Naked Exclusion with Private Offers

Jeanine Miklós-Thal University of Rochester

Greg Shaffer University of Rochester

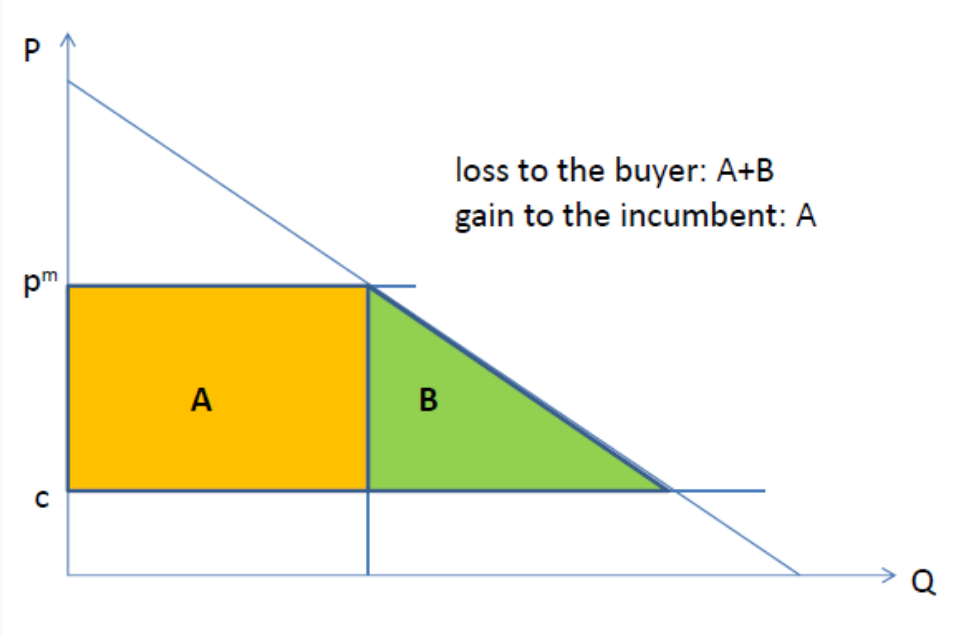
August 2015

Introduction

- Vertical contracts that prohibit a seller's customers from dealing with rival sellers have long been controversial in antitrust.
- A key point of contention is whether and when such contracts can profitably be used by an incumbent seller to deter a potential entrant.

Introduction

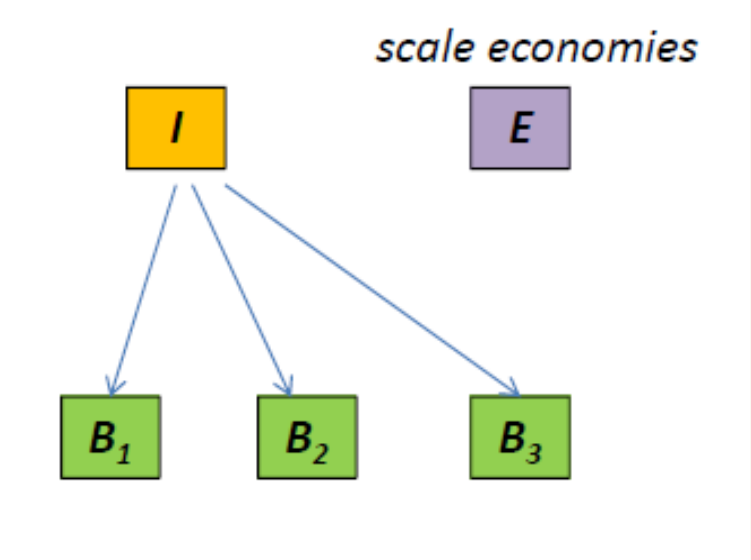
- Chicago school: Why would buyers whose interest is to promote entry and competition sign such contracts?



The incumbent would incur a loss if it had to fully compensate the buyer for signing an exclusive contract.

Introduction

- Rasmusen, Ramseyer, and Wiley (1991), Segal and Whinston (2000): theory of "**naked exclusion**"



$\Longrightarrow$ *Incumbent can exploit externalities between buyers to deter entry:*

1. coordination failure between buyers (Rasmusen et al.)
2. divide-and-conquer exclusionary strategy (Segal & Whinston)

Introduction

- Rasmusen et al. (1991) and Segal and Whinston (2000) focus on the case of publicly observable exclusivity offers.

- We consider the profitability of exclusive contracts when offers are privately observable: each buyer observes only its own offer, not the offers made to the other buyers.

Introduction

- Rasmusen et al. (1991) and Segal and Whinston (2000) focus on the case of publicly observable exclusivity offers.

- We consider the profitability of exclusive contracts when offers are privately observable: each buyer observes only its own offer, not the offers made to the other buyers.
    - Out-of-equilibrium beliefs may matter: if a buyer receives an unexpected offer from the incumbent, what are its beliefs about the offers the incumbent made to the other buyers?

Preview of Results

- Out-of-equilibrium beliefs are critical in determining the success of a *divide-and-conquer strategy*.

Preview of Results

- Out-of-equilibrium beliefs are critical in determining the success of a *divide-and-conquer strategy*.
  - A divide-and-conquer strategy equilibrium *does not exist* when buyers have **passive beliefs**.

Preview of Results

- Out-of-equilibrium beliefs are critical in determining the success of a *divide-and-conquer strategy*.
  - A divide-and-conquer strategy equilibrium *does not exist* when buyers have **passive beliefs**.
  - A divide-and-conquer strategy equilibrium *does not exist* when buyers have **wary beliefs**.

Preview of Results

- Out-of-equilibrium beliefs are critical in determining the success of a *divide-and-conquer strategy*.
  - A divide-and-conquer strategy equilibrium *does not exist* when buyers have **passive beliefs**.
  - A divide-and-conquer strategy equilibrium *does not exist* when buyers have **wary beliefs**.
  - Strong and unrealistic assumptions on beliefs are needed to support a divide-and-conquer strategy in equilibrium.

Preview of Results

- Out-of-equilibrium beliefs are critical in determining the success of a *divide-and-conquer strategy*.
  - A divide-and-conquer strategy equilibrium *does not exist* when buyers have **passive beliefs**.
  - A divide-and-conquer strategy equilibrium *does not exist* when buyers have **wary beliefs**.
  - Strong and unrealistic assumptions on beliefs are needed to support a divide-and-conquer strategy in equilibrium.

- Equilibria in which the incumbent obtains exclusion for free, due to a lack of coordination between buyers, exist for **any** out-of-equilibrium beliefs.

Model

- Players:
  - Two sellers, an incumbent and an entrant
  - N symmetric buyers ($i = 1, 2, ..., N$)

- Timing:
  1. The incumbent simultaneously offers each buyer i an exclusive contract, with compensation $x_i \geq 0$. The buyers simultaneously decide whether to accept or reject their offers.
  2. The entrant decides whether to enter.
  3. The incumbent and the entrant (if it has entered) compete in setting prices. The entrant can only compete for "free" buyers.

Model

- In stage 3, the incumbent earns a profit of $\pi > 0$ from buyer i if i is unable to deal with the entrant, and zero otherwise.
- Free buyers are better off with entry than without entry (pay the monopoly price without entry, competitive price with entry): $x^* > 0$.
- Buyers have more to gain from entry than the incumbent stands to lose:

$$x^* > \pi.$$

- There is an integer $N^* < N$ such that it is profitable for the entrant to enter if and only if the number of signed buyers is strictly less than N^*.

Public Offers

- Let $s_i \in \{0, 1\}$ denote buyer i's decision in stage two, with $s_i = 1$ if buyer i accepts its offer and $s_i = 0$ if buyer i rejects its offer.
- Let $S = \sum_i s_i$ denote the number of buyers who accept.

Proposition (Segal and Whinston, 2000)

When the incumbent's offers are publicly observable, exclusionary subgame-perfect equilibria in which

(A) $S > N^*$ *always exist, and in all such equilibria,* $\sum_i s_i x_i \leq \min\{N^* x^*, N\pi\}$ *and* $x_i = 0$ *if* $s_i = 0$*;*

(B) $S = N^*$ *exist if and only if* $N\pi \geq N^* x^*$*, and in all such equilibria,* $x_i = x^*$ *if* $s_i = 1$*, and* $x_i = 0$ *if* $s_i = 0$*.*

Private Offers

Can exclusive contracts still be profitable for the incumbent when the exclusivity offers are privately observable?

Private Offers

Can exclusive contracts still be profitable for the incumbent when the exclusivity offers are privately observable?

- Buyers' out-of-equilibrium beliefs may matter now.
- Let's analyze the two possible cases $S > N^*$ and $S = N^*$ in turn.

Private Offers: Equilibria with S > N*

- In any equilibrium in which $S > N^*$, $x_i = 0$ for all i:
  - If $x_i > 0$ and i accepts the incumbent's offer on the equ. path, the incumbent could profitably deviate by offering $x_i = 0$.
  - If $x_i > 0$ and i rejects the incumbent's offer on the equ. path, i could profitably deviate by accepting its offer.

- Equilibria in which $S > N^*$ exist for **any** out-of-equilibrium beliefs:
  - Intuitively, the incumbent has no incentive to deviate regardless of the buyers' out-of-equilibrium beliefs, because it obtains exclusion at zero cost on the equilibrium path (and a negative offer would be rejected under any beliefs).

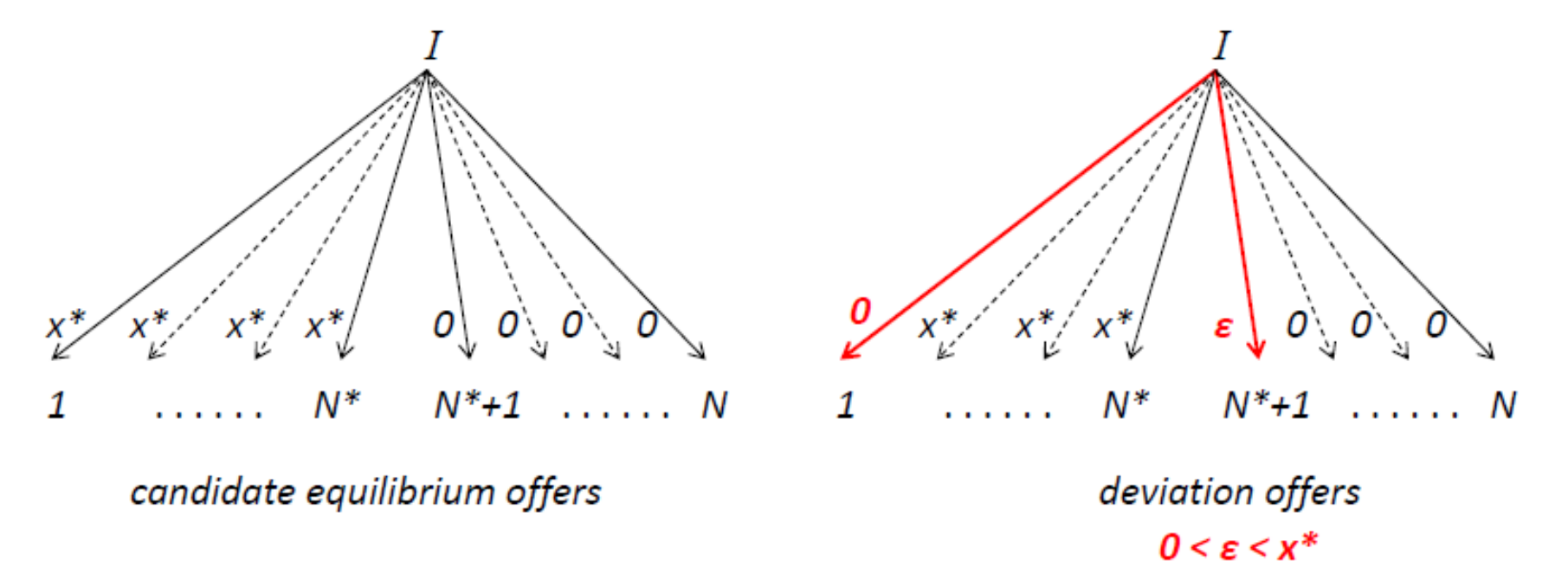
Private Offers: Equilibria with S = N*

- Now exclusion is costly for the incumbent, because it must offer full compensation (x^*) to the N^* buyers who accept exclusivity on the equilibrium path.
- Therefore, the incumbent may be tempted to deviate in order to achieve exclusion more cheaply.
- The profitability of such a deviation depends on buyers' out-of-equilibrium beliefs when receiving unexpected offers below x^*.
- Let's see what happens with the two most commonly used beliefs in the vertical-contracting literature: (i) *passive beliefs*, and (ii) *wary beliefs*.

Passive Beliefs

Passive beliefs: a buyer who receives an unexpected offer continues to believe that the other buyers have received their equilibrium offers.

Proof that exclusion via a divide-and-conquer strategy cannot be supported:



Wary Beliefs

- One might expect buyers to recognize that the incumbent's best offer to any one buyer will depend on its contracts with the other buyers.
- Thus, if buyers interpret deviations as deliberate choices by the incumbent, it may make more sense for buyers to have *wary beliefs*.
- A buyer with wary beliefs who receives an out-of-equilibrium offer believes that all other buyers have received offers that maximize the incumbent's expected profit given the observed offer (McAfee and Schwartz, 1994).

Wary Beliefs: Formal Definition

- Useful notation for formal definition of wary beliefs: Buyer i's equilibrium strategy can be summarized by an acceptance set A_i denoting all offers that buyer i is willing to accept (which must be optimal given i's beliefs and the strategies of all other players).

Definition (wary beliefs)

After receiving an offer x_i from the incumbent, buyer i believes that

1. the incumbent expects it to accept the offer if and only if $x_i \in A_i$;
2. the incumbent's offers to the remaining $N-1$ buyers are best for the incumbent, given condition 1 and the acceptance sets of the remaining $N-1$ buyers;
3. all other buyers reason the same way.

Wary Beliefs — Proof

Proof that exclusion via a divide-and-conquer strategy **cannot** be supported:

- Suppose (in negation) that there is an equilibrium in which the entrant is excluded via divide-and-conquer offers: $S = N^*$, $x_i = 0$ if $s_i = 0$, and $x_i = x^*$ if $s_i = 1$.

- In such an equilibrium, each buyer's acceptance set, A_i, must exclude all offers below x^*, otherwise the incumbent could profitably deviate to offers that deter entry at a lower total cost to the incumbent.

Wary Beliefs — Proof cont.

- Now suppose the incumbent offers $\widetilde{x}_i \in (0, x^*)$ to buyer i with $s_i = 0$.

Wary Beliefs — Proof cont.

- Now suppose the incumbent offers $\widetilde{x}_i \in (0, x^*)$ to buyer i with $s_i = 0$.
- Since $\widetilde{x}_i \notin A_i$, wary beliefs imply that buyer i believes that the incumbent (i) expects it to reject the deviation offer and (ii) makes optimal offers to the remaining $N - 1$ buyers given its rejection.

Wary Beliefs — Proof cont.

- Now suppose the incumbent offers $\widetilde{x}_i \in (0, x^*)$ to buyer i with $s_i = 0$.
- Since $\widetilde{x}_i \notin A_i$, wary beliefs imply that buyer i believes that the incumbent (i) expects it to reject the deviation offer and (ii) makes optimal offers to the remaining $N - 1$ buyers given its rejection.
- This means that when buyer i has wary beliefs and $\widetilde{x}_i \notin A_i$, it believes that the incumbent offers x^* to N^* other buyers for whom x^* is in their acceptance sets and 0 to the remaining $N - N^* - 1$ buyers.

Wary Beliefs — Proof cont.

- Now suppose the incumbent offers $\widetilde{x}_i \in (0, x^*)$ to buyer i with $s_i = 0$.
- Since $\widetilde{x}_i \notin A_i$, wary beliefs imply that buyer i believes that the incumbent (i) expects it to reject the deviation offer and (ii) makes optimal offers to the remaining $N - 1$ buyers given its rejection.
- This means that when buyer i has wary beliefs and $\widetilde{x}_i \notin A_i$, it believes that the incumbent offers x^* to N^* other buyers for whom x^* is in their acceptance sets and 0 to the remaining $N - N^* - 1$ buyers.
- Buyer i hence believes that exclusion will occur regardless of its own decision, which implies that accepting $\widetilde{x}_i$ is optimal for the buyer, **a contradiction**.

Summary of results

Proposition

When the incumbent's offers are privately observable, exclusionary (weak) perfect-Bayesian equilibria in which

(A) $S > N^*$ *exist for any out-of-equilibrium beliefs, and in all such equilibria,* $x_i = 0$ *for all* i*;*

(B) $S = N^*$ *do not exist when buyers have passive or wary beliefs.*

For what beliefs does divide-and-conquer work?

- In any divide-and-conquer equilibrium, buyers must reject all offers strictly below x^*.
- Any buyer who receives an unexpected offer in $(0, x^*)$ must thus believe that at most $N^* - 1$ other buyers have received offers in their acceptance sets, so that the buyer believes it is either pivotal for exclusion or that entry will happen regardless of its own decision.
- We have shown that passive and wary beliefs do *not* satisfy this condition.

For what beliefs does divide-and-conquer work?

- Examples of beliefs that can support a divide-and-conquer strategy:
  - Symmetric beliefs: a buyer who receives an unexpected offer believes that all other buyers have received the same offer.

For what beliefs does divide-and-conquer work?

- Examples of beliefs that can support a divide-and-conquer strategy:
  - Symmetric beliefs: a buyer who receives an unexpected offer believes that all other buyers have received the same offer.
  - A buyer i who receives an unexpected offer believes that the incumbent expects it to accept the offer (even if it is *not* in i's equ. acceptance set) and makes the optimal offers to the other buyers, given i's acceptance and the other buyer's equ. acceptance sets.

For what beliefs does divide-and-conquer work?

- Examples of beliefs that can support a divide-and-conquer strategy:
  - Symmetric beliefs: a buyer who receives an unexpected offer believes that all other buyers have received the same offer.
  - A buyer i who receives an unexpected offer believes that the incumbent expects it to accept the offer (even if it is *not* in i's equ. acceptance set) and makes the optimal offers to the other buyers, given i's acceptance and the other buyer's equ. acceptance sets.

For what beliefs does divide-and-conquer work?

- Examples of beliefs that can support a divide-and-conquer strategy:
  - Symmetric beliefs: a buyer who receives an unexpected offer believes that all other buyers have received the same offer.
  - A buyer i who receives an unexpected offer believes that the incumbent expects it to accept the offer (even if it is *not* in i's equ. acceptance set) and makes the optimal offers to the other buyers, given i's acceptance and the other buyer's equ. acceptance sets.
- Under any belief that "works," buyers believe either (i) that the incumbent's other offer are not optimal given the privately observed offer, or/and (ii) that the incumbent has incorrect expectations about what offers will be accepted off the equ. path.

Alternative Selection Criteria

Recent literature on equilibrium refinements for sequential games with imperfect information proposes two alternatives:

- Eguia et al. (2015) argue that the action profiles most likely to be played in equilibrium are the ones that can be sustained by the largest collection of out-of-equilibrium beliefs.
  - Selects exclusionary equilibria with $S > N^*$ in our model, as these can be supported by *all* out-of-equilibrium beliefs.
- In and Wright (2012): *Reordering Invariance* – beliefs
  - Coincides with wary beliefs in our context $\longrightarrow$ rules out exclusionary equilibria in which $S = N^*$

Conclusions

- Perfect Bayesian equilibrium imposes no constraint on out-of-equilibrium beliefs in our model. Nevertheless, some beliefs are more sensible than others, and thus not all equilibria are equally deserving of attention.
- It is common in the literature on vertical contracting to restrict attention to either (i) passive beliefs or (ii) wary beliefs.
- We have shown that in both cases, whether buyers have passive or wary beliefs, exclusion cannot be induced in equilibrium by means of a divide-and-conquer strategy.
- Exclusionary equilibria that rely on a coordination failure on the part of the buyers, on the other hand, exist for any out-of-equilibrium beliefs.

Conclusions

Our results suggest that discriminatory contracts aimed at implementing a divide-and-conquer strategy are not likely to arise in in equilibrium when offers are secret.

Why might one nonetheless observe discriminatory contracts in practice?

- Asymmetric buyers, e.g., a buyer may be big enough to induce entry *on its own*.
- *Binding* public announcements by the incumbent
  - Clear rules regarding who is entitled to compensation for exclusivity, e.g., based on quantity or "loyalty" criteria.
  - Although the incumbent could still make secret offers to buyers that do not satisfy the conditions, it may be hard to renege on compensation payments to those buyers that satisfy the conditions.

Extensions

- We show that the results are unchanged if the incumbent can make price commitments in stage one.

Extensions

- We show that the results are unchanged if the incumbent can make price commitments in stage one.

- Extending the model to allow buyers to compete would likely reduce the gains from exclusion (because of the well known inability of an incumbent monopolist to support monopoly pricing when buyers have passive or wary beliefs) but not fundamentally alter our results.

Extensions

- We show that the results are unchanged if the incumbent can make price commitments in stage one.
- Extending the model to allow buyers to compete would likely reduce the gains from exclusion (because of the well known inability of an incumbent monopolist to support monopoly pricing when buyers have passive or wary beliefs) but not fundamentally alter our results.
- Extending the model to allow offers to be made sequentially, as Segal and Whinston (2000) do in the context of observable offers, is tricky because sensible off-equilibrium beliefs are hard to pin down.

Extensions

- We show that the results are unchanged if the incumbent can make price commitments in stage one.
- Extending the model to allow buyers to compete would likely reduce the gains from exclusion (because of the well known inability of an incumbent monopolist to support monopoly pricing when buyers have passive or wary beliefs) but not fundamentally alter our results.
- Extending the model to allow offers to be made sequentially, as Segal and Whinston (2000) do in the context of observable offers, is tricky because sensible off-equilibrium beliefs are hard to pin down.
- Work in progress on divide-and-conquer strategies in other contexts.