Dissertation Summary

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Mechanism design theory has given economists a set of tools for designing institutions to achieve socially desirable outcomes. Unfortunately, the behavioral assumptions that these theories often rest are somewhat unrealistic. Testing these institutions in a laboratory setting gives us insight into what assumptions or properties of institutions make them behaviorally successful. Moreover these insights allow us to create new theories that offer, in principle, better actual performance. Thus, the interplay between experimental economics and economic theory seems vital in mechanism design to insure successful institutions. It is in this spirit that this dissertation precedes.

My dissertation deals entirely with mechanisms that were designed to achieve the Lindahl allocation in a public goods environment. The Lindahl allocation is a Pareto optimal allocation in a public good environment that leaves no participant worse off than they started and is thus a very desirable allocation to achieve. The first chapter of the dissertation experimentally examines three such mechanisms in a laboratory setting. It finds that the mechanism that gets the closest to the Lindahl allocation is the one that induces a game with very strong stability of equilibrium properties. Unfortunately this mechanism also has some clear disadvantages: first, it is very complicated; second, payoffs to consumers while learning to play equilibrium are very low; and last, the mechanism gets more complicated when more people participate. The second chapter uses the insights from the first experiment to create a new institution which avoids some of the concerns outlined above while maintaining the strong stability of equilibrium property. The final chapter of the dissertation experimentally compares the new mechanism introduced in chapter 2 with the most successful mechanism from the first experiment. The treatments in this experiment are designed to stress the above observed trouble areas. Below I provide a brief description of each project.

(1) **Out-of-Equilibrium Performance of Three Lindahl Mechanisms: An Experiment (with Natalia Lazzati and Mark Walker)**

We describe an experimental comparison of three incentive compatible mechanisms designed to achieve Lindahl outcomes as Nash equilibria: the mechanisms due to Walker (1981), Kim (1993), and Chen (2002). We find that Chen's mechanism, which is supermodular, converges closest and most rapidly to its equilibrium. However, we find that the properties that move subjects toward equilibrium in Chen's mechanism typically generate sizeable tax obligations, as well as large budget surpluses and deficits, when not in equilibrium. The mechanism therefore often yields extremely low payoffs for subjects until getting close to equilibrium. The Kim mechanism, on the other hand, converges relatively close to its equilibrium and exhibits much better out-of-equilibrium efficiency properties.

(2) A Simple Supermodular Mechanism that Implements Lindahl Allocations.

This paper introduces a new incentive compatible mechanism which for general preference environments implements Lindahl allocations as Nash equilibria. We show via an example that having a mechanism induce a supermodular game (in the sense of Chen (2002)) is not typically sufficient to get dynamic stability of equilibrium. However, for the new mechanism, inducing a supermodular game guarantees the best reply mapping is a contraction. Thus, this new mechanism provides a connection between the desirable welfare properties of Lindahl allocations and the theoretical/convergence properties of games whose best reply mappings are a contraction.

(3) Information Complexity, Variance, and Convergence in Two Dynamically Stable Lindahl Mechanisms

The final chapter of the dissertation is funded by a NSF Dissertation Improvement Grant and experimentally compares the new mechanism introduced in chapter 2 with the Chen mechanism. This last experiment explores how changes in the informational complexity of the two mechanisms impact their relative performance (as the number of consumers in the economy grows larger). These results have direct applications to other work in mechanism design and computer science.