Implementing with veto players: simple mechanisms

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1 Introduction

In 1997, Dagan, Serranoa and Volij present a simple tree games for bankruptcy problems. In the game a special player, the one with highest claim, has a special role. He is the proposer and the rest of the players answer to this proposal. In the case of a negative answer the conflict is solved bilaterally, applying a normative solution concept to a special two-claimant bankruptcy problem. This paper studies similar simple tree games in the context of coalitional games with a veto player. The veto player is the proposer and similarly to the case of Dagan, Serrano and Volij in the case of negative answer of some player a bilateral resolution is formulated.

The paper shows that with this simple mechanisms the outcomes of any Nash equilibrium should belong to a certain set. And those aoutcomes are not necessarily efficient. The second part of the paper studies a more complex tree game where the veto player, the proposer, could make secuential proposals whenever there is a positive value to divide among the players.

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2 The model

Given a veto balanced game (N, v), we will define a tree game associated to the TU game and denoted by $G(N.v)$. The game has n stages and in each stage only one player is playing. In the first stage a veto player is playing and he anounces a proposal x^1 that belongs to the set of feasible and non negative allocations of the game (N, v). In the next stages the non veto players are playing, each one once at one stage. They have two actions. To accet or to reject. If a player, let say i, accepts the proposal x^{t-1} at stage t, he leaves the game with the payoff x_i^{t-1} and for the next stage the proposal x^t coincides with the proposal at $t-1$, that is x^{t-1}. If player i rejects the proposal then a two-person TU game is formed with the veto player and the player i. In this two-person game the value of the grand coalition is $x_1^{t-1} + x_i^{t-1}$ and the value of the singletons is obtained by applying the Davis-Maschler reduced game given the game (N, v) and the allocation x^{t-1}. The player i will receive as payoff the result of some restricted standard solution applied in the two-person game.

Input : a veto-rich game (N, v) with a veto player, the player 1, and an order in the set of the rest players (responders)
Output : a feasible and non negative distribution x.

1. Start with stage 1. The veto player makes a feasible and not negative proposal x^1 (not necessariñy an imputation).

2. Let the stage t where the t responder plays, given the allocation x^{t-1}. If he says yes he receives the payoff x_t^{t-1}, leaves the game, and $x^t = x^{t-1}$.

   If he says no he will receive the payoff

$$y_t = \max\left\{0, 1\backslash 2(x_1^{t-1} + x_t^{t-1} - v_{x^{t-1}}(\{1\}))\right\} where$$

$$v_{x^{t-1}}(\{1\})) = 1 \in S \subseteq N\backslash \{t\} \max\left\{v(S) - x^{t-1}(S\backslash \{1\})\right\}$$

   Now, $x^t = \begin{cases} x_1^{t-1} + x_2^{t-1} - y_t & forplayer1 \\ y_t & forplayert \\ x_i^{t-1} & if i \neq 1, 2 \end{cases}$

3. The game ends when the stage n is played and we define $x^n(N, v)$ as the vector with coordinates $\left(x_j^n\right)_{j \in N}$.