

# Full Collusion with Entry and Incomplete Information\*

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## Abstract

This paper reformulates infinitely repeated duopoly games with incomplete information, on the grounds that firms in reality take preparatory actions in each period, in order to be active in the market of that period. In our model, each firm learns its private cost type and decides whether or not to take a costly entry action which allows it to operate in the market every period. If a firm enters, it plays a game belonging to a class of games that includes Bertrand duopoly and some auctions as special cases, either as a monopolist or as a duopolist. The firms can communicate after learning their types and before making their entry decisions. We study full collusion (joint profit maximization) which requires a higher-quality firm to solely enter and to choose an action maximizing the stage profit. We present a condition on the stage game which is both necessary and sufficient in order for sufficiently patient firms to fully collude by a stationary equilibrium. The condition is more likely to hold when the entry cost increases, which signifies that the entry cost is an important factor facilitating full collusion. We also show that under some parameter restrictions, asymmetric equilibria where only one firm reveals its type every period sustain full collusion for a wider range of discount factors. These asymmetric equilibria reduce the total amount of communication, which may make it harder for antitrust authorities to detect collusion.

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*Keywords:* Bertrand Competition; Fixed Costs; Unknown Costs; Private Information; Infinitely Repeated Game; Pre-play Communication; One-sided Communication; Full Collusion

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