Naked Exclusion with Heterogeneous Buyers

Ying Chen
Johns Hopkins University

Jan Zápal
CERGE-EI

EEA-ESEM Milan
August 22-26, 2022

Introduction

exclusionary contract binds buyer to buy from given seller
(e.g. Visa signing with banks not to issue American Express cards)

a buyer signing imposes negative externality by harming competition

number of important contributions, used in regulatory practice, cited in court decisions

this paper: Segal & Whinston with heterogeneous buyers

what do we get: number of surprising economically meaningful results

Model

- incumbent firm I, potential entrant E, set of buyers $N = \{1, \dots, n\}$
- marginal cost of production $c_I > c_E > 0$
- buyer i demands $d_i(p) = s_i d(p)$ units, s_i is i's size

- game has three periods:

1. I signs exclusionary contracts with buyers
2. E decides to enter or not
3. active firms post prices to buyers

Model

- incumbent firm I, potential entrant E, set of buyers $N = \{1, \ldots, n\}$
- marginal cost of production $c_I > c_E > 0$
- buyer i demands $d_i(p) = s_i d(p)$ units, s_i is i's size

- game has three periods:

1. I signs exclusionary contracts with buyers
2. E decides to enter or not
3. active firms post prices to buyers

Model: πs_i, $s_i x$

let p^m and πs_i be the solution and the value of

$$\max_{p \in \mathbb{R}_+} (p - c_I) \cdot s_i d(p)$$

let $s_i x$ be

$$\int_{c_I}^{p^m} s_i d(p) dp$$

econ 101 $\rightarrow \pi < x$

Model: periods 2 & 3

set of contracted buyers C, set of free buyers $F = N \setminus C$

Model: periods 2 & 3

set of contracted buyers C, set of free buyers $F = N \setminus C$

	no entry	entry
buyers in C buy from	I at p^m	I at p^m
buyers in F buy from	I at p^m	E at c_I
I's profit	$\pi \sum_{i \in N} s_i$	$\pi \sum_{i \in C} s_i$
E's profit	0	$(c_I - c_E) d(c_I) \sum_{i \in F} s_i - f$

Model: periods 2 & 3

set of contracted buyers C, set of free buyers $F = N \setminus C$

	no entry	entry
buyers in C buy from	I at p^m	I at p^m
buyers in F buy from	I at p^m	E at c_I
I's profit	$\pi \sum_{i \in N} s_i$	$\pi \sum_{i \in C} s_i$
E's profit	0	$(c_I - c_E) d(c_I) \sum_{i \in F} s_i - f$

loss of $s_i x$

Model: periods 2 & 3

set of contracted buyers C, set of free buyers $F = N \setminus C$

	no entry	entry
buyers in C buy from	I at p^m	I at p^m
buyers in F buy from	I at p^m	E at c_I
I's profit	$\pi \sum_{i \in N} s_i$	$\pi \sum_{i \in C} s_i$
E's profit	0	$(c_I - c_E) d(c_I) \sum_{i \in F} s_i - f$

no loss

Model: period 1

simultaneous offers:

- I offers $(t_i)_{i \in N} \in \mathbb{R}^n_+$ to buyers
- buyers simultaneously accept or rejects

sequential offers: in each round I either stops or approaches unapproached $i \in N$ with $t_i \geq 0$

- stop $\rightarrow$ period 2
- approaches $i \rightarrow i$ either accepts or rejects
  - i accepts $\rightarrow i$ becomes contracted, t_i paid, next round
  - i rejects $\rightarrow i$ remains uncontracted, next round

Model: solution concept

- strategies map histories into actions
- SPE in pure strategies
+ indifferent buyers accept
+ simultaneous offers: buyers' strategies do not admit profitable self-enforcing coalitional deviations

Related literature

- Fumagali, Motta, Calcagno 2018 chapter 3
- Whinston 2006 chapter 4
- Rasmusen, Ramseyer, Wiley 1991 AER
- Segal & Whinston 2000 AER
- Fumagali & Motta 2006 AER

Homogeneous buyers benchmark

- $s_1 = s_2$
- exclusion requires one or more buyers

$\pi(s_1 + s_2) < s_1 x$

- SIM+SEQ: entry in any equilibrium, no buyer signs

Homogeneous buyers benchmark

- $s_1 = s_2$
- exclusion requires one or more buyers

$\pi(s_1 + s_2) < s_1 x$

- SIM+SEQ: entry in any equilibrium, no buyer signs

$\pi(s_1 + s_2) > s_1 x$

- SIM+SEQ: exclusion in any equilibrium
- SIM: $(s_1 x, 0)$ offered, both buyers accept
- SEQ: 0 offered to a buyer, who accepts

Heterogeneous buyers: The example

- $s_1 < s_2$
- exclusion if and only if the large buyer signs
- I's payoff from fully compensating buyer 2 is $\pi(s_1 + s_2) - s_2 x$
- suppose $\pi(s_1 + s_2) - s_2 x > 0$
- if buyer 1 rejects in round 1, then exclusion in round 2
- buyer 1 accepts zero in round 1
- after which I stops (entry) and receives $\pi s_1 > \pi(s_1 + s_2) - s_2 x$

Heterogeneous buyers: The example

- $s_1 < s_2$
- exclusion if and only if the large buyer signs
- I's payoff from fully compensating buyer 2 is $\pi(s_1 + s_2) - s_2 x$
- suppose $\pi(s_1 + s_2) - s_2 x > 0$
- if buyer 1 rejects in round 1, then exclusion in round 2
- buyer 1 accepts zero in round 1
- after which I stops (entry) and receives $\pi s_1 > \pi(s_1 + s_2) - s_2 x$

Heterogeneous buyers: The example

- $s_1 < s_2$
- exclusion if and only if the large buyer signs

- I's payoff from fully compensating buyer 2 is $\pi(s_1 + s_2) - s_2 x$
- suppose $\pi(s_1 + s_2) - s_2 x > 0$

- if buyer 1 rejects in round 1, then exclusion in round 2
- buyer 1 accepts zero in round 1
- after which I stops (entry) and receives $\pi s_1 > \pi(s_1 + s_2) - s_2 x$

The example: observation 1

in any equilibrium:

- I approaches the small buyer with 0
- he accept
- entry happens

The example: observation 2

in the example:

- if buyer 1 rejects in round 1, then exclusion in round 2
- if buyer 1 accepts in round 1, then entry in round 2

acceptance by i in general has two effects:

- lowers exclusion threshold $\rightarrow$ exclusion more likely thereafter
- lowers additional payoff from exclusion by πs_i $\rightarrow$ exclusion less likely

- buyer homogeneity ties the two effects together
- in the example (with vetos more generally) first effect absent

The example: observation 2

in the example:

- if buyer 1 rejects in round 1, then exclusion in round 2
- if buyer 1 accepts in round 1, then entry in round 2

acceptance by i in general has two effects:

- lowers exclusion threshold $\rightarrow$ exclusion more likely thereafter
- lowers additional payoff from exclusion by πs_i $\rightarrow$ exclusion less likely

- buyer homogeneity ties the two effects together
- in the example (with vetos more generally) first effect absent

The example: observation 2

in the example:

- if buyer 1 rejects in round 1, then exclusion in round 2
- if buyer 1 accepts in round 1, then entry in round 2

acceptance by i in general has two effects:

- lowers exclusion threshold $\rightarrow$ exclusion more likely thereafter
- lowers additional payoff from exclusion by πs_i $\rightarrow$ exclusion less likely

- buyer homogeneity ties the two effects together
- in the example (with vetos more generally) first effect absent

THE EXAMPLE: OBSERVATION 3

- with buyer homogeneity high π brings exclusion
- we revise this to 'high π brings I's maximal payoff'

$$\pi \sum_{i \in N \setminus V} s_i + (\pi - x) \sum_{i \in V} s_i$$

- maximum equals $\pi \sum_{i \in N \setminus V} s_i$
- exclusion when $V = \varnothing$
- entry when $V \neq \varnothing$

The example: observation 4

– $\pi(s_1 + s_2) - s_2 x > 0$ means exclusion with simultaneous

– sequential pro-competitive (and Pareto superior)

	simultaneous exclusion	sequential entry
I	$\pi(s_1 + s_2) - s_2 x$	πs_1
E	0	$(c_I - c_E) s_2 d(c_I)$
s_1	p^m	p^m
s_2	p^m & $s_2 x$	c_I