

Precluding Ex Ante Collusion in Externality Mechanisms

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May 27, 2009

The established approach to collusion in mechanisms, put forward by Laffont, Martimort (1997), assumes full obedience of the colluding players to the coalition's joint decisions, such as the manipulation of reports to the grand mechanism. Put differently, after the payoff-relevant information has been disclosed within the "side mechanism", infinite punishment is applied to anyone who deviates from the mutually agreed manipulation. Participation to such contract has to be however justified ex-interim - that is, each player, upon learning his private information and knowing which actions would be appointed by the contract if he reveals, should be willing to do so.

In this paper, we look at collusion of a different nature. First, full enforcement of actions will be infeasible. Those deviating from the coalition utility maximization can be, at most, deprived of any share in its extra surplus. Second, collusion will be defined by a *full* communication structure (Wilson, 1978) for a subset of players. The commitment to full communication will take place at the ex ante stage, before any private information emerges. Due to this timing, we refer to such agreements as *ex ante collusion*. Third, any coalition will stay uninformed as to anything that goes beyond its boundaries; with the usual exception that the player set, the rationality and the "type" distribution remain common knowledge. In particular, the members

of a coalition will observe that coalition's composition, but will not be aware of collusion between other players.

A mechanism is susceptible to collusion, if there are benefits from sharing information within a group and using it to manipulate reports. The technique is to compare ex ante payoffs under different partitions of the player set and study whether the finest partition provides better payoffs than those arising under a coalition's deviation. A mechanism is said to be robust to collusion, if the finest partition is stable. Note that partition of players into singleton coalitions is equivalent to fair play in a mechanism - when private information remains in the possession of just one player. Standard externality mechanisms like Vickrey auction and the expected externality mechanism are in general not robust to collusion when coalitions can share surplus via transfers.

We modify standard externality mechanisms so as to make them robust to ex ante collusion. The new mechanisms work in environments where any player partitions can emerge without being observed by the mechanism designer. This natural possibility is not considered in the standard collusion literature, but represents a significant challenge to the design of collusion-proof mechanisms.