

## **Latest Insights on Coalition Formation Theory Report on the 4th Coalition Theory Network Workshop**

*Sonia Oreffice, Fondazione Eni Enrico Mattei*

After the 1998 Venetian conference on coalition theory applied to economic issues, this methodological workshop gathered scholars and researchers coming from different countries and fields of interest to present their recent insights on coalition formation and contribute a broad update on the state of the art of the theoretical framework currently in use.

The intent was to provide a new platform of analytical tools and operational findings related to specific key-points of the structure of strategic incentives in order to investigate and compare them in view of a unifying common approach and set of tools.

As a matter of fact, the main purpose of the coalition theory network, formally created last year at the 3rd coalition formation workshop, is to support an interdisciplinary exchange aiming at the effective prediction of the outcome of the real negotiation process referred to, and spur researchers to harmonise research on coalition formation.

In particular, this edition tackled the problem, already raised last year, of addressing membership rules and formal structures to model co-operation in an univocal way. After recognising and emphasising the common nature of the two-stage structure by which the formation and the economic implications of coalitions are usually taken into account, it is still needed to bring together the several findings that revolve around the issue of membership and institutional rules in order to provide a common language and shared analytical structure to deal with this important aspect.

This international conference was hosted by the Department of Economics in Aix-en-Provence (Université de la Méditerranée, to which GREQAM belongs) and held three sessions in two days; more than 25 participants (half of which French) attended the authors' detailed presentation of eleven working papers and the following discussion (see box below).

The first morning session dealt with two papers that from very different points of view tackle some of the main features of the Kyoto Protocol, investigating through a game theoretic approach one of the latest international negotiation coalition outcome.

The paper by Tulkens et al. theoretically interprets the protocol by focusing on emission quotas, on their optimality and efficiency of their trading. The authors consider Kyoto as an intermediate given step in the right direction, i.e. toward the optimal coalition (the core-stable one in their cooperative view) while emphasising the economic purpose and tools embedded in the treaty. As to the two stage approach on coalition formation, the authors give an accurate representation of the main economic issues linked to emission levels by focusing on the second stage, in which the coalition is already formed.

On the contrary, the theoretical analysis performed in the paper "Alfa-rules and equilibrium endogenous coalitions" addresses the very formation of coalitions by focusing on the strategic incentive system that underlies the signature of a treaty. In particular, it presents a new stage, the rule game, to account for players' voluntary and endogenous choice of the membership rule informing the subsequent negotiations. Indeed, starting from the distinctive non-cooperative assumption of self enforcement, the paper first analyses the coalitions that endogenously form when different membership rules are considered in a context of positive spillovers like the Kyoto Protocol framework. Secondly, by endogenising the alfa-rule choice, namely the choice among various degrees of minimum participation constraints, it provides sharp theoretical predictions of the coalitions that players are going to form in different scenarios. As a matter of fact, starting from a strong applied interest (Kyoto and the most part of IEA exhibit a minimum participation clause) the resulting three-stage game provides a new consistent tool to better highlight strategic incentives as well as consolidate the formal basic structure.

The paper presented by Le Breton and Weber analyses the two key concepts linked to any co-operative outcome of coalition formation, i.e., the desirability (profitability) and sustainability (stability) of a coalition. The paper focuses on the main theoretical issues involved in the formation of coalitions in a core process, by distinguishing instances of the finite number from the continuum number .

The key feature of stability is basically addressed also in the analysis of hedonic (in which the payoff of a coalition member only depends on the identity of his own partners) coalition structure (paper presented by Bogomolnaia and Jackson). Indeed, to understand when coalitions are actually going to form, the authors develop a general model in which players are allowed to form more than one coalition and point out the

sufficient conditions that lead to core-stable coalitions with respect to different cases (asymmetry and symmetry of players, membership rule with exit permission).

The afternoon session offered the only two papers dealing with the formation of coalitions as related to an applied topic: firm market competition and trade. The main concern addressed in Bloch's communication is to assess what degree of co-ordination of trade can be reached in bilateral oligopolies with the variation of two characteristics of the model (product complementarity and existence of more than one market) and to claim that general results are called for since significant theoretical insights on the strategic incentives that lead to equilibrium are not provided in this typical coalition framework.

In the other applied contribution as well, the authors develop their analysis starting from their interest in a model of agglomeration and trade; by pointing out a new model that takes into account the main features of recent economic geography literature, they inspect the impact on the agglomeration outcome of different pricing policies and of a forward looking approach to migration. Their model actually provide a previously unattained unifying framework of existing results and new results. Their strong methodological contribution is indeed to propose a general formal approach that allows for further analysis on various implications on this kind of coalition formation and to show that it is possible to determine the main patterns endogenously.

The perspective of directly addressing the system of strategic incentives that lead to endogenous formation of coalitions without focusing on a specific topic is again found in the analysis performed by Paz on the negotiation outcome in the presence of farsighted players. Here, the public good provision framework is considered only to define the payoff function and especially to tackle the free-riding pervasive issue by singling out a consistent model that captures the main strategic incentives without too much structure on the negotiation process. In fact, by means of a two-stage game which allows for group deviations, multiple coalition formation and simultaneity of the first stage, through the usual incremental approach the author accounts for players' forward looking behaviour using the notion of largest consistent set. Her main assumption is that there is no limitation of the bargaining process that leads to co-operation because reactions on coalition formation are not restricted at all, as put forth in previous analyses. Anyway, the very sharp prediction that emerges is quite unusual: the only stable outcome is the grand coalition. In fact, the strong incentive for a single player to deviate is here contrasted with his assumed farsightedness. Although accurately constructed, the model provides a prediction that is not consistent with real negotiation outcomes and calls for a definite debate centred on how to account for farsightedness or general reactions in a context of Nash stability.

The third and last session similarly started from the basic non-cooperative two-stage game. The paper on stability and segregation establish the equilibrium conditions that single out the stable, pareto-optimal coalition partitions by assuming asymmetric players, multiple coalition formation, sequential order of moves in the first stage, and, in particular, that players prefer to join a group whose members are similar to him with respect to a distinctive characteristic. By focusing on this interesting topic they find that the stochastic process embedding the strategic interactions converges when payoffs associated to an action depend only on players who take the same action.

The paper on inequality, instead, starting from the exclusive membership of clubs, investigates how communities form with respect to the inequality of income, that is to say how inequality affects the formation of various clubs. Through the same basic two-stage game with sequential moves, asymmetric players and fixed payoff division, here with an endogenous number of clubs, it is shown how self interested players form clubs of homogeneous people.

The paper by Manzini and Mariotti presents coalition formation with the exclusive membership rule and excludable goods and shows how excess entry can be the inefficient equilibrium outcome. Indeed, singling out a non-cooperative two-stage game with endogenous surplus division by a sequential structure that distinguish the approaching phase from the payoff division proposal, the authors suggest an interesting point: when players do have the power of excluding the unwanted, excessive entry will result. Hence, getting rid of the usual club efficiency hypothesis, they clarify the mechanism at work with a  $n=3$  model, the simplest to capture the surprising result of "the tragedy of the clubs". The authors themselves claim that this crucial result deserves a more general analysis with a larger population and multiple clubs also nested in different kind of goods.

In conclusion, all the speakers stressed the need for a more uniform framework to deal with coalition formation along with the intent to further pursue the various research directions, mapping out the work to be done for the future.