriminate, to some extent, between true and false messages. To illustrate, consider again the above lobbying model but suppose there is an intermediary agent (a bureaucratic agency, a congressional committee, or a private consultant) that first evaluates lobby reports (messages). Let π_i denote the exogenous and commonly known probability that the agent comes up with a positive recommendation effectively saying that the state is t_2 (which is favorable to the interest group L) when actually the state is t_1 , and assume that $0 \leq \pi_1 < \pi_2 \leq 1$; note that π_2/π_1 in fact measures the (perceived) reliability of the agent. As shown in Potters and van Winden (1992a), the scope for information transfer and the impact of messages on the policymaker's (G 's) action increases in this case. Even costless messages ($c = 0$) can now induce G to select x_2 if there is sufficient confidence in the agent (more specifically, if $\pi_2/\pi_1 \geq 1/\alpha$, with α defined as before). Similarly, in Milgrom's (1981) 'persuasion game' and in Milgrom and Roberts' (1986) model of 'competition among interested parties' costless messages are informative due to the assumption that lying is impossible ($\pi_1 = 0$), and in Kambhu's (1988) model of a regulated firm costless messages by the firm can be informative due to the assumption that true reports will not be found false (cf. $\pi_2 = 1$) and false reports are detected with positive probability ($\pi_1 < 1$).

Instead of relying on an intermediary agent, the screening may be more direct, as through monitoring or auditing, as in Austen-Smith and Wright (1992). In this model an interest group L again prefers one of two possible actions by a legislator G . Although this preferred action gives a fixed payoff which is independent of the state of the world (cf. $b_1 = b_2$), L can, nevertheless, send informative messages because lying is expected to be costly. The reason is that in equilibrium there is a probability that G will check L 's message and, if caught dissembling, a (given) penalty has to be paid by L . This model also shows that the legislator may want to rely on the lobbying process instead of firsthand data acquisition, even when the cost involved in such acquisition is lower than the cost of monitoring the lobbyist. A weakness of this model is the implicit assumption that G can commit itself to impose a

penalty on L in case the latter is checked and found to be dissembling.

In fact Austen-Smith and Wright's model deals with two interest groups with opposed interests, and it shows that the presence of such *multiple groups* may increase the scope for information transfer. The reason is that the group for which the legislator's (G 's) prior belief is favorable will also lobby if the probability that the other group will successfully mislead the legislator is sufficiently high. In that case the private information of the groups is fully revealed in equilibrium, as the legislator's threat to check for sure is credible, because of the opposed interests of the groups (implying that one of them is lying for sure if they send the same message).¹⁸

In Potters (1992) the increased scope for information transfer is shown by incorporating two groups, with opposite interests concerning G 's actions, in the basic lobby model discussed above. Even if lobbying costs are not prohibitive for either group, full revelation of information is possible in this case, because the group with 'bad' information can be deterred from sending a (false) message by the lobbying of the group with 'good' information. It is an equilibrium for both groups to separate then, thereby in a sense providing an 'oversupply' of information (as one group separating would be sufficient).

Multiple agents also play a role in the political participation games studied by Ainsworth and Sened (1993) and Lohmann (1993). In these models the agents, holding private information that is relevant for a policymaker, may have incentives to take a costly political action to signal their information to this policymaker who conditions her decision on the number of individuals engaged in political participation. Lohmann, *inter alia*, shows that there can be an oversupply of costly (uninformative) action. Ainsworth and Sened introduce a lobbyist who is known to be fully informed and, upon entry, provides an informative signal to the agents to participate and to the policymaker to choose a particular action. They, *inter alia*, show the importance of a sufficiently high entry cost for the lobbyist.

In the 'one-shot' games discussed so far there is no endogenous penalty on lying (false messages). One way such a penalty could come about is through a loss of credibility or reputation. Perhaps the most natural way to allow for this is to model the interaction as a *repeated game*. Sobel (1985) analyzes a finitely repeated signalling game that is relevant in this respect. In this model a receiver (G) is uncertain regarding the preferences of a sender (L), which is, with a commonly known probability, either a 'friend' (identical preferences as G) or an 'enemy' (completely opposite preferences). In each period of the game the players are confronted with one of two possible states of the world (with a commonly known probability), about which only L is informed. L

¹⁸In this model the groups can acquire (complete) information on the state of the world against a cost that is also known to G . Moreover, it is assumed that G can observe the information acquisition by a group (but not the content of the information), in which case G knows that the group is informed. In Austen-Smith (1994) it is assumed that neither the cost nor the acquisition of information by the sender (L) is observable by the receiver (G). However, (only) an informed L can prove that she is informed if she wishes to do so. By allowing in this way that informed types who acquired unfavorable information pool with the uninformed, it turns out that the scope for information transfer increases compared with the case that L is known to be informed.

then sends a costless message concerning the state of the world to G , who then selects an action that is payoff-relevant to both players, after which the true state is revealed. The principal equilibrium of this game shows that L typically sends truthful information for the first several periods, increasing its reputation of being a friend when there is a positive probability that an enemy would have lied. Eventually, however, an enemy will mislead G , in which case L loses its reputation and the opportunity to deceive G in the future.

Repeated play also provides an opportunity to an interest group to influence the decision of a policymaker through sanctions—*pressure*—instead of messages (lobbying). In a one-shot game, an announcement of a punishment or a reward by L (L_1) is not credible, as is easily seen by applying a backwards-induction argument. However, in case of repetition and asymmetric information, L may be motivated to enhance its reputation for being a type (L_2) prefers to carry out sanctions. This is shown in Potters and van Winden's (1990) pressure model, which is an adaptation of Kreps and Wilson's (1982) reputation model. The anticipation of L 's willingness to build a reputation through sanctions may induce G to 'concede' and take the action which is preferred by L . Furthermore, in order to elicit concession, the interest group needs less initial credibility (a lower prior belief of being L_2) the larger the number of repetitions of the game. Interestingly, after a sanction the probability that G concedes L is increasing in the cost of a sanction to L_1 , and decreasing in the benefit to L_1 of having G concede. These results correspond to those obtained for the basic lobby model.

Earlier it was discussed that the presence of multiple interest groups (senders) may increase the scope for information transfer. It turns out that this scope, and thereby the possibility to influence the decision of policymakers, may also increase if there are *multiple receivers*. This is shown in Farrell and Gibbons' (1985) model with two 'audiences' (see also Austen-Smith 1993). An informed sender can send a costless message—in private or in public—to two interested but uninformed receivers, who then take actions which affect the payoff of the sender as well as the receiver. It is studied how the incentives for information transfer to one receiver are affected by the presence of the other. One of the interesting outcomes is that there may be a separating equilibrium in public, but no separating equilibrium in private. For instance, if the sender's preferences over the receivers' actions are independent of its true type (as in the basic lobby model), we know that cheap talk in relation to each of the receivers separately (that is, in private) cannot be informative. However, Farrell and Gibbons demonstrate that if these preferences go in opposite directions, so that the sender would be tempted to lie in opposite directions in private, its message may be credible when it is communicated to both audiences in public.

16.6 Conclusion

In this survey we discussed four modelling approaches to study the influence of interest groups. The first approach, using an 'influence function', focuses on the strategic interaction between interest groups in influencing government

policies; policymakers or voters are not involved as players. The second approach, concentrating on campaign contributions and using a 'vote function', adds political candidates as players (typically as Stackelberg leaders); interest groups now take policies as given, but influence the election outcome through their contributions, exploiting the vote function. The third approach, employing a 'composite utility function', stands out because of its cooperative features; it turned out, however, that these functions can be supported by non-cooperative (electoral competition and campaign contributions) models. The fourth approach, finally, focuses on the opportunities for interest groups to influence policymakers through strategic information transfer.

In our view, the most important achievement of the models developed so far has been to incorporate interest group activity into the formal positive analysis of government behavior. Notwithstanding the fact that they can be easily criticized regarding their neglect of certain strategic or institutional aspects, at least to some extent these models meet the generally felt need to allow for the political influence of interest groups. By investigating the opportunities for such influence outside the election context—in particular, through strategic information transmission—they help to redress the imbalance in public choice theory, which almost exclusively focused on the electoral nexus between policymakers and agents in the private sector. Importantly also, the research covered in this survey has produced many results concerning the determinants and impact of interest group activity that can be translated into testable hypotheses.

This brings us to one of the topics that was not addressed in this paper, which concerns the empirical support for the models discussed. The need here for brevity is not the only limitation; rigorous applications and tests (except perhaps for the case of campaign contributions in the U.S.) are also lacking in the literature. Although 'stylized facts' based on empirical studies and statements are often referred to (see, *e.g.*, Morton and Cameron 1992, Mueller 1989 and Potters 1992), the character of the evidence put forward is typically piecemeal and casuistic. No doubt, this is to a significant extent due to the nature of the subject investigated. It seems quite obvious that adequate field data concerning the dynamics and impact of lobbying and pressure will be hard evidence to come by. Although our improved theoretical understanding of the mechanisms involved may further the acquisition of better data sets, we expect that laboratory experiments—which facilitate the investigation of particular aspects in a controlled environment—will become an important additional tool for empirical investigation in this area (for a first attempt concerning the basic lobby model, see Potters and van Winden, 1992b).

Another topic that was hardly addressed regards the welfare aspects of interest group behavior. This issue is particularly focussed on in the many rent-seeking models that have been developed lately, where interest groups compete for a monopoly rent provided by the government. However, the main research interest here is in the extent to which these rents are dissipated in the competition process, and not the way they are established or influenced through interest group activity. Principal-agent models of asymmetric infor-

mation form another line of research in this area. This literature is typically concerned with the normative (mechanism design) problem of the determination of optimal incentive schemes for agents, given the objectives and observations of the principal (the policymaker).¹⁹ By assuming that the principal can commit her or himself to a message-response profile a specific—in particular a more efficient—equilibrium can be selected. Incidentally, also in these models it is found that the influence of an interest group depends on its stake, the costs of exerting influence, and the type of its interests (which have to go in the 'right' direction), as was established for the basic lobby model (see, e.g., Laffont and Tirole 1991).

These models and the models using a 'compromise utility function', discussed in Section 16.4, point at an interesting and important area for future research, which consists of exploring the correspondence between the maximization of a social welfare function (with political weights attached to the utility of social groups) and the outcome of political economic processes with endogenous incentives, that is, without exogenously given commitment possibilities. This correspondence has already been shown for some electoral competition models (Baldwin 1987, Coughlin, *et al.* 1990), but as yet this is not the case for models focussing on interest group activity outside the election context.²⁰

Apart from this, an important future research task consists of extending and linking up the simple and isolated models that have been developed so far (*cf.* Kolman 1992). And, finally, we emphasize the need for more, and, particularly, more appropriate, empirical studies. In our view, laboratory experiments may be very helpful here, not only because of the aforementioned difficulties in getting adequate field data, but also to check the soundness or the predictive value of the rationality assumptions of the present models. In this regard, such experiments would seem to be an excellent tool for the development and testing of 'bounded rationality' models.

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¹⁹ See, e.g., Baron (1989), Baron and Myerson (1982), Laffont and Tirole (1991), and the critique in Milgrom and Roberts (1986).

²⁰ Suggestive in this respect is the pressure model of Potters and van Winden (1990), where the impact of pressure is that it causes a temporarily inefficient outcome, forestalling a redistribution of the payoffs to the disadvantage of the agent exerting pressure. This suggests that as long as the influence (power) structure is not contested a social welfare function might do.

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