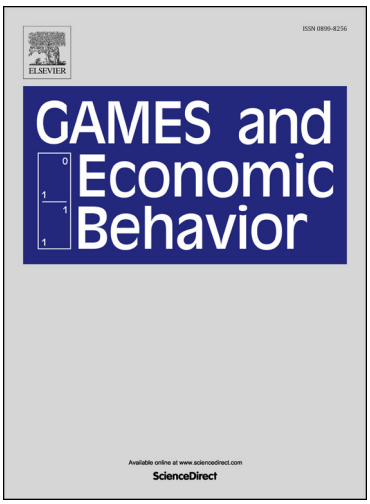
Accepted Manuscript



Values for cooperative games over graphs and games with inadmissible coalitions

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PII: S0899-8256(16)30148-8
DOI: http://dx.doi.org/10.1016/j.geb.2016.12.007
Reference: YGAME 2625

To appear in: *Games and Economic Behavior*

Received date: 23 April 2015

Please cite this article in press as: Hellman, Z., Peretz, R. Values for cooperative games over graphs and games with inadmissible coalitions. *Games Econ. Behav.* (2016), http://dx.doi.org/10.1016/j.geb.2016.12.007

VALUES FOR COOPERATIVE GAMES OVER GRAPHS AND GAMES WITH INADMISSIBLE COALITIONS

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ABSTRACT. We suppose that players in a cooperative game are located within a graph structure, such as a social network or supply route, that limits coalition formation to coalitions along connected subsets within the graph. This in turn leads to a more general study of coalitional games in which there are arbitrary limitations on the collections of coalitions that may be formed. Within this context we define a generalisation of the Shapley value that is studied from an axiomatic perspective. The resulting 'graph value' (and 'S-value' in the general case) is endogenously asymmetric, with the automorphism group of the graph playing a crucial role in determining the relative values of players.

Keywords: Shapley value, network games.
JEL classification: C71, D46, D72.

1. INTRODUCTION

One of the standard interpretations of the Shapley value, as a measure of the average marginal contribution of a player to each and every possible coalition, may strain credulity if taken too literally in a great many social situations. This holds particularly when players may, due to affinity, consanguinity, or other factors, have clear preferences for joining certain coalitions as opposed to others. Consider, for just one example, a job market. Is it not more likely that a potential hire will join a company if he knows someone within the company? How likely is it for a job seeker to join a company if she does not share a common language with any of its current employees?[1]

Cases in which many theoretically possible coalitions will not realistically be formed are not limited to social situations alone. If one is studying

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[1] These examples have similar motivations to those used to motivate hedonic games, as introduced in Drèze and Greenberg (1980). In the literature review section below we detail how our model differs from that of hedonic games.