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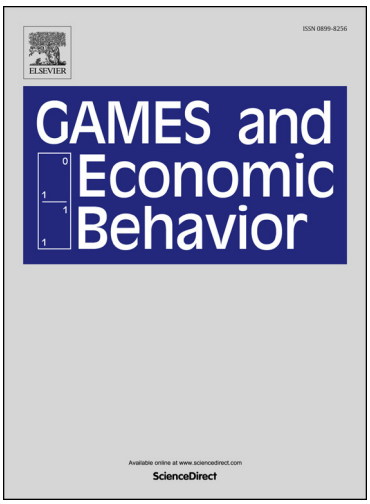

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The Conditional Shapley-Shubik measure for Ternary Voting Games

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Abstract

Ternary voting games (TVGs) model situations where a voter has three options, which can be thought of as yes, no, and abstention. This paper presents $\widetilde{\phi}$, an extension of the Shapley-Shubik power measure to ternary voting games. $\widetilde{\phi}$ measures a voter's power as the probability that the voter will be pivotal given that they do not abstain. This contrasts with other extensions of the Shapley-Shubik measure to TVGs, which measure power as the probability that a player's vote is pivotal no matter what that vote is. Desirable properties of power measures in SVGs are extended to TVGs and $\widetilde{\phi}$ is shown to satisfy these properties.

Keywords: Cooperative Games, Ternary Voting Games, Ordinal Equivalence, Shapley-Shubik Index, Postulates of Power Measures
JEL: C71, D72

1. Introduction

Shapley Shapley (1953) studies games with transferable utility. This work is extended in Shapley and Shubik (1954) to developing a method of measuring voting power in parlimentary voting systems. In these games voters have only two options, to vote yes or to vote no. One critique of this approach is that voters often have a third option, namely to abstain from voting. In many real situations, abstentions are quite important and are not equivalent to either a yes or no vote: the UN security council is a well-known example of such a situation. This has led to voting models with three options for each voter, even when there are only two options for the collective, for example Felsenthal and Machover (1997) and Rubinstein (1980). (Note that Bolger (1983), studied games with more than two unordered options. We consider situations where it makes sense to order the options.) These models add a complication for determining how to measure power. (See Birkmeier et al. (2011) for a discussion of some of these issues in the context of the German Bundesrat.) In particular, how should the power measurement take into account the abstention vote?

Felsenthal and Machover (1997) develops an extension of the Shapley-Shubik index, ϕ for games with three voting options. Freixas (2005) in turn extended to games with more than three options. One issue with ϕ is that it fails to satisfy the analogues of some basic voting properties, such as the donation postulate, which are satisfied by the Shapley-Shubik