A Simple Theory of Predation

C. Fumagalli\textsuperscript{1}  \hspace{1cm} M. Motta\textsuperscript{2}

\textsuperscript{1}Bocconi University

\textsuperscript{2}ICREA-Universitat Pompeu Fabra and Barcelona GSE

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Motivation

Predation has been the object of many recent and prominent cases, especially in Europe:

- *Intel vs. EC* (May 2009): EUR 1.06 billion of fine, highest ever
- *Cardiff Bus vs. OFT* (November 2008)
- *Telecom Italia vs. AGCM* (November 2004)
- *Wanadoo vs. EC* (July 2003)
- *Aberdeen Journals vs. OFT* (September 2002)
- *Deutsche Post vs. EC* (March 2001)
- *NAPP vs. OFT* (March 2001)

In the US:

Predatory pricing has intrigued the antitrust community for many years

- **Chicago School**: predation is irrational (unsuccessful and dominated by more efficient practices to get rid of rivals)
- **Modern IO**: under specific circumstances predation successful and fully rational strategy to exclude
  
  - Reputation/Signalling Models: Kreps and Wilson (JET, 1982); Milgrom and Roberts (JET, 1982); Predation for Takeovers: Saloner (RAND, 1987)
  - Signal Jamming: Scharfstein (RAND, 1984); Fudenberg and Tirole (RAND, 1986)
  - Deep Pocket Theory of Predation: Bolton and Scharfstein (AER, 1990)

Most of these models are based on informational problems.
Our contribution

This paper offers a new explanation of predatory pricing which does **not** rely on informational problems.

- The crucial ingredients for predation to arise are:
  - sequential buyers/markets
  - scale economies (either from the supply or the demand side)
  - incumbency advantage

**Basic mechanism**

The incumbent may engage in below-cost pricing to some early buyers/markets to **deprive** a (more efficient) rival of the **scale** (or of the key profits) it needs to operate successfully. Once the rival is excluded, the incumbent will recoup losses by increasing prices on the remaining buyers/markets.
This mechanism applies to a variety of situations:

- The prey may be either an entrant or an existing rival: **entry deterrence/marginalization**.
- Entry/expansion may be prevented also in **adjacent markets** related by common costs.
- Supply side scale economies and **demand side** scale economies (network externalities or two-sided markets).

Our mechanism may help rationalize predation in cases where standard theories may not apply (or may co-exist with them):

- **The cases mentioned above** may be read in the spirit of this model.

**Below cost** pricing is crucial to exclude:

- Our paper supports the use of tests that compare the allegedly abusive price to some cost benchmark.
Roadmap

1. Introduction
2. A simple example
3. Discussion
   - Why inefficient exclusion?
   - Which markets fit the example?
   - Beyond the example
   - Related literature
4. Robustness
   - No Intertemporal Price Discrimination
   - Simultaneous offers, Strategic buyers, Growing markets
   - Downstream Competition
5. Extensions
6. Conclusions
Assumptions

- Two buyers: $B_1$ and $B_2$.
- Unit demand if $p \leq 1$.
- Firms: $I$ (incumbent) and $E$ (entrant).
- Homogeneous products.
- Production costs:
  - $c_E = 0 < c_I < 1/2$.
  - $E$ still needs to pay the fixed cost $f$ when the game starts, while $I$ has already sunk it.
  - $c_I < f < 2c_I$.

**Remark**: Entry efficient, but single buyer insufficient to reach efficient scale.
Remark: Similar timing as in Bernheim and Whinston (JPE, 1998) - Non-coincident markets application.
**Predation**
If \( f > \frac{3cI}{2} \), then there is exclusion of firm \( E \) at the equilibrium:
- \( p_1^I = p_1^E = f - c_I < c_I \), \( B_1 \) buys from \( I \), no entry in period 1
- \( p_2^I = p_2^E = f > c_I \), \( B_2 \) buys from \( I \), no entry in period 2.

**Entry**
If \( f \leq \frac{3cI}{2} \), then the equilibrium involves entry of firm \( E \):
- \( p_1^I = p_1^E = 2c_I - f < c_I \), \( B_1 \) buys from \( E \), entry in period 1.
- \( p_2^I = p_2^E = c_I \), \( B_2 \) buys from \( E \).
Proof

**Competition for** $B_2$

- If $f$ sunk in period 1 $\Rightarrow$ the cost to supply $B_2$ are $c_I > 0 = c_E$.
  - in equilibrium $p = c_I$ and $B_2$ buys from $E$.
- If $f$ not sunk in period 1 $\Rightarrow$ the cost to supply $B_2$ are $c_I < f = c_E$.
  - in equilibrium $p = f$ and $B_2$ buys from $I$.

**Investment in period 1**

- If $B_1$ did not buy from $E$ $\Rightarrow$ investment not profitable: $f > c_I$.
- If $B_1$ addressed $E$ at $p^1_E$ $\Rightarrow$ investment profitable as long as
  $$\Pi_E = p^1_E + c_I - f \geq 0$$

**Competition for** $B_1$

- Firm $E$ is willing to supply $B_1$ as long as $p^1_E \geq f - c_I = \tilde{c}_E$.
- Firm $I$ is willing to supply $B_1$ as long as $p^1_I \geq c_I - (f - c_I) = \tilde{c}_I$.

$$\tilde{c}_E > \tilde{c}_I \iff f - c_I > 2c_I - f \iff f > \frac{3c_I}{2}$$
Why inefficient exclusion?

\[ \tilde{c}_E = f - c_I \text{ versus } 2c_I - f = \tilde{c}_I \]

- The firm that serves the first buyer will supply also the second.

- Firm \( E \) is 'globally' more efficient then \( I \) (\( f < 2c_I \)), which tends to make firm \( E \) more aggressive when competing for \( B_1 \).

- But the \textbf{incumbent extracts more rents} than firm \( E \) from the second buyer (\( f > c_I \)), which tends to make the incumbent more aggressive when competing for \( B_1 \):
  - If it captures \( B_1 \), then the incumbent will charge a price as large as \( f \) to \( B_2 \).
  - Instead, if firm \( E \) captures \( B_1 \), then it will be able to fix the lower price \( c_I < f \) to \( B_2 \).

- If the latter effect is strong enough, the incumbent manages to capture \( B_1 \) and inefficient exclusion takes place.
Remark: Exclusion in the absence of a first mover advantage. Sources of exclusion:

- Incumbency advantage: $I$ has already sunk $f$.
- Single buyer insufficient for $E$ to reach efficient scale ($f > c_I$).

⇒ This creates the scope for rents extraction more favourable to the incumbent and for inefficient exclusion.
Here, it is crucial that $I$ has already paid the fixed cost when the game starts, while $E$ has not.

Think of markets where:

- buyers decide on the basis of tender offers
- it takes time to undertake the investment required to enter (large and complex infrastructure to build)
- incumbents can rely on fully developed infrastructure

*Telecom Italia* case
More generally....

- **Two** contestable units; \( q_I, q_R \): non-contestable units;

- \( C_I(q_I), C_R(q_R) \) total cost functions such that:
  
  - The **rival is more efficient** than \( I \) in producing the two contestable units: 
    \[
    C_R(q_R + 2) - C_R(q_R) < C_I(q_I + 2) - C_I(q_I)
    \]
  
  - The **rival is less efficient** than \( I \) in producing a single contestable unit: 
    \[
    C_I(q_I + 1) - C_I(q_I) < C_R(q_R + 1) - C_R(q_R).
    \]

These properties can result from the interaction of:

- Existence of **scale/scope economies**, learning effects;

- **Incumbency advantage** for \( I \): larger numbers of captive buyers.
More generally....

There exists a threshold level of $R$’s cost to produce the two contestable units such that:

- If $R$’s **cost advantage is not too large**, inefficient exclusion takes place due to a predatory strategy of the incumbent: below cost pricing on $B_1$, losses recouped on $B_2$.

- If $R$’s cost advantage is large enough, firm $R$ supplies both buyers.

**Remarks:**

- Below-cost pricing necessary to exclude.
- The stronger the incumbency advantage ($\uparrow \bar{q}_I$), the (weakly) more likely the predatory equilibrium.
- The rival may be a potential entrant as well as an existing competitor whose expansion is prevented.
Related Literature

- Literature on predatory pricing mentioned above:
  - Cabral and Riordan (Econometrica 1994; JIE 1997): under learning effects, the incumbent uses aggressive pricing in the first period to speed up learning, deny efficiency to the rival and increase its exit probability.
  - Besanko et al (2011): numerical simulations show that **efficiency-denying** effect crucial for predation-like behaviour to be welfare detrimental.

- Inefficient exclusion due to **contracting externalities**: Bernheim and Whinston, (JPE, 1998); Segal and Whinston, (AER, 2000).

- Exclusion and discriminatory offers: Innes and Sexton (AER, 1994), Karlinger and Motta (forthcoming JIE).

- Exclusionary tying in complementary markets: Carlton and Waldman (RJE, 2002).
If no intertemporal price discrimination ⇔ no predation: both buyers pay \( c_I \) and entry takes place

- No scope for recoupment

**Banning** intertemporal price discrimination (banning below-cost pricing) welfare beneficial? Not necessarily!

- when \( f > \frac{3c_I}{2} \), promotes productive efficiency (+ allocative efficiency under elastic demand)
- when \( f \leq \frac{3c_I}{2} \): chilling competition effect (detrimental under elastic demand)
Simultaneous offers, Strategic buyers, Growing markets

- If offers are made **simultaneously** (and buyers also choose simultaneously), exclusion may arise only due to buyers’ **coordination failures**.
  - Different mechanism, below-cost pricing not necessary to exclude.

- If buyers could delegate to a common agent their purchases, or could pool their orders, then inefficient exclusion would **not** take place.

- If buyers can choose when to buy, then race to be the first:
  - Back to the simultaneous case

- If the second buyer/market is **larger** than the first one (new product, longer time horizon), exclusion **less** likely to take place.
  - Less likely that a single buyer insufficient to reach efficient scale.
When buyers are firms (retailers) competing for final consumers, exclusion less likely the more intense downstream competition (see also, for exclusive dealing, Fumagalli and Motta, AER 2006):

- Imagine buyers sell homogeneous products in the downstream market and compete in prices;
- If the first buyer committed to buy from the incumbent at a certain wholesale price, firm $R$ will not suffer any disadvantage when competing for $B_2$.
- By offering a slightly lower wholesale price, firm $R$ will allow $B_2$ to capture the entire downstream market and will guarantee itself enough scale to operate successfully.
- No scope for second period rents extraction favourable to the incumbent.
Common costs

- The previous analysis extends to a setting where the two contestable buyers are buyers of different products and there are economies from joint production.

- The incumbent may predate in the first market to preserve its dominant position in the other market.

Network externalities/Two-sided markets

- The analysis extends to the case where scale economies arise from the demand side.

- Combination of network externalities and incumbency advantage (the incumbent can rely on a larger established customer base):
  - At full size (i.e. when both of the new buyers add to it) the quality of the rival’s network is superior to the incumbent’s
  - But with only one new buyer the quality the rivals’ product is inferior.

- Rents extraction from second buyer more favourable to the incumbent ⇒ scope for inefficient exclusion through below-cost pricing to the first buyer.
Conclusions

- New theory of harm in predation cases

- An agency who believes that the present theory might apply to a given case should necessarily show that the following factors co-exist in the industry:
  - importance of scale economies (whether due to fixed costs, learning effects, demand externalities or other reason)
  - strong incumbency advantages (reinforced by switching costs and infrequency of purchases)
  - weak buyer power
  - weak downstream competition
  - possible intertemporal price discrimination
  - sufficiently mature market

- Our story can rationalize cases where standard theories fail to apply, but can also co-exist with them (see AKZO case).