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Common agency with informed principals: Menus *and* signals

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Abstract

This paper considers general games in which multiple informed principals simultaneously compete to influence the decisions of a common agent. It shows that we can characterize all outcomes of any game in which principals delegate the final decisions to the agent using arbitrary mechanisms, by studying a simpler game in which they can offer only menus of decisions and send cheap-talk signals to the agent. For games in which the principals instead participate in making final decisions, we can characterize all their outcomes by studying a simpler game in which principals can again send cheap-talk signals but can offer only menus of direct mechanisms, to which they report their information truthfully.
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1. Introduction

Common-agency games model settings in which multiple principals non-cooperatively contract with a single agent.[2] These games have proved useful to study many economic problems, such as the possibility of tacit collusion and its implications for antitrust regulation, the consequences of multilateral lobbying on government policies, and the optimality of common vs. exclusive retailers in wholesale trade.[3]

This paper studies a new class of common-agency games in which the principals have private information,[4] distinguishing between two subclasses. In *non-delegation* games, each principal commits to an arbitrary mechanism that specifies an allocation as a function of how both she and the agent simultaneously communicate with the mechanism itself. In *delegation* games, after the principal commits to a mechanism, only the agent can communicate with it.

The paper's contribution is to provide two results—one for each subclass—that aim to simplify the problem of characterizing equilibrium outcomes of common-agency games with informed principals. Both results focus on (weak) Perfect Bayesian Equilibria. They extend the intuition behind the Menu Theorem[5] to problems with informed principals. This extension requires that principals be allowed to reveal their information (type) up front, when they offer their mechanism to the agent.

The result for delegation games shows that we can recover all outcomes that arise when principals compete in arbitrary communication mechanisms, by finding the equilibria of the following 'signal-menu game.' In this game, principals offer menus of allocations—as suggested by the Menu Theorem—and also privately send 'cheap talk' signals to the agent. Moreover, each principal's signal space can be conveniently chosen to be $[0, 1]$. This is because, in any equilibrium of the original game, each principal can offer the agent at most a continuum of mechanisms, each possibly revealing her information in a different way.

The result for non-delegation games relies on a different signal-menu game. Each principal sends 'cheap-talk' signals from $[0, 1]$ as before, but now offers the agent menus of direct mechanisms (DMs). For each menu, all DMs depend only on the principal's reports on her type. Such menus allow the agent to act on his exogenous and endogenous information by selecting different DMs. At the same time, the DMs allow each principal to retain all her power to participate with the agent in choosing allocations. Finally, the result shows that we can recover all outcomes of the original non-delegation game by finding the equilibria of the new game in which, after offering a menu of DMs, each principal *truthfully* reports her type to the DM chosen by the agent. As explained below, this result also implies that the equilibrium outcomes of the original game would not change if each principal could communicate with her mechanism after seeing the agent's message.

This paper relates to the literature on mechanism design with one informed principal.[6] In non-delegation games in which there is only one principal and she is informed, Myerson's In-

[2] As a convention, the paper uses feminine pronouns for the principals and masculine ones for the agent.

[3] See, e.g., Bernheim and Whinston [2,3].

[4] Martimort and Moreira [11] and Lima and Moreira [10] consider specific common-agency games with informed principals.

[5] See Peters [24], Martimort and Stole [12], and the discussion below.

[6] Myerson [18], Maskin and Tirole [14,15], Mylovanov and Tröger [19].

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