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Fully absorbing dynamic compromise ☆

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Abstract

I consider a repeated divide-the-dollar voting model with rejections leading to the implementation of the previous period's allocation (see Kalandrakis [14]). I show that if proposals can be non-exhaustive, then equal division can be achieved as an absorbing steady state from any initial allocation given a large enough discount factor as a part of a Markov Perfect equilibrium. This result is robust to changes in voting thresholds and persistence in proposal power *outside* of unanimity or total persistence.

JEL classification: C73; D72

Keywords: Dynamic legislative bargaining; Markov perfect equilibria

1. Introduction

This note considers a discrete-time infinite repeated legislative bargaining game where previous allocations serve as a status-quo for current proposals. There are N players, henceforth referred to as *legislators*. In each period, a legislator is randomly selected with equal probability to make a proposal on how to divide a budget of size one among himself and the other legislators. All legislators then vote simultaneously to accept or reject the proposal. If a majority of legislators vote accept, then the proposed division is implemented for that period. If not, then the

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division from the previous round is implemented instead. Thus, the division implemented in the previous round acts as an *evolving status quo*. Per-period utility is a strictly concave function of an individual legislator's budget allocation and legislators discount future payoffs in a standard exponential fashion.

Under these conditions, I show the existence of a fully-absorbing equal division Markov Perfect equilibrium when discount factors are large enough. This continues a strand of literature originally started by Kalandrakis [14] and with more recent contributions, among others, by Kalandrakis [15], Bowen and Zahran [6], Anesi and Seidmann [1] investigating the properties of different Markov perfect equilibria in the aforementioned setting. I refer to these equilibria as "fully-absorbing" because convergence to the steady state occurs from any initial status quo. Additionally, I show that this result is robust to changes to (i) the voting threshold necessary for budget passage and (ii) persistence of proposal power.

One reason why the current model may derive some interest is because it lives between the repeated game and bargaining literatures. Specifically, it differs from the standard non-cooperative bargaining literature (see Rubinstein [18]) as (i) agreements take place via majority rule (instead of unanimity), (ii) there is a new budget to be shared in every period, and (iii) the default option is the previous period's allocation (as opposed to an assumed fixed default). Additionally, the current model differs from a standard repeated game setting because of the evolving status quo and thus in its analysis. Another line of interest derives from the applicability of the model (see Bowen et al. [7] who analyze mandatory and discretionary spending in a two party system).

A basic motivation for interest in equal division outcomes is the observation that in many real-world settings, budget allocations go far beyond minimal winning coalitions. For example, see the distribution of US Federal Highway funds[1] where significant spending is allocated to each state.

Throughout the note, I focus on Markov perfect equilibrium. In the current setting, the restriction to Markovian strategies is typically justified on the grounds of simplicity and more importantly, the fact that frequent legislative turnover may lead to a lack of institutional memory.[2] In the setting considered here, for a strategy to be Markovian, the proposal strategy of legislators may only rely upon the status quo proposal, and the accept/reject decision may only rely upon the status quo proposal and the current proposal.

However, the focus on Markov equilibrium introduces difficulties that are not present when strategies can be fully history dependent. First, existence is often not a trivial matter in Markovian strategies and is typically shown through construction. Duggan and Kalandrakis [8] show existence in a related model with shocks, which are necessary for the existence result. Second, without the Markovian restriction, the goal of supporting an equal division fully-absorbing equilibrium would be trivial as agents could monitor which agent was the last deviator (if any) and thereby keep track of who to punish and for how long. But, in a Markov Perfect environment, there is a difficulty of encoding or grouping the much larger space of all possible histories into the space of allocations. Additionally known folk theorems fail to apply in the given setting.

[1] See http://www.fhwa.dot.gov/safetealu/fy11comptables.pdf for 2011 figures and more recent years at http://www.fhwa.dot.gov/map21/funding.cfm.

[2] For example, if the discount factor comes not only from time discounting, but is also dependent upon the legislator possibly being not reelected, then a fully history dependent equilibrium may require a legislator to look at his predecessors' history in determining his history dependent action and possibly to continue punishment schemes based upon those historical actions.