Random Entrance and Duration of Overlapping Generation Games: Impact on Stability and Gains

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Abstract:

We consider a LQ game with many randomly entering players staying in the game for a random amount of rime. Particularly, at each time step a random number of players enters the game and each one of them has a random time horizon. Examples of such interaction patterns appear is several situations such as the customers of a bank, the electricity producing firms and intergeneration cooperation and competition. The Nash equilibrium is characterized by coupled Riccati equations for Markovian Jump Linear Systems and the existence of a Nash equilibrium is proved using Brouwer's fixed point theorem. We also consider the game with a very large number of players assuming a Kantian cooperative behavior. We then focus on the effects of the distribution of the number of the players entering the game at each time step, as well as the probability of leaving the game at each time step to the stability of the overall system, as well as the cost and the gains of the participants. Several numerical results are also presented.