MARKET FORECLOSURE: ENTRY DETERRENCE AND PREDATION
Overview

• Context: How can you discourage rivals from entering a market you are in or plan to enter? If you’re the entrant, how can you get past the incumbent’s defenses?
• Concepts: commitment, cheap talk, entry deterrence, preemption
• Economic principle: sometimes, lack of flexibility is more valuable than flexibility
Commitment

- For many decisions, it’s useful to have lots of options.
- In games, it’s sometimes useful to have fewer options: to eliminate moves that lead to unattractive equilibria.
- We refer to this limitation of your options as commitment (as in, you’re committed to a particular course of action).
Dupont and titanium dioxide

- TiO$_2$: white chemical pigment employed in the manufacture of paint, etc.
- Primary raw material: ilmenite ore (DuPont) or rutile ore (six smaller rivals)
- Sharp increase in rutile ore price (1970): DuPont cost advantage up to 44% from 22%; also, ilmenite better compliant with stricter environmental regulation
- Window of opportunity: expand capacity faster than demand, discourage expansion (or entry) by rival firms
- Goal: increase DuPont’s market share from 30% in 1972 to 56% in 1980 and perhaps 65% in 1985
- Market share did increase; by 1985, five domestic competitors had exited

Incumbent-entrant capacity game

- Incumbent chooses capacity
- Entrant observes incumbent’s choice and chooses capacity (0 = no entry). If entry, pay cost $F$

<table>
<thead>
<tr>
<th>Incumbent</th>
<th>Entrant</th>
<th>0</th>
<th>24</th>
<th>26</th>
<th>28</th>
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<tbody>
<tr>
<td>40</td>
<td>1920</td>
<td>0</td>
<td>960</td>
<td>880</td>
<td>800</td>
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<td></td>
<td>1936</td>
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<tr>
<td>44</td>
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<td>0</td>
<td>768</td>
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<td>48</td>
<td>1920</td>
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Demand curve: $Q = 100 - p$. Capacity costs: $c_1 = 12, c_2 = 4$. 
Case 0: no entrant

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<th>1936</th>
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- If there is no entrant, incumbent’s best choice is 44
- Denote this as **monopoly capacity**
Case 1: $F = 500$

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<tr>
<td>1920</td>
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<td>1936</td>
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- Given Entrant’s strategy, Incumbent is better off by choosing 40
- We call this a strategy of **entry accommodation**
Case 2: $F = 600$

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<tr>
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<td>1920</td>
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- Given Entrant’s strategy, Incumbent is better off by choosing 48
- We call this a strategy of **entry deterrence**
### Case 3: $F = 700$

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<th>26</th>
<th>28</th>
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</thead>
<tbody>
<tr>
<td>1920</td>
<td>0</td>
<td>68</td>
<td>80</td>
<td>84</td>
</tr>
<tr>
<td>1936</td>
<td>0</td>
<td>-28</td>
<td>-24</td>
<td>-28</td>
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<tr>
<td>1920</td>
<td>0</td>
<td>-124</td>
<td>-128</td>
<td>-140</td>
</tr>
</tbody>
</table>

- Given Entrant’s strategy, Incumbent is better off by choosing 44.
- We refer to this situation as **blockaded entry**.
Incumbent-entrant capacity game

- $F = 500$. Entrant is better off by entering. Incumbent’s optimal capacity: 40 (entry accommodation)

- $F = 600$. Entrant stays out if and only if incumbent chooses capacity 48, which is optimal choice (entry deterrence)

- $F = 700$. Incumbent chooses optimal monopoly capacity (44) and entrant stays out (blockaded entry)

- Notice that incumbents optimal capacity is non-monotonic with respect to $F$: from 40 to 48, then down to 44
The miracles of science

![Graph showing TiO₂ Capacity (000 tons) for rival firms and DuPont from 1972 to 1977.]
Games hospitals play

• Previous theory suggests relation between likelihood of entry and investment is non-monotonic:
  – Low entry probability: blockaded entry
  – Medium entry probability: entry deterrence
  – High entry probability: accommodated entry

• Possible test: period after Medicare announces likely reimbursement increase but before it takes effect

• Incumbent’s strategy: sales volume increase (market for electrophysiological studies, procedure to identify cardiac arrhythmias)

• Measure of entry probability: # of potential entrants

Games hospitals play

Product proliferation

• Example: Breakfast cereals
  – Highly profitable industry
  – Low technological barriers to entry
  – Same small number of incumbents for decades

• Idea: increase number of varieties so as to leave no room for potential entrants
Preemption by product proliferation

- **Incumbent**
  - 2 varieties
    - **Entrant**
      - Enter: 0, 20
      - Do not enter: 60, 0
  - 3 varieties
    - **Entrant**
      - Enter: 23, -3
      - Do not enter: 40, 0

Assumptions: entrant creates 4 varieties when incumbent has 2; entrant creates 1 variety when incumbent has 3.
Proliferation

• As with capacity expansion, product proliferation sacrifices short-run monopoly profits for the value of entry preemption.

• Ditto for store location. Example: Staples

  Staples was trying to build a critical mass of stores in the Northeast to shut out competitors ... By building these networks [of stores] in the big markets like New York and Boston, we have kept competitors out for a very, very long period.

  — Thomas Stemberg, in *Staples for Success*

• Other examples?
Limit pricing

• If Southwest Airlines is present in airports A and B, then the likelihood of offering A-B is 70 times higher than if it is not present in A or B

• Suppose SA is present in A; what do A-B incumbents do if SA enters B
  – fares are cut (less so in “guaranteed-entry” routes)
  – capacity remains the same
  – number of passengers increases

• Could be adjustment to entry, could be deterrence (e.g., signaling low cost)
Contracts and bundling

- Long-term contracts: Nutrasweet
- Exclusive dealing: Unilever
- Per processor fees: Microsoft
- All-unit discounts: Intel
- Bundling: Microsoft IE, airlines
- MFC clauses: insurer-hospital contracts
IE vs Netscape

- Windows (only operating system) WTP: $50
- Computer user requires at most one Internet browser
- Three groups of users (1 million each)
  - IE fans: IE WTP: $25, Netscape WTP: $10
  - Netscape fans: IE WTP: $10, Netscape WTP: $25
  - Die-hard Netscape fans: IE WTP: $10, Netscape WTP: $40
No bundling equilibrium

- Windows price: $50
- IE price: $25
- Netscape price: $25
- Microsoft’s profit: $175 million
- Netscape’s profit: $50 million

\[ 3 \times 50 + 1 \times 25 = $175 \text{ million} \]
Bundling equilibrium

- Windows+IE price: $60
- Netscape price: $30
- Microsoft's profit: $3 \times 60 = $180 million
- Netscape's profit: $1 \times 30 = $30 million
- Intuition: bundling commits Microsoft to price IE aggressively
The aspartame market

- Aspartame: low-calorie sweetener discovered (by accident) in 1965
- Searle (owner) extends original patent to 1987 (Europe), 1992 (US)
- Monsanto acquires Searle in 1985, sells branded version of aspartame: Nutrasweet (main market: diet soda)
- Holland Sweetener Company (HSC) creates plant in 1986 in anticipation of aspartame’s patent expiry.
- Monsanto’s preemptive moves:
  - Sign long-term exclusive contracts with Coke and Pepsi
  - Slash prices in Europe (first patent to expire)
Naked exclusion

- Entrant requires 30% market share to cover entry costs
- Incumbent “bribes” \((70 + \epsilon)\)% customers with price they’d get under duopoly (minus \(\epsilon\))
- Entrant stays out; \((30 - \epsilon)\)% customers pay high price
Extracting “entrant’s surplus”

- To be completed
Raising rivals’ costs

• Most favored nations clause: hospital agrees to “fully
  and promptly inform” insurer about lower rates offered
  to other insurance companies

• Cases:
  – Reazin v. Blue Cross & Blue Shield of Kansas
  – Ocean State Physicians Health Plan, Inc. v. Blue Cross
    and Blue Shield of Rhode Island
Controlling essential assets

- Sleeping patents: Xerox plain-paper copying
- Synthetic insulin: Eli Lilly and Genentech
- Patent portfolios: Nortel
- Airport landing slots: Compass II
- Incumbent’s and entrant’s incentives:
  - Incumbent stands to lose $\pi^m - \pi^d$ from rival entry
  - Entrant stands to gain $\pi^d$ from entry
  - Typically $\pi^m - \pi^d > \pi^d$
Pay for delay

- When a medical drug patent expires, generics manufacturers are willing to enter.
- Branded drug companies stand to lose $\pi^m_b - \pi^d_b$ from entry by generics.
- Generics entrants stand to gain $\pi^d_g$.
- Typically $\pi^m_b > \pi^d_b + \pi^d_g$, that is, $\pi^m_b - \pi^d_b > \pi^d_g$.
- Gains from trade: there is a price $p$ such that $\pi^m_b - \pi^d_b > p > \pi^d_g$ such that entrant agrees to be "bribed" to delay entry.
Predatory pricing

- The “dual” of entry deterrence as foreclosure strategy
- Common definition: pricing below cost with the intent of driving rival out of the market
- Related to concept of dumping (international trade)
Predatory pricing: Chicago argument

\[ \pi^d, \pi^d \]

\[ \pi^m, 0 \]

\[ -\pi^p, -\pi^p \]
Predatory pricing with deep purses

\[
\begin{align*}
\pi^m, 0 & \quad \text{no loan} \\
\pi^d, 0 & \quad \text{exit} \\
\pi^d, \pi^d & \quad \text{don’t prey} \\
-\pi^P, -\pi^P & \quad \text{prey} \\
\pi^d, \pi^d & \quad \text{don’t prey} \\
\end{align*}
\]
Predation as an equilibrium

- The Chicago School approach
- Asymmetric information: reputation for toughness
- Asymmetric information: lending contracts and deep pockets
- Dynamics: learning curves, network effects, etc
Takeaways

• Commitment is the art of limiting your options for strategic advantage. The commitment must be known and believed by others

• Incumbent firms have a variety of ways to discourage entry: long-term contracts, aggressive pricing, excess capacity, product proliferation, reputation for aggressive response