Part VI. Theory of competition policy

Chapter 16. Strategic incumbents and entry

Chapter 16. Learning objectives

- Understand how the incumbent's investment decision depends on the strategic effects of this investment and on the type of product market competition.

- Examine the rationale behind several entry-related strategies.
  - How do investments in capacity, in R&D and strategies designed to raise the entrant's cost affect cost variables?
  - Under which conditions can brand proliferation, bundling decisions and manipulation of the installed base of customers be used as entry deterrence tools?

- Understand how imperfect information and the presence of multiple incumbents influence our results.

Taxonomy of entry-related strategies

- Incumbent's investment decision anticipating the possibility of entry depends on
  - Strategic effect of this investment
  - Type of product market competition
- Two-stage game
  - First stage
    - Incumbent (firm 1) chooses some irreversible investment K_1
  - Second stage
    - Observing K_1, entrant (firm 2) decides to enter or not
    - Product market decisions
      - ✓ If the entrant enters: duopoly
      - ✓ If not: incumbent remains in monopoly position

Taxonomy of entry-related strategies (cont'd)

- If potential entrant decides to enter
  - Second-stage decisions: σ_1 and σ_2, typically either a price ($\sigma_i = p_i$) or a quantity ($\sigma_i = q_i$)
  - Profits: $\pi_1(K_1, \sigma_1, \sigma_2)$ and $\pi_2(K_1, \sigma_1, \sigma_2)$
  - Equilibrium: $\{\sigma_1^*(K_1), \sigma_2^*(K_1)\}$
- If potential entrant does not enter
  - Entrant makes zero profit
  - Incumbent obtains $\pi_1^m\big(K_1, \sigma_1^m(K_1)\big)$
    - $\sigma_1^m(K_1)$: monopoly choice in stage 2
- 2 options for the incumbent under the threat of entry
  - Entry deterrence: choose K_1 such that $\pi_2\big(K_1, \sigma_1^*(K_1), \sigma_2^*(K_1)\big) \leq 0$
  - Entry accommodation: choose K_1 to maximize
  $$\pi_1\big(K_1, \sigma_1^*(K_1), \sigma_2^*(K_1)\big)$$

Taxonomy of entry-related strategies (cont'd)

- Question: does the incumbent over- or under-invest when acting strategically?
  - Is investment level at subgame perfect equilibrium higher or lower than what would be chosen by an incumbent acting 'non strategically'?
  - We answer the question for
    - entry deterrence
    - entry accommodation

Entry deterrence

- Incumbent chooses investment to make entry unprofitable
  - Assume: monopoly choice of K_1 is not sufficient to avoid entry (entry is not 'blockaded')
    - $\rightarrow$ Incumbent must distort its investment choice
  - Distortion is costly $\rightarrow$ incumbent chooses investment such that
    $$\pi_2\big(K_1, \sigma_1^*(K_1), \sigma_2^*(K_1)\big) = 0$$

- Impact of a change in K_1 on the entrant's profit?
  - Totally differentiate π_2 with respect to K_1

$$\frac{d\pi_2}{dK_1} = \frac{\partial \pi_2}{\partial K_1} + \frac{\partial \pi_2}{\partial \sigma_1}\frac{\partial \sigma_1^*(K_1)}{\partial K_1} + \frac{\partial \pi_2}{\partial \sigma_2}\frac{\partial \sigma_2^*(K_1)}{\partial K_1}$$

Total effect   **Direct effect**   **Strategic effect (SED)** $= 0$ (envelope theorem)

Entry deterrence (cont'd)

- Direct effect can be of any sign
  - Negative (e.g., persuasive advertising)
  - Positive (e.g., some types of informative advertising)
  - Nul (e.g., investment in capacity)
- Strategic effect: by changing its ex ante decision, incumbent modifies its ex post behaviour
  $\rightarrow$ which affects firm 2's profit
- Investment makes the incumbent tough (soft) if total effect ($d\pi_2/dK_1$) is negative (positive)
- To deter entry $\rightarrow$ need to look aggressive
- So, if investment makes incumbent...
  - **Tough** $\rightarrow$ incentive to *overinvest*: '**top dog strategy**'
  - **Soft** $\rightarrow$ incentive to *underinvest*: '**lean and hungry look**'

Entry deterrence (cont'd)

- ## Lesson
  - If investment makes incumbent tough (i.e., if investment ↓ entrant's profit), then incumbent must behave as a **top dog** to deter entry: he must overinvest (be strong or big) to look aggressive.
  - If investment makes incumbent soft (i.e., if investment ↑ entrant's profit), then incumbent must adopt a **lean and hungry look** to deter entry: he must underinvest (be weak or small) to look aggressive.

Entry accommodation

- Firm 1 takes entry as given $\rightarrow$ no longer chooses K_1 to make π_2 negative but to maximize π_1

  - $\rightarrow$ Differentiate $\pi_1\left(K_1, \sigma_1^*(K_1), \sigma_2^*(K_1)\right)$ with respect to K_1

$$\frac{d\pi_1}{dK_1} = \frac{\partial\pi_1}{\partial K_1} + \frac{\partial\pi_1}{\partial\sigma_1}\frac{d\sigma_1^*(K_1)}{dK_1} + \frac{\partial\pi_1}{\partial\sigma_2}\frac{d\sigma_2^*(K_1)}{dK_1}$$

Total effect   **Direct effect**   = 0 (envelope theorem)   **Strategic effect (SEA)**

- Direct effect exists anyway and can be neglected
- Strategic effect: influence of firm 1's investment on firm 2's second-stage behaviour
- Incumbent should
  - *Overinvest* if strategic effect is positive
  - *Underinvest* otherwise

Entry accommodation (cont'd)

- Sign of the strategic effect (SEA)? Depends on
  - Sign of strategic effect under entry deterrence (SED)
  - Whether 2nd-stage strategies are strategic substitutes or complements

$$sign\left(\frac{\partial \pi_1}{\partial \sigma_2} \frac{d\sigma_2^*(K_1)}{dK_1}\right) = sign\left(\frac{\partial \pi_2}{\partial \sigma_1} \frac{d\sigma_2^*(K_1)}{dK_1}\right)$$

Chain rule

Same sign if firms' choices have same nature

$$= sign\left(\frac{\partial \pi_2}{\partial \sigma_1} \frac{d\sigma_2^*}{d\sigma_1} \frac{d\sigma_1^*}{dK_1}\right) \Leftrightarrow$$

$$sign\left(\frac{\partial \pi_1}{\partial \sigma_2} \frac{d\sigma_2^*(K_1)}{dK_1}\right) = sign\left(\frac{\partial \pi_2}{\partial \sigma_1} \frac{d\sigma_1^*}{dK_1}\right) \times sign\left(\frac{d\sigma_2^*}{d\sigma_1}\right)$$

SED   **SEA**   **Slope of firm 2's reaction curve**

Entry accommodation (cont'd)

- If 2nd-stage choices are strategic substitutes
  - Reaction curves are downward sloping
  - SEA has reverse sign of SED

Investment makes firm 1 tough $\rightarrow$ SED < 0 $\rightarrow$ SEA > 0 $\rightarrow$ overinvestment
Investment makes firm 1 soft $\rightarrow$ SED > 0 $\rightarrow$ SEA < 0 $\rightarrow$ underinvestment

- $\rightarrow$ Same conduct for accommodation and deterrence
  - If investment makes incumbent tough, incumbent overinvests $\rightarrow$ top dog strategy $\rightarrow$ Commitment to be aggressive
    - $\downarrow$ entrant's profit (good for deterrence)
    - $\uparrow$ incumbent's profit (good for accommodation)
  - If investment makes incumbent soft , incumbent underinvests $\rightarrow$ lean and hungry look $\rightarrow$ Commitment not to be aggressive

Entry accommodation (cont'd)

- If 2nd-stage choices are strategic complements
  - Reaction curves are upward sloping
  - SEA and SED have the same sign

Investment makes firm 1 tough $\rightarrow$ SED < 0 $\rightarrow$ SEA < 0 $\rightarrow$ underinvestment
Investment makes firm 1 soft $\rightarrow$ SED > 0 $\rightarrow$ SEA > 0 $\rightarrow$ overinvestment

- Different conducts for accommodation and deterrence
  - When deterrence calls for overinvestment (top dog), accommodation calls for underinvestment $\rightarrow$ puppy dog
  - When deterrence calls for underinvestment (lean and hungry look), accommodation calls for overinvestment $\rightarrow$ fat cat
  - Intuition: incumbent wants to look inoffensive so as to trigger a favourable response from the entrant

Entry accommodation (cont'd)

- **Lesson**: The optimal business strategies for entry deterrence (D) and for entry accommodation (A) are as follows.

Investment makes the incumbent

	Tough	Soft
Strategic substitutes	*(D and A)* Top dog	*(D and A)* Lean and Hungry
Strategic complements	*(D)* Top dog *(A)* Puppy Dog	*(D)* Lean and Hungry *(A)* Fat Cat

Case. **Kodak vs. Fuji**

- US market for photographic film
  - Up to 1970s: dominated by Kodak
  - Fuji managed to enter in 1980: 5% market share
- Fuji's entry was first deterred and then accommodated by Kodak.
  - Why and how? → analysis by Kadiyali (1996)
  - Deterrence → see below
  - Accommodation
    - Strategic variables: price and advertising → complements
    - → Incumbent is better off not acting in an aggressive way
    - Kodak was in a position to cut its price but did not do so; also, Kodak's advertising aimed at expanding the market not at stealing business from Fuji → puppy dog strategy

Strategies affecting cost variables

- Specific examples for investment K_1

  - Investment in capacity as an entry deterrent

  - Investment as an entry deterrent reconsidered
    - Model of R&D competition

  - Raising rivals' costs

Investment in capacity as an entry deterrent

- Why installing capacity early?
  - To convey to potential entrants that incumbent will have low marginal costs and thus be a tough competitor to deal with.
  - May convince potential entrant that it will not recover its entry costs.
- Incumbent may strategically distort its investment upward.
- In practice, many investment decisions are lumpy and thus automatically give commitment.
- Contracts
  - With upstream suppliers: long-term supply contracts that are costly to revise
  - Long-term labour contracts

Investment in capacity as an entry deterrent (cont'd)

- Investment makes incumbent tough
- Firms compete in quantities
- Incumbent chooses top dog strategy
- Stage 1

$$\text{Incumbent sets capacity } \overline{q}_1 \geq 0$$

- Stage 2
  - Entrant decides upon entry
  - Active firms set additional capacity and produce a quantity that is not larger than the installed capacity:

$$\text{Incumbent sets } \Delta\overline{q}_1 \geq 0 \text{ and } q_1 \leq \overline{q}_1 + \Delta\overline{q}_1$$

$$\text{Entrant sets } \Delta\overline{q}_2 \geq 0 \text{ and } q_2 \leq \Delta\overline{q}_2$$

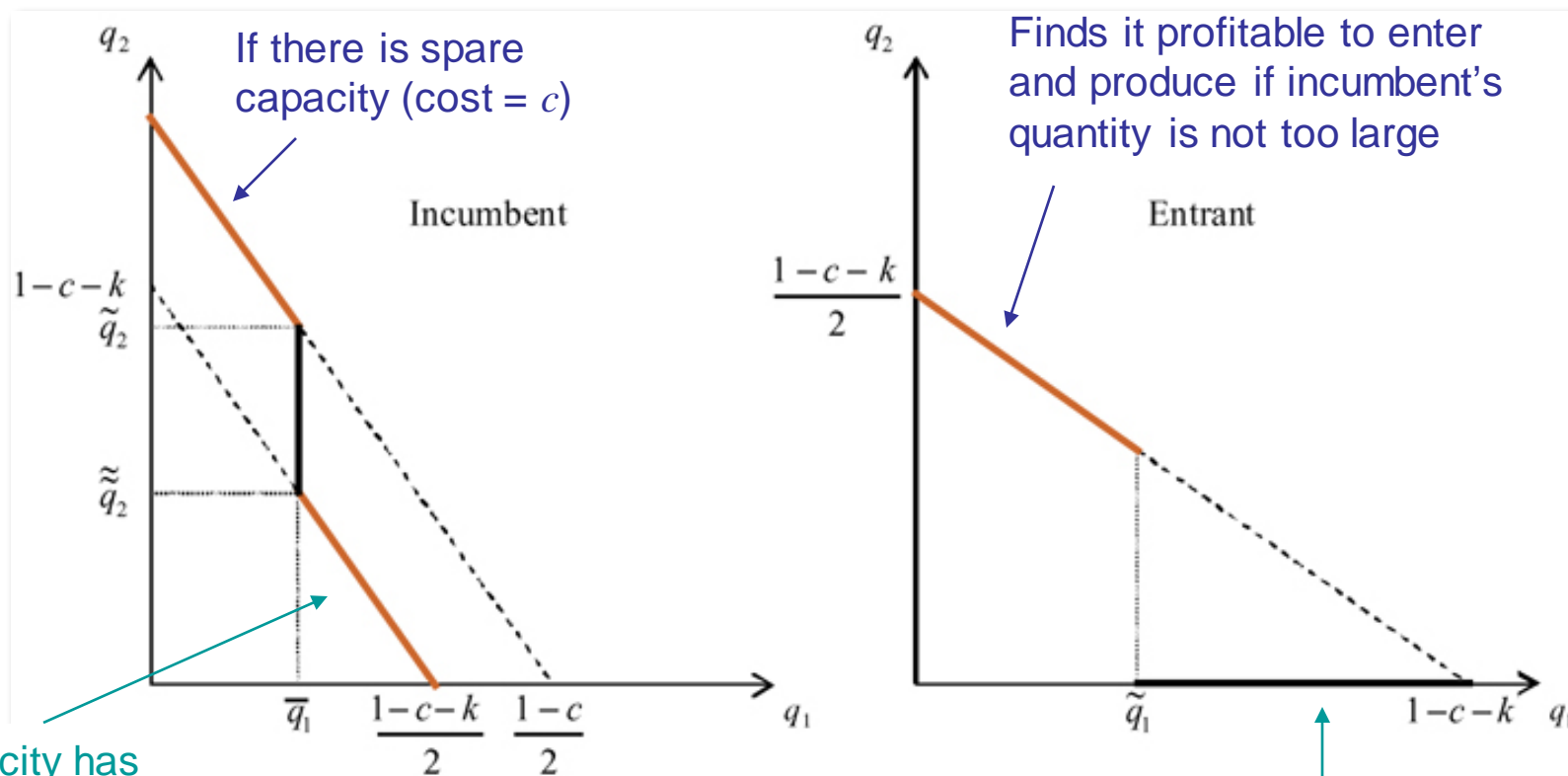# Investment in capacity as an entry deterrent (cont'd)

- Inverse demand $P(q) = 1 - q = 1 - q_1 - q_2$
- Cost structure
  - $e \rightarrow$ sunk costs in case of entry
  - $k \rightarrow$ marginal cost of an expansion in capacity
  - $c \rightarrow$ marginal cost of production
  - Incumbent's cost structure at stage 1: $C_1^1(\overline{q}_1) = k\overline{q}_1$
  - Stage 2:

$$C_1^2(q_1, \Delta\overline{q}_1) = cq_1 + k\Delta\overline{q}_1$$

$$C_2^2(q_2) = cq_2 + k\Delta\overline{q}_2$$
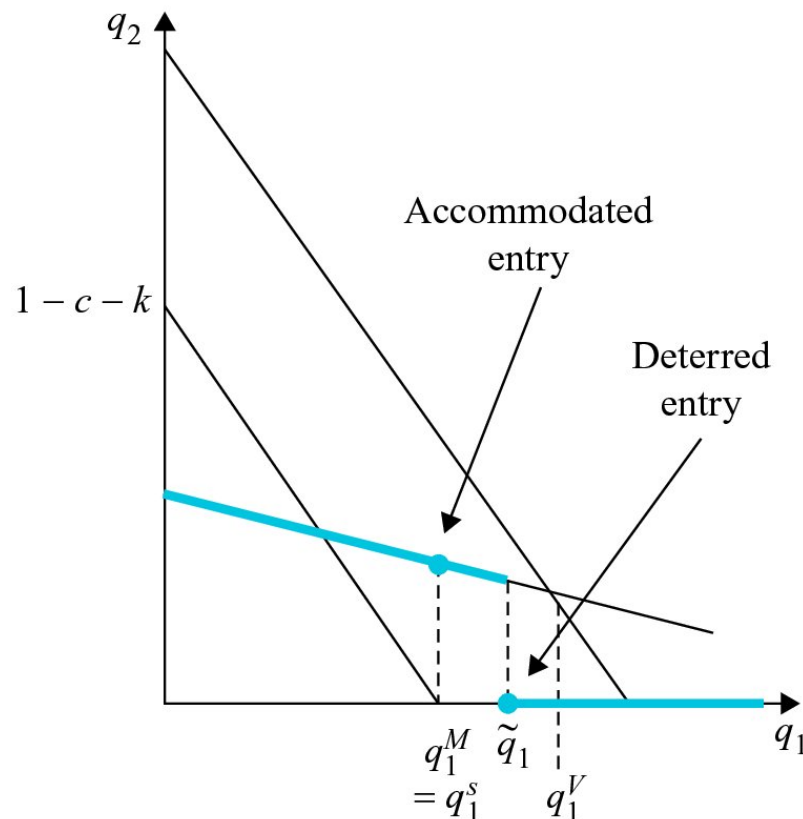
Investment in capacity as an entry deterrent (cont'd)

- Reaction functions at stage 2 if entry

If there is spare capacity (cost = c)

Incumbent

Finds it profitable to enter and produce if incumbent's quantity is not too large

Entrant

If capacity has to be expanded (cost = $c+k$)

Which equilibrium ('intersection') obtains depends on where the 2 functions jump.

Stays out otherwise

Investment in capacity as an entry deterrent (cont'd)

- Possible equilibria
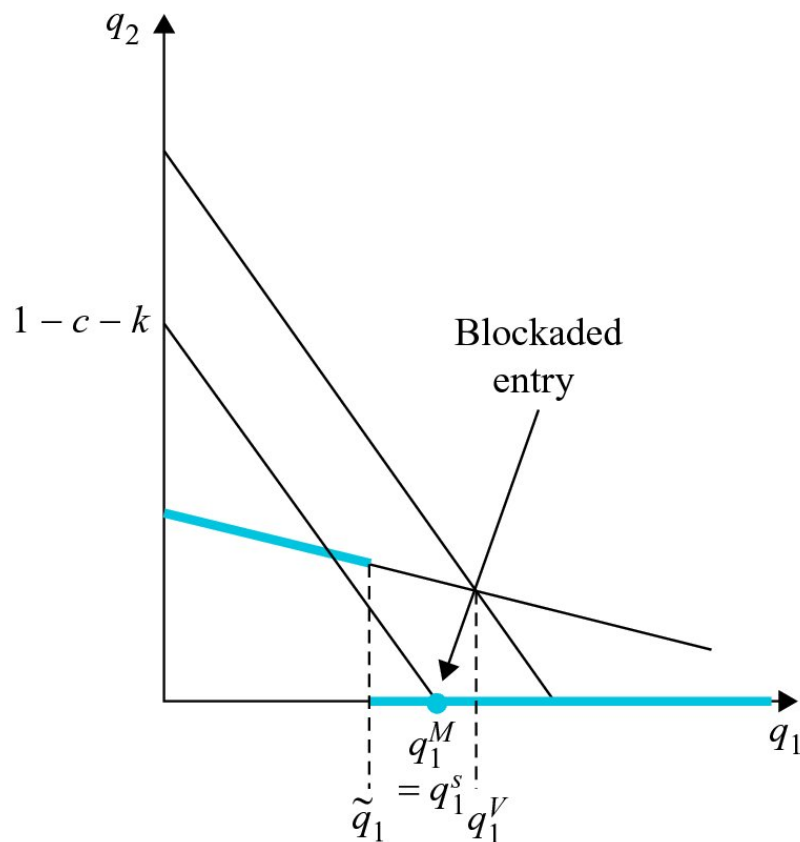
Investment in capacity as an entry deterrent (cont'd)

- **Lesson**: In an entry model with capacity commitment, the incumbent's conduct depends on the cost of entry, e.
  - For small entry costs ($e < e^*$), the incumbent prefers to accommodate entry and behaves as a Stackelberg leader.
  - For intermediate entry costs ($e^* \leq e \leq e^+$), the incumbent chooses to deter entry by expanding its capacity.
  - For large entry costs ($e > e^+$), the incumbent can behave as an unconstrained monopolist as entry is blockaded.

Investment in capacity as an entry deterrent (cont'd)

- Entry deterrence may not be anticompetitive!
  - Actual competition doesn't take place.
  - **But** potential competition forces incumbent to expand capacity.
  - Net effect on consumer and total surplus may be positive.

- **Lesson**: Suppose that entry costs are such that incumbent prefers to deter entry. Then, if entry costs are not too large, consumer surplus is higher if entry is deterred instead of being accommodated. The opposite prevails for larger entry costs.

Investment as an entry deterrent reconsidered

- A simple model of R&D competition
- K_1: investment that allows firm 1 to lower its average cost of production in the first stage
  - Cost: $\overline{c}(K_1)$ with $\overline{c}'(K_1) < 0$
  - First-period profits ↑ with K_1: $\pi^m(\overline{c}(K_1))$
- Second period
  - Incumbent and entrant compete in R&D
  - Each firm spends resources x_i
  - R&D technology is stochastic → Firm i's probability of finding the innovation is given by:

$$\mu_i(x_i) \text{ with } \mu_i'(0) = \infty, \ \mu_i' > 0, \text{ and } \mu_i'' < 0$$

Investment as an entry deterrent (cont'd)

- If one firm finds the innovation
  - This firm drives the other firm out of the market (innovation is drastic) and obtain profits $\pi^m(c)$
- If both firms find the innovation
  - They produce a homogeneous good at the same cost.
  - Price competition then drives profits down to zero.
- If no firm finds the innovation
  - Incumbent keeps its first-period profit.
- $\rightarrow$ Expected profits:

$$\pi_1 = \mu_1(1-\mu_2)\pi^m(c) + (1-\mu_1)(1-\mu_2)\pi^m(\overline{c}(K_1)) - x_1$$

$$\pi_2 = \mu_2(1-\mu_1)\pi^m(c) - x_2$$

Investment as an entry deterrent (cont'd)

- Does investment make incumbent tough or soft?
  - $K_1 \uparrow \rightarrow$ first-period marginal cost $\downarrow$
  - $\rightarrow$ $\pi^m(\overline{c}(K_1))$ $\uparrow$
  - $\rightarrow$ incumbent's fall-back position in period 2 if it fails to find the innovation improves
  - $\Rightarrow$ larger $K_1 \downarrow$ incumbent's incentive to innovate
  - $\Rightarrow$ Investment makes incumbent **soft**.
- R&D expenditures are strategic substitutes
  - See FOCs for profit maximization
- <u>Conclusion</u>: firm 1 wants to commit to play more aggressively $\rightarrow$ it $\uparrow$ its incentive to innovate $\rightarrow$ it $\downarrow$ K_1
  - Underinvestment: Lean and hungry look strategy

Raising rivals' cost

- Accommodation or deterrence can also be achieved by acting directly on the entrant's cost function
  - Incumbent could sabotage entrant's production facilities.
  - Lobby the government to raise taxes on imported products so as to deter entry of foreign competitors.
  - Clearly anticompetitive; no need for further analysis.
- Some cost-raising strategies may force the incumbent to raise his own costs as well...
  - Example: liberalization of the German postal market
    - Incumbent Deutsche Post was pushing forward for minimum wage legislation in this sector to apply also to newcomers.
  - Trade-off between harm incumbent does to potential entrant and harm he does to himself.

Raising rivals' cost (cont'd)

- Such strategies = form of overinvestment
  - A non-strategic incumbent would not deliberately increase its own cost.

- Same 2-stage model as before
  - Investment K_1 ↑ costs of both firms: $c_1(K_1)$ and $c_2(K_1)$
  - The following result holds in a wide variety of settings:

- **Lesson**: Cost-raising strategies (i.e., strategies that raise the rival's cost but also the incumbent's) are more likely to be used to deter entry than to accommodate it.

Strategies affecting demand variables

- Goal: committing to reduce the demand that is available for the entrant

- 3 specific tactics:

  - Product positioning

    - "Brand proliferation": $\uparrow$ number of varieties put on the market $\rightarrow$ fewer niches for entrant

  - Bundling

    - If incumbent controls 2 products, bundling them may make entry less profitable

  - Switching costs

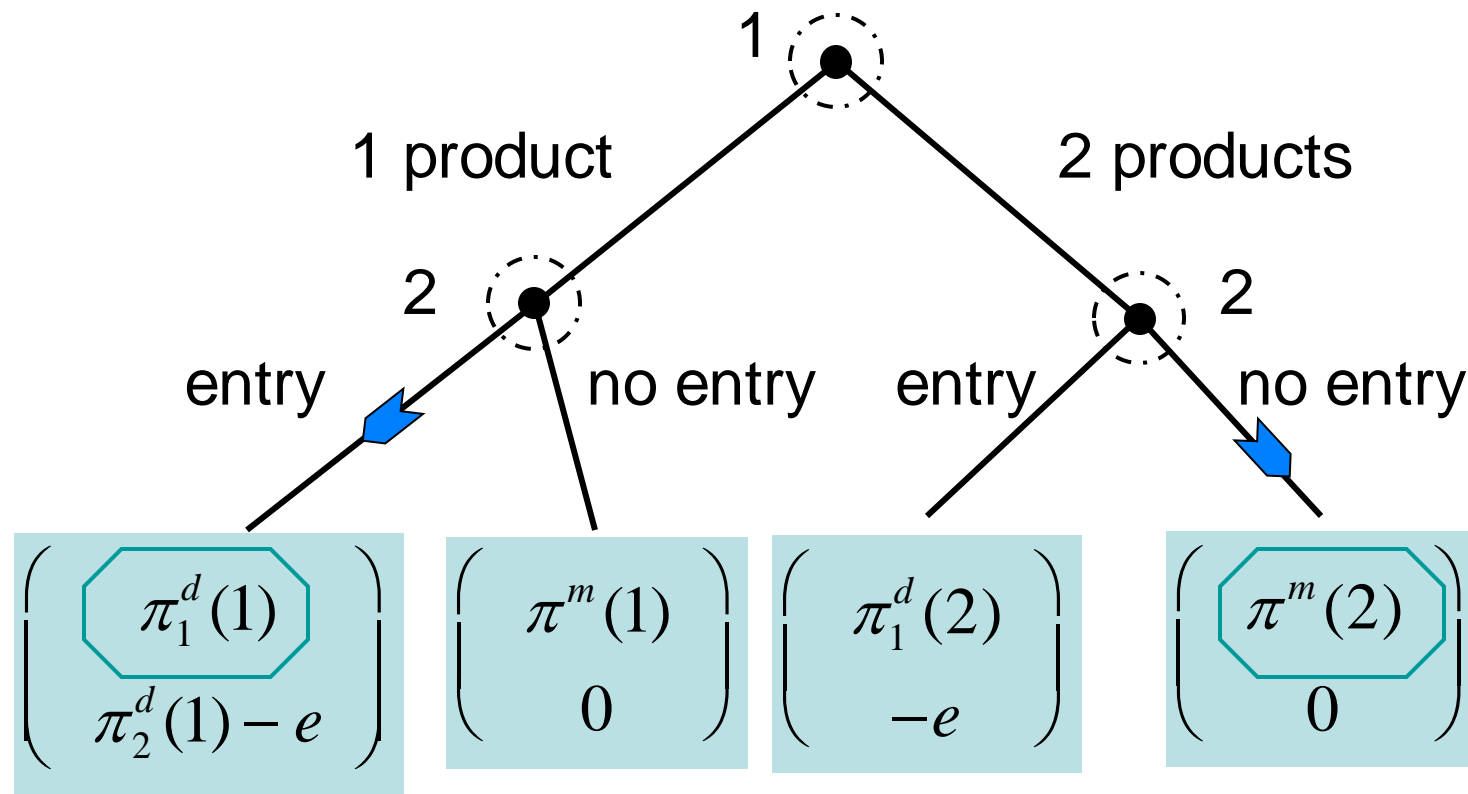   - Incentive to build an earlier base of customers

Brand proliferation

- Model
  - Incumbent can produce a base product.
  - It may want to produce also an imperfect substitute.
  - Corresponding monopoly profits:
    - $\pi^m(1)$ and $\pi^m(2)$, with $\pi^m(1) > \pi^m(2)$
      $\rightarrow$ optimal to produce 1 product in protected monopoly
  - 3-stage game
    - Incumbent chooses to produce 1 or 2 products
    - Entrant decides to enter or not; if entry (cost: e), entrant's product competes directly with incumbent's 2nd product.
   - Active firms simultaneously set prices.

Brand proliferation (cont'd)

- Equilibrium
  - Equilibrium profits at stage 3 following entry: $\pi_i^d(k)$
    - i: firm's identity; k: number of products offered by incumbent
  - Entrant's profits at stage 2 if incumbent has...
    - 1 product: $\pi_2^d(1) - e$ (assume it is positive)
    - 2 products: $\pi_2^d(2) - e = 0 - e \rightarrow$ entry not profitable
  - Stage 1
    - Incumbent can deter entry by offering 2 products
    - Deterrence profitable if $\pi^m(2) > \pi_1^d(1)$
    - If so, unique subgame perfect equilibrium with brand proliferation used as an entry deterrent.

Brand proliferation (cont'd)

Tree diagram:

- Node 1 branches: "1 product" (left) and "2 products" (right)
- Left node 2 branches: "entry" and "no entry"
- Right node 2 branches: "entry" and "no entry"

Payoffs (left to right):

$$\begin{pmatrix} \pi_1^d(1) \\ \pi_2^d(1) - e \end{pmatrix} \quad \begin{pmatrix} \pi^m(1) \\ 0 \end{pmatrix} \quad \begin{pmatrix} \pi_1^d(2) \\ -e \end{pmatrix} \quad \begin{pmatrix} \pi^m(2) \\ 0 \end{pmatrix}$$

- **Lesson**: An incumbent may use brand proliferation to deter entry.
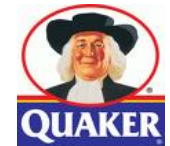
Case. **The ready-to-eat (RTE) cereal industry**

- US, 1940s to 1970s: high concentration
  - 4 major manufacturers (Kellogg, General Foods, General Mills and Quaker Oats) → 85% of sales
  - No entry in this period, although profitable industry
- → Barriers to entry
  - No real barrier coming from economies of scale, capital requirements, product differentiation, patents...
  - Main cause: brand proliferation
    - No new *firm* entered **but** 80 new *brands* were introduced by 6 major incumbent firms between 1950 and 1972!
    - Federal Trade Commission (1972): '*these practices of proliferating brands, differentiating similar products and promoting trademarks through intensive advertising result in high barriers to entry into the RTE cereal market*'.

Brand proliferation (cont'd)

- ## Modified model
    - Implicit assumption in previous model: exit from the industry is sufficiently costly.
    - Suppose that between stages 2 and 3, both firms have the option to withdraw the modified product at an exit cost x.

- ## Payoff matrix

		Firm 2	
		Stay	**Exit**
Firm 1	**Stay**	$\pi_1^d(2), 0$	$\pi^m(2), -x$
	Exit	$\pi_1^d(1) - x, \pi_2^d(1)$	$\pi^m(1) - x, -x$

Brand proliferation (cont'd)

- Equilibrium?
  - Entry cost is sunk at this stage $\rightarrow$ entrant has dominant strategy to stay.
  - Given that the entrant stays, incumbent's choice depends on x
    - Introducing 2nd product $\rightarrow$ 'cannibalization': $\pi_1^d(2) < \pi_1^d(1)$
    - If $x < \pi_1^d(1) - \pi_1^d(2)$, then incumbent withdraws 2nd product
    - Brand proliferation is no longer a credible deterring device.

- **Lesson**: If the incumbent can withdraw its product at sufficiently low cost from a segment in which it faces a direct competitor, brand proliferation is not a credible strategy for entry deterrence.

Bundling and leverage of market power

- Suppose that an incumbent firm
  - is a monopolist in the market for product A
  - faces potential competition for product B
- By bundling products A and B, incumbent may
  - $\downarrow$ demand addressed to rival firm producing B
  - $\rightarrow$ Make entry unprofitable (or induce exit from the industry)
  - See the book for a specific model checking this conjecture.

- **Lesson**: A firm with market power in one market may be able to use pure bundling to leverage its market power into another second market and induce exit by firms operating in this second market.

Bundling and leverage of market power (cont'd)

- Longer-term analysis
  - Monopoly position of firm 1 in market A is at risk if a competitor establishes itself successfully in market B
    - Firm 1 may forego short-term profit goals
    - The use of technological bundling may allow firm 1 to induce exit of firm 2 in market B
  - If being successful in market B is prerequisite for entry in market A, firm 1's successful attempt to induce exit in market B protects its monopoly position in market A in the long term.
  - Important considerations in the Microsoft case.

Case. **The European Microsoft case**

- 2004: European Commission found that Microsoft had leveraged its market power from its primary market for PC operating systems (OS) into the secondary, complementary market for work group server OS.

  - Primary market: Microsoft has 90% market share.

  - Secondary market: Microsoft's market share rose from 20% (late 1990s) to 60% (2001).

  - The Commission argued that at least part of this spectacular increase was due to Microsoft's deliberate restriction of the interoperability between Windows PCs and non-Microsoft work group servers (= virtual bundling).

Switching costs as an entry deterrent

- Incumbent's product exhibits switching costs. (see Chapter 7)

- To deter entry, what should the incumbent do?

  - expand its base of customers (i.e., overinvest) OR

  - contract its base of customers (i.e., underinvest)

- 2 opposite forces when expanding customer base:

  - More costly for entrant to attract customers

    - Profitability of large-scale entry $\downarrow \rightarrow$ entry deterrence calls for overinvestment: **top dog strategy**

  - Small-scale entry may become more profitable if incumbent cannot price discriminate between old and new buyers

    - Incumbent sets large price to 'skim' locked-in customers, but large price also for new buyers; so, entry is easier $\rightarrow$ entry deterrence calls for underinvestment: **lean and hungry look strategy**

Switching costs as an entry deterrent (cont'd)

- Model of Chapter 7 can be used to illustrate the 2 forces and conclude the following:

- **Lesson**: Switching cost affect entry conditions in 2 opposing ways:
  - they hamper large-scale entry that seeks to attract existing customers of the incumbent;
  - they induce the incumbent to harvest its base of consumers with high prices, thereby relaxing price competition for unattached consumers and making entry easier on that segment.

Limit pricing under incomplete information

- Behaviour of incumbent firms: set low prices in order to avoid or delay entry
  - Connection between a low price today and an unfavourable environment for the entrant tomorrow
    - Previous switching cost model: installed base can be increased by lowering the pre-entry price
- If, however, price is a short-run variable that can be changed at no or little cost, low price today may be irrelevant for the entrant's entry decision.
- Limit pricing story becomes relevant in the presence of asymmetric information
  - Potential entrant is uncertain about the cost structure of the incumbent.

Limit pricing under incomplete information (cont'd)

- 2-period model
  - 1st period
    - Incumbent operates as a protected monopolist
      - ✓ Learns its cost and chooses $q_1(c) \rightarrow$ price: $p_1(c)$
      - ✓ Cost can be high or low: $c_H > c_L$
    - Entrant observes $p_1(c)$ and may infer incumbent's cost.
  - 2nd period
    - Entrant decides whether to enter and pay the fixed cost e
    - After entry, entrant learns incumbent's marginal cost.
    - Firms compete in quantities

Limit pricing under incomplete information (cont'd)

- Entrant may be in a situation that
  - Entry is profitable if incumbent has high costs
  - Entry is not profitable ex ante if incumbent's costs are low
- $\rightarrow$ High-cost incumbent may hide its type by using a pooling strategy.
- $\rightarrow$ Entrant cannot infer the incumbent's cost structure.
- $\rightarrow$ Entrant may not want to enter the market.
- **Lesson**: If the entrant is uncertain about the incumbent's costs and would enter if it knew that the incumbent had high cost, a high-cost incumbent can mimic the low-cost incumbent in the monopoly period and thus avoid entry thereafter. Such a strategy is the equilibrium strategy of the incumbent for particular beliefs held by the entrant and an intermediate level of entry costs.

Case. **Kodak vs. Fuji** (Act II)

- US market for photographic film
  - Up to 1970s: dominated by Kodak
  - Fuji managed to enter in 1980: 5% market share
- Fuji's entry was first deterred. How?
  - Kodak was limit pricing and limit advertising.
  - If Fuji had imperfect information on either market demand or Kodak's costs, Kodak could choose low prices and high advertising budgets to indicate low costs of production
  - $\rightarrow$ low price and advertising elasticities
  - Estimates made by Kadiyali (1996) indeed show such low elasticities.

Entry deterrence and multiple incumbents

- Possibility of free riding in entry deterrence
  - If entry can be successfully deterred by proper subset of incumbents, those outside that subset freely benefit from the other firm's investments.
  - Incumbents acting in a noncooperative way may invest less in entry deterrence than they would do if they could coordinate their actions.
- Number of entrants is critical for the underinvestment result to be observed.
  - See the book for a simple example.

- **Lesson**: Multiple incumbents may not be able to deter entry if they do not coordinate their investment decisions.

Case. **Kodak vs. Fuji** (Act III)

- After Fuji's entry (1980), limit pricing and advertising persisted. (Kadiyali, 1996)
  - Post-entry: very low own-price & own-advertising elasticities.
  - Prices were lower and advertising levels higher post- rather than pre-entry.
  - No entry occurred despite high price-cost margins ($1.28 per roll for Kodak, $1.35 per roll for Fuji).
- The 2 firms seem to have joined forces to deter entry.
  - Observed prices correspond to estimations of a tacit collusion model (prices low enough to deter entry but higher than in a more competitive equilibrium).

Review questions

- Explain why entry deterrence and entry accommodation call for the same strategy when product decisions are strategic substitutes, and for opposing strategies when product decisions are strategic complements. Illustrate with some examples.

- Why, and in what circumstances, would an incumbent firm facing potential entry find it profitable to expand its production capacity above the level that a monopolist ignoring entry would choose.

- Explain under which conditions an incumbent firm is able to use brand proliferation to deter entry.

- Why is incomplete information crucial for limit pricing to serve as an entry deterrent? Explain.

- Is there a free-riding problem when several incumbents try to deter entry? Discuss.