Scientific Report of the *IX Coalition Theory Network Meeting*

Barcelona, 30th-31st January, 2004

The 2004 CTN Meeting was held at Univesitat Autonoma de Barcelona, in Bellaterra, Spain. Confirming the trend established in the last two editions of the workshop, this year's meeting has been attended by many of the leading scholars in the field of coalition and network formation. Together with prestigious first time participations, such as that of Professor Bashkar Dutta of Warwick University (a new member of the network), we had the very welcome return of Prof. Debraj Ray of New York University, who had been one of the main contributors and promoters of the network, and of coalition theory in general, in its early stages.
This year's meeting came with a specific title: *Collective Decision Making and Institutional Design*. And, as the title suggests, most of the contributions presented dealt with problems of network and collective choice.

Institutional Design was the topic of the first paper, by **Barbera and Jackson**, studying the problem of designing voting rules for international economic union. In particular, the authors consider two stage voting processes, in which countries representatives are elected in order to vote at the international level on "yes or no" type of issues (the authors think of a choice between the status quo and change). The main question addressed by the paper is how to decide the voting weights of each country when within countries preferences are not homogeneous. The authors find that total (expected) welfare is maximized when weights are proportional to the difference between a country's preferences for change and those for the status quo. Quite surprisingly, the decision about weights turns out to be independent of that about the majority to be adopted, which, instead, should depend on the general bias in favour of one of the alternatives. The authors also use their model to interpret the voting rules suggested for decision making within the EU at the Nice Conference of 2000 and at the Constitutional Convention of 2003.

The following paper, **Arenas, Díaz-Guilera, Guimerà and Vega-Redondo**, looked at another aspect of institutional design, related to the complexity of information processing and decisions within large organizations, such as firms. They consider a problem in which decisions to be taken arrive randomly to the firm, and can only be solved by one agent within the firm. Information flows hrough the network according to rules that represent the internal organization of the firm. The authors study how to design the network in order to obtain optimal performances of the organization. They find that the optimal architecture clearly depends on the rate of arrival of problems to the firm. Low arrival rates require a centralized architecture (a star), while high arrival rates require more decentralized architectures, where congestion is not as serious.

Institutional design is the object of another paper, by **Vivier-Lirimont**, studying optimal banking networks. This paper finds that Pareto Optimality is attained by three connected structures: the complete graph, the circle and the star. A different, but related, approach is taken by **Jackson and Bloch**, who study under which circumstances, different forms of side payments can lead to the formation of efficient networks. They consider a game of simultaneous network formation, and study increasingly powerful devices of money transfers among players, ranging from simple payoff demands for the formation (or deletion) of one's own links, to demands related to the formation or deletion of all links in the network, to contingent demands, which may depend on other players actions in the game. They find that depending of the presence or absence of externalities, efficiency can be achieved by means of different types of transfers. In particular, in the absence of externalities, a simple demand on one's own link is sufficient for efficiency in equilibrium. If

externalities are present, agents need to make demands on other players links or even contingent demands in order to achieve efficiency.

The design problem faced by **Macho Stadler and Perez Cartillo** is instead one of payoff allocation, and also applies, as the previous paper, to general economic environments with externalities. The author study how to distribute the gains from cooperation within a group preserving the properties satisfied by the Shapley Value (efficiency, linearity, anonimity and zero payoff to dummy players). The difference of this paper with respect to previous extensions of Shapley's axioms to partition function games is that each group of agents is allocated an average of the payoffs it could obtain in all possible scenarios, and each agent in the group obtains the Shapley value of this average game. The authors obtain a unique solution by imposing a stronger symmetry axiom than the usual one, requiring that when two agents do not gain anything by merging, they should obtain the same as singletons and as a coalition.

Fairness is again the spirit of the paper presented by **Shlomo Weber**, dealing with the design of stable unions under the threat of secession. This paper builds previous works by the authors, in which secession proof structures were shown to exist for a stylized model of gains from cooperation and heterogeneity in tastes. Here, the author is able to characterize the unique allocation rule that allows for secession proofness. This rule, that the author calls Rawlsian, maximizes the payoff of the least fortunate agents; in a context of transferable utility, it boils down to the egualitarian rule. The result holds for infinite agents on a line, but the author provides an approximate result in the same spirit for the bounded case.

The last paper dealing, strictly speaking, with institutional design, is that of **Merlo, Eralsan and Diermeier,** investigating the role of bicameralism in determining two features of equilibrium parliamentary coalitions: durability and composition. The authors uses some previous work by Merlo on stochastic multilateral bargaining as a theoretical background of their empirical investigation. They find that only the composition of the government would be affected by the removal of bicameralism. This because the equilibrium effect of the change on durability is mediated by that on composition: although the removal of bicameralism would reduce the durability of each coalition, in equilibrium the composition of the government coalition changes, in such a way that the (partial equilibrium) effect on durability is offset.

The rest of the papers focus on the (decentralized) formation of networks and coalitions, and on the properties of stable (or equilibrium) structures.

Goyal, van der Leij and Gonzalez examine a well known and debated feature of today's integrated society, that goes under the name of "small world hypothesis". This theory estimates that any hypothetical pair of citizens around the world can communicate with each other through a path of acquaintances amounting to a maximum of 6 to 8 other world citizens. Goyal at al. test this type of hypothesis for the specific world of economics publishing scholars. The results say that in the 90s the world of publishing economists were much smaller than twenty years before, with much of the increased integration due to the emergence of stars, that allowed for short connecting path between most of the existing scholars.

Networks are again the topic of the paper by **Garratt, Parco, Qin and Rapoport**, performing a laboratory experiment aimed at testing the link formation behaviour of agents. This paper considers a three players framework with link congestion, in which the line network is efficient. The aim of the author is to test the predictive power of the method of **potential maximization,** which selects a unique element from the set of Nash equilibria. The results show that this method perform well in most cases. Another contribution on networks, by **Tercieux and Vannetelbosch**, defines a concept

of network stability – risk dominance – that refines the concept of pairwise stability of Jackson and Wolinky (1996), and is selected by stochastic evolutionary dynamics. In the paper by **Edward Cartwright**, social networks have the role of determining the reference groups on which boundedly rational agents base their imitative strategies. This paper studies how agents can learn to play approximate Nash equilibria by means of imitation and innovation.

Ray, Eliaz and Razin study a very interesting model of group decision making, in which agents have to compare two alternatives. Agents face uncertainty; moreover they perceive disagreement as the worst possible outcome. A crucial feature of the paper is the fact that agents can abstain from voting, and their abstention is counted as a vote for both alternatives. Therefore, given any majority rule, it may be the case that neither alternative wins if too little players have abstained. In other terms, not abstaining may lead to the worst outcome if the supermajority rule is too demanding. This fact gives players characterized by less intense preferences for one alternative over the other an incentive to abstain, rather than risking disagreement. A voter is said to be aggressive if the threshold (in intensity of preferences) under which he abstains is low (he will risk disagreement more often). This threshold is endogenously given in equilibrium. The author show the very interesting result that as the set of voters become large, equilibria with a tyranny of the minority appear. These equilibria are characterized by a more aggressive behaviour by the minority voters, who are able to have their preferred alternative passed with higher probability. Such equilibria never disappear as the group gets larger. For all sizes, however, equilibria with the majority alternative winning always exist.

The only contribution on coalition formation was given by **Bloch and Gomez**. The main feature of the paper is the twofold decision space of players at each stage of the game. On one side, coalitions decide a strategy to be enacted in some underlying game in strategic form, describing the economic environment in which negotiations are embedded. On the other, agents form coalitions and take decisions with respect to their cooperative behaviour. It is crucial here that coalitions, differently from other previous papers on dynamic coalition formation and payoff division, are allowed to form without permanently leaving the game. Under this assumption, all players go on bargaining and sharing the gains from cooperation until such gains are exhausted. From this, the result that efficiency is always attained when outside options are pure (a condition related to the absence of spillovers across groups). When such spillovers are present, however, inefficiency may be a persistent feature of all Markov perfect equilibria. The authors also provide interesting examples of the dynamics of coalition formation. In a public good game, agents are shown to reach efficiency in equilibrium (despite the impure outside options), but this may take two stages of negotiation. In a principal-agent model, the timing of efficiency depends on the type of externalities exerted by trades. If these are positive, efficiency is reached immediately. If these are negative, efficiency takes two steps of negotiations. The possibility of inefficient equilibria is illustrated in a game of market entry with synergies.

Some final considerations. This year's meeting has confirmed the increasing interest of researchers for network structures, underlying their role in various contexts, ranging from the theory of learning, to the evolution of scientific collaborations, to the efficiency of banking intermediation. Network theory is a domain in which the need for applications of the a theoretical framework is greatly felt, both because of the practical relevance of the issues being dealt with, as well as for the extreme complexity of abstract investigation in this field. We can expect an increasing number of applied studies in this specific field of research to characterize future meetings. For now, the member institutions of the Coalition Theory Network wish to thank all attending scholars, researchers and students, and looks forward to meeting you all again at the next CTN meeting in Warwick, January 2005.