

Part II. Market power

Chapter 4. Dynamic aspects of imperfect competition



Slides

Industrial Organization: Markets and Strategies

Paul Belleflamme and Martin Peitz, 2d Edition

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Chapter 4. Learning objectives

- Understand how competition is affected when decisions are taken sequentially rather than simultaneously.
- Analyze entry decisions into an industry and compare the number of firms that freely enter with the number that a social planner would choose.
- Distinguish endogenous from exogenous sunk cost industries and analyze how market size affects market concentration.

Sequential choice: Stackelberg

- Chapter 3: ‘simultaneous’ decisions
 - Firms aren’t able to observe each other’s decision before making their own.
- Here: sequential decisions
 - Possibility for some firm(s) to act before competitors, who can thus observe past choices.
 - E.g.: pharma. firm with patent acts before generic producers
 - Better to be **leader** or **follower**?
 - Depends on nature of strategic variables & on number of firms moving at different stages.
 - First mover must have some form of **commitment**.
 - When and how is such commitment available?

One leader / One follower

- First-mover advantage?
 - Firm gets higher payoff in game in which it is a leader than in symmetric game in which it is a follower.
 - Otherwise, second-mover advantage.
- Quantity competition: **Stackelberg model**
 - Similar to Cournot duopoly
 - But, one firm chooses its quantity before the other.
 - Look for subgame-perfect equilibrium
 - Setting
 - $P(q_1, q_2) = a - q_1 - q_2$; $c_1 = c_2 = 0$
 - Firm 1 = leader; firm 2 = follower

One leader / One follower (cont'd)

- We solve by backward induction.
- **Step 1. Follower.** Firm 2 observes q_1 and chooses q_2 to maximize $\pi_2 = (a - q_1 - q_2)q_2$. Its first-order condition, $a - q_1 - 2q_2 = 0$, yields the best response

$$q_2(q_1) = \frac{a - q_1}{2}$$

- **Step 2. Leader.** Firm 1 anticipates the follower's reaction, so it maximizes

$$\pi_1 = (a - q_1 - q_2(q_1))q_1 = \left(a - q_1 - \frac{a - q_1}{2}\right)q_1 = \frac{1}{2}(a - q_1)q_1$$

- Its first-order condition is $\frac{1}{2}(a - 2q_1) = 0$.

One leader / One follower (cont'd)

- **Step 3. Equilibrium.** Solving the leader's first-order condition and substituting into the follower's best response,

$$q_1^L = \frac{a}{2} \quad \text{and} \quad q_2^F = q_2(q_1^L) = \frac{a}{4}$$

- **Step 4. Price and profits.** Total output is $\frac{3a}{4}$, so

$$P(q_1^L, q_2^F) = \frac{a}{4}, \quad \pi_1^L = \frac{a}{4} \times \frac{a}{2} = \frac{a^2}{8}, \quad \text{and} \quad \pi_2^F = \frac{a}{4} \times \frac{a}{4} = \frac{a^2}{16}$$

- In the simultaneous Cournot game, $q^C = \frac{a}{3}$ and $\pi^C = \frac{a^2}{9}$ for each firm, and $\frac{a^2}{16} < \frac{a^2}{9} < \frac{a^2}{8}$.

Worked example: Stackelberg vs. Cournot

- Parameters.** $P(q) = 12 - q_1 - q_2$ and $c_1 = c_2 = 0$.

	Leader	Follower	Price	Industry profit
Stackelberg	$q = 6, \pi = 18$	$q = 3, \pi = 9$	3	27
Cournot	$q = 4, \pi = 16$	$q = 4, \pi = 16$	4	32

- Result:** The leader produces more and earns more than under Cournot ($18 > 16$), while the follower produces less and earns less ($9 < 16$). Total output is higher, so the price is lower ($3 < 4$) and consumers are better off.

One leader / One follower (cont'd)

- Results
 - Leader makes higher profit than follower. As firms are symmetric → **First-mover advantage**
 - Comparison with simultaneous Cournot
 - $q^C = a/3$ & $\pi^C = a^2/9$
 - **Larger (lower) quantity and profits for leader (follower) w.r.t. Cournot**
 - Intuition: leader has stronger incentives to increase quantity when follower observes and reacts to this quantity, than when follower does not.

One leader / One follower (cont'd)

- **Lesson:** In a duopoly producing substitutable products with one firm (the leader) choosing its quantity before the other firm (the follower), the subgame perfect equilibrium is such that
 - firms enjoy a first-mover advantage;
 - the leader is better off and the follower is worse off than at the Nash equilibrium of the Cournot game.

One leader / One follower (cont'd)

- Price competition
 - Previous result hinges on strategic substitutability
 - Follower reacts to $\uparrow$ in leader's quantity by $\downarrow$ its own quantity
→ leader finds it profitable to commit to a larger quantity.
 - Reverse applies under strategic complementarity
 - If leader acts aggressively, follower reacts aggressively.
 - Preferable to be the follower and be able to set lower price.
- **Lesson:** In a duopoly producing substitutable products under constant unit costs, with one firm choosing its price before the other firm, the subgame-perfect equilibrium is such that at least one firm has a second-mover advantage.

One leader / Endogenous number of followers

- E.g.: market for a drug whose patent expired
 - Leader: patent holder / Followers: generic producers
 - Observation: leader cuts its price, possibly to keep the number of entrants low
- Theoretical prediction
 - **Leader always acts more aggressively (i.e., sets larger quantity or lower price) than followers.**
 - Intuition: leader is also concerned about the effect of its own choices on the number of firms that enter; nature of strategic variables is less important.
 - Confirms the observations.

Commitment

- Implicit assumption so far:
 - Leader can **commit** to her choice.
- Schelling's analysis of conflicts
 - **Threat**: punishment inflicted to a rival if he takes a certain action. Goal: prevent this action
 - **Promise**: reward granted to a rival if he takes a certain action. Goal: encourage this action
 - But, threats and promises must be **credible** to be effective → they must be transformed into a **commitment**: *inflict the punishment or grant the reward must be in the best interest of the agent who made the threat or the promise.*
 - **How?** Make the action **irreversible**.

Commitment (cont'd)

- **Paradox of commitment**

- It is by limiting my own options that I can manage to influence the rival's course of actions in my interest.

- **Case:** *When Spanish Conquistador Hernando Cortez landed in Mexico in 1519, one of his first orders to his men was to burn the ships. Cortez was committed to his mission and did not want to allow himself or his men the option of going back to Spain.*

- **How to achieve irreversibility?**

- Quantities: install production capacity (+ sunk costs)
- Prices: 'most-favoured customer clause', print catalogues

Sequential price competition

- **Setting.** Two firms with differentiated products and zero costs. Demand for firm i 's product is

$$q_i = a - p_i + dp_j, \quad \text{with } -1 < d < 1$$

- Substitutes if $d > 0$; complements if $d < 0$.
- Firm 1 (leader) sets p_1 first; firm 2 (follower) observes p_1 and sets p_2 .
- **Benchmark: simultaneous choice.** Each firm's first-order condition is $a - 2p_i + dp_j = 0$. In a symmetric equilibrium,

$$p^{sim} = \frac{a}{2 - d}$$

- Details for general demand and costs: EconS 503's website, Chapter 8, slides 154-177.

Sequential price competition (cont'd)

- **Step 1. Follower.** Firm 2 maximizes $p_2(a - p_2 + dp_1)$, so

$$p_2(p_1) = \frac{a + dp_1}{2}$$

- Upward-sloping if $d > 0$ (strategic complements); downward-sloping if $d < 0$ (strategic substitutes).
- **Step 2. Leader.** Firm 1 maximizes $p_1(a - p_1 + dp_2(p_1))$. Solving its first-order condition,

$$p_1^{seq} = \frac{a(2 + d)}{2(2 - d^2)} \quad \text{and} \quad p_1^{seq} - p^{sim} = \frac{ad^2}{2(2 - d)(2 - d^2)} > 0$$

- The leader sets a higher price than under simultaneous choice, both with substitutes and with complements.

Sequential price competition (cont'd)

- **Step 3. Follower's price.** Substituting p_1^{seq} into $p_2(p_1)$,

$$p_2^{seq} - p^{sim} = \frac{d}{2} (p_1^{seq} - p^{sim})$$

- Substitutes ($d > 0$): the follower also raises its price, but by less than the leader, so it undercuts the leader and gains market share.
- Complements ($d < 0$): the follower lowers its price.
- Intuitively, with substitutes the leader raises its price to induce a softer response from its rival, which benefits the follower even more.

Worked example: sequential price competition

- **Parameters.** $a = 12$ and zero costs.

	Leader (p, π)	Follower (p, π)	Simultaneous (p, π)
Substitutes, $d = 1/2$	8.57, 64.3	8.14, 66.3	8, 64
Complements, $d = -1/2$	5.14, 23.1	4.71, 22.2	4.8, 23.0

- **Result:** With substitutes, both firms earn more than under simultaneous choice, and the follower earns the most: a second-mover advantage. With complements, the leader gains and the follower loses: a first-mover advantage.

- **Endogenous Entry**
- Go to EconS 503's website, Chapter 8, slides 193-209

Free entry: endogenous number of firms

- So far (with one exception), limited number of firms
 - Implicit assumption: entry prohibitively costly
- Here, opposite view
 - No entry and exit barriers other than entry costs.
 - Firms enter as long as profits can be reaped.
 - Two-stage game
 1. Decision to enter the industry or not
 2. Price or quantity competition
 - 3 models
 - Free entry in Cournot model
 - Free entry in Salop model
 - Monopolistic competition

Properties of free entry equilibria

- Setting
 - Industry with symmetric firms; entry cost $e > 0$
 - If n active firms, profit is $\pi(n)$, with $\pi(n) > \pi(n+1)$
 - Number of firms under free entry, n^e such that $\pi(n^e) > 0$ and $\pi(n^e+1) < 0$
 - $e \uparrow \rightarrow n^e \downarrow$

Case. Entry in small cities in the U.S.

- Bresnahan & Reiss (1990,1991) estimate an entry model
 - Data from rural retail and professional markets in small U.S. cities.
- Results
 - Firms enter if profit margins are sufficient to cover fixed costs of operating.
 - Profit margins $\downarrow$ with additional entry.

Cournot model with free entry

- **Setting.** $P(q) = a - bq$ and $C_i(q) = cq$, with $c < a$. Each entrant pays an entry cost e .
- **Step 1. Cournot equilibrium with n firms** (Chapter 3). Each firm produces $q(n) = \frac{a-c}{b(n+1)}$, and its price margin is $bq(n)$, so

$$\pi(n) = b[q(n)]^2 - e = \frac{1}{b} \left(\frac{a-c}{n+1} \right)^2 - e$$

- “Business-stealing effect”: individual output falls with entry, $q(n+1) < q(n)$.
- **Step 2. Free-entry equilibrium.** Firms enter until profits are zero, $\pi(n^e) = 0$:

$$(n^e + 1)^2 = \frac{(a-c)^2}{be}$$

Cournot model with free entry (cont'd)

- **Step 3. Social optimum (second best).** The planner chooses the number of firms, but not their output. Welfare is consumer surplus plus profits:

$$W(n) = \underbrace{\frac{b}{2}[nq(n)]^2}_{\text{consumer surplus}} + \underbrace{nb[q(n)]^2}_{\text{gross profits}} - ne = \frac{n(n+2)}{2b} \left(\frac{a-c}{n+1} \right)^2 - ne$$

- Since the derivative of $\frac{n(n+2)}{(n+1)^2}$ is $\frac{2}{(n+1)^3}$, the condition $W'(n^*) = 0$ becomes

$$\frac{(a-c)^2}{b(n^*+1)^3} - e = 0 \quad \Leftrightarrow \quad (n^*+1)^3 = \frac{(a-c)^2}{be}$$

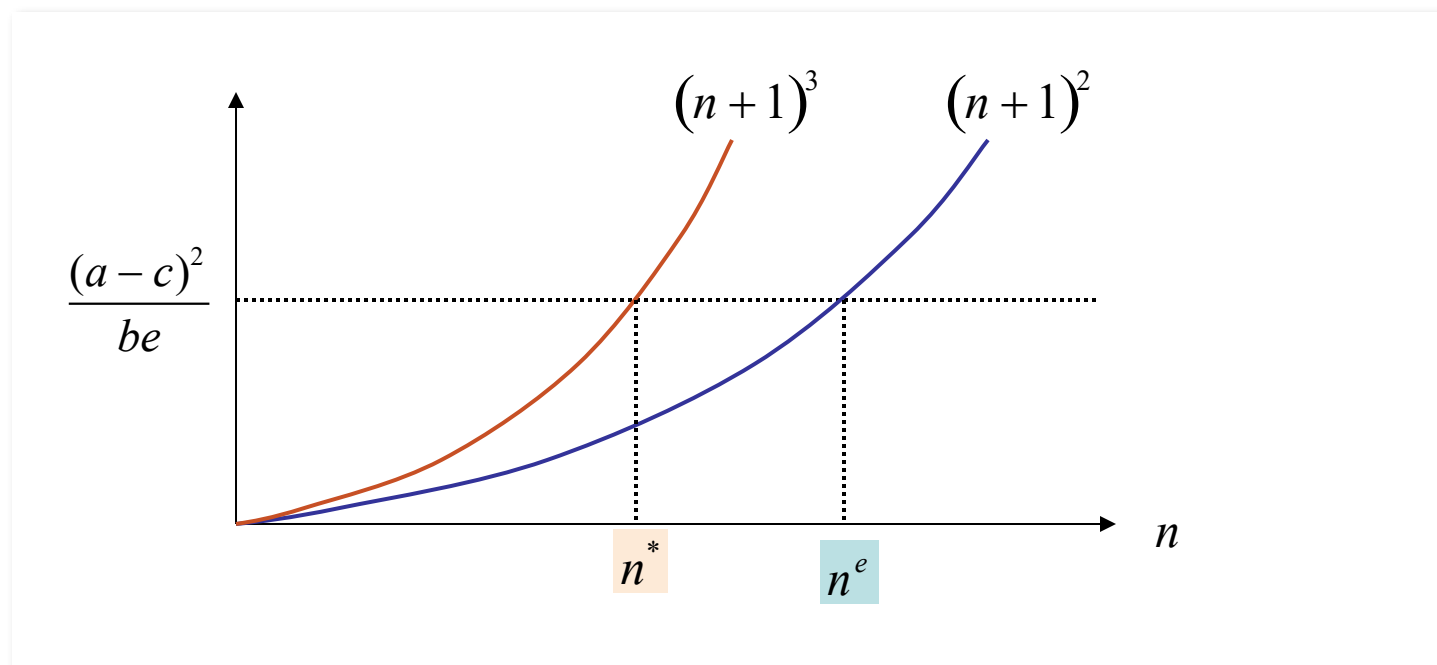
Cournot model with free entry (cont'd)

- **Step 4. Comparison.** Let $K \equiv \frac{(a-c)^2}{be}$. Then $n^e + 1 = K^{1/2}$ and $n^* + 1 = K^{1/3}$. Since $K > 1$, then $n^e > n^*$.
- **Example.** $a = 10$, $c = 2$, $b = 1$, and $e = 1$, so that $K = 64$:

$$n^e + 1 = \sqrt{64} = 8 \quad \Rightarrow \quad n^e = 7$$

$$n^* + 1 = 64^{1/3} = 4 \quad \Rightarrow \quad n^* = 3$$
 - Check: $\pi(7) = \left(\frac{8}{8}\right)^2 - 1 = 0$.
- The market attracts more than twice as many firms as the planner would choose.

Cournot model with free entry (cont'd)



- **Lesson:** Because of the business-stealing effect, the symmetric Cournot model with free entry exhibits socially excessive entry.

Price competition with free entry

- Salop (circle) model of Chapter 3
 - Firms enter and locate equidistantly on circle with circumference 1
 - Consumers uniformly distributed on circle
 - They buy at most one unit, from firm with lowest 'generalized price' (unit transportation cost, τ)
 - If n firms enter, equilibrium price: $p(n) = c + \tau / n$
- Free-entry equilibrium

$$\pi(n^e) = 0 \Leftrightarrow (p - c) \frac{1}{n^e} - e = 0 \Leftrightarrow \frac{\tau}{(n^e)^2} = e \Leftrightarrow n^e = \sqrt{\frac{\tau}{e}}$$

Price competition with free entry (cont'd)

- **Stage 2 (prices).** With n firms equidistantly located on the circle, the symmetric equilibrium price is (Chapter 3)

$$p(n) = c + \frac{\tau}{n}$$

- Each firm serves a market share of $\frac{1}{n}$.
- **Step 1. Profit with n firms.**

$$\pi(n) = (p(n) - c) \frac{1}{n} - e = \frac{\tau}{n} \times \frac{1}{n} - e = \frac{\tau}{n^2} - e$$

Price competition with free entry (cont'd)

- **Step 2. Stage 1 (entry).** Firms enter until $\pi(n^e) = 0$:

$$\frac{\tau}{(n^e)^2} = e \quad \Leftrightarrow \quad n^e = \sqrt{\frac{\tau}{e}}$$

- Substituting into $p(n)$, the free-entry price is

$$p(n^e) = c + \frac{\tau}{\sqrt{\tau/e}} = c + \sqrt{\tau e}$$

- Higher entry costs lead to fewer firms and higher prices.

Price competition with free entry (cont'd)

- **Step 3. Social optimum (second best).** Every consumer buys one unit, so the planner minimizes total costs: entry costs plus transportation costs.
- Consumers travel at most $\frac{1}{2n}$, on both sides of each of the n firms:

$$TC(n) = ne + \tau \left(2n \int_0^{1/(2n)} s \, ds \right) = ne + \frac{\tau}{4n}$$

- The first-order condition is

$$TC'(n^*) = e - \frac{\tau}{4(n^*)^2} = 0 \quad \Leftrightarrow \quad n^* = \frac{1}{2} \sqrt{\frac{\tau}{e}} = \frac{1}{2} n^e$$

Price competition with free entry (cont'd)

- **Example.** $\tau = 16$, $e = 1$, and $c = 10$:
 - Free entry: $n^e = \sqrt{16} = 4$ firms and $p = 10 + \sqrt{16} = 14$. Check:
 $\pi(4) = \frac{16}{16} - 1 = 0$.
 - Social optimum: $n^* = 2$ firms.
 - Intuitively, an entrant mostly steals customers from its neighbors (business-stealing effect), but it only slightly reduces transportation costs.
- **Lesson:** In the Salop circle model, the market generates socially excessive entry: twice as many firms as the social optimum.

Monopolistic competition

- 4 features
 - Large number of firms producing different varieties
 - Each firm is negligible
 - No entry or exit barriers → economic profits = 0
 - Each firm enjoys market power
- S-D-S model (Spence, 1976; Dixit & Stiglitz, 1977)
 - Rather technical → see the book
- **Lesson:** In models of monopolistic competition, the market may generate excessive or insufficient entry, depending on how much an entrant can appropriate of the surplus generated by the introduction of an additional differentiated variety.

Industry concentration and firm turnover

- So far, exogenous sunk costs
 - e = sunk cost, exogenous (i.e., not affected by decisions in the model); if $e \uparrow \rightarrow n^e \downarrow$
 - If market size $\uparrow \rightarrow n^e \uparrow$ & industry concentration $\downarrow$
- **Lesson:** In industries with exogenous sunk costs, industry concentration decreases and approaches zero as market size increases.
- Not verified empirically in all industries
 - $\exists$ industries with large increase of market demand over time **and** persistently high concentration
 - To reconcile theory with facts: endogenous sunk costs

Industry concentration and firm turnover (cont'd)

- **A model with endogenous sunk costs**
 - Quality-augmented Cournot model
 - 3-stage game (details in subsequent slides)
 1. Firms decide to enter
 2. Firms decide which quality to develop
 3. Firms decide which quantity to produce
 - Endogenous sunk costs arise from strategic investments that increase the price-cost margin
 - Improvements in quality, advertising, process innovations
 - Intuition: Market size $\uparrow \rightarrow$ market more valuable $\rightarrow$ active firms invest more $\rightarrow$ some of extra profits are competed away $\rightarrow$ upper bound on entry (lower bound on concentration)

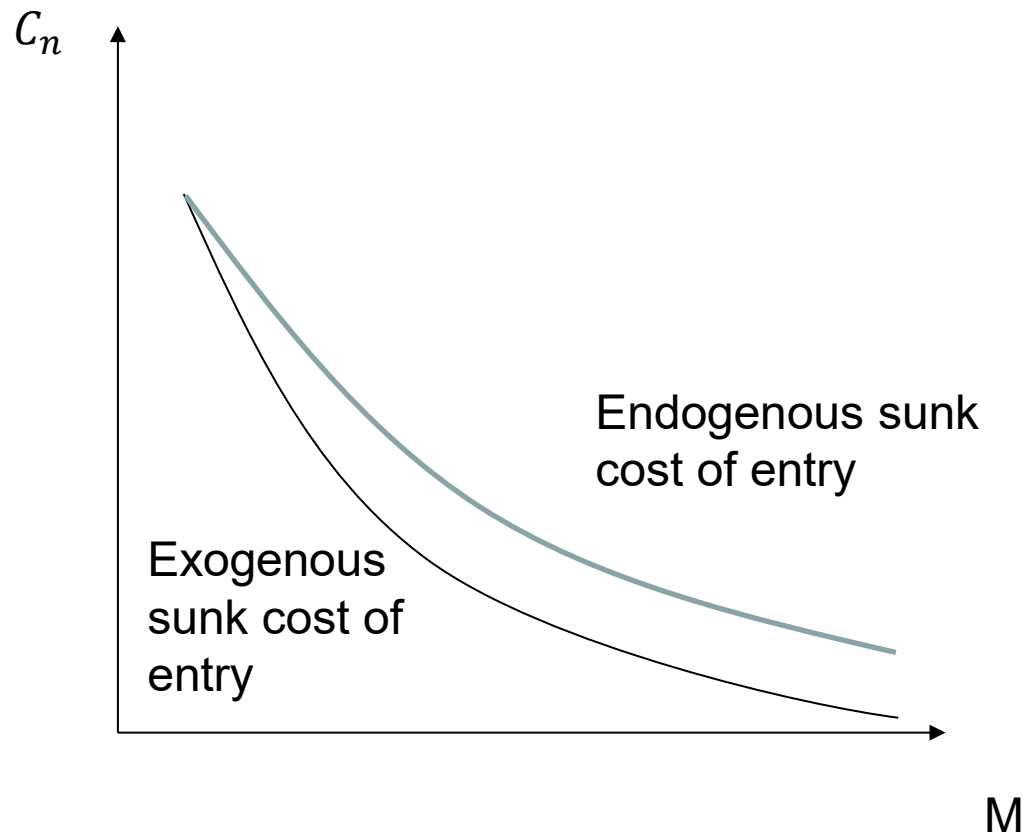
Industry concentration and firm turnover (cont'd)

- **Lesson:** In markets with endogenous sunk costs, even as the size of the market grows without bounds, there is a strictly positive upper bound on the equilibrium number of firms.

Case. Supermarkets in the U.S.

- Ellickson (2007): supermarkets concentration (U.S., 1998)
 - Identifies 51 distribution markets
 - All are highly concentrated (dominated by 4 to 6 chains), *independently of the size of the particular distribution market.*
- Due to endogenous sunk costs?
 - Quality dimension: available number of products
 - Can be increased by more shelf space and/or improved logistics
 - Average number of products has indeed increased
 - 14,000 (1980), 22,000 (1994), 30,000 (2004)
 - Investments are incurred within each distribution market.

Industry concentration and firm turnover (cont'd)



Details: Quality-augmented Cournot model

- Effect of endogenous sunk costs on entry?
- 3-stage game
 1. Firms decide to enter
 2. Firms decide which quality to develop (s_i)
 3. Firms decide which quantity to produce (q_i)
- Consumers
 - Measure M , with Cobb-Douglas utility function

$$u(q_0, q) = q_0^{1-\gamma} (sq)^\gamma$$
 - Consumers spend a fraction γ of their income y on the good offered by Cournot competitors
 - Total consumer expenditure = $M\gamma y$

Details: Quality-augmented Cournot model (cont'd)

- **Stage 3 (quantities).** Consumers compare products by their price-quality ratio, so all active firms must have the same ratio:

$$\frac{p_i}{s_i} = \lambda \quad \text{for all active firms } i$$

- **Step 1. Industry revenue.** Consumers spend $R = M\gamma y$ on the good, so

$$R = \sum_i p_i q_i = \lambda \sum_i s_i q_i \quad \Leftrightarrow \quad \lambda = \frac{R}{\sum_i s_i q_i}$$

- A higher quantity by firm i lowers λ : $\frac{d\lambda}{dq_i} = -\frac{s_i}{R} \lambda^2$.

Details: Quality-augmented Cournot model (cont'd)

- **Step 2. Firm i 's first-order condition.** Firm i maximizes $(p_i - c)q_i = (\lambda s_i - c)q_i$:

$$\lambda s_i - c - \frac{s_i^2 q_i}{R} \lambda^2 = 0 \quad \Leftrightarrow \quad s_i q_i = \frac{R}{\lambda} - \frac{cR}{\lambda^2 s_i}$$

- **Step 3. Solving for λ .** Summing over the n firms and using $\sum_i s_i q_i = \frac{R}{\lambda}$ from Step 1,

$$\frac{R}{\lambda} = \frac{nR}{\lambda} - \frac{cR}{\lambda^2} \sum_i \frac{1}{s_i} \quad \Leftrightarrow \quad \lambda = \frac{c}{n-1} \sum_i \frac{1}{s_i}$$

Details: Quality-augmented Cournot model (cont'd)

- **Step 4. Price margin and profit.** Let $\Sigma \equiv \sum_i \frac{1}{s_i}$. Using $p_i = \lambda s_i$ and Step 2,

$$p_i - c = \left(\frac{s_i \Sigma}{n-1} - 1 \right) c \quad \Rightarrow \quad (p_i - c)q_i = \left(1 - \frac{n-1}{s_i \Sigma} \right)^2 R$$

- Firm i sells a positive quantity if and only if its quality is not too low relative to its rivals':

$$\frac{1}{n-1} \sum_j \frac{1}{s_j} > \frac{1}{s_i}$$

Details: Quality-augmented Cournot model (cont'd)

- Exogenous quality
 - Include entry costs, e , and fixed costs for producing quality, $C(s)$.
 - Symmetric equilibrium: $s_i = s$.
 - Firm's net profit:

$$(p^*(n) - c)q^*(n) - e - C(s) = R / (n^2) - e - C(s) = M\gamma y / (n^2) - e - C(s)$$

- If market size M explodes, $n \rightarrow \infty$
- Confirmation of result in 2-stage (entry-then-quantity-competition) model: no lower bound on concentration

Details: Quality-augmented Cournot model (cont'd)

- **Endogenous quality: stage 2.** Quality costs $C(s_i) = \alpha s_i^\beta$. If all other firms choose quality $\hat{s}$, firm i 's profit is

$$\left(1 - \frac{1}{\frac{1}{n-1} + \frac{s_i}{\hat{s}}}\right)^2 R - \alpha s_i^\beta$$

- **Step 5. Symmetric quality.** Differentiating with respect to s_i and setting $s_i = \hat{s} = s^*$,

$$\frac{2(n-1)^2}{n^3 s^*} R = \alpha \beta (s^*)^{\beta-1} \quad \Leftrightarrow \quad (s^*)^\beta = \frac{2R(n-1)^2}{\alpha \beta n^3}$$

- Quality increases in $R = M\gamma y$: in larger markets, firms compete more fiercely in quality.

Details: Quality-augmented Cournot model (cont'd)

- **Step 6. Stage 1 (entry).** In a symmetric equilibrium, gross profit is $\frac{R}{n^2}$ and quality costs $\alpha(s^*)^\beta = \frac{2R(n-1)^2}{\beta n^3}$, so

$$\pi(n) = \frac{R}{n^3} \left(n - \frac{2}{\beta} (n-1)^2 \right) - e$$

- Profits can be positive, even for very large R , only if the bracket is positive:

$$n - \frac{2}{\beta} (n-1)^2 > 0 \quad \Leftrightarrow \quad n < \bar{n} \equiv 1 + \frac{1}{4} (\beta + \sqrt{\beta(\beta+8)})$$

- The bound $\bar{n}$ does not depend on market size M .

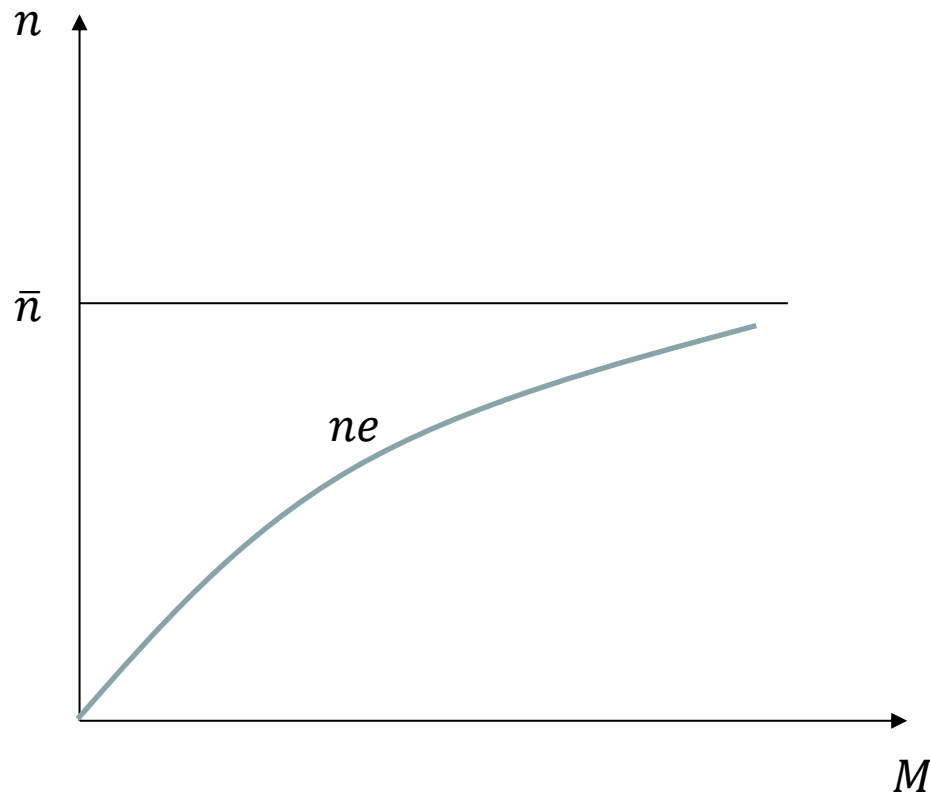
Details: Quality-augmented Cournot model (cont'd)

- **Example.** $\beta = 5$:

$$\bar{n} = 1 + \frac{1}{4}(5 + \sqrt{65}) \approx 1 + \frac{5 + 8.06}{4} \approx 4.27$$

- At most four firms can be active, no matter how large the market becomes.
 - With $n = 5$, the bracket is $5 - \frac{2}{5} \times 16 = -1.4 < 0$: a fifth firm always makes losses.
- Intuitively, as the market grows, firms invest more in quality, which raises the sunk cost of competing and keeps the number of firms small: a **natural oligopoly**.

Endogenous sunk costs: number of firms



- Let $\beta = 5, e = 0.2$. $\bar{n}$ is not a function of M

Details: Quality-augmented Cournot model (cont'd)

- **Lesson:** In markets with endogenous sunk costs, even as the size of the market grows without bounds, there is a strictly positive upper bound on the equilibrium number of firms.

Industry concentration and firm turnover (cont'd)

- **Dynamic firm entry and exit**
 - So far, static models
 - OK to predict number of active firms in industries
 - But, unable to generate entry and exit dynamics
 - What do we expect?
 - Market entry (exit) in growing (declining) industries
 - What do we observe?
 - Simultaneous entry and exit in many industries
 - Explanation?
 - Firms are heterogeneous (e.g., different marginal costs)
 - Their prospects change over time (idiosyncratic shocks)
 - Model
 - More technical; to be read in the book

Industry concentration and firm turnover (cont'd)

- **Lesson:** In monopolistically competitive markets, market size $\uparrow$
 - total number of firms in the market $\uparrow$
 - only particularly efficient firms stay
 - turnover rate $\uparrow$
 - ⇒ firms tend to be younger in larger markets.

Case. Hair salons in Sweden

- Asplund and Nocke (2006) compare age distribution of hair salons across local markets.
- Hypothesis: *estimated age distribution function of firms with large market size lies above estimated age distribution of firms with small market size.*
- Confirmed by the data.

Review questions

- Why is there generally a first-mover advantage under sequential quantity competition (with one leader and one follower) and a second-mover advantage under sequential price competition? Explain by referring to the concepts of strategic complements and strategic substitutes.
- When firms only face fixed set-up costs when entering an industry, how is the equilibrium number of firms in the industry determined? Is regulation possibly desirable (to encourage or discourage entry)? Discuss.

Review questions (cont'd)

- What is the difference between endogenous and exogenous sunk costs? What are the implications for market structure?
- Which market environments lead to simultaneous entry and exit in an industry?