Econ 510

Monopolization I
• **Exclusionary practices**
  practices carried out by a *dominant* firm with the aim of *deterring entry* or *inducing exit* in the same market or in related markets.

• **Common time pattern:**
  – Initial aggressive phase in order to reduce (actual or expected) profitability of (actual or expected) competitors.
    
    Short-run sacrifice of profits

  – Recoupment period: once (actual or potential) competition has been eliminated, exploitation of market power
    
    Higher profits in the long-run
• Fresh attention:
  – Liberalisation and privatisation processes have created asymmetric market structures with strong incumbents.
  – Growing importance of sectors which exhibit network effects

Very difficult topic in anti-trust:
  – To distinguish exclusionary practices from tough competition is not an easy task
Plan of the lectures

• Predatory pricing

• Non-price monopolization practices
  – Commitment to aggressive pricing
    • Over-investment in capacity
    • Product Proliferation
    • Bundling and tying
    • ...
  – Increasing rivals’ costs
    • Exclusive Dealing
    • Refusal to supply
    • Overinvestment in advertising
    • ....
Search for a theory

• McGee (1958): we should not expect predation to occur:
  – Criticism to “deep pocket” arguments: why should the prey not be able to obtain further funds?
  – Predation is inefficient (destroys industry profits): merging with rivals would be more profitable

• Yamey (1972)’s counter-objections:
  – 1. Predation discourages further entry (merging with an entrant would invite further entry)
  – 2. Predation allows to buy rivals at lower prices (see also Saloner, 1987)

• But: lack of rigorous foundation to predation theory until the 80s.
Predatory pricing

• A dominant firm sets low prices in order to exclude rivals.

• A convincing economic theory of predation has appeared only recently:
  – Reputation models
  – Signal jamming models
  – Financial models

All these stories rely on asymmetric information.
Reputation models

• A price war today creates a reputation of being a strong and aggressive incumbent thereby discouraging future entry.

• Simple model:
  – Incumbent monopolist active in a number of identical markets.
  – Potential entrant in each market.
  – If entry, the incumbent can adopt predatory pricing or not.
  – Sequential entry.

If information is complete, there is no effect of reputation building and predation will not occur.
(Selten’s chain store paradox- Finite Prisoner’s Dilemma)
Complete information

One-shot game:

\[ \pi_I^M > \pi_I^A > \pi_P^I \]
\[ \pi_E^A > 0 > \pi_P^E \]
Complete information

\begin{itemize}
\item Mkt 1
  \begin{itemize}
  \item time 1
    \begin{itemize}
      \item E
        \begin{itemize}
          \item out
            \begin{itemize}
              \item \( (\pi^M_I, 0) \)
            \end{itemize}
          \item in
            \begin{itemize}
              \item Fight
                \begin{itemize}
                  \item \( (\pi^P_I, \pi^P_E) \)
                \end{itemize}
              \item Accommodate
                \begin{itemize}
                  \item \( (\pi^A_I, \pi^A_E) \)
                \end{itemize}
            \end{itemize}
        \end{itemize}
    \end{itemize}
  \end{itemize}
\item Mkt 2
  \begin{itemize}
  \item time 2
    \begin{itemize}
      \item E
        \begin{itemize}
          \item out
            \begin{itemize}
              \item \( (\pi^M_I, 0) \)
            \end{itemize}
          \item in
            \begin{itemize}
              \item Fight
                \begin{itemize}
                  \item \( (\pi^P_I, \pi^P_E) \)
                \end{itemize}
              \item Accommodate
                \begin{itemize}
                  \item \( (\pi^A_I, \pi^A_E) \)
                \end{itemize}
            \end{itemize}
        \end{itemize}
    \end{itemize}
\end{itemize}
\end{itemize}
Incomplete information

• The entrant does not know if the incumbent is **weak** or **strong**. A Strong incumbent always benefits from fighting.

• A **weak** incumbent fights entry at the beginning of the game to establish a reputation of being strong and discourage future entry.  
  (Kreps and Wilson, 1982)

• Ex.: The aspartame market.
Signal jamming models

• The entrant has imperfect info on market profitability.

• It tests the market.

• The incumbent sets prices which are lower than optimal short-run prices:
  – Why? To disturb the signal that the entrant receives from the test.
  – To make the entrant believe that market is barely profitable, thereby inducing it to abandon entry or to reduce its scale of activity.

(Scharfstein, 1984 – Fudenberg and Tirole, 1986)
Financial predation

- **Traditional story:**
  - The dominant firm is endowed with **more abundant financial resources** (“long purse”) than a small firm (recent entrant).
  - The dominant firm can afford losses for a longer period.
  - The large firm engages in a price war until the small firm is driven out of the market.

- **Challenge to this view:**
  - The prey can obtain external financing during the predation phase.
  - Anticipating this, the dominant firm will not start the price war.
Financial predation

- **Information asymmetries** give rise to **financial market imperfections**:
  - The financial contract must be designed in such a way that provides incentives to repay the loan.
  - This may generate inefficiencies.

- **Examples**:
  - loan offered if own resources are large enough (collateral);
  - loan extension denied in case of poor performance...

**Credit constraints**: profitable projects are not financed
Financial predation

- But, financial contracts designed to alleviate agency problems create scope for predation.
  - Price war $\rightarrow$ small firm’s profits $\downarrow$
    - the small firm does not accumulate enough own resources to obtain the loan
    - exit.

- Attempt to reduce exposure to predation (ex. Loan offered even if scarce collateral) exacerbates agency problem.

(Bolton and Scharfstein, 1990)
Modelling credit constraints

Holmstrom-Tirole (1997)

• A risk-neutral entrepreneur needs to pay a fixed cost $F$ to enter the industry (or to develop a project).
• Own assets are $A$: it needs to borrow $F-A$ from a risk-neutral bank.
• Entrepreneur protected by limited liability.
• If financed, entrepreneur can: work diligently (high effort) on the project or shirk (low effort).
• If diligent, project succeeds with prob. $p$ (revenue=$R$) fails with prob. $1-p$ (revenue=$0$).
• If shirking, project fails with prob. 1, but private benefit $B$.
• Effort is not observable (or not verifiable): impossible to write a contract on it
  – information asymmetry (with moral hazard) between bank and entrepreneur (capital market imperfection).
• Ass.: if no information asymmetry, investment would be made: $pR>F$
The optimal contract

- The entrepreneur’s IC (if he obtains S in case of success): \[ pS \geq B \]

- The bank’s IP: \[ p(R-B/p) \geq F-A \]

- The bank’s lending decision depends on firm’s assets: it offers the loan iff \[ A \geq \bar{A} = F - pR + B \]

- If \( A < \bar{A} \) a project with positive NPV is not financed (firm is credit constrained).
Financial predation

- Two firms: I (incumbent), and E (a recent entrant). They differ only in assets: I has a long purse, E has limited assets.
- Assume that both have incurred fixed cost for period 1, but not yet for period 2.

- Stage 1: I preys or accommodates entry. If preys, both get $\pi_P$; if not, they get $\pi^A > \pi_P > 0$.
- Stage 2: each firm either pays F or goes out of business.
- Stage 3: effort decisions. If high effort (and both paid F), both earn $\pi^A$ with prob. $p$; if only one paid F, $\pi^M > 2\pi^A$ with prob $p$. 
Financial predation

• Assumptions:
  – \( p \pi^A > F \)
  – I has own assets \( A_I > F \) (always able to finance the investment)
  – E’s assets in the first period are 0: its second period assets equal first period retained earnings.
  \[ F - \pi^A < p \left( \frac{\pi^A - B}{p} \right) < F - \pi^p \]
  – Since I always invests and makes high effort, from stage 2 on, the game is as the financing model above: E will be financed only if I does not prey, \( \pi^A \) replaces R.
  – But, does firm I have an incentive to predate? Yes, if:
    \[ p\pi^M + \pi^p > p\pi^A + \pi^A \]
    • Therefore, predation will occur if the future prospect of higher profits outweighs the current losses from predation.
Financial predation

• Incumbent’s financial advantage assumed.

• If the recent entrant is financially strong, exclusion does not occur ➔ strong entrants can exert a pro-competitive effect!!!!
Innocent low prices

• With switching costs, network effects, learning effects, product complementarity, low prices may be consistent with healthy competition.
  – Ex.: firm launching a new product sets low prices (even below costs) to form a critical mass of consumers.

• However, this argument is less likely to apply to a firm which is dominant in the industry.

• Dominance test alleviates the risk of misclassification.
Two-tier approach

- Proposed rule:
  1. Is there enough market power for recoupment?
     - If predator is dominant, go to 2.
     - Else, dismiss the case.
  2. Is there sacrifice of profits?
     - P>\text{AverageTotalCost (ATC)}: always lawful
     - P<\text{AverageVariableCost (AVC)}: presumed unlawful (burden of proof on defendant)
     - AVC<P<\text{ATC}: presumed lawful (burden of proof on plaintiff)
Non-price exclusionary strategies

• Commitment to aggressive pricing in case of entry (stay):
  – Over-investment in capacity
  – Product proliferation
  – Bundling
  – ..... 

• Increase of the rival’s costs
  – Exclusive dealing
  – Over-investment in advertising
  – Refusal to supply.....
Over-investment in capacity

(Dixit, 1980)

- The incumbent installs a larger capacity than a monopolist would do in the absence of threat of entry.
- Why? If capacity is scarce, incentives to undercut rivals are weak (demand attracted from rivals cannot be satisfied).
- Large capacity makes it credible that competition will be very tough in case of entry → Entry discouraged.

• Ex.: DuPont and the Titanium Dioxide Industry.

Investment choices must be irreversible!

Difficult to distinguish from innocent investment.
Product proliferation

• Incumbent produces a high number of varieties (larger than short-run optimal).

• Why?
  – If entry, the entrant forced to produce varieties close to the incumbent’s ones.
  – Low differentiation → tough price competition → entry unprofitable.

Variety choice must be irreversible!

• Example: US market of ready-to-eat breakfast cereals.
Tying and Bundling

• **Tying**
  
  the purchase of one good (tying good) is conditional upon the purchase of another good (tied good).
  
  – the tied product may be bought alone.
    
    • Ex.: computer and OS.
  
  – **Requirement tying**: goods sold in variable proportions
    
    • Ex.: printer and toner; photocopy machine and after-sale services; mobile telephone and calls.

• **Bundling**

  two goods are sold together
  
  – **Pure bundling**: goods available only together
    
    • Ex.: newspaper and supplement;
  
  – **Mixed bundling**: goods available also separately
    
    • Ex.: fixed menu and order à la carte.
Exclusionary bundling

- Bundling can be used by a dominant firm to extend its monopoly into an adjacent market or to protect its position in the home market.

Independent products
Independent products

• Bundling the two products, the incumbent commits to aggressive pricing if entry, thereby discouraging entry. (Whinston, 1990)

• Why?
  – In order to earn monopoly profits on market A, I must sell also in market B.
Simple model

• Assumptions

1. Demand: \[ D_A = \begin{cases} 1 & \text{if } p_A \leq v \\ 0 & \text{otherwise} \end{cases} \quad D_B = \begin{cases} 1 & \text{if } p_B \leq w \\ 0 & \text{otherwise} \end{cases} \]

2. Costs: \( v > c_{IA}, \quad w > c_{IB} > c_{EB} \).

3. Sunk cost \( F \) to enter the market \( B \). If entry, Bertrand comp.

4. \( c_{IB} - c_{EB} > F \)

5. \( v - c_{IA} - F_B > c_{IB} - c_{EB} \).

6. Bundling is irreversible and requires a fixed cost \( F_B \).
Simple model

After entry decision, active firms name prices:

- If bundling and E out: $\tilde{p}_I = v + w$
- If no bundling and E out: $p_{I,A} = v$ \hspace{1cm} $p_{I,B} = w$
- If no bundling and E in: $p_{I,A} = v$ \hspace{1cm} $p_{I,B} = c_{IB}$ \hspace{1cm} $p_E = c_{IB} - \varepsilon$
- If bundling and E in: $\tilde{p}_I = v + c_{EB} - \varepsilon$ \hspace{1cm} $p_E = c_{EB}$
Cont. eq, after bundling and E in

• If \( w - p_E \geq v + w - \tilde{p}_I \) \( \Leftrightarrow \) \( p_E \leq \tilde{p}_I - v \), consumers buy good B from E.

• If \( \tilde{p}_I < p_E + v \) , consumers buy both goods from I.

• Equilibrium: \( \tilde{p}_I = v + c_{EB} - \varepsilon \) \( p_E = c_{EB} \). Consumers buy from I

• An eq. where \( \tilde{p}_I > v + c_{EB} \) and consumers buy from I does not exist:
  – E has incentive to deviate \( p'_E = \tilde{p}_I - v > c_{EB} \)

• An eq. where \( p_E > c_{EB} \) and consumers buy from E does not exist:
  – I has incentive to deviate \( \tilde{p}'_I = p_E + v - \varepsilon \)

\[ \pi'_E = p_E + v - \varepsilon - c_{IB} - c_{IA} - F_B > 0 \] by ass. 5
Sub-game perfect equilibrium

- **Irreversibility** is crucial for exclusion.
  - Given that E in, I’s profits lower in case of bundling.
  - If bundling reversed without costs and in a short time, in case of entry I would reverse bundling.
  - Anticipating this, E would enter.
Bundling and Portfolio Effects

- Consumers benefit from joint supply.
- Bundling provides a competitive advantage over competitors.
Efficiency reasons for tying

- Reduction of transaction costs for consumers.
- Quality improvement.
- Solution to information problems.
Price discrimination device

• Simple example:

<table>
<thead>
<tr>
<th></th>
<th>1’s willingness to pay</th>
<th>2’s willingness to pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good A</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Good B</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Bundle</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

• Without bundling: $p_A=4$, $p_B=5$  \( \pi=18 \)

• With bundling: $p=12$  \( \pi=24 \)
Price discrimination device

• **Requirement tying** allows to sort consumers according to their intensity of use and make them pay accordingly.
  – Example: copy machine tied to toner.
  – Demand for toner measures intensity of use.
  – Low price for the machine, high price for toner allows to price discriminate.

• Welfare effects of price discrimination in general **ambiguous**:
  – More likely to increase welfare when it attracts new consumers.
Conclusion

• *Per se* prohibition not justified.

• *Rule of reason* approach:
  
  – Evaluate whether exclusionary effect exists:
    • Irreversibility?
    • less likely if complementary products.
    • Entry in one market affects success of entry in another market?
  
  – Evaluate existence and importance of (potential) efficiency gains.
Exclusive dealing

Contract that commits a firm to deal exclusively with some vertically related firms but not with others.

- Example: a dominant seller prohibits buyers from dealing with competitors
- A dominant seller commits to deal exclusively with one (or some specific) vertical related firm(s)

- Exclusive dealing may allow a dominant firm to deter efficient entry:
  - Traditional argument.
  - Chicago school critique.
  - Recent theories.
Anti-competitive ED

• Traditional argument

If ED, no entry: firm E has nobody to sell to.

\[ c_E \leq c_I \]
Chicago school critique

• Why does the buyer agree on exclusivity?

• If B rejects exclusivity:
  – entry;
  – \( p^* = c_I; \quad \pi_B = CS(c_I); \quad \pi_I = 0 \)

• If B accepts exclusivity:
  – no entry;
  – \( p^* = p^m; \quad \pi_B = CS(p^m); \quad \pi_I = \pi^m \)

• B’s loss = \( CS(c_I) - CS(p^m) = x^* \rightarrow \pi^m = I’s \text{ gain} \)
Chicago school critique

- The incumbent cannot (profitably) compensate the buyer to elicit acceptance.

- The incumbent cannot (profitably) use ED to deter entry.

- ED will be signed only if mutually beneficial.

- Efficiency considerations explain the use of ED.
“Rent extraction” (Aghion and Bolton – non-stochastic version)

- An incumbent can use exclusive deals to extract rents from entrants.

- A simple example: Inelastic demand, $q = 1$.

\[ C_E < C_I, \]
Game:

1. I offers an exclusive deal with \((x, d, w_I)\), where:
   \(x\) = compensation;
   \(d\) = penalty (liquidated damages”) if deal terminated
   \(w_I\) = price commitment.

2. Buyer \(B\) accepts or rejects.

3. \(E\) decides on entry.

4. If entry, \(E\) decides \(p_E\) (and if no deal, \(I\) chooses \(p_I\).)

5. \(B\) decides on termination (if had signed),
   or on supplier (if “free”).

Note. Here the buyer is final consumer with willingness to pay \(v\) and unit demand.
If buyer rejects, $E$ enters and buyer buys at $p_E = c_I - \varepsilon$.

Any contract should leave buyer with at least:

$$CS_B = v - c_I$$

If buyer accepts $(x, d, w_I)$, it switches to $E$ only if:

$$p_E + d \leq w_I$$

(or: $p_E \leq w_I - d$).

Entry occurs only if $p_E \geq c_E$. 

Incumbent maximises its profits, by offering:

\[ x^* = 0, \quad d^* = c_I - c_E, \quad w_I^* = c_I. \]

Buyer makes \( \cs_B = \nu - c_I \);

entrant makes zero profit;

incumbent makes \( \Pi_I = c_I - c_E (= d^*) \).

The incumbent finds it optimal to allow entry and use the EC and the penalty to extract the efficiency rent associated with entry.

In this model, entry is pre-empted only if E’s cost is stochastic and I makes mistakes in predicting E’s costs.
Contracts as a barrier to entry (Aghion and Bolton, AER 1986)

- Assumptions:
  - Incumbent I has cost $c_I = 1/2$
  - B’s valuation: $v = 1$ (unit demand)
  - Potential entrant E: $c_E$ unif. distr. in $[0,1]$.
  - Exclusive deal $(p, p_o)$: B will buy from I at price $p$, but: it can buy from E if pays "liquidated damages" $p_o$.

- The game:
  - $t_1$: firm I offers $(p, p_o)$ to B, who accepts or rejects
  - $t_2$: firm E decides on entry and sets price $p_E$. (If no contract, I chooses its price $p$)
  - $t_3$: payoff realisation.
No exclusive contract

- If $c_E < 1/2$, E enters, sets $p_E=1/2$ and gets all
- If $c_E \geq 1/2$, no entry, I sets $p=1$
  - Prob. of entry: $\phi=Pr(c_E \leq 1/2)=1/2$
  - Buyer's surplus if entry: $v-p_E=1-1/2=1/2.$
  - With probability $(1-\phi)$, B has surplus $v-p_I=0.$
  - B's expected surplus: $(1/2)\phi+(1-\phi)0=1/4.$
  - I's expected payoff: $(0)\phi+(1-\phi)(1-1/2)=1/4.$
Exclusive contract

• B buys from E if: \( p_E + p_o \leq p \): if it enters, E sets \( p_E = p - p_o \).
  ⇒ Prob. of entry with contract: \( \phi' = Pr(c_E \leq p - p_o) = p - p_o \).

• Incumbent's problem:
  \[
  \max_{p, p_o} \pi = \phi' p_o + (1-\phi')(p-1/2)
  \]
  s.to: \( 1 - p \geq 1/4 \).

  [B accepts only if better off than no contract (=1/4)]

  \[
  \max_{p_o} \pi
  \]
  s.to \( p \leq 3/4 \),  ⇒ \((p^*, p_o^*) = (3/4, 1/2) \).

• Hence, firm E enters with prob. \( \phi' = p^* - p_o^* = 1/4 \).
Effects of exclusivity

• Entry efficient if $c_E \leq 1/2$, but occurs under the contract only if $c_E \leq 1/4$
  $\Rightarrow$ welfare loss for $1/4 < c_E \leq 1/2$

• Does I offer this contract in equilibrium?

• When E very efficient, I prefers not to deter entry (it extracts some of E's rent via t).
Efficiency reasons for ED

• Protect and encourage relation-specific investments
  – Ex.: stimulate producer’s investments into retailers’ services (free riding).

• Promote retailer loyalty
  – Ex.: encourage the retailer to tailor its promotional efforts towards the manufacturer’s product.

• Maintain the value of the product
  – Ex.: producer of a luxury good commits not to sell it through supermarkets not to damage the image of the good.
Conclusion

• *Per se* prohibition not justified.

• *Rule of reason* approach:
  
  – Evaluate whether exclusionary effect exists:
    
    • Buyer’s fragmentation?
    • less likely if upstream competition intense.
    • Less likely if downstream competition intense.
    • Important scale economies upstream?
  
  – Evaluate existence and importance of (potential) efficiency gains.
Increasing rivals’ costs

• A vertically integrate firm may refuse to supply a key input to a downstream rivals.

• Deny inter-operability to a rival network.

• Over-investment in advertising.