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Models in Cooperative Game Theory.
Crisp, Fuzzy and Multi–Choice Games.

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The existence of several classical text books of the theory of games, including also chapters on the cooperation models, caused that there exist very few text books dealing also with non-classical modifications of the considered games. This gap is overbridged by the referred book and it is worth writing that it offers a good elementary textbook covering an attractive field of investigation.

The referred booklet is divided into three main parts, and each of them consist of several brief chapters further segmented into short singular sections. The first part, "*Cooperative Games with Crisp Coalitions*" offers the elements of the classical theory of cooperative games with transferable utility (also games with side-payments). In this model each player participates in exactly one coalition. After introducing the elementary concepts in "*Preliminaries*" the part continues with three chapters devoted to "*Cores and Related Solution Concepts*" (including also such solutions like stable sets, reasonable sets or Weber set), to "*The Shapley Value and τ-Value*", and to "*Classes of Cooperative Crisp Games*". The last (and most extensive) chapter deals with such concepts like totally balanced games, convex games and clan games.

The second part, "*Cooperative Games with Fuzzy Coalitions*" briefly summarizes the main ideas and concepts of the vague cooperation in which each player may distribute his activity among different groups of partners, which means that he participates in several coalitions with different degrees of the intensity of participation. The formal tools of the fuzzy set theory are used on an elementary level, and their knowledge is assumed. This part, after brief "*Preliminaries*", includes three main chapters. One of them is devoted to "*Solution Concepts for Fuzzy Games*", where several fuzzifications of the classical core, Shapley value, Weber set and some other solutions are dealt. Further chapter deals with "*Convex Fuzzy Games*" and the third chapter concerns the "*Fuzzy Clan Games*". The extent of the second part is equivalent to the first one and it offers methodological comparison of the deterministic and fuzzy approach to the cooperative behavior.

The third part, "*Multichoice Games*" is shorter than the previous two parts, and it can be understood as a transition between crisp and fuzzy cooperation. In those games, every player has only a finite number of levels in which he can cooperate with (not only one) coalitions. Also this part is introduced by "*Preliminaries*" and then it is divided into two chapters. One of them is devoted to "*Solution Concepts for Multichoice Games*" modifying the traditional objects like core, Shapley value and some others. The second one, "*Classes of Multichoice Games*" deals with balanced and convex games.

The book is brief and it includes the choice of the most significant concepts and properties of the cooperative games with transferable utility. But it also offers the easy and lucid possibility to compare the methods, tools and "philosophy" of three views on cooperation and coalitional decision-making. The list of 77 *References* offers only a short selection of the existing literature but it is representative enough for eventual more detailed study of some of the treated topics.

Generally, the referred book may serve as an introduction to the study of cooperative games and to the basic orientation in their concepts, main problems and fundamental

solutions presented from three different points of view. The organization of the text is clear and logical and the orientation in it is easy.

It is possible to recommend the referred book to a wide class of readers from students oriented to the mathematics of economic models, over the researcher who need the basic information about that topic for their own research in some related fields, up to the specialists in cooperative games theory wishing to have the basic comparison of crisp, fuzzy and multichoice models in one brief volume.

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