Entry Barriers

- Joe Bain’s definition of entry barrier
  - Anything that allows incumbent firms to earn supranormal profits without threat of entry.

- Bain suggested some barriers:
  - Economies of scale (e.g. fixed costs).
  - Absolute cost advantages.
  - Product differentiation.
  - Capital requirements.
Entry and Cournot Competition

- Costs $c(q) = F$. Demand $Q(P) = 1 - P$.
- In Cournot equilibrium with $n$ firms, profit is
  \[ \Pi(n) = \left( \frac{1}{n+1} \right)^2 - F \]
- Assuming $n - 1$ firms in market, new firm enters if $\Pi(n) \geq 0$.
  - Entry is harder when $F$ is high.
- Equilibrium number of firms
  \[ n^* = \frac{1}{\sqrt{F}} - 1 \]

Entry and Bertrand Competition

- Costs $c(q) = F$. Demand $Q(P) = 1 - P$.
- If $n = 1$, firm makes monopoly profit:
  \[ \Pi(1) = \frac{1}{4} - F \]
- If $n \geq 2$, Bertrand competition implies
  \[ \Pi(n) = -F \]
- Incumbent will never face entry: Entrant has no added value.
- Heisenberg principle: You change game by joining.
- History matters: first mover advantage.
- Logic: backwards induction.
  - Desirability of entry depends on what happens after entry.
NutraSweet

- NutraSweet made over $500m in 1985.
  - Patent ended in 1987 in Europe and 1992 in USA.
- In 1986, Holland Sweetener Co. built plant in Holland.
  - In 1987, prices fell from $70/lb to $25/lb.
  - Holland made large losses.
- In the US, Pepsi and Coke signed new deals in 1991.
  - But at much lower prices. Saved $200m a year.
- Pepsi and Coke gained most from Holland’s entry; not Holland.

Gainesville Regional Utility

- City–owned utility depended on CSX railroad for coal.
  - Price $20.13/ton
- Norfolk Southern offered Gainesville $13.68/ton.
  - But NS railroad 20 miles too short. Cost $28m to extend.
- CSX eventually offered $15.38/ton
  - Also threatened to abandon railroad, so town would be hostage to NS.
- Gainesville signed new contract with CSX. Saved $34m.
How Incumbents Respond to Threat

- Blockaded Entry
  - Incumbents compete as if no entry threat.
- Deterred Entry
  - Incumbents modify behaviour to deter entry.
- Accommodated Entry
  - Incumbents find it (individually) more profitable to allow entry than deter.

How can an Incumbent Deter Entry?

- Limit entry pricing: incumbent could lower its price
  - But is this credible?
  - Why does price before entry have anything to do with price after entry?
  - Game theory killed limit entry pricing in 1970s.
- For this reason we analyse case where incumbent can deter entry through quantity or capacity choice.
- Limit entry pricing resuscitate in 1980s
  - Signaling: low pre-entry price signals low cost.
  - Switching costs.
- There are other ways to deter entry. For example, signing long term contracts with customers.
Blockading, Accommodating and Deterring

- Incumbent firm 1 chooses quantity.
  - Firm 2 chooses to enter or not.
  - In firm 2 enters they then chooses quantity.
- Costs $c(q) = F$. Demand $Q(P) = 1 - P$.
- Firm 2 chooses quantity $q_2 = (1 - q_1)/2$. Profit becomes,

$$\Pi_2 = \frac{1}{4}(1 - q_1)^2 - F$$

- Blockade firm 2.
  - Firm 1 ignores firm 2 and maximises $\Pi_1 = q_1(1 - q_1)$, yielding $q_1^* = 1/2$.
  - If firm 2 enters they make $q_2^* = 1/4$ and $\Pi_2 = 1/16 - F$.
  - Blockade if $F \geq 1/16$.

Blockading, Accommodating and Deterring cont.

- Accommodate firm 2. (Classic Stackelberg)
  - Firm 1 assumes firm 2 will enter. Firm 1 maximises

$$\Pi_1 = q_1(1 - q_1 - \frac{1 - q_1}{2})$$

  - Hence $q_1^* = 1/2$, $q_2^* = 1/4$, $\Pi_1 = 1/8$ and $\Pi_2 = 1/16 - F$.
- Deter firm 2.
  - Firm 1 chooses $q_1 = 1 - 2\sqrt{F}$, so $\Pi_2 = 0$.
  - Profit: $\Pi_1 = 2\sqrt{F} - 2F$.
  - At $F^* \approx 1/200$, $2\sqrt{F^*} - 3F^* = 1/8 - F^*$
- Summary
  - If $F \geq 1/16$ then blockade.
  - If $1/16 > F \geq F^*$ then deter.
  - If $F^* > F$ then accommodate.
Capacity Investment to Deter Entry

- If firm can commit to high quantity it can delay entry.
  - Is this credible?
  - After entry won’t want to produce $q_1 = 1 - 2\sqrt{F}$.

- Reinterpret the Stackelberg model
  - Firm 1 chooses capacity
  - Firm 2 chooses to enter and her capacity
  - Firms choose output

- Firm 1 can invest in a lot of capacity to make high output strategy credible.

A Taxonomy of Business Strategies

- Firm 1 is incumbent. Firm 2 is entrant.
  1. Firm 1 chooses investment $K_1$.
  2. Firms 1 and 2 simultaneously choose $x_1$ and $x_2$ (e.g. outputs).

- Profit of firm $i$ is $\Pi^i(K_1, x_1, x_2)$. 
**Blockading Entry**

- Firm 2 does not enter.
- Firm 1 chooses monopoly level of output, \( x_1^m(K_1) \), where
  \[
  \frac{\partial}{\partial x_1} \Pi^1(K_1, x_1^m, 0) = 0
  \]
- Firm 1 chooses monopoly investment, \( K_1^m \), where
  \[
  \frac{d}{dK_1} \Pi^1(K_1, x_1^m(K_1), 0) = 0
  \]

**Deterring Entry**

- If entry occurs then choose Nash output \((x_1^*(K_1), x_2^*(K_1))\)
- To deter entry choose \( K_1 \) such that
  \[
  \Pi^2(K_1, x_1^*(K_1), x_2^*(K_1)) = 0
  \]
- How does \( K_1 \) effect \( \Pi_2 \)? Differentiating,
  \[
  \frac{d\Pi^2}{dK_1} = \frac{\partial\Pi^2}{\partial K_1} + \frac{\partial\Pi^2}{\partial x_1} \frac{\partial x_1^*}{\partial K_1}
  \]
  where \( \partial\Pi^2/\partial x_2 = 0 \).
- 1st term: Direct effect. 2nd term: Strategic effect.
- Firm 1 wants to look tough to deter.
  - Investment makes you look tough if \( d\Pi^2/dK_1 < 0 \)
  - Investment makes you look soft if \( d\Pi^2/dK_1 > 0 \)
Ways to Look Tough

• Investment in production capacity
• Product positioning
  – Moving towards center of Hotelling line.
• Product proliferation
  – Having many products on the market.
• Tying
  – Firm 1 is in markets A and B. Firm 2 enters market A.
  – If products are tied then entry will be more costly for firm 1.
  – Hence commit to react aggressively to entry.

Entrant’s Strategy: Get paid to Play

• Recall NutraSweet and Gainseville examples.
  – Entry benefits customers more than entrant.
  – Entrant should ask customer to pay for entry.
• How to get paid
  – Sign contract before entering.
  – Contributions towards fixed costs.
  – Last–look provision.
• Example: Cell–Phones.
  – In 1989, McCaw bid for LIN Broadcasting.
  – LIN paid $94m to get BellSouth to bid.
  – McCaw increased bid and paid BellSouth $23m to exit.
  – McCaw eventually won, but paid $1,000m more.
Entrant’s Strategy: Judo Entry

- Example: Sega vs. Nintendo.
  - Nintendo dominated 8-bit market.
  - Sega entered with 16-bit machine.
  - Nintendo delayed 16-bit, for fear of cannibalizing 8-bit sales.
- Example: Softsoap
  - When Softsoap launched, not clear whether it would be success.
  - Hence majors didn’t launch with brand names.
- Example: Entering small.
  - Not worth crushing: lowering price too costly.
- Judo entry: Use incumbent’s weakness as your strength.

Encouraging Entry of Compliments

- We have more rivals that we would like.
- We have fewer complimentors than we would like
  - Fiat failed in US due to mechanic shortage.
- Subsidise compliments
  - MS subsidised 3rd party software for DOS
- Form jointly funded compliment provider
  - Industry association
- Do it yourself!
  - Sony bought Columbia pictures/music after Betamax
Assignment

• Read “EasyOz” (27/10/05), “Battle of the Atlantic” (13/10/05) and “Crowded Skies” (22/04/04) in The Economist. For background: “What is Strategy?”, Michael Porter, Harvard Business Review 1996.

• Which types of firm are entering the long haul airline industry?

• What is the strategy of the entrants? What is their competitive advantage?

• What are the entry costs?

• How might the incumbents respond to the threat of entry?