



The dynamics of coalition formation – A multilateral bargaining experiment with free timing of moves[☆]



James Tremewan^a, Christoph Vanberg^{b,*}

^a University of Vienna and Vienna Center for Experimental Economics, Austria

^b University of Heidelberg, Germany

ARTICLE INFO

Article history:

Received 20 January 2016

Received in revised form 14 July 2016

Accepted 15 July 2016

Available online 20 July 2016

JEL classification:

C7

C9

D7

Keywords:

Multilateral bargaining

Group choice

Experiments

Continuous time

Cooperative game theory

Coalition formation

ABSTRACT

We experimentally investigate behavior in a finitely repeated coalition formation game played in continuous time. Subjects interact in groups of three, bargaining over the distribution of payments which occur at regular time intervals. During a given interval, payments occur if and only if a majority is in agreement about their allocation. Aside from these rules, we purposefully impose little structure on the bargaining process. We investigate the frequency and stability of different types of agreements, as well as transitions between them. Two-thirds of payments involve divisions where one player receives nothing, almost half of which are equal splits of the entire surplus between two players. The most stable division is the three-way equal split. Transitions between agreements are frequent and are generally consistent with myopic payoff maximization, in the sense that subjects do not accept short-term losses. We also find that transitions between coalitions are not Markovian. In particular, players more often forgo short-term gains in order to remain in a coalition if it has proven stable in the past.

© 2016 Elsevier B.V. All rights reserved.

1. Introduction

A large literature in economics and political science studies coalition formation as a bargaining game in which a majority of players must agree on a division of an exogenously available surplus. Most of this literature investigates situations in which the interaction ends once a coalition is formed. In many real-world settings, coalition formation occurs in the context of repeated interaction over an extended period of time. Examples include the formation and maintenance of government coalitions, alliances between factions in international or civil conflict (Nolutshungu, 1996), and firms cooperating on supply chain management (Nagarajan and Sošić, 2008). In each of these examples, the members of a coalition reap benefits repeatedly or continuously for as long as agreement persists. Over time, coalitions may dissolve if agreement erodes and new coalitions may be formed. These dynamic aspects introduce new strategic considerations and raise additional questions concerning the stability of coalitions.

[☆] We thank the editor and two anonymous reviewers for constructive comments.

* Corresponding author at: Department of Economics, University of Heidelberg, Bergheimer Str. 58, 69115 Heidelberg, Germany.
E-mail addresses: james.tremewan@univie.ac.at (J. Tremewan), vanberg@uni-hd.de (C. Vanberg).

This paper reports on an experiment designed to study the formation and stability of coalitions in such a setting. Specifically, we investigate behavior in a finitely repeated three-player majoritarian bargaining game played in continuous time. In our game, players may propose and agree to divisions at any point in real time, and no structure is imposed on the order in which they do so. Payoffs flow at one-second intervals when agreements are in place, and the game ends after a fixed surplus is fully distributed. The goal of our research is to observe what types of divisions arise most frequently and are most stable in this environment.

We find that most payments are two-way splits that completely exclude one player. Among these, nearly half are equal divisions between the two members of the “minimum winning coalition”. However, these agreements are typically highly unstable. The most stable agreement is the three-way equal split, which consistently accounts for 20% of realized payoffs. We find that transitions between agreements, *when they occur*, are consistent with myopic payoff maximization. That is, players agree only to transitions which lead to higher immediate payoffs. However, there is also evidence of far-sighted behavior, as not all such (proposed) transitions are agreed to. In particular, players appear to condition their response to tempting proposals on the past behavior of their (current) coalition partners. We find that players are less likely to agree to a new proposal that promises higher immediate payoffs, the more ‘loyal’ their coalition partner has proven in the past. This observation is important because such history dependent behavior is commonly excluded in theoretical analyses, which typically make the simplifying assumption that strategies are stationary and transitions are Markovian.

2. Related literature

The literature on coalition formation comprises contributions from diverse fields, including sociology, social psychology, economics, and political science. The multitude of approaches within both the traditions of cooperative and non-cooperative game theory, testifies to the complexity of the problem under investigation. Bargaining behavior and outcomes are likely to be affected by subtle institutional, environmental, and personal factors. This complexity makes experimental investigation of an unstructured environment particularly relevant, as it can help to test and inspire theory in the face of so many reasonable approaches.

Early theoretical contributions to the problem of coalition formation used the axiomatic approach of cooperative game theory. The relative strength of this approach is that it avoids the imposition of a particular structure on the bargaining process, a feature shared by unstructured bargaining experiments. A variety of solution concepts were developed, including the Shapley value (Shapley, 1952), kernel (Davis and Maschler, 1965), nucleolus (Schmeidler, 1969), core (Aumann, 1961), and bargaining set (Aumann and Maschler, 1961). What these concepts imply in our bargaining environment will be detailed in Section 4.1.

In keeping with the “institution-free” spirit of cooperative approaches, early experiments were typically unstructured. In Kalisch et al. (1996), subjects bargain face-to-face, and the only rule imposed is that they agree by majority vote. Fiorina and Plott (1978) follow a similar approach, arguing that this “allows (...) procedures to be essentially endogenous and as ‘natural’ as possible (...)” Thus, these authors felt that experiments on coalition formation should induce preferences and enforce majority rule, but otherwise leave subjects “free to do what they want” (Fiorina and Plott, 1978). One of the conclusions from such face-to-face experiments was that personality plays an important role, with more talkative and aggressive subjects being more successful. There are numerous disadvantages associated with face-to-face experiments: bargaining partners can be identified, so factors such as gender and personal appearance need to be controlled for; face-to-face communication may be more likely to induce other-regarding concerns that interfere with monetarily induced preferences; completely free communication allows for the influence of personality as discussed above. These concerns suggest a role for computer-mediated experiments which exclude face-to-face interaction.

As far as we are aware, the earliest such experiments were performed using a set of programs called *Coalitions*, first described in Kahan and Helwig (1971). The program was designed to implement one-shot bargaining games in a characteristic function game framework. Communication was limited to a small vocabulary, and although players could send messages only in a predefined order, the options a player had during their turn, and the necessity of everybody first accepting then ratifying a coalition meant that little meaningful structure was imposed. A number of papers used this program to test and compare cooperative solution concepts with a variety of different games, for example Rapoport and Kahan (1976) which finds support for the individually rational bargaining set model and Horowitz (1977) for the core.¹

In contrast to the axiomatic and institution-free approach of cooperative game theory, more recent theoretical contributions have followed a non-cooperative approach. The method is to explicitly specify a bargaining *procedure* as an extensive form game. The structure of a such a game imposes strict rules regarding, for example, who may make a proposal, when and in what order votes are taken, and so on. The most well-known theory in this category is the legislative bargaining model of Baron and Ferejohn (1989). Despite strong *procedural* assumptions, it admits multiple subgame perfect equilibria. Concrete predictions can therefore be derived only by imposing additional *behavioral* assumptions which restrict the kinds of strategies employed (e.g. symmetry and stationarity).² The general point is that all non-cooperative models impose rigid

¹ Anbarci and Feltovich (2013) implements computer-mediated unstructured bargaining, but in the much simpler bilateral case.

² Since its publication, a number of extensions and alternatives to the BF model have been developed. A detailed review of this literature is beyond the scope of the current paper.

Download English Version:

<https://daneshyari.com/en/article/7242734>

Download Persian Version:

<https://daneshyari.com/article/7242734>

[Daneshyari.com](https://daneshyari.com)