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Articles 1

POLITICAL COALITION BARGAINING BEHAVIOUR

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One theme in the anlaysis of coalitions, and collectivities generally, concerns the relationship between the benefits accruing to each coalition member and the resources which each member brings to the coalition. Thus, Browne and Franklin (1973) found that the largest parties in successful parliamentary coalitions tend to have fewer cabinet portfolios than would be expected on the basis of their parliamentary representation, while smaller parties have more such portfolios. A second theme deals with the role of the political entrepreneur in putting together sufficient support to form a ruling group. Frohlich, Oppenheimer, and Young (1971) have treated some of the ways in which a political entrepreneur may manipulate private goods to generate such support.

Part I of this paper represents a preliminary theory of bargaining in political coalitions, based upon a series of assumptions about the behavior of an entrepreneurial (E) party and minor parties. First the basic assumptions underlying the theory are stated and then the model of E party and minor party behavior is derived. In Part II of the paper, our theory is briefly compared to other approaches to coalition formation. The utility of the formulation in evaluating the extant empirical literature and in guiding inquiry is discussed; some specific examples are given.

PART I – THEORY OF POLITICAL BARGAINING

It is assumed that:

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1. Each party has a leader who, together with the members of the party, formulate a party programme. This programme will determine the benefits or resources which accrue to the party through the electoral process.

2. The party may gain or lose benefits by engaging in coalition bargaining when the opportunity presents itself.

3. Each party will have a well defined utility function which exhibits risk averse or risk neutral characteristics, i.e., if U is the utility function then $U' > 0$ and $U'' \leqslant 0$. Moreover, if the party is risk averse, it will be characterized by decreasing absolute risk aversion.[1] The utility function will be formulated by the party leader, presumably in consulation with the party membership.

4. Coalition bargaining behaviour will be initiated by an entrepreneur party called the E party. This will generally be the plurality party in the legislature, but not necessarily so. The E party will try to form a ruling coalition by bargaining away some of the resources it would command as leader of the ruling coalition. We call these resources a bribe. The E party will bargain so as to maximize expected utility.

5. The bargaining process will be successive in that the E party deals with one minor party at a time, starting first with a "more pivotal" party and working down. A minor party will be "more pivotal" than an alternative minor party, if the entrance of the former into the protocoalition is more likely to lead to a ruling coalition than that of the latter. We will assume that all parties have a homogeneous interpretation as to which party is "more pivotal" at each stage of coalition formation.

Terminology

b = the bribe to the minor party under consideration.

$\bar{b}$ = the bribe to the alternative minor party (parties).

B_1 = resources of the E party if it is unable to form a ruling coalition.

B = resources which the E party would command upon forming a ruling coalition.

π = subjective probability formed by the E party that the minor party under consideration will join the protocoalition. $\pi = \pi(b)$ is an increasing function of the bribe so that $\pi'(b) > 0$.

p = subjective probability formed by the E party that the alternative party (parties) will join the protocoalition. $p = p(\bar{b})$ and $p'(\bar{b}) > 0$.

A: The E Party

Four cases will be used to develop the ramifications of the model for E party

[1] This means, intuitively, that the more resources commanded by a party the more likely it is to undertake a gamble or, alternatively, the less it is willing to pay to avoid the gamble. The concept of absolute risk aversion was developed independently by Arrow and Pratt.

behaviour. These are outlined below:

		A Particular Minor Party Is:	
		Necessary	Not Necessary
A Particular	Sufficient	Case One	Case Two
Minor Party Is:	Not Sufficient	Case Three	Case Four

In case one the E party deals with only one particular party. Here only one additional party is sufficient to make up a ruling coalition, and only one is readily available to join with the E party. This condition is likely to come about when there are relatively few parties in Parliament, and the choice of potential coalition partners is restricted by the policy preferences of the E party.

In case two, the E party bargains with a particular minor party which is sufficient for a ruling coalition, but other alternative arrangements are possible for the E party. Everything else being equal, such alternatives would be expected to vary with the number of parties in Parliament. In case three the E party bargains with a minor party necessary to form a ruling coalition but which cannot by itself insure success. Comparing case three with case one should permit an estimate of the effects of increasing the number of parties in a coalition, *ceteris paribus*. In case four the E party bargains with a minor party which is neither necessary nor sufficient for success.

Case One[2]

$$\underset{b < B-B_1}{\text{Max}} \{\pi(b)\, U(B-b) + (1 - \pi(b))\, U(B_1)\}$$

First-order condition: (1)

$$\pi'(b)\, U(B-b) - \pi(b)\, U'(B-b) - \pi'(b)\, U(B_1) = 0$$

or

$$\pi'(b)\, \{U(B-b) - U(B_1)\} = \pi(b)\, U'(B-b) \qquad (2)$$

Second-order condition:

$$Z_1 = \pi''(b)\, U(B-b) - 2\,\pi'(b)\, u'(B-b) + \pi(b)\, U''(B-b) - \pi''(b)\, U(B_1) < 0. \qquad (3)$$

The right hand side of equation (2) is the expected loss (in utility terms) of increasing the bribe by one more unit of resource. The left hand side is the expected gain (in utility terms) of offering one more unit of resource. Therefore, the first order condition states that the optimal bribe is such that at the margin the expected cost of the bribe is just equal the expected gain from coalition formation.

We can easily see how the optimal bribe b^* varies with the parameters B_1 and B. From (2) we obtain $b^* = b^*(B, B_1)$. (4)

[2]Internal solutions are assumed since the E party is indifferent to a boundary solution. It is also assumed that the second order conditions for a maximum are satisfied.

Substituting (4) back into (2) and differentiating with respect to these parameters we find:

$$\frac{\partial b^*}{\partial B_1} = \frac{\pi'(b^*)\, U'(B_1)}{Z_1^*} < 0 \tag{5}$$

and $$\frac{\partial b^*}{\partial B} = \frac{\pi(b^*)\, U''(B-b^*) - \pi'(b^*)\, U'(B-b^*)}{Z_1^*} > 0 \tag{6}$$

Theorem 1. The more resources available to the E party without a coalition, the smaller the bribe it will offer the minor party.

Theorem 2. The more resources commanded by the E party through a successful coalition, the larger the bribe it will offer the minor party.

Case Two

$$\underset{b < B-B_1}{\text{Max}} \{\pi(b)\, U(B-b) + (1-\pi(b))\, [p(\bar{b})\, U(B-\bar{b}) + (1-p(\bar{b}))\, U(B_1)]\}$$

The results from case one will carry over to case two except that the optimal bribe in the latter case (b^{**}) will be less than b^*. To see this let $\bar{B}_1$ be the certainty equivalent of the alternative coalition so that $p(\bar{b})\, U(B-\bar{b}) + (1-p(\bar{b}))\, U(B_1) = U(\bar{B}_1)$. Now $U(\bar{B}_1) > U(B_1)$ for, if not, the alternative coalition would not be a viable option. Therefore $\bar{B}_1 > B_1$. But case two is now equivalent to - - - Max $\pi(b)\, U(B-b) + (1-\pi(b))\, U(\bar{B}_1)$ - - - which is case one with B_1 replaced by $\bar{B}_1$. But we already know that $\frac{\partial b^*}{\partial B_1} < 0$ and so we have demonstrated the following:

Theorem 3. The more parties in Parliament, the smaller the bribe offered to any one minor party and to all minor parties in the coalition.

Case Three[3]

$$\underset{b,\bar{b}}{\text{Max}} \{\pi(b)\, p(\bar{b})\, U(B-b-\bar{b}) + (1-\pi(b)\, p(b))\, U(B_1)\}$$

Subject to $b + \bar{b} < B-B_1$

[3]Since both parties are necessary for the coalition, we optimize simultaneously with respect to b and $\bar{b}$. Alternatively, we would treat $\bar{b}$ as a parameter in which case only one first-order condition, equation (7), is relevant. In the event that $\bar{b}$ is treated as a parameter it can be shown, not surprisingly, that $\frac{db}{d\bar{b}} < 0$.

The first order conditions of this problem are:

$$\pi'(b)\ [U(B-b-\bar{b})-U(B_1)] = \pi(b)\ U'(B-b-\bar{b}) \tag{7}$$

$$p'(\bar{b})\ [U(B-b-\bar{b}) - U(B_1)] = p(\bar{b})\ U'(B-b-\bar{b}) \tag{8}$$

$$b + \bar{b} < B-B_1 \tag{9}$$

Dividing (7) by (8) we obtain the optimality condition.

$$\frac{\pi'(b)}{\pi\ (b)} = \frac{p'(\bar{b})}{p\ (b)} \tag{10}$$

This equation can be interpreted to say that the optimal bribes are set so as to elicit an equal desire (in probability terms) from both parties to join the coalition.

Again the interesting question is the relationship between b^{***}, the optimal bribe in case three, and b^*. We will show that $b^{***} < b^*$ so that the following theorem can be stated.

Theorem 4. The more parties in the coalition, the smaller the bribe offered to any one minor party.

Proof. Compare equation (7) with first-order condition for case one, equation (2). In the former B is replaced by $B-\bar{b}$ but otherwise the equations are identical. But from (5) we know that $\frac{\partial b^*}{\partial B} > 0$ and so $b^{***} < b^*$.

Several cases could occur in the bargaining process leading up to a ruling coalition. In a case two situation, the E party might start to bargain with a particular minor party which alone could create a ruling coalition, and not reach agreement. The E party might then go to another minor party sufficient to create a ruling coalition (case two), or to a minor party which can only contribute to such a coalition (case four).

Depending on the structure of the Parliament, there are many possible combinations which fall into the case four category. Since case four does not lend itself to further generalizations, beyond those already made, we will illustrate the minimal example. This consists of a 4 party Parliament in which the E party can form a ruling coalition with any 2 out of the 3 minor parties. Let $\pi(b)$, $p(\bar{b})$ and $\theta(\hat{b})$ be the probability of each minor party joining.

Case Four

$$\max_{b<B-B_1-\bar{b}-\hat{b}} \{\pi(b)\ p(\bar{b})\ U(B-b-\bar{b}) + \pi(b)\theta(\hat{b})U(B-b-\hat{b}) + p(\bar{b})\theta(\hat{b})U(B-\bar{b}-\hat{b}) + [1-\pi(b)\ p(\bar{b}) - \pi(b)\ \theta(\hat{b}) - p(\bar{b})\ \theta(\hat{b})]\ U(B_1)\}$$

First-order condition:

$$p(\bar{b})\{\pi'(b)[U(B-b-\bar{b}) - U(B_1)] - \pi(b)U'(B-b-\bar{b})\}$$

$$+ \theta(\hat{b}) \{\pi'(b)[U(B-b-\hat{b})-U(B_1)] - \pi(b)U'(B-b-\hat{b})\} = 0$$

B: The Minor Parties

The reactions of the minor party during the bargaining process will depend, among other things, on the costs of joining a successful coalition or unsuccessful coalition. The costs of joining a successful coalition are the opportunity costs of those resources devoted to coalition as opposed to party platforms. These costs are taken to be directly related to the resources commanded by the minor party if it didn't join the protocoalition, i.e. to the number of seats the party has in Parliament. The minor party may endure costs joining an unsuccessful protocoalition by virtue of becoming associated with the personnel and policies of the E party.

Terminology

S = resources which the minor party enjoys if it doesn't join the protocoalition. These resources result from the electoral process.

C_1 = cost of joining a successful coalition.

C_2 = cost of joining an unsuccessful coalition.

b = the bribe which the E party offers the minor party to join the protocoalition.

M = subjective probability held by the minor party that a successful coalition will be formed conditional on the party joining the protocoalition. We will assume that all of the above variables are functions of S. In particular, it is assumed that C_{2s} and M_s, the derivatives of C_2 and M with respect to S, are non-positive and non-negative, respectively.

We can define the minimum bribe which will induce the minor party to join the protocoalition by the equation:

$$M\ U\ (S+b-C_1) + (1-M)\ U(S-C_2) = U(S) \tag{11}$$

If there are no costs incurred by joining an unsuccessful coalition this minimum bribe is equal to C_1. This suggests that bribes in coalitions which traditionally reform after each election tend to be smaller than those of more common coalition types. On the other hand, if there are costs to joining an unsuccessful coalition the minor party will join only if $b > C_1$ so that $(b-C_1)$, the net bribe, is the relevant variable for analysis.

The interesting question concerning minor party behaviour is the effect of its size or, in our terminology, the resources commanded by the minor party prior to the coalition on the required net bribe.

Theorem 5. The less resources commanded by the minor party prior to the coalition, the larger the required net bribe.

Proof: Differentiating (11) with respect to S gives:

$$M\,U'(S+b-C_1)\,\frac{d(b-C_1)}{ds} = [U(S-C_2) - U(S+b-C_1)]M_s + (1-M)U'(S-C_2)C_{2s} + U'(S)-MU'(S+b-C_1)-(1-M)U'(S-C_2) \tag{12}$$

Since the sum of the first two terms on the right hand side of the equation is negative, the theorem is evident provided $F(C_2)$ is non-positive where,

$$F(C_2) = U'(S) - M\,U'(S+b-C_1) - (1-M)\,U'(S-C_2) \tag{13}$$

Now if the minor party is risk neutral $F(C_2)$ is identically zero and the theorem is proved. Suppose the party is risk averse. Clearly $F(0) = 0$ since $C_2 = 0$ implies $b = C_1$. Also $C_2 \geqslant 0$. Therefore, if we can determine the sign of $F'(C_2)$ we will know the sign of $F(C_2)$.[4] But,

$$F'(C_2) = -M\,U''(S+b-C_1)\,\frac{d(b-C_1)}{dC_2} + (1-M)U''(S-C_2) \tag{14}$$

From (11) we know that,

$$\frac{d(b-C_1)}{dC_2} = \frac{(1-M)\;U'(S-C_2)}{M\;\;U'(S+b-C_1)} \tag{15}$$

Substituting (15) into (14) gives,

$$F'(C_2) = \left[(1-M)\;\frac{-U''\;(S+b-C_1)U'(S-C_2)}{U'(S+b-C_1)} + U''\;\;(S-C_2)\right]$$

$$= (1-M)U'(S-C_2)\left[\frac{-U''\;(S+b-C_1)}{U'(S+b-C_1)} + \frac{U''\;(S-C_2)}{U'(S-C_2)}\right]$$

$$= (1-M)U'(S-C_2)\;[R(S+b-C_1) - R(S-C_2)]$$

where R represents the absolute risk aversion function. Since R is assumed to be decreasing by hypothesis we find that $F'(C_2) < 0$ and therefore $F(C_2) < 0$.

[4]This follows the observation that if the function f(x) defined for $x > 0$ has the properties that (i) $f(0) = 0$ and (ii) $f'(x) \lesseqgtr 0$ then $f(x) \lesseqgtr 0$ for $x > 0$.

PART II – DISCUSSION

Our constrained-maximization approach bears some similarity to other approaches. One approach has emphasized coalition-building by means of protocoalitions (Brams and Riker, 1972). Both Brams and Riker's and our model emphasize that the incentives for different actors change according to stage in the coalition-building process; both attempt to specify the relative magnitudes of these varying incentives. Brams and Riker, however, build their models on the basis of two protocoalitions, uncommitted members, and costless protocoalition formation. Their formulation is based upon the opportunities available for an uncommitted member to be pivotal at different stages in the coalition-building process. Not only do the mathematics of their model differ from ours, but more importantly, the underlying assumptions differ. Our model is based on a single entrepreneurial party approaching possible partners, rather than two parties directly competing under costless freedom to enter and leave. By assuming costless and frictionless movement between protocoalitions, the Brams and Riker model emphasizes coalition-building suitable to party nominating conventions, but less useful for ruling Parliamentary coalitions.[5]

Another approach, that of Riker (1962) and Leiserson (1968), emphasizes coalition size but is vague about the distribution of payoffs in ruling coalitions. The Riker theorem that parties try to form minimum winning coalitions is nonfalsifiable in that the existence of greater than minimum winning coalitions may be rationalized by risk-averse behaviour, yet such behaviour is not endogenous to their models. In our model on the other hand, an E party will offer a positive bribe to a party provided the payment is outweighed by the gain from coalition formation. The latter could easily include coalition durability or coalition control so that a greater than minimum winning coalition is not excluded by our model.

The work of Dodd (1974) highlights the differences between our model and that of the minimum winning models. Dodd develops his empirical work around the motif of a minimum winning coalition. Dodd relates the effect of parliamentary parameters (such as fractionalization) to the size of ruling coalitions rather than to the distribution of rewards in the ruling coalition. Dodd goes on to relate coalition durability to the size of the ruling coalition. Our theory implies that durability may be a function of the distribution of rewards rather than coalition size, *per se*. If, for example, the minor parties get a smaller share than predicted by their size and the parliamentary structure, then the coalition may be more likely to fall apart. Dodd's finding that minimum winning coalitions tend to be more durable may depend upon the reward structure. If minimum winning coalitions are perceived to be more durable, then rewards to each minor party and therefore to all parties in a minimum winning coalition should be larger, *ceteris paribus*. These are open empirical questions.

[5]One useful task for the future might be to explore the degree to which the models are similar as the number of actors increased and the relative size of different actors changes.

Some direct evidence on the validity of our model is presented by Browne and Franklin (1973) on our Theorem 5. They test the Gamson (1961) theorem that "payoffs to partners in winning coalitions will be proportional to their resource contributions." Pooling all parties, major and minor, Browne and Franklin regressed the per cent of cabinet seats held by coalition members against the per cent of coalition seats held by these members. They found that the payoffs were generally proportional to seats although smaller parties, especially in smaller coalitions, tended to receive more than their proportional share (of cabinet seats). This corresponds with our Theorem 5, "the less resources commanded by the minor party prior to the coalition, the larger the required net bribe." A preliminary reanalysis of the Browne and Franklin data focusing upon three party coalitions showed a substantially larger bribe to the smallest party, as compared with that to the intermediate party in the coalition.[6]

The discussion preceding Theorem 5 deals with costs which might be incurred by joining an unsuccessful coalition. These costs will not be incurred in institutionalized coalitions, those which tend to reform after each election. Such coalitions are likely to be characterized by fewer bribes than other coalitions. Austria, Sweden and possibly Luxembourg were characterized both by this type of coalition and – when bribes are defined in terms of overpayment of cabinet portfolios – by fewer bribes to minor parties.

Parliamentary coalition formation may be complex enough that no single model may capture the essence of the process. The "constrained maximization" orientation presented here seems fruitful, although it clearly does not handle the game-theoretic complexities of coalition bargaining. For example, constitutional provisions may be important in affecting the bargaining situation. In Israel, overpayments to minor parties were rare, perhaps because, according to the constitution, the plurality party must form the government. Cross' (1967) model, showing that a party *essential* for coalition formation will possess substantial advantages in bargaining, might help explain this. The difficulty, however, is that particular cases can always be explained on an *ad hoc* basis. The utility of our model is its generality and potentially wide applicability.

[6]Here we have defined the net bribe (bribe received by a minor party) in terms of Browne and Franklin's (1973) notion of the appropriate level of payment. This level can be defined as the number of cabinet portfolios proportional to a minor party's contribution (in Parliamentary seats) to the ruling coalition. A net bribe is an overpayment, a payment *greater* than the appropriate level. Bribes may be viewed differently by entrepreneur and minor parties, and different operational measures might be developed.

REFERENCES

Arrow, K. J. *Aspects of the Theory of Risk-Bearing.* Helsinki: The Yrjo Jahnsson Foundation, 1965.

Brams, Steven J. and Riker, William H. "Models of Coalition Formation in Voting Bodies." *Mathematical Applications in Political Science, VI.* Edited by James Herrdon. Charlottesville: University Press of Virginia, 1972.

Browne, Eric C. and Franklin, Marke N. "Aspects of Coalition Payoffs in European Parliamentary Democracies." *Amer. Pol. Sci. Rev.,* 67 (1973), 453-469.

Cross, John G. "Some Theoretic Characteristics of Economic and Political Coalitions." *Jour. Conf. Res.* 11 (1967), 184-195.

Dodd, Lawrence C. "Party Coalitions in Multiparty Parliaments: A Game–Theoretic Analysis." *Amer. Pol. Sci. Rev.,* 68 (1974), 1093-1117.

Frohlich, Norman, Oppenheimer, Joe A., and Young, Oran R. *Political Leadership and Collective Goods.* Princeton: Princeton University Press, 1971.

Gameson, William A. "A Theory of Coalition Formation." *Amer. Soc. Rev.,* 62 (1961), 373-382.

Leiserson, Michael A. "Factions and Coalitions in One-Party Japan." *Amer. Pol. Sci. Rev.,* 62 (1968), 770-787.

Pratt, John. "Risk Aversion in the Small and in the Large." *Econometrica,* 32 (1964), 122-136.

Riker, William H. *The Theory of Political Coalitions.* New Haven: Yale University Press, 1962.

_____ and Ordeshook, Peter C. *An Introduction to Positive Political Theory.* Englewood Cliffs, N.J.: Prentice-Hall, 1973.