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Constitutions and groups

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ABSTRACT

We develop a general theoretical framework that allows us to study the group structures that are going to emerge at equilibrium in overlapping coalition settings. We introduce the notion of constitution in order to model for each group the rules governing both the composition of the group and the conditions needed to leave the group and/or to become a new member of the group. We propose the concept of constitutional stability to study the group structures that are going to emerge at equilibrium. This concept generalizes previous stability concepts in the literature in which the constitutional rules were exogenously given or not explicitly considered. We combine requirements on constitutions and preferences for guaranteeing both the existence and the emergence of constitutionally stable group structures. Finally, we show how these results are useful to identify constitutionally stable group structures in many-to-many matchings.

1. Introduction

1.1. Overview

Many economic, social and political activities are conducted by groups or coalitions of individuals. For example, consumption takes place within households; production is carried out by firms which can be seen as large coalitions of owners of different factors of production; firms pool their expertise in joint ventures and strategic alliances; workers are organized in unions or professional associations; political life is conducted through political parties and interest groups; and individuals belong to formal and informal social clubs. The understanding of how and why such groups form and the precise way in which they affect outcomes of social and economic interactions has been apprehended assuming that each individual can only be member of one of these groups.[1] However, there are many situations in which individuals might be member of more than one group. Firms A, B and C might cooperate in a strategic alliance, firms B and D might cooperate in another alliance, while firms A and D may not cooperate with each other. Overlapping groups of individuals may be involved in relationships involving public-goods provision, reciprocity or information-sharing. Free trade agreements are signed among overlapping collections of countries.

Up to now, very little theoretical work exists on overlapping coalition formation settings. Chalkiadakis et al. (2010) introduce a model for cooperative games with overlapping coalitions that is applicable in situations where agents need to

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[1] Ray (2007) and Ray and Vohra (2015) provide surveys of models of coalition formation.

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allocate different parts of their resources to simultaneously serve different tasks as members of different coalitions. They explore the stability concept of the core[2] in such overlapping coalition setting.[3] The goal of our paper is to provide a general theoretical framework that could be used to study the stability of any situation involving overlapping coalitions, and not only of specific cooperative or non-cooperative games with overlapping coalitions. It departs from previous work in two important aspects. First, in order to be as general as possible, we abstract from activities carried out within each group and we suppose that individuals' preferences depend on the group structure. Second, we introduce the notion of constitution to model for each group the rules governing both the composition of the group (restricting the set of feasible deviating coalitions) and the conditions needed to leave the group and/or to become a new member of the group (i.e., the supporting coalitions that could grant the admission into the group of each feasible deviating coalition). We want the rules or constitutions to be as general as possible in order to capture a wide spectrum of possible applications. For instance, some groups could have capacity constraints or some legal requirements regarding the type of member that could be part of the group. In some groups it might be possible to dismiss members but in others there might be a protection against dismissal. Or, in some groups entry might be free but in others it might require the consent of certain number of members (a majority or the unanimity of them, for example). Therefore, both the individuals' preferences and the constitutional design may have a significant impact on the formation and stability of group structures.

We then propose the concept of constitutional stability to predict the group structures that are going to emerge at equilibrium in overlapping coalition settings where the deviating coalition has to take into account the constitution of the group she wants to modify. This concept generalizes previous stability concepts in the literature in which the rules governing the composition of each group as well as the exit of current members and/or the arrival of new members were exogenously given or not explicitly considered.[4] The idea of constitutional stability is that modifying the composition of a group (according to its constitution) via the deviation of a feasible deviating coalition needs the consent of both the deviating players and every member of at least one of the supporting coalitions that could grant the admission into the group and/or the departure of the group of such feasible deviating coalition. The other main contribution of this paper is exploring the stability concept of constitutional stability in two different ways. We examine both the existence of constitutionally stable group structures as well as whether the society will reach one of these stable group structures.

To this end, we adapt to our setting the random dynamic process developed for marriage problems by Roth and Vande Vate (1990). They show that the Markov process converges to a stable matching with probability one. In our study, we use the notion of improving path of Jackson and Watts (2001, 2002) who propose a dynamic process of network formation in which individuals form and sever links based on the improvement that the resulting network offers them relative to the current network. Jackson and Watts (2002) prove that this deterministic dynamic process may end at a pairwise stable network or may cycle. In our framework, an improving path is a sequence of group structures that can emerge when players join or leave some groups based on the improvement the resulting group structure offers them relative to the current one. Each group structure in the sequence differs from the previous one in that one group is modified by a feasible deviating coalition and every player joining the group strictly prefers the resulting group structure to the current one. Moreover, the deviation should not be blocked and, hence, there should be a supporting coalition that strictly benefits from the deviation.[5]

We show that the society induces a constitutionally stable group structure if and only if there are no closed cycles.[6] We provide requirements on constitutions and individuals' preferences guaranteeing that, from every initial group structure, there always exists an improving path leading to a constitutionally stable group structure. In other words, we show the kind of constitutions that leads to stability and we explore relations between various constitutional arrangements and individuals' preferences guaranteeing stability.

One of the most interesting features of our model is its versatile applicability since overlapping groups appear in many environments. The last part of this paper is devoted to a particular application, namely to job markets with labor unions, where we show how the previous results could be useful to identify the constitutionally stable group structures in this particular environment. By embedding many-to-many matchings into our setting, we study the existence of constitutionally stable firm structures (i.e., matchings) in three environments that differ in the level of authority that the owners of the firm and the workers could have. We show that the job market becomes stable if the degree of authority of one side of the market becomes sufficiently high. We also find a variation of Roth's "polarization of interests" (cf. Roth, 1984) between employers and employees: Each side of the market would be worse off if the other side obtains more degree of authority.

1.2. Literature review

The formation of social groups is of fundamental interest and it has been examined from numerous angles. For instance, Ellickson et al. (1999, 2001) as well as Allouch and Wooders (2008) analyze this issue in the context of general equilibrium

[2] Core stability implies that no group of agents should be able to profitably deviate from a configuration in the core.

[3] See also the work of Myerson (1980), Shenoy and Kraus (1996), Dang et al. (2006), Conconi and Perroni (2002) and Albizuri et al. (2006) for other specific cooperative or non-cooperative models of overlapping coalitions.

[4] The most used stability concept in both the traditional non-overlapping scenario and the overlapping one is the core. Typically, it assumes that the deviators only form coalitions among themselves and, thus, no composition and/or admission rules are considered.

[5] Our notion of improving path is also a variation of the notion of path in Roth and Vande Vate (1990); i.e., the random sequence of matchings generated from an arbitrary matching by randomly satisfying a blocking pair at each step in the sequence.

[6] This result has been established by Roth and Vande Vate (1990) for marriage problems.