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GROUP INTERACTION, COALITION STRUCTURES AND THE FORMULATION OF ECONOMIC POLICY

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INTRODUCTION

Theoretical and empirical research in the areas of economic policy and development planning more often disassociate the objectives of the plan from the political preferences and ideological interests which motivate the underlying decision criteria. The objectives of economic and social policy result from a complex process of interaction and aggregation of the preferences and interests of various articulate groups and segments of society. Which articulate interest groups determine the course of government policy and what are the mechanisms whereby political parties, trade-union and employers' organisations, the military, the church, etc.. formulate demands on the system and determine through their action, interaction and the formation of alliances, the conduct of economic and social policy?

The purpose of this research is to formulate some tentative hypotheses on how a particular span of ideologies pertaining to various classes and groups in conjunction with the internal power structure and institutional framework produce certain policy results. How do different groups enter into coalitions or alliances and what is the impact of coalition structures on the conduct of policy? Is a particular coalition structure stable or unstable? Does government have the necessary support to implement its policies? Government policy (for instance in the area of income distribution) will benefit certain groups or classes often at the expense of other segments of the community. To the losses and gains resulting from a particular government act correspond measures of endorsement and rejection by supporting and opponent groups respectively. Given the distribution of power between supporting and opponent groups, does the implementation of a government act have sufficient support? If policy is implemented without the appropriate measure of endorsement, the countervailing power of dissident interest groups and their interaction with those groups which endorse government policy may result in a conflictive and unstable political situation.

In this paper we will suggest a model of group interaction which identifies articulate interest groups in terms of their ideological or policy positions as well as their power to influence or obstruct the conduct of government policy. The model will be applied to examine the affinity or lack of affinity between policy groups as well as identify those policy fronts or issues where opponent groups may or may not have shared values. Once policy groups have been identified in terms of a set of ideological or policy attributes, the formation of coalitions and alliances can be examined. The stability of coalition structures as well as measures of overall system stability may suggest whether a particular combination and interaction of group ideologies produces a stable or unstable situation.

Given a set of group preference attributes, what modes of aggregation may be envisaged which will translate group or class interests into an overall set of decision criteria? I am refering here to the problem of aggregation of (individual) utility functions which has redeived extensive (and perhaps exaggerated) treatment in the literature on welfare economics.

The underlying preoccupation is nothing new Jean Jacques Rousseau in Le Contrat Social was faced with the problem of aggregating individual interests (les interéts particuliers) to obtain in the common will (la volonté générale). Rousseau, however, clearly distinguishes between la volonté de tous (the will of all) and la volonté générale. The former is the aggregation of individual (often conflicting) interests, whereas the latter is an expression of collective interests (interêt commun)which does not necessarily imply aggregation of individual interests. In other words, in Rousseau there is a recognition of the duality between individual interests (*les interets particuliers*) and the common will (*l'interet commun*). La *Volonté générale* is not a consequence of implicit aggregation but a result of the rules of the game which are inherent in *Le Contrat Social*. Players start out with different and conflicting interests and play the game according to their respective strategies. The solution of the game coincides with la *volonté générale*. The *contrat social* is the acceptance on the part of the participants to play the game according to certain established rules.

Although *Arrows Possibility Theorem* is consistent within its own terms of reference, the underlying framework abstracts from the role of power in the decision-making processes.[1] In this context, the determination of collective decisions is largely a function of how powerful interest groups interact, clash, negotiate and resolve their policy differences.[2]

New lines of enquiry are required embodying explicitly the notion of power in economic policy theory and describing the process whereby peripheral demands are translated into collective choices. Behavioural models in the area of *public choice* have focussed on the *log-rolling assumption* and the process whereby opponent groups negotiate and trade on various policy fronts. Another line of enquiry is the socalled *committee decision problem* developed by Van den Bogaard, Theil and others.[3] This approach consists in determining a decision rule implying the minimisation of a committee loss function.

Implicitly log-rolling models are of a cooperative nature involving a process of negotiation between opponent groups. They may be inappropriate to examine situations of overt conflict between social groups or analysing group policy strategies under uncertainty which may be of a game theoretical nature. Although conceptually attractive game theoretical models are difficult to implement in empirical models of group interaction.

THE THEORETICAL FRAMEWORK

We will assume m policy groups and n policy variables. Policy preferences of group j, j = 1,2...m are defined in an n dimensional policy space $\mathbf{X}$. Policy groups are in a position to rank alternative social states in accordance with the properties of Completeness, Transititivity and Reflexivity.[4] Furthermore we assume that group j = 1,2... m has a most desired policy position X^j such that X^j is at least preferred to all other possible states belonging to X. In other words, X^j represents a point of satiety for which the utility of group j is maximum. The jth policy group identifies his desired policy position (or ideology) in terms of an n component vector $X^j = (X_1^j, X_2^j \ldots . X_n^j)$.

The preference patterns of policy group j may be represented by a disutility or loss function of the form

$$L_j(X) = \sum_k Wjk\,(X_k^j - X_k)^2 \qquad (1)$$

$$j = 1,2\ldots m$$

where Wjk is the relative weight assigned to the squared deviation of X_k from its desired policy value. The loss or disutility of group j is a weighted sum of the squared deviations from their desired values, Wjk is therefore the marginal disutility of the underlying squared deviation. The position of zero or minimum losses coincides with the achievement of the jth group's most desired social state.

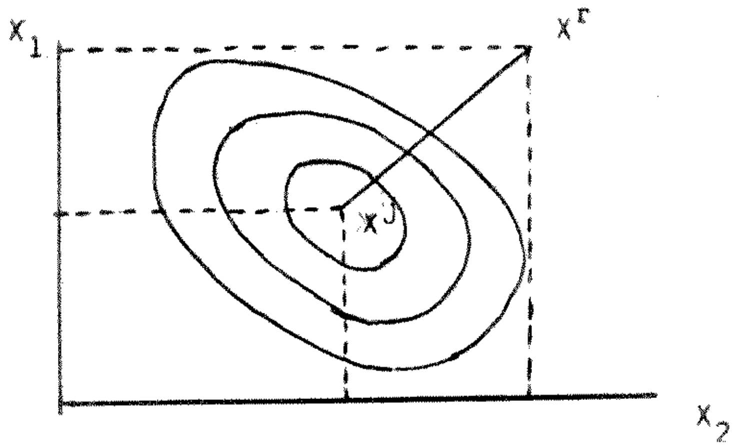

Fig. 1

The loss function is represented schematically in figure 1. The indifference curves are contour lines.

MEASURES OF LOSS AND DISTANCE:

In this section we will develop measures which identify the policy disparity or policy distance between group j and group r. Since the policy positions of two groups may be compatible in relation to one policy front and not to another --- eg. j may be in agreement with r on educational policies but not on industrial policies -- it is useful to define these measures in the first instance with respect to policy variable k.

1. Policy disparity or unweighted loss is defined as follows:

$$N_k(j;r) = (X_k^j - X_k^r)^2 \tag{2}$$

Total policy disparity or unweighted loss is:

$$N(j;r) = \sum N_k(j;r) \tag{3}$$

A notion of distance defined in a Euclidean vector space from the measure of total policy disparity is

$$\delta(\ j;r) = \sqrt{\Sigma(X_k^j - X_k^r)^2} \qquad (4)$$

$$= \sqrt{N(j;r)}$$

The distance $\delta(j;r)$ corresponds to the distance $\overline{X^j X^r}$ in figure 1 below. Distance is reflexive:

$$\delta(\ j;r\ ) = \delta(\ r;j\ ) \qquad (5)$$

The notion of distance can be used to identify the policy distance between two groups. The measure is reflexive and therefore implies that the perception of policy distance by both j and r is equal --ie. j and r view the squared deviations from their desired policy position with the same intensity. In other words, all policy variables have identical weights.

2. Loss, irreflexive or pseudo-distance:

The loss or disutility incurred by j through the imposition of r's (eg. government) desired policy state with respect to policy variable k is:

$$l_k\ (j;r) = Wjk\ (X_k^j - X_k^r)^2 \qquad (6)$$

$$= Wjk\ N(j;r)$$

$$l_k\ (j;r) \neq l_k\ (r;j) \quad \text{unless}$$

Wjk = Wjr -- ie. the policy weight is equal for both j and r.

Total group losses are:

$$L\ (j;r) = \Sigma l_k\ (j;r) \tag{7}$$

$$= \Sigma w_{jk}\ (x_k^j - x_k^r)^2$$

$$\text{where } \sum_k w_{jk} = 1$$

Pseudo-Distance:

$$d\ (j;r) = \sqrt{\Sigma w_{jk}\ (x_k^j - x_k^r)^2}$$

$$= \sqrt{L\ (j;r)} \tag{8}$$

$d\ (j;r) \neq d\ (r;j)$. In other words group j may feel a much greater distance through the imposition of r's policy platform than r may feel with respect to j's policy platform. Pseudo-distance is irreflexive.

Loss Matrices:

The hypothetical losses corresponding to the underlying ideological disparities between interacting groups may be represented in matrix form as follows:

$$L_k = \begin{bmatrix} 0 & l_k\ (1,1) & \cdots\cdots & l_k(1,m) \\ l_k\ (2,1) & 0 & \cdots\cdots & l_k(2,m) \\ \vdots & & \ddots & \vdots \\ l_k(m,1) & l_k(m,2) & \cdots\cdots & 0 \end{bmatrix}$$

The typical element $l_k\ (j;r)$ identifies the loss incurred by j with respect to r's policy platform. The elements in the principle diagonal are equal to zero.

Total group loss is

$$L\ (j;r) = \sum_k l_k\ (j;r)$$

Thus the matrix $L = \left[L\ (j;r)\right]$ is

$$L = L_1 + L_2 + \dots L_n \tag{10}$$

The measures of <u>policy</u> <u>disparity</u> and <u>distance</u> can also be represented in matrix form.

Distribution of power:

The foregoing measures of loss and distance may be used to identify the affinity or lack of affinity between policy groups. The underlying measures may also be used to explain the formation of alliances or coalitions based on preference affinity. To examine, however, the process of group interaction and problems relating to stability and the feasibility of government policy, the definition of measures which identify the power or influence of the various policy groups is required.

We may define a coefficient of group influence which measures the overall power of the group in the decision-making process or alternatively different coefficients of group influence for different policy variables on the assumption that the group may have more power relative to other groups in influencing some policy variables (and less influence with respect to others). For instance, Sociedad de Fomento Fabril has more power of influence in affecting economic policies than educational policies whereas the church has more influence in the latter.

Let α_{jk} be defined as the coefficient of group influence, $\alpha_{jk} < 1$ $\sum_{j} \alpha_{jk} = 1$ $k = 1,2 \ldots . n$ policy variables. The coefficient of group influence measures the relative power or influence of group j (with respect to other groups) in affecting or changing policy variable k. The overall coefficient of group influence may be viewed as a weighted average of the α_{jk}'s.

The distribution of power can be conveniently described in matrix form:

$$P = \begin{bmatrix} \alpha_{11} & \alpha_{12} \cdots\cdots & \alpha_{1n} \\ \alpha_{21} & \alpha_{22} \cdots\cdots & \alpha_{2n} \\ \vdots & & \vdots \\ \alpha_{m1} & \alpha_{m2} \cdots\cdots & \alpha_{mn} \end{bmatrix} \qquad (11)$$

is an m x n matrix. The typical element α_{jk} identifies the power of the $_j$th policy group to affect or change policy variable k.

Opposition and Antagonism:

The opposition or antagonism of group j to group r is a function of

1) the subjective perception of loss incurred by j through the action of r (eg. government). The greater the loss the more group j will be motivated in opposing group r's policy platform.
2) the power of group j in affecting the decision-making processes . In other words, opposition or antagonism is a function of <u>preference</u> <u>distance</u> or loss and the power of effectively opposing or antagonising an opponent group.

$$\overline{OP}_k\ (j;r) = \alpha_{jk}\ l_k\ (j;r) \qquad (12)$$

$\overline{OP}_k$ (j;r) measures the opposition of group j to the policies of group r (eg. government) with respect to policy variable k.

<u>Total Opposition:</u>

$$\overline{OP}\ (j;r) = \alpha_j\ L(j;r) \qquad (10)$$

where α_j is the overall coefficient of influence and L (j;r) is total loss of the j-th group through the imposition of r's policies.

<u>Opposition</u>: embodies respectively the notions of difference in preference and distribution of power. The greatest value of opposition will arise when the opponent group (s) has (have) high losses exhibited by high ideological disparities

and high coefficients of influence -- ie. the power to pressure government for instance to change its policy platform.

Clearly, <u>opposition</u> is not generally reflexive. Group j may exhibit high opposition to group r's policies whereas r may exhibit only mild opposition to j's policy position.

The measures of opposition can be represented more conveniently in matrix notation:

$$\overline{OP}^{\,k} = \left[\alpha_{jk} l_k \,(j;r)\right] \tag{13}$$

The typical element of $\overline{OP}^{\,k}$ is the opposition of group j to group r's policy position pertaining to the kth policy variable.

<u>Coalitions:</u>

Coalitions will <u>ex</u> <u>ante</u> be established on the basis of ideological affinities. Group j will form a coalition with group r against g (government) if the losses it incurs by identifying with r are lower than those by identifying with g:

$$\mathcal{L}\ (j;r) < \mathcal{L}\ (j;g) \tag{14}$$

however r will <u>accept</u> to form a coalition with j if

$$\mathcal{L}\ (r;j) < \mathcal{L}\ (r;g) \tag{15}$$

These rules can be generalised to a model involving m groups. The underlying loss calculus will be qualified later to take into account explicitly the fact that when a coalition (ie. between two or more goups) is formed the coalition platform will be determined as a consequence of the interaction of the members of the coalition and as a function of their relative power in the coalition.

Cross-cutting coalition structures:

Groups may form overall policy coalitions where they are allies on all policy fronts or alternatively groups may enter into partial or cross-cutting coalitions-- ie. j may enter a coalition with group r (against g) on educational policy and with g on economic policy. The coalition rules in terms of ideological affinities are similar to those established above:

$$\begin{aligned} & l_k\ (j;r) < l_k\ (j;g) \\ \text{and} \quad & l_k\ (r;j) < l_k\ (r;g) \end{aligned} \qquad (16)$$

(16) implies that r and j will form a partial coalition against g on policy front k.

Cross-cutting coalition structures have been described by David Freeman as a mechanism which is likely to attenuate political and social instability[5]. Opponents on one policy issue are allies on another policy issue.

The cross-cutting structure is politically more stable than if groups j and r were ennemies on all political fronts.

Numerical illustration:

Envisage a policy situation involving 3 policy variables A, B and C and 3 policy groups 1, 2, 3.

The loss matrices are

$$L_A = \begin{bmatrix} 0 & 5 & 3 \\ 4 & 0 & 6 \\ 2 & 7 & 0 \end{bmatrix}$$

$$L_B = \begin{bmatrix} 0 & 1 & 5 \\ 3 & 0 & 2 \\ 1 & 4 & 0 \end{bmatrix}$$

$$L_C = \begin{bmatrix} 0 & 2 & 10 \\ 15 & 0 & 4 \\ 10 & 3 & 0 \end{bmatrix}$$

The matrix of power distribution is

$$P = \begin{bmatrix} .5 & .1 & .2 \\ .4 & .7 & .8 \\ .1 & .2 & .0 \end{bmatrix}$$

1) Cross-Cutting Coalition structures:

With respect to policy variable A:

$$l_A\,(1,3) < l_A\,(1,2)$$

and

$$l_A\,(3,1) < l_A\,(3,2)$$

thus groups 1 and 3 will enter in a coalition against 2 on policy front A.

With respect to policy variable B:

$$l_B\ (1,2) < l_B\ (1,3)$$

However $l_B\ (2,3) < l_B\ (2,1)$

$$l_B\ (3,2) > l_B\ (3,1)$$

In other words 1 would prefer to form a coalition with 2 against 3 although 2 has advantage in associating with 3 rather than with 1. However, 1 will refuse to enter a coalition with 3 and 3 will not accept to form a coalition with 2. No coalition will result with respect to policy variable B (under the established rule). With respect to policy variable C, groups 2 and 3 will form a coalition against 1. In terms of the notion of cross-cutting coalition structures, the resulting coalition may *a priori* be relatively stable since 1 and 2 are allies on A and ennemies on C. With respect to policy variable B no coalition results.

Opposition

The matrices $\overline{OP}^k$ exhibiting the measure of opposition can be calculated and are as follows:

$$\overline{OP}^A = \begin{bmatrix} 0 & 2.5 & 1.5 \\ 1.5 & 0 & 2.4 \\ .2 & 1.4 & 0 \end{bmatrix}$$

$$\overline{OP}^B = \begin{bmatrix} 0 & .1 & .5 \\ 2.1 & 0 & 1.4 \\ .2 & .8 & 0 \end{bmatrix}$$

$$\overline{OP}^C = \begin{bmatrix} 0 & .4 & 2 \\ 12.0 & 0 & 3.2 \\ 0 & 0 & 0 \end{bmatrix}$$

Let us assume _a priori_ from matrix P that the government group is 2 with coefficients of influence of .4, .7 and .8 with respect to policy variables A, B and C respectively.

The opposition of groups 1 and 3 to government (group No.2) is high with respect to policy front A

$$\overline{OP}^A\ (1,2) = 2.5$$
$$OP^A\ (3,2) = 1.4$$

although 2 counteracts with:

$$\overline{OP}^A\ (2,1) = 1.6$$
$$\overline{OP}^A\ (2,3) = 2.4$$

While 1's pressure on 2 (government) is higher than 2's counterpressure, 2 is more effective in neutralizing 3's counterpressure. Since we have seen that 1 and 3 will (on the basis of their preference affinities) form a coalition against 2 with respect to variable A and since 1 is more powerful and has a greater strength of opposition to 2's policies than 3, there is a likelihood that 3 will give in and adopt 1's policy platform and their joint action will be sufficient to counteract and significantly change government policy with respect to variable A. With respect to policy front B, the underlying loss matrix has shown that no coalition will result. Given the distribution of power, government will be able to counteract the opposition of both opponent groups since

$$\overline{OP}^{B}\ (2,1) > \overline{OP}^{B}\ (1,2)$$

and

$$\overline{OP}^{B}\ (2,3) > \overline{OP}^{B}\ (3,2)$$

On policy front C, groups 1 and 2 are potentially in coalition against group 3 although since group 3 is in any eventwithout power of opposition and therefore is unable tr effect a change with respect to policy variable C, 2 may refuse to form a coalition with 1 against 3 knowing fair well that 3 has no strength of opposition and that 1 would not want to enter a coalition with 3 because it has greater preference affinity with 2. 2 is in a position to impose its ideology.with respect to C.

Clearly, these illustrations do not involve any trades between groups with respect to different policy fronts--- ie. one group may negotiate a compromise with another group on one policy front on the assumption that an agreement will be forthcoming on a different policy front -- even though the groups may be very much opposed in terms of ideology.

Stability:

How stable is the system? Government can impose its policies with respect to policy fronts B and C while opposition groups can fight their way in policy front A mainly due to 1's strength of opposition. In the absence of negotiation between government and group 1 (and 3) the situation is potentially unstable with respect to policy variable A where government and opposition are well equiped to oppose and counteroppose. The balance of forces would presumably result in a battle which would tend to favour opposition forces. Assuming negotiation or trade, government may make certain concessions to opposition on policy front B and C in exchange for a settlement with opposition forces on policy front A. Trades and negotiation can be analysed in the context of committee decision rules which will be discussed later.

The foregoing analysis has not envisaged specifically

a) the changes in ideology,

b) the shifts in the distribution of power, which result from a coalition structure. Matrices P and L^k identify the distribution of power and the ideology before coalition formation. The formation of a coalition between 2 of the groups against the third will imply a new 2x3 matrix exhibiting the new distribution of power resulting from the coalition. In this respect we may reasonably assume that the power of the coalition will at least be equal to the sum of the powers of the respective groups although their joint power may in fact increase as a result of the coalition.

On the first assumption, the distribution of power (in the numerical illustration) resulting from the coalition of 1 and 3 against 2 is

$$P_C = \begin{bmatrix} .6 & .3 & .2 \\ .4 & .7 & .8 \end{bmatrix}$$

obtained from the original matrix P by adding the rows elements corresponding to those groups entering the coalition.

For m groups, n policy variables, the initial distribution of power before coalition formation is represented by an m x n matrix. Assuming that the m groups form q coalitions the resulting matrix of power distribution is

$$P_C = \begin{bmatrix} \sum_j \alpha_{j1} & \sum \alpha_{j2} \ldots\ldots\ldots & \sum \alpha_{jn} \\ \sum_s \alpha_{s1} & \sum \alpha_{s2} \ldots\ldots\ldots & \sum \alpha_{sn} \\ \vdots & & \vdots \\ \sum_t \alpha_{t1} & \sum \alpha_{t2} \ldots\ldots\ldots & \sum \alpha_{tn} \end{bmatrix} \qquad (17)$$

P_C is a q x n matrix of coefficients. The typical element represents the coefficient of influence of the i th coalition i = 1,2 ... q pertaining to the k th policy variable.

The foregoing analysis has assumed that the power of the coalition is equal to the sum of the power of the respective groups which form the coalition.

Ideological shifts resulting from coalition structures:

We saw earlier that groups j and r will form a coalition on the basis of ideological compatibility although the distribution of power will be an important factor in motivating the formation of coalitions. In other words, group j may not wish to associate with group r because group r's power of influence is low and therefore its strength of opposition is weak. Group j may prefer to join with group s which has more power in opposing government than group r with whom it has more ideological compatibilities. However group s may refuse to form a coalition with group j.

a) because group j exhibits ideological incompatibilities with group s and/or
b) that group j itself has little power of influence and therefore is of little use to s in opposing a joint enemy. The foregoing analysis on coalitions can be qualified as follows:

Group j will enter the coalition which is most likely to improve its position with respect to imposed government policy. Furthermore it will also be motivated by the bargain it can obtain with its partner(s) in the coalition in influencing the policy platform of the coalition. If group j has low power of influence and s has high power of influence, group s may be able to impose its policy platform on group j and the resulting ideology of the coalition will coincide with the ideology of the dominant policy group (ie. group s). If the groups j and s have approximately the same power of influence, the policy platform of the coalition may result as a mid-way compromise which reconciles the respective ideologies of groups j and s. The policy platform which results from the coalition, however, should be such that the losses incurred by compromising are not greater than the losses the respective groups may incur by colluding (in another coalition) with partners of similar or equal power of influence.

Let us first assume for the moment, that j and s form a coalition on a single policy variable k

X_k^j is j's desired policy configuration and

X_k^s is s's desired policy configuration. Since there is only one policy issue the weighting problem does not apply. The disparities with respect to government policy are:

$(X_k^j - X_k^g)^2$ and $(X_k^s - X_k^g)^2$ where X_k^g is government policy. Thus the loss incurred by each group (with respect to government) is:

$$l_k\ (j,\ g) = (x_k^j - x_k^g)^2$$

and (18)

$$l_k\ (s,\ g) = (x_k^s - x_k^g)^2$$

Assume that the power of influence of j and s is:

α_{jk} and α_{sk} respectively.

Their relative power inside the coalition may be represented by

$$\beta_{jk} = \frac{\alpha_{jk}}{\alpha_{jk}+\alpha_{sk}}$$

$$\beta_{sk} = \frac{\alpha_{sk}}{\alpha_{jk}+\alpha_{sk}} \qquad (19)$$

$$\beta_{jk} + \beta_{sk} = 1$$

The resulting desired configuration for the coalition will be the following convex combination of the desired policy configurations of group s and j respectively:

$$x_k^{j+s} = \beta_{jk}\ x_k^j + \beta_{sk}\ x_k^s \qquad (20)$$

The above expression implies that the platform or ideology of the coalition is a function of the relative power of j and s in the coalition. If j has no power of influence $\beta_{jk} = 0$, the resulting coalition platform will coincide with the desired configuration of group s. The above expression can be generalized to p participants (in a coalition):

$$X_k^c = \sum_{j=1}^{p} \beta_{jk} \quad X_k^j \tag{21}$$

where X_k^c is the policy platform of the coalition.

In the 2 group coalition (j and s) the losses incurred by j in entering the coalition are:

$$\begin{aligned} l_k\ (j,\ j+s) &= (X_k^j - X_k^{j+s})^2 \\ &= (X_k^j - \beta_{jk} \quad X_k^j - \beta_{sk} \quad X_k^s)^2 \\ &= ((1 - \beta_{jk}) \; X_k^j - \beta_{sk} \quad X_k^s)^2 \\ &= (\beta_{sk} \; (X_k^j - X_k^s))^2 \end{aligned} \tag{22}$$

The losses of s are:

$$\begin{aligned} l_k\ (s,\ j + s) &= (X_k^s - X_k^{j+s})^2 \\ &= (\beta_{jk} \; (X_k^s - X_k^j)^2 \end{aligned} \tag{23}$$

j will join forces with s only if the losses of adopting the coalition platform are not greater than those incurred by joining any other policy group. This statement is only valid under the assumption that j is only concerned with ideological affinities and the platform which will result from the coalition and not by the <u>big brother</u> argument -- ie. compromise in terms of one's convictions and join a big brother who has strength of opposition and is more likely to effectively oppose government. The criterion for coalition can now be expressed as follows: j will form a coalition with s if:

$$l_k\ (j,\ j+s)\ <\ l_k\ (j,\ j+r) \qquad (24)$$

where r is any other potential partner. Similarly s will accept to enter a coalition with j if:

$$l_k\ (s,\ j+s)\ <\ l_k\ (s,s+r) \qquad (25)$$

The foregoing discussion was based on a one issue coalition and the relative weighting of the different policy variables was assumed not to apply, and that the groups (in the coalition) although exhibiting different policy preferences evaluate the disparity with respect to government policy with the same intensity.

Coalition structures - n policy variables, p coalition members:

The loss of the jth policy group (j = 1,2...m) with respect to coalition platform C_t,t = 1,2...N pertaining to the kth policy variable (k = 1,2...n) is

$$l_k\ (j\ ;\ \hat{C}_t) = w_{jk}\ (X_k^j - X_k^{\hat{C}_t})^2 \qquad (26)$$

where $\hat{C}_t$ is the coalition platform of coalition members including j ie.--- $\hat{C}_t = C_t + j$.

The total loss of the jth group with respect to the coalition platform is

$$L\ (j;\hat{C}_t) = \sum_k l_k\ (j;\hat{C}_t) = \sum_k w_{jk}\ (X_k^j - X_k^{\hat{C}_t})^2 \tag{27}$$

Assuming that the determination of the coalition platform depends on the relative power of the coalition members

$$X_k^{C_t} = \sum_{S=1}^{p} \beta_{sk}\ X_k^s \tag{28}$$

(28) implies that the coalition platform is a convex combination of the desired positions of the p coalition members, $o \leqslant \beta_{sk} \leqslant 1$, $\Sigma\beta_{sk} = 1$. β_{sk} is the relative power of group s (s=1,2....p) in affecting policy variable k.

Thus the loss of j with respect to the coalition platform (pertaining to variable k) is:

$$l_k\ (j;\hat{C}_t) = w_{jk}\ (X_k^j - \Sigma\beta_{sk}\ X_k^s)^2 = w_{jk}\ (X_k^j\ (1-\beta_{jk}) - \Sigma\beta_{sk}\ X_k^s)^2 \tag{29}$$

Total losses of j (over all policy variables) resulting from joining coalition C_t is:

$$L\ (j;\hat{C}_t) = \Sigma l_k\ (j;\hat{C}_t) = \sum_k w_{jk}\ (X_k^j\ (1-\ \beta_{jk}) - \sum_s \beta_{sk}\ X_k^s) \tag{30}$$

The coalition formation rules based on ideological affinities established in (14), (15) and (16) can now be appropriately qualified. Group j will wish to join the coalition C_t which will minimize its losses $L(j;\hat{C}_t)$ for t=1,2.,j,..N (over all possible coalition structures). The acceptance of j by potential coalition partners implies that the potential partners would not loose more with the entry of j in the coalition than if they were to join another potential coalition (or potential partners).

Consider for instance the following situation: There exist N already formed coalitions and group j is unaffiliated.

$$L\ (j\ ;\ \hat{C}_r) < L\ (j\ ;\ \hat{C}_t) \qquad (31)$$

for t=1,2..... N, $t \neq r$ implies that j will join coalition C_r if the losses of the coalition platform of C_r including group j-- ie. coalition $\hat{C}_r$, are less than the losses incurred by joining any other coalition C_t.

The members of coalition $\grave{C}_r$ must accept group j in the coalition. The acceptance of j will depend on the measure of ideological affinity of the members of C_r with group j. Some members may support j's entry while others will oppose it. Since the entry of j in the coalition implies an ideological shift, the motivation of members of C_r with respect to j's possible entry will largely depend on the gains and losses to the members of the coalition resulting from j's entry. Thus if for coalition member s:

$$L\ (s,\ C_r) < L\ (s,\ \hat{C}_r) \qquad (32)$$

s may well oppose j's entry in the coalition. The acceptance of j in the coalition will result after internal negotiation between the various coalition members. If the sum of the net weighted gains resulting from j's entry is positive, j will (on the basis of preference affinity) be accepted into the coalition:

$$\sum_{s} \beta_s \left(L(s;\hat{C}_r) - L(s;C_r)\right) > 0 \qquad (33)$$

The net gains are weighted by the coefficients β_s which indicate the relative power of influence of the various members within the coalition.

Clearly, while preference affinity is an important consideration in discussing coalition formation, the acceptance or rejection of a new member will often depend on whether an enlarged and reinforced coalition is more effective in opposing, for instance, the policies of government. In other words, j's entry while implying an ideological shift of the coalition platform may be instrumental in achieving certain policy objectives which are more effectively achieved by a more powerful and cohesive political entity.

Sofar, we have implicitly assumed that the composition of the coalition does not change as a result of j's entry. The entry of a new member into coalition C_r may in fact not only imply changes in the composition of coalition C_r, but also in the composition of other coalition structures. As a result of j's entry into C_r, some members may decide to leave C_r and join another coalition. If for coalition member s:

$$L\ (s;\hat{C}_r) > L\ (s;\hat{C}_t) \qquad (34)$$

where $\hat{C}_t = C_t + s$, member s will be motivated, on the basis of preference affinity, into joining coalition C_t. The coalition members of C_t may or may not accept group s, depending on the preference affinity criterion (33) above. The entry of s into coalition C_t will, however, also change the composition of C_t by inducing some of the members of C_t to leave and join other coalition structures. In other words, the cumulative effects of the entry of group j into coalition C_r may be described as follows:

1) j enters C_r, the policy platform of C_r <u>shifts</u> with the entry of j in the coalition.

2) the ideological shift resulting from j's entry induces the departure of one or more members who join other existing coalitions. Their exit will imply a further ideological shift of the coalition platform.

3) the entry of those dissident members of C_r into other coalitions will induce ideological shifts in the platforms of other coalition structures.

4) the ideological shifts will induce changes in the composition of the various coalitions which accepted the dissident C_r members motivating possible departures.

5) the process is cumulative. The departure of one member from C_r through the entry of j will induce changes in the composition of other coalitions with the possibility of a <u>feed-back</u> effect on coalition C_r.

6) the feed-back effect on C_r may produce <u>a second round</u> of changes in the composition of coalition C_r (with even the possibility of a departure of j).

If the loss functions of all policy groups and their power coefficients β_s (in all coalition structures) are known, the cumulative effects of an initial change in the composition of a particular coalition may be determined.

The affiliation rule (31) above, implies that j does not anticipate possible changes in the composition of C_r. If j can anticipate the primary and secondary changes in composition which result from its entry, the underlying criterion for affiliation should be modified as follows:

$$L\ (j;\overline{C}_r) < L\ (j;\overline{C}_t) \qquad (35)$$

for $t = 1,2...N \quad r \neq t$ where $\overline{C}_r$ and $\overline{C}_t$ are the coalition structures which result from the direct and indirect effects (on coalition composition) as a consequence of j's entry into C_r.

COMMITTEE DECISION PROCEDURES:

In this section we will examine the application of the Van den Bogaard committee decision problem which suggests optimal decision rules for a committee consisting of M members.[6]

The model assumes that each committee member has a desired policy position and that his preferences are characterized by a quadratic loss function. Members have equal weight. If the members belong to parties of different size and importance we assume that each party consists of a number of party members who have identical preference functions. In other words, each party will be weighted in terms of the number of its members or votes in the committee (or representative body).

The Van den Bogaard model embodies the log-rolling assumption ---ie. committee members arrive at a decision through a process of negotiation. In the Van den Bogaard model the log-rolling assumption implies that the loss incurred by the jth committee member through the imposition of the desired policy positions of all other members be equal to the loss incurred by all other committee members through the imposition of j's policy position. We will see later the implication of this behavioural assumption.

The notion of load

The loss function of the jth member is:

$$L_j(X) = \sum w_{jk} (X_k^j - X_k)^2$$

$X^j = (X_1^j; X_2^j \dots X_n^j)$ is j's desired policy position and

$X = (X_1, X_2 \ldots X_n)$ is the actual value of the policy variables to be determined from the committee (or parliamentary) decision processes. In other words, the jth member's loss function identifies the loss of j with respect to (<u>expost</u>) committee (or parliamentary) policy.

The preference of the jth member is equally well described by any positive multiple of the loss function since $L_j\ (X)$ is defined up to a homogeneous linear transformation.

Thus the loss function of j may be written $d_j L_j\ (X)$ where d_j is a positive multiple or <u>load factor</u>. The significance of d_j will be discussed later on.

The committee loss function --- assuming for the moment that all members are equal, is the implicit aggregation of the members' loss functions

$$L_c\ (X) = \sum_j d_j\ L_j\ (X) \qquad (36)$$

The <u>loads</u> are not factors which explicitly weight the preferences functions of the various committee members but unknowns (to be determined) which depend on the fulfillment of Van den Bogaard's log-rolling condition. This condition implies making corresponding row and columns of the loss matrix (weighted by the load factors) pair-wise equal:

$$\sum_r d_j\ L(j;r) = \sum_r d_r\ L(r;j) \qquad (37)$$

j = 1,2...M members which may be expressed as follows:

$$\begin{bmatrix} -\Sigma L(1,r) & L(2,1) & \cdots\cdots & L(M,1) \\ L(1,2) & -\Sigma L(2,r) & \cdots\cdots & L(M,2) \\ \vdots & & \ddots & \vdots \\ L(1,M) & \cdots\cdots & \cdots\cdots & -\Sigma L(M,r) \end{bmatrix} d = 0 \qquad (38)$$

where d is a column vector of <u>load</u> <u>factors</u> (d_1, $d_2 \ldots$. d_M). (38) is a system of homogeneous linear equations which enables us to determine the unknown load factors d_1, $d_2 \ldots . d_M$. The underlying matrix in (38) is singular. System (38) has a nontrivial solution which is unique apart from an arbitrary multiplicative scalar and which is the characteristic vector of the matrix in (38).

In a parliamentary process where parties are of different size or strength, the model should be adjusted accordingly by assuming that the power of each party is proportional to its membership size and that the members have homogenous preferences. In this respect, expression (38) below may be written as follows:

$$\begin{bmatrix} -\Sigma\alpha_1 \; L(1,r), & \alpha_2\alpha_1 \; L(2,1) & \cdots\cdots & \alpha_m\alpha_1 \; L(m,1) \\ \alpha_1\alpha_2 \; L(1,2) & -\Sigma\alpha_2 \; L(2,r) & \cdots\cdots & \alpha_m\alpha_2 \; L(m,2) \\ \vdots & & & \vdots \\ \alpha_1\alpha_m \; L(1,m), & \alpha_2\alpha_m \; L(2,m) & \cdots\cdots & -\Sigma\alpha_m \; L(m,r) \end{bmatrix} d = 0 \qquad (39)$$

(39) is equivalent to a committee of M members which belong to m parties of unequal size (or power). It is obtained from the

initial problem by appropriate row and column summations of the M x M matrix in (38), d is an m component vector of load factors -- ie. corresponding to each party. $\alpha_1, \alpha_2 \ldots \alpha_m$ are coefficients indicating the membership size (or power) of the various parties or groups.

The Committee decision function:

The Committee loss function in the case of m parties of unequal strength is

$$L_c(X) = \sum_j \alpha_j \quad d_j \quad L_j(X) \tag{40}$$

The optimal committee rule which satisfies the Van den Bogaard side-condition is obtained by minimizing the committee loss function for values of the load factors $d_1, d_2 \ldots d_m$ obtained from the solution of (39) above.

Group losses resulting from log-rolling:

The load factors determined in the committee decision problem depend on the perception of loss by the different groups. If the perception of loss is the same for all groups, $L(j;r)=L(r;j)$ for $j,r= 1,2\ldots m$ $r \neq j$, and the underlying loss matrix $L(j;r)$ is symmetric. In this case the Van den Bogaard condition is satisfied when the load factors are all equal to unity.

In other words, the load factors may be viewed as implicit weights which are a function of the perception of loss by the groups. The procedure implicitly favours those groups which have a high perception of loss.[7]

Denoting the optimal committee decision by X^P, the loss incurred by group j by accepting Van den Bogaard's log-rolling procedure is

$$L\ (j;P) = W_{jk}\ (X_k^j - X_k^P)^2 \qquad (41)$$

Group j will accept the log-rolling procedure if the anticipated losses of log-rolling are less than those which may be incurred through another decision procedure. The determination of $L(j;P)$ for all $j = 1,2...m$ should enable one to identify which groups are most likely to benefit from a log-rolling procedure.

Partial Log-Rolling:

Parliamentary debate (for instance) may pertain to a single policy front (eg. health) or to several policy objectives discussed simultaneously (eg. health, education and social welfare). In other words, the log-rolling procedure may apply to either the entire policy platform (of the various groups), to a particular set of issues or to a single issue. Is it more advantageous to (say) group j to negotiate or trade with respect to its entire policy platform implying concessions on some policy fronts for favours (from other policy groups) on other policy fronts, or is it better to negotiate policy issues separately?

Assume for instance that the committee decision process implies a separate discussion and log-rolling with respect to each policy front. The committee decision procedure would imply minimizing:

$$l_c\ (X_k) \;=\; \sum_j \alpha_{jk}\ d_{jk}\ l_j\ (X_k) \qquad (42)$$

where $l_c\ (X_k)$ and $l_j\ (X_k)$ are respectively the loss functions of the committee and groups j=1,2...m pertaining to policy variable k. d_{jk} are the load factors corresponding to the k th variable. α_{jk} may be interpreted either as the size or importance of the j th group or the power of influence of group j in affecting policy variable k. In the former case $\alpha_{jk} = \alpha_j$ for all k.

Denoting the optimal solution of (42) above by X_k^Q, the vector of optimal solutions obtained through successive log-rolling over all policy variables is

$$X^Q \;=\; (X_1^Q,\ X_2^Q \ldots\ldots X_n^Q) \qquad (43)$$

and the total loss of group j incurred through successive partial log-rolling is

$$L\ (j;Q) \;=\; \sum w_{jk}\ (X_k^j - X_k^Q)^2 \qquad (43)$$

Group j will favour partial log-rolling as opposed to general log-rolling if

$$L\ (j;Q) < L\ (j;P)$$

In general, group j will favour the decision procedure which will minimize its losses endorsing either partial log-rolling, general log-rolling or successive log-rolling with respect to various sub-sets of the policy variables. In the later case, group j may for instance endorse a first negotiating procedure with respect to health, education and social welfare and a second negotiation with respect to transport, communication and industrial policy. This decision strategy implies that trades and negotiation pertain to each subset. A concession by j in educational policy may be traded against a favour (by other policy groups) in health or social welfare. The decision procedure, however, does not allow for a trade between (say) education and industrial policy.

How is the decision procedure (eg. partial versus general log-rolling) determined? It is reasonable to assume that the decision to either discuss various policy aspects separately or jointly is largely a function of the distribution of power between the different groups in the committee as well as the implicit or explicit coalitions between groups. The choice of the decision procedure per se is perhaps more important than the results of the procedure. With respect to coalition structures, groups may form coalitions which are based on affinity with respect to decision procedures rather than on the basis of ideological affinities.

Coalition Decision Procedures:

Clearly, the Van Den Bogaard log-rolling model can not only be applied to exhibit the mechanisms of group interaction within a committee but it is also appropriate to analyse the decision-making procedures within a coalition. Whereas in an overall model of group interaction, the decision-making procedures may or may not be characterized by a log-rolling procedure (eg. groups may or may not wish to negotiate), in a coalition composed of several distinct policy groups united in a common goal, decisions will normally be arrived at after discussion and negotiation.

Stability:

The measures of loss and distance may be interpreted as implicit indicators of the affinity or antagonism between policy groups. Does the interaction between opponent policy groups lead to stable or unstable results?

System stability will depend on the interaction of group ideologies, on the relative strength of the various policy groups in the decision-making processes (ie. the distribution of power) and on the structure of group coalitions. A crude and tentative measure of instability $\overline{IN}$ may be suggested in terms of the measure of opposition $\overline{OP}$ (j;r) defined in (10) above:

$$\overline{IN} = \sum_{j}\sum_{r} \overline{OP}\,(j;r) \qquad (44)$$

Instability is equal to the sum of opposition $\overline{\overline{UP}}(j;r)$ over all policy groups. The underlying measure may be useful in identifying instability $\overline{IN}$ in a historical perspective.

System stability will also depend on coalition structures -- ie. whether coalitions are of a cross-cutting nature --- as well as on the institutional and behavioural rules which characterize the decision-making processes --- do these rules allow for trade and negotiation?[8]

Coalition stability:

The stability of a coalition is a function 1) of preference or ideological homogeneity within the coalition -- ie. the degree of consensus or agreement with respect to the coalition platform 2) a function of the internal distribution of power within the coalition.

A coalition is therefore likely to be unstable if the ideological disparities between the members' desired policy positions and the coalition platform is large. These disparities will be weighted in accordance with the relative power or importance of the various members in the coalition. Thus if a particular coalition member has important ideological differences with the overall coalition platform (which results from the interaction of the various members) and power within the coalition, these two factors are likely to contribute to the instability of the coalition.

The instability of coalition C_r may be defined as follows:

$$\overline{IN}\ (C_r) = \frac{\sum \beta_s\ L\ (s;C_r)}{\max_t .\ \overline{IN}\ (C_t)} \qquad (45)$$

Coalition instability $\overline{IN}\ (C_r)$ is a weighted sum of coalition members' losses with respect to the coalition platform C_r. The weights are coalition power coefficients (of the coalition members). Max $\overline{IN}(C_t)$ is the maximum value of $\overline{IN}$ (instability) over all coalition structures (actual/or potential). The underlying measure of coalition instability will vary between zero and unity and should therefore indicate the relative stability of the various coalition structures within the system.

Perception and Intergroup Comparisons:

The perception of loss or distance (between groups j and r) is identical when the weights assigned to the various policy variables are identical. The weights of the group loss functions represent the marginal disutilities of the underlying squared deviations of the variables from their desired group values. Identical weights while implying identical perception clearly does not imply identical preference (loss) functions since the desired group values are different. In other words, the weights represent the intensity of loss of a one unit deviation from the underlying desired (group) value.

Similarity in preference perception may be measured by the following indicator:

$$\overline{SP}\,(j;r) = \frac{|L\,(j;r) - L\,(r;j)|}{\max\limits_{s,t} |L(s,t) - L(t,s)|} \qquad (46)$$

the numerator of (46) above is the absolute value of the difference between perceived losses. The denominator is the maximum value of the difference over all policy groups. Thus $\overline{SP}$ (similarity in perception) is a coefficient between 0 and 1. Similarity in perception is maximum when the $\overline{SP}$ is equal to zero. It should be noted that $|L(j;r) - L(r;j)| = 0$ is a necessary but not a sufficient condition for similarity in perception. Symmetry does not necessarily imply identical weights (of the loss functions).[9]

Concluding Remarks:

This paper has developed a simple framework for analysing the policy positions of articulate interest groups and the underlying process of group interaction. Notions of preference distance enabled us to identify the ideologi cal affinities between policy groups and analyse the process of coalition formation. Tentative measures of antagonism (between groups), opposition (eg. to government policy) and stability were suggested in terms of the underlying measures of loss and distance and the distribution of power between the various policy groups.

The framework is empirically oriented. The group loss functions can be determined from revealed preferences. In this respect, interviewing and other techniques to reveal preferences may be envisaged.[10]

In other words, each policy group can be identified in terms of a set of observed or revealed preference attributes pertaining, for instance, to short-run policy variables (eg. unemployment, price stability), to various social priorities (eg. health, education, housing, etc..) or to alternative institutional arrangements (or reforms). While in the first two cases, the policy variables may be measured in terms of conventional units, the identification of desired institutional arrangements requires, however, the use of coding and scoring techniques. The purpose of scoring techniques is to establish a scale of measurement for preference attributes which are generally considered as qualitative (eg. alternative institutional arrangements). Scoring techniques have been utilised by Adelman and Morris to identify a set of qualitative or institutional variables in a cross-section study of over 70 developing countries.[11] Scoring techniques have been used extensively in the area of experimental psychology.

Policy Formulation and Planning:

The determination of policy preference attributes enables one to analyse not only the affinities between groups and potential coalition structures but also the implications of a particular structural reform or government policy measure. Given the distribution of power among groups, what is the measure of political instability generated by a particular government project? How much instability is generated by the antagonism of dissident groups? Is the support of favorable groups sufficient to compensate for the opposition of dissident groups? In other words, is the implementation of government policy feasible or will it result in a politically unstable and explosive situation?

The identification of preference indicators pertaining to different classes, groups and segments or society should be considered as an instrument for linking the process of policy formulation to the interests and preferences of the community. This _formal link_ is a step in the direction of implementing the notion of group participation in policy and planning models.

FOOTNOTES:

1.- Kenneth Arrow: Social Choice and Individual Values, New York, 1951.

2.- The methodological implications of Power in economic analysis are discussed in J.K. Galbraith's A.E.A. 1972 presidential address: Power and the Useful Economist, American Economic Review, LXII, 1973.

3.- Cf. Henry Theil: Optimal Decision Rules for Government and Industry, Ch. 7, and Van den Bogaard and Arnaiz: On the Sensitivity of Committee Decisions Under Alternative Quadratic Criteria.

4.- For a discussion of these properties cf. Quirk and Saposnik: Introduction to General Equilibrium Theory and Welfare Economics, Ch. 1.

5.- David Freeman: Social Conflict, Violence and Planned Change.

6.- The Van den Bogaard model is described at greater length in H. Theil: Optimal Decision Rules, Ch. 7.

7.- For instance if 1 is twice as less sensitive to pain as 2, each time 2 receives a hit from 1, the Van den Bogaard rule permits him to hit 1 back twice.

8.- An alternative measure of stability is discussed in Calcagno et al: "Programas de Gobierno y Desarrollo Político".

9.- Theil suggested the following measure of "incomparability" of preferences of a pair of committee members

$$I_{gh} = \frac{|d_g \lambda_{gh} - d_h \lambda_{hg}|}{|d_g \lambda_{gh} + d_h \lambda_{hg}|}$$

where λ_{gh}, λ_{hg} are the losses of individuals g and h (Theil's notation, equivalent to our L(j;r) and L(r;j)), d_g and d_h are the load factors. "I_{gh} is a number between 0 and 1 on the assumption that the two committee members do not agree as to the optimal decision (if they do, I_{gh} is of the indeterminate form o/o). Theil also suggests a measure of the incomparability of the preferences of the gth committee member with those of all other committee members. For further discussion of these concepts, the reader is referred to H. Theil, Optimal Decision Rules, Section 7.2.7.

10.- I have examined methods for revealing policy preference functions in "Optimal Policy Configurations under Alternative Community Group Preferences", and in "La Fonction de Désutilité ..."

11.- Adelman and Morris, Society, Politics and Economic Development.

REFERENCES

Adelman I. and C. Morris: Society, Politics and Economic Development, John Hopkins, 1967.

Quirk and Saposnik: Introduction to General Equilibrium Theory and Welfare Economics, McGraw Hill, 1968.

Galbraith J.K.: Power and the Useful Economist, (presidential address), American Economic Review, LXIII, 1973, I-II.

Luce D. and H. Raiffa: Games and Decisions, John Wiley, 1957.

Theil H.: Optimal Decision Rules for Government and Industry, North Holland, Amsterdam, 1964.

Chossudovsky M.: La Fonction de Desutilité, Une Evaluation de la Politique Economique à Court Terme, L'Actualité Economique, décembre 1972.

Chossudovsky M.: Optimal Policy Configurations under Alternative Community Group Preferences, Kyklos, XXV, Fasc 4, 1972, 754-769.

Van den Bogaard P.J.M. and Arnaiz G.: On the Sensitivity of Committee Decisions under Alternative Quadratic Criteria, International Center for Management Science, Rotterdam, 1961 (mimeographed report).

Frey B.: Models of Perfect Competition and Pure Democracy, Kyklos, 1971, 736-755.

Calcagno A.E., Pedro Sainz y Juan de Barbieri: "Programas de Gobierno y Desarollo Político, un Modelo de Análisis" en América Latina: Modelos Matematicos, O. Varsavsky y A.E. Calcagno(eds), Editorial Universitaria, Santiago, 1971.

Farquarson Robin: Theory of Voting, Yale University Press, 1969.

Freeman David; Social Conflict, Violence and Planned Change, Some Research Hypotheses, Coexistence, Vol. 9, No. 2, 1972.

Kronjö T.O.M.: Positive Contributions by Conflict Theory to the Analysis of War and Peace Problems, Coexistence, Vol. 9, No. 2, 1972.

Tinbergen Jan: Economic Policy, Principles and Design, North Holland, Amsterdam, 1956.