Note

On competing mechanisms under exclusive competition [☆]

Andrea Attar [a,b,*], Eloisa Campioni [b], Gwenaël Piaser [c]

[a] *Toulouse School of Economics, CNRS, France*
[b] *DEF, Università di Roma Tor Vergata, Italy*
[c] *IPAG Business School, France*

A R T I C L E I N F O	A B S T R A C T
	We study games in which several principals design mechanisms in the presence of privately informed agents. Competition is exclusive: each type of each agent can participate with at most one principal and meaningfully communicate only with him. Exclusive competition is at the center stage of recent analyses of markets with private information. Economic models of exclusive competition restrict principals to use standard direct mechanisms, which induce truthful revelation of agents' exogenous private information. This paper investigates the rationale for this restriction. We provide two results. First, we construct an economic example showing that direct mechanisms fail to completely characterize equilibrium outcomes even if we restrict to pure strategy equilibria. Second, we show that truth-telling strongly robust equilibrium outcomes survive against principals' unilateral deviations toward arbitrary mechanisms. © 2018 Published by Elsevier Inc.

1. Introduction

We study competing-mechanism games of incomplete information in which competition is exclusive: contracts incorporate exclusivity clauses and they are fully enforced. Thus, upon observing her private information and the publicly observable mechanisms, each agent can participate and communicate with at most one principal. Each principal fully observes the set of agents who participate with him, and agents take no hidden actions. Final allocations are determined by the contracts that principals independently sign with agents.

Exclusive competition is at the hearth of most theoretical analyses of markets with privately informed agents. This assumption plays a fundamental role in competing auctions (McAfee, 1993), competitive screening (Rothschild and Stiglitz, 1976), competitive search (Guerrieri et al., 2010), and competing hierarchies (Martimort, 1996) models, among many others. At the same time, letting firms compete over exclusive contracts is regarded as a convenient way to represent full observability of agents' trades in the extension of general equilibrium theory to private information economies (Prescott and Townsend, 1984; Bisin and Gottardi, 2006).

Despite the prominent role of these economic settings, we still lack a general characterization of equilibrium mechanisms under exclusive competition. Indeed, the approaches above share the restriction to standard direct mechanisms: each principal commits to incentive schemes that associate his decisions to the array of exogenous types reported by agents.[1] In addition, they focus on *incentive compatible* mechanisms which induce agents to truthfully reveal their types to the principal they participate with. Yet, few, if any, theoretical arguments have been developed to support these choices. If competition is exclusive, to what extent can one safely restrict attention to direct mechanisms and to agents' truthful behaviors? The present paper contributes to answer this question by setting up a general competing-mechanism setting of exclusive competition, and introducing a solution concept that formalizes the above restrictions. We provide two main results.

First, we show that the restriction to direct mechanisms involves a loss of generality. We exhibit a pure strategy equilibrium outcome of an incomplete information game, in which principals post *indirect* mechanisms that cannot be reproduced in the game in which they post direct ones. The example is casted in a stylized competitive insurance setting in which two insurance companies compete to serve two privately informed consumers. We show that the communication made available by indirect mechanisms allows to support a monopolistic allocation at equilibrium. Indeed, indirect mechanisms generate threats that the monopolistic principal cannot reproduce by relying on simple direct mechanisms.

Second, we formalize the restrictions made in economic applications by introducing the notion of truth-telling strongly robust equilibrium. In a competing-mechanism game in which principals post direct mechanisms, a truth-telling strongly robust equilibrium is a (subgame perfect) equilibrium in which agents are truthful on the equilibrium path, and no principal has a profitable deviation regardless of the continuation equilibrium that agents may play. We investigate whether the corresponding outcomes survive if a principal deviates to general mechanisms. This amounts to analyzing the implications of enlarging the strategy space of a single principal, holding fixed the behavior of his rivals. We prove that any truth-telling strongly robust equilibrium in which principals play pure strategies survives if a principal deviates to any indirect mechanism. As will be discussed in Section 2, this provides a rationale for the restrictions postulated in applications. The result crucially relies on the assumption of exclusive competition, which ties an agent's communication to her participation choice. This is shown by means of a two-principals two-agents example, in which agents' communication is unrestricted: each type of each agent can participate with at most one principal, and can send non-degenerate messages to both of them. In the example, fixing the mechanism of one principal, we can hence construct a deviation to an indirect mechanism of the other principal and an induced equilibrium of the agents' game, generating a profile of decisions which cannot be reproduced by a deviation to a direct mechanism and an associated truthful report for the agents.

Related literature. This paper contributes to the literature on equilibrium characterization in competing-mechanism games. Several game-theoretic examples have shown that direct mechanisms fail to provide a full characterization of equilibrium outcomes. To get the result, however, they crucially exploit either the fact that each agent participates with many principals at a time (Peters, 2001; Martimort and Stole, 2002), or that an agent participating with a given principal can also communicate with the principals who post the competing mechanisms (Epstein and Peters, 1999). We instead consider competing mechanisms under exclusive competition. That is, agents participate with at most one principal and their communication decisions are restricted: each type of each agent sends informative messages only to the principal it participates with. In this context, we show the existence of equilibrium outcomes that cannot be supported by direct mechanisms.

Another key issue for equilibrium characterization is whether equilibria supported by direct mechanisms are robust against principals' deviations towards indirect ones. A positive result in this direction is provided by Peters (2003) under common agency. He shows that, in *single-agent* models of *nonexclusive* competition, a principal cannot profitably deviate from a pure strategy, truth-telling, equilibrium by using arbitrary indirect mechanisms.[2] The result does not typically extend to multiple agents.[3] An exception is provided by Han (2007) who considers competing-mechanism games of *complete* information, and shows that each strongly robust equilibrium outcome of the direct mechanism game survives against principals' unilateral deviations to indirect mechanisms. We extend Han (2007) analysis to the incomplete information case by proving a robustness result for exclusive competition settings. Truth-telling strongly robust equilibria survive against principals' deviations to more complex communication schemes. In a similar exclusive competition framework, Peck (1997) reaches a negative conclusion: given the mixed strategy of one principal, his opponent can post a mechanism inducing a continuation equilibrium which cannot be reproduced when agents behave truthfully. Our Proposition 1 hence clarifies that Peck (1997)'s insight fundamentally relies on principals playing mixed strategies at equilibrium.

The paper is organized as follows: Section 2 develops a general model of competing mechanisms under exclusive competition. Section 3 provides an example showing the limited power of direct mechanisms. Section 4 proves equilibrium robustness, and clarifies the role of exclusive competition. Section 5 concludes.

---

[1] In such direct mechanisms, agents only communicate to principals their exogenous private information (type), but not the *market* information generated by the presence of several competing mechanisms. Modeling this additional communication may require very complex message spaces. Epstein and Peters (1999) are the first to characterize the *universal* mechanisms which allow to report all relevant information, therefore formalizing an extended notion of type for the agents. This abstract construction, however, has little bite in applications, as extensively discussed by Peters (2014).

[2] See Theorem 2 in Peters (2003).

[3] Peters (2004) and Attar et al. (2012) provide examples of multiple-agent settings with moral hazard in which agents participate with all principals at a time and equilibria supported by direct mechanisms fail to be robust.