Can labor markets help resolve collusion? ☆

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Abstract

We show that, in a multi-agent contract setting, the principal can effectively rule out tacit collusion among agents (i.e., "bad" equilibrium) by posting permanent job openings to an external labor market. That is, a simple "market-like" employment mechanism can yield collusion-proof contracts.
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A well-known problem in the mechanism design literature is the possibility of collusion among agents when the mechanism chosen by the principal has multiple Nash equilibria. Most contracts involving more than one agent, and not explicitly designed to be collusion-proof, may be prone to collusion. Collusion may appear in problems of adverse selection and hidden actions, and will arise in most repeated interactions and in games where agents must truthfully reveal their private information.[1]

[1] The possibility of collusion has been documented in repeated interactions (Fudenberg et al., 1994), standard auction settings (Blume and Heidhues, 2004), team production (Demski and Sappington, 1984) and in the industrial organization literature (Ivaldi et al., 2003). There is also an extensive literature, which we do not cite here, that studies collusion in various adverse selection settings.

Several contributions to implementation theory have shown that one can often complement existing mechanisms in order to rule out collusion. Laffont and Martimort (1997, 2000), among others, consider enriched collusion-proof mechanisms in private information settings when types are uncorrelated or correlated. Several of these results are extended in Che and Kim (2005), for general specifications of the interaction.

Interestingly, these mechanisms have not produced yet a clear analogue in existing organizations. There are several plausible reasons for this. First, enriched mechanisms can become more complex than the original contract, and thus may rely on more sophisticated strategies and beliefs. Second, these models usually exclude moral hazard, thus making it easier to redirect the claims to the residual surplus from the game, whereas many interactions may feature hidden actions by the principal (if a firm is sold) or the agents (during production). Third, the design of collusion-proof mechanisms requires a very precise knowledge of the environment, which makes a practical application difficult.

In this paper, we proceed in a different direction, asking whether simple labor markets and job offers, can help resolve certain forms of collusion. In contrast to the implementation literature, we do not attempt to design a general mechanism, but consider an employment game that somewhat resembles how organizations operate. Further, the employment game determines which agent will work for the organization, but does not alter the wage contract of an employed agent.

We show that permanent openings on all jobs held by agents will rule out a large class of plausible collusive equilibria. The intuition of the model is similar to Palfrey (1992, Theorem 1 p.295) who suggests that the introduction of an uninformed agent can be used strategically by the principal, although the game and the problem are very different. In our model, collusion is inferred in equilibrium by outsiders who rationally apply for the job of a colluding insider. Then, any extra welfare achieved by collusion must be dissipated by market forces, and the equilibrium prescribed by the principal always Pareto-dominates other equilibria such that insiders collude.

1. The model

Let us assume that a principal, indexed by $i=0$, contracts with n agents, indexed by $i=1, \ldots n$; we assume that the number of agents required to operate the firm is fixed.

In the basic model (no labor markets), the principal designs a contract and then players choose their best response in the Normal form game induced by the contract. The principal can design a contract based on a signal x, publicly revealed when the game ends. In the standard moral hazard framework, the signal x may include the profit of the firm and, more generally, signals informative on the actions of the agents (Holmström, 1979) as well as different performance measures (Holmström and Milgrom, 1987). In adverse selection settings, the signal x can be a bid (in auction settings), or more generally a type report, but it may also include information acquired by the auctioneer and publicly disclosed (Milgrom and Weber, 1982).

A contract is defined as a function $\phi(x)$, which associates a social choice $\phi(x) \in Y$ to any public signal. This contract may be a vector of wages (in a compensation contracts), an allocation and transfer schedule (in auctions) or the provision of public goods (in public-good problems). It may include private components or common components, which affect all players, depending on the interaction which is considered.

For each contract ϕ, the principal and the agents play the following simultaneous-move game. For each i, player i receives a private signal (or type) $s_i \in S_i^\phi$ and then may choose a (private) action; a vector of signals is denoted $s=\{s_1, \ldots, s_n\}$. A pure strategy in this game is given by a mapping from any signal s_i to