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Allocation Rules for Dynamic Random Network Formation Processes

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Abstract

Most allocation rules for network games, such as the Myerson value, the position value and the component-wise egalitarian solution assume that the network structure is fixed. In our paper, we put explicit emphasis on the construction of networks and examine the dynamic formation of networks whose evolution across time periods is stochastic. Our framework is essentially that of Faigle and Grabisch [Values for Markovian Coalition Processes. Economic Theory, {to appear}] but applied to networks. Time-series of networks are studied that describe processes of network formation where several players or links may appear or disappear at any period. Moreover, convergence to the complete nor (one of the) efficient network(s) is not necessarily prescribed. Transitions from one network to the next are random and yield a Markov chain. The main contribution of our paper is to propose an allocation rule that takes into consideration the marginal contributions of a player or a link to the network formation process relative to a given network game. We show that particular assumptions on the network game and specific processes permit to recover the player and linked-based Jackson's allocation rules for network games.

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Abstract

Most allocation rules for network games, such as the Myerson value, the position value and the component-wise egalitarian solution assume that the network structure is fixed. In Jackson [Allocation rules for network games. Games and Economic Behavior 51 (2005) p.128-154.] a new class of allocation rules that takes into account the potential alternative constructions of network is introduced by assuming that the efficient network will eventually emerge. In our paper, we put explicit emphasis on the construction of networks and examine the dynamic formation of networks whose evolution across time periods is stochastic. Our framework is essentially that of Faigle and Grabisch [Values for Markovian Coalition Processes. Economic Theory, *to appear*] but applied to networks. Time-series of networks are studied that describe processes of network formation where several players or links may appear or disappear at any period. Moreover, convergence to the complete nor (one of the) efficient network(s) is not necessarily prescribed. Transitions from one network to the next are random and yield a Markov chain. The main contribution of our paper is to propose an allocation rule that takes into consideration the marginal contributions of a player or a link to the network formation process relative to a given network game. We show that particular assumptions on the network game and specific processes permit to recover the player and linked-based Jackson's allocation rules for network games.

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