



# Implementation via rights structures <sup>☆</sup>

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## Abstract

Implementation of socially desirable alternatives can be thought of as a way to design power distribution in a society such that the *equilibrium outcomes* coincide with the alternatives chosen at each preference profile. In this paper, we introduce a new institutional framework for implementation, which takes power distribution in a society as its point of departure. We use the notion of a rights structure, introduced by Sertel (2001), to formalize the power distribution in a society. We formulate and characterize implementability via rights structures under different specifications, which require having well-defined convergence dynamics and being consistent with farsighted behavior. We identify how implementation via rights structures is related to implementation via mechanisms. In the presence of at least three agents, we find the class of rights structures, implementability via which is equivalent to Nash and strong Nash implementability. We also introduce a strategic counterpart of implementation via rights structures in terms of deviation-constrained mechanisms.

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## 1. Introduction

It is hard to deny the steadily growing role of implementation in economic theory over the past four decades. Every modern society is familiar with institutional “real life” mechanisms, such as constitutions, legal codes, rules of corporate culture and social norms that aim to rule out socially undesirable outcomes and implement solely desirable ones under different circumstances. Such real life mechanisms, however, often have fuzzy objective with questionable social desirability. The constructs that link the objective to the existing societal preference profile are usually rough. Even in economic regulation, which may be regarded as a field of relatively well-posed problems in contrast to other areas, mechanism design was conducted more or less by “trial and error” until the 1970s, as the objective of the mechanism was not precisely defined.

Implementation theory takes the social objective—mostly represented by a social choice rule—as given. Thus, its point of departure is a precisely defined object, which the society is assumed to have somehow unanimously agreed upon. Moreover, the objective relates the social desirability of an outcome to the current societal preference profile and other relevant parameters in a precise manner. It is exactly this ambitious aim that gives rise to the main problem concerning implementation, as the designer lacks the ability to observe the individuals’ actual preferences. Beginning with Hurwicz (1972), the notion of a game form has been introduced to deal with this problem.

A game form—together with a game-theoretic equilibrium notion—is used to implement a social choice rule. The selected equilibrium notion is assumed to reflect the behavioral fundamentals of the individuals in the society. In the last three decades, many studies have been successful in identifying implementable social choice rules according to widely used equilibrium notions.<sup>1</sup> However, a persistent criticism of implementation theory has been that the game forms constructed to obtain general results have “unnatural” features that take away from the relevance of the theory.<sup>2</sup> Jackson (1992) and Abreu and Matsushima (1992) argue in detail besides being difficult to interpret, there are several technical problems associated with these games.

In our view, the main question is whether the framework within which the agents interact is sufficiently familiar and understandable, so that the agents will act in predictable ways. Thus, the introduction of a framework for implementation, formulated in a language closer to that of real life mechanisms, might be useful in dealing with this problem. One way of describing what implementation via a mechanism does is that the conjunction of a game form with an equilibrium notion results in a power distribution<sup>3</sup> in the society under which the equilibrium outcomes coincide with those of the social choice rule to be implemented. A natural question that then arises is whether or not the power distribution that does the job can be taken as the point of departure in implementation. This is the main problem that we deal with in this paper.

From among several possibilities to represent a power distribution, the notion of a rights structure introduced by Sertel (2001) seems to be the best fit for our approach. Similar to the

<sup>1</sup> For instance see Abreu and Sen (1991), Moore and Repullo (1988), Danilov (1992), Dutta and Sen (1991, 2012), Palfrey and Srivastava (1991), McKelvey (1989).

<sup>2</sup> Specifically, some sort of *integer game* or *modulo game* is used to eliminate strategies with unacceptable outcomes from the equilibria. In these games, whenever there is no consensus, the agent who announces the highest integer gets to be a dictator. We use a similar construction in the proof of Proposition 3 to establish a connection between our model and classical implementation.

<sup>3</sup> Moulin and Peleg (1982) formally proposed the notion of an *effectivity function* to describe the power distribution induced from a mechanism. We discuss how this notion is carried to the implementation problem while situating our work within the existing literature.

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