# DESIGNING MECHANISMS FOR AGENTS WHO DO NOT PLAY GAMES

By Leonid Hurwicz and Stanley Reiter

In this work, a mechanism consists of three elements: a message space, a set of response rules, and an outcome rule. In a broader perspective, response rules govern a dynamic process and may originate from established traditions or legislation.Outcome rules are, at least in part determined by the laws of nature (physics, biology), as well as by tradition and/or legislation. In our static framework, response rules define equilibrium relations.

Since we are interested in mechanism design, the message space as well as the equilibrium and outcome rules (other than those dictated by nature) become the unknowns of the problem.

the environment (i.e., the agents' characteristics) and the mechanism determine the equilibrium outcomes. Our objective is to discover mechanisms satisfying specified desirability criteria of equilibrium outcomes. In a simple framework such a criterion is obtained by specifying a (social) goal function whose range is a space of outcomes , and the domain a class of environments (lists of individual agents' characteristics). A mechanism is said to realize a goal function if, in any given environment, its equilibrium outcomes agree with those specified by the goal function for that environment. It is said to be informationally decentralized if, when presented with a proposed message space point, an agent is able to respond with acceptance or rejection based only on this agent 's knowledge its own characteristic.

Given a goal function, our procedure for constructing a mechanism consists of two phases: (1) defining a covering family of subsets of the parameter space;

(2) choosing a transversal for that family, so that the intersection points of the transversal with the subsets generate a message space. We call our choices in the two phases the Method of Rectangles and the Method of Transversals respectively.

The subsets are so chosen that the mechanism generated is informationally decentralized and realizes the given goal function. It is then shown that our choice of the covering family is informationally efficient in the class of decentralized mechanisms realizing the given goal function. (This means that the covering of the parameter space by the subsets belonging to the family is maximally coarse.) Moreover, although not every choice of an acceptable family yields a message space of size (cardinality, dimension) minimal for the given goal function and the class of admissible environments, there exists a family yielding both a message space of minimal size and maximal coarseness .

When the agents' strategic behavior is ruled out, the problem of constructing a decentralized mechanism realizing a goal function becomes trivial. For instance, direct revelation would do. Implementation (e.g., in Nash equilibria) is a special case of informationally decentralized realization. Since it admits strategic behavior, it narrows the class of eligible mechanisms and hence can be expected to result in loss of informational efficiency