Course: Mechanism Design

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1   Course outline

This course aims to introduce the students to the theory of mechanism design. It is typically a planner's problem who designs a market where several agents participate. The planner has some specific goals which depend on the interactions of these agents. The actions of the agents depend on private information (or type) they possess. The agents are strategic and often use the private information to align the outcomes of the game to their interests. A crucial element in such a setting is the information structure. The planner has the freedom to choose any market so that the outcomes obtained through the strategic interactions amongst the agents yield her desirable outcome, given the information structure.

In this short course we will discuss three major problems in mechanism design:

1.1   Auctions

We start with a monopolist's problem when the buyers' valuations are unknown. Starting from a basic single buyer setting, we will generalize and discuss the optimal mechanism for the seller. We will discuss the standard setting of private value auctions (first-price and second-price auctions) and revenue equivalence theorem. We will introduce the idea of basic mechanism design and revelation principle through this setting. Solution concepts such as dominant strategy incentive compatibility and Bayesian incentive compatibility would be introduced based on the information structures and further applications would be briefly discussed. [6 hours]

1.2   Public goods provision

Next we discuss the well-known problem of public goods provision where an authority needs to decide on the level of public goods provision, given the unknown values for willingness to pay. We will introduce VCG mechanism and budget balance problem. We will discuss some application to bilateral trade. [4 hours]

1.3   Matching

We introduce two-sided matching problems, e.g. marriage market or school choice problem. These are the markets with two disjoint sets, such as men and women, and colleges and students. Each agent on one side has preferences over the set of agents on the opposite side. We start with one-to-one matching and characterize the class of stable matchings. We will discuss Gale-Shapley algorithm in this regard and also introduce the idea of optimal matching from the point of view of any one side. [4 hours]

2 References

1. "An Introduction to the Theory of Mechanism Design" by T. Börgers; Oxford University Press, 2015.

2. "Auction Theory" by V. Krishna, Academic Press, 2010.

3. "Microeconomic Theory" by A. Mas-Colell, M. Whinston and J. Green; Oxford University Press.