

A Generalization of the Revelation Principle in an Informationally Decentralized Economy

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Abstract

When we design an allocation mechanism, we should take into account not only the resource constraints but also the incentive compatibility constraints. The revelation principle asserts that the incentive compatibility constraints can be replaced with the truth-telling constraint, i.e. each player should not be worse off by telling the truth. However, the standard revelation principle implicitly assumes that the social planner or designer himself implements the designed mechanism. This implicit assumption becomes easily inadequate in reality. In many cases, the planner or designer need to delegate the implementation to multiple implementors, who follow the designer's instructions based on decentralized information. In such a case, the revelation principle should be changed accordingly. The informationally decentralized economy requires not only that each individual should tell the truth consistently to each social implementor (multiple truth-telling constraint: MTTC), but also that he should visit each class of social implementors once and only once (no repeated visit constraint: NRVC). The traditional revelation principle turns out to be a special case when there is only one social implementor. This paper further explores the implications of the generalized revelation principle in a pure exchange economy. It turns out that the linearity of value function, i.e. the existence of price, is required to ensure NRVC and that money becomes essential to ensure MTTC through cash-in-advance constraints. While the optimal allocation mechanism in the informationally decentralized economy looks similar to the first-best solution of the Arrow-Debreu economy, it is inferior even to the second-best solution. Hence it is referred as the third-best solution. Some numeric examples compare the optimal allocations under three different implemental conditions.

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