

Lectures on Mechanism Design (April 2012)

Claude d'Aspremont

Introduction

The construction of « mechanisms » as formal games is used not only to understand the functioning of existing social organizations, but also to propose new institutions, or types of contracts, and explore their properties, integrating collective objectives as well as individual incentives. *Mechanism design* concerns most aspects of social life and applies to legal, political and economic systems. Several examples will be analyzed, such as auction design, public good or service provision, voting schemes, etc.

Games of incomplete information

Informational constraints set the limits to the power of the « mechanism designer » (whether he is in or outside the game) and are created by the strategic behavior of the individual agents when exploiting the incomplete observability of their own actions (moral hazard) or of their own characteristics (adverse selection). For that reason, non-cooperative games of incomplete information need to be introduced.

- Games of incomplete information : types and beliefs
- Bayesian Equilibrium
- Examples

Dominant strategy efficient implementation

The strongest way to ensure compatibility with individual incentives in mechanism design is to refer to an equilibrium in dominant strategies. This allows for belief-free implementation. Three classical topics will be reviewed :

- « Direct mechanisms » and the Revelation Principle
- the Gibbard-Satterthwaite Theorem
- Vickrey-Clarke-Groves efficient mechanisms and the associated budget-balance problem.

Bayesian implementation

A weaker notion of incentive compatibility is based on the concept of Bayesian equilibrium, where the beliefs of the individual agents are taken into account. Again the Revelation Principle can be enunciated and Vickrey-Clarke-Groves mechanisms can be generalized. Various conditions on the beliefs have been introduced

in the literature to ensure both efficiency and budget balance (hence Pareto efficiency). Some conditions are restrictive (such as independence) others are much more general allowing for correlated individual types. These conditions will be reviewed.

- A Revelation Principle for Bayesian implementation
- The Expected Externality Mechanism
- Generic conditions on beliefs (primal and dual forms)

Participation constraints

In addition to the informational constraints, the mechanism designer may have to take into consideration the possibility for the individual agents to leave the game. When participation is voluntary, even Bayesian implementation becomes difficult, as demonstrated, for example, by the Myerson-Satterthwaite result in the case of independent beliefs. However under some general conditions on the beliefs (assuming correlation), the participation problem can be solved.

- Expected Surplus Lemma
- Generic conditions on beliefs (primal and dual forms)
- Transfer Scoring Rules

References

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