

Part VI. Theory of competition policy

Chapter 15. Horizontal mergers



Slides

Industrial Organization: Markets and Strategies

Paul Belleflamme and Martin Peitz, 2d Edition

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Chapter 15. Learning objectives

- Understand what influences the profitability of Cournot mergers.
- Assess how a merger affects welfare.
- Examine how modifications of the model change the results of our analyses.
 - Successive mergers
 - Entry-inducing mergers
 - Price competition
 - Impact on tacit collusion
- Understand how merger analyses are conducted empirically.

Horizontal mergers

- Merger control in the US
 - Long tradition: Clayton Act from 1914
 - Mergers are forbidden if substantial lessening of competition
 - Current approach: Horizontal Merger Guidelines (2010)
- Merger control in the European Union
 - Introduced in 1990
 - Before: individual member states were in charge
 - Revised in the 2004 Horizontal Merger Guidelines
- 2 main effects of mergers on competition
 - **Negative**: fewer decision makers
 - **Positive**: efficiency gains
- What if profitable but welfare-reducing merger?

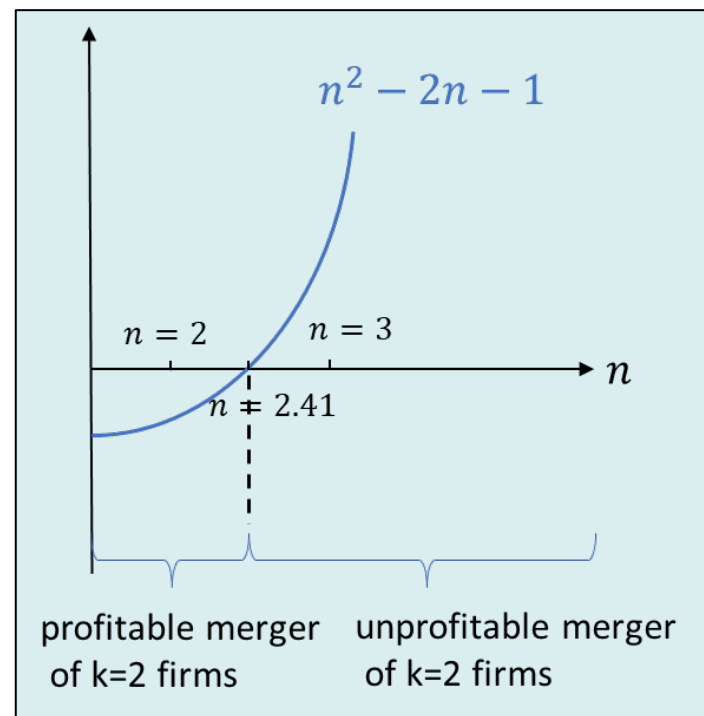
Mergers between 2 firms

- Market for a homogeneous product
 - Monopoly profit $\pi^m = \pi(1)$ is greater than industry profits in duopoly $2\pi(2)$
 - Merger to monopoly is always profitable.
- For mergers which fall short of a merger to monopoly, the issue is less clear-cut.
- Compare profits at the post-merger and the pre-merger equilibria.
 - Suppose constant marginal cost and no synergy effects \rightarrow no cost advantage for the merged firm (merger equivalent to buying a firm and closing it down)

Mergers between 2 firms (cont'd)

- Consider a single merger between 2 firms
 - The other firms in the industry will always gain from the merger.
 - Why? The merging firms internalize their previous rivalry once they are placed under common control.
 - → Benefits the firms outside the merger
 - Cournot competition → as a response to the merger,
 - the other firms increase output
 - detrimental to merging firm's profit.
- **Lesson:** Under Cournot competition, mergers of two firms are unlikely to be profitable if the market is fragmented but they are more likely to be profitable if the market is concentrated.

- Consider $p(q_i) = a - Q$, $MC = c$, where $a > c \geq 0$
- $\max_{q_i} (a - Q)q_i - cq_i$
 - Find BRF, then equilibrium output is $q_i^* = \frac{a-c}{n+1}$
- And equilibrium profits are $\pi_i(q_i^*) = \left(\frac{a-c}{n+1}\right)^2$
- $\pi_i(n-1) > 2\pi_i(n) \leftarrow$ "a single merger is profitable "
- $\left(\frac{a-c}{(n-1)+1}\right)^2 > 2\left(\frac{a-c}{n+1}\right)^2$
- Simplifies to $n^2 - 2n - 1 \leq 0$



Mergers between 2 firms (cont'd)

- Previous result hinges on 6 assumptions
 - Only 2 firms merge.
 - No increasing marginal cost of production (no capacity constraints)
 - Merger does not affect efficiency of production.
 - Only a single merger is possible.
 - No additional firm can enter.
 - Firms are Cournot competitors.
- Relax these assumptions one by one.

Mergers between several firms

- Merger is profitable if it involves a sufficiently large number of firms.
- **Lesson:** Mergers between multiple firms are only profitable for Cournot competition if a highly concentrated market results.
- Profitability depends on 2 opposite forces
 - By internalizing previous rivalry, the merged entity reduces its quantity and thereby increases its profit.
 - But outside firms react by increasing their quantity, which reduces the profitability of the merger.
 - For the 1st effect to dominate, the number of outside firms must be small enough.

Mergers between several firms (cont'd)

- Analytically:
 - $P(q) = a - q$, marginal cost c , no synergies
 - n firms, k of which merge
 - Merger is profitable if post-merger profit of the merged entity is larger than k times the pre-merger profit:

$$\begin{aligned} \pi_I \geq k\pi_{ea} &\Leftrightarrow \frac{(a-c)^2}{(n-k+2)^2} \geq k \frac{(a-c)^2}{(n+1)^2} \\ &\Leftrightarrow (k-1)(-k^2 + (2n-3)k - (n+1)^2) \geq 0 \\ &\Leftrightarrow k > \frac{1}{2} \left(2n + 3 - \sqrt{4n+5} \right) > 0.8n \end{aligned}$$

- So-called “80% rule”.

Efficiency-increasing mergers

- If merger confers an advantage to merged entity with respect to the outside firms:
 - Merged firm does not \downarrow its production so much
→ Outside firms do not \uparrow their production so much
- More mergers should become profitable in the presence of efficiency gains.
- 2 different types of efficiency gains
 - Scale economies
 - Synergies

Scale economies

- Merged entity has now access to the combined productive capacity of the merging partners.
- Assumptions
 - Each firm owns a certain amount of capital.
 - When some firms merge, the merged entity owns the combined capital stock.
 - Each firm's marginal cost increases linearly with that firm's output.
 - The larger the firm's capital stock, the lower the slope of the marginal cost curve.
- The merged entity has a lower marginal cost curve than either of the constituent firms.

Scale economies (cont'd)

- Model

- $P(q) = a - q$, n firms, k of which merge
- K : capital stock; c, h : positive parameters

- Total cost:

$$C(q_i, K) = cq_i + \frac{h}{2} \frac{1}{K} q_i^2$$

- Marginal cost: $c + (h/K)q_i \rightarrow$ rotates about the intercept as the capital stock changes.
- Redo the previous analysis under these assumptions.

- **Lesson:** Fixed asset combinations and increasing marginal costs enlarge the scope for profitable mergers in Cournot industries.

Synergies

- Assumptions
 - $P(q) = a - q$, n firms, k of which merge
 - Pre-merger constant marginal cost c
 - Merger \downarrow marginal cost of the merged firm from c to $c - x$ (x positive).
 - Redo the previous analysis under these assumptions.

- **Lesson:** Mergers between Cournot competitors that do not result in a highly concentrated market are only profitable if they entail sufficiently large synergies.

Welfare analysis of Cournot mergers

- We use the total surplus criterion
 - Sum of consumer surplus, CS, and total profits (“insiders” and “outsiders” profits).
 - Allow merger if $\Delta W = \Delta CS + \Delta \Pi_I + \Delta \Pi_O > 0$
- Interplay between
 - Competition-reducing effect of mergers
 - Potential efficiency gains
- Merger can increase total surplus if efficiency gains are large enough.
 - ‘Efficiency defence’
- But, there also exist levels of synergies that make mergers profitable but, at the same time, detrimental to consumers (or to society as a whole).



Case. The 'efficiency defence'

- 1998: *Superior Propane* and *ICG Propane* are the 2 largest propane distributors in Canada.
- Plan of merger
- 2 effects
 - Reduction of competition
 - Substantial in 66 of 74 local markets
 - Near monopoly in 16 local markets.
 - Estimated deadweight loss of C\$ 6 Mio. per year
 - Cost efficiencies
 - Estimated C\$ 29 Mio. per year
- Merger permitted using the total surplus criterion.

Welfare analysis of Cournot mergers (cont'd)

- Linear Cournot model with synergies
 - $P(q) = a - q$, n firms, k of which merge;
 - Pre-merger constant marginal cost c ;
 - Post-merger marginal cost of the merged firm decreases from c to $c - x$, where $x > 0$.
 - Define $\phi = x / (a - c) < 1 \rightarrow$ measures synergies

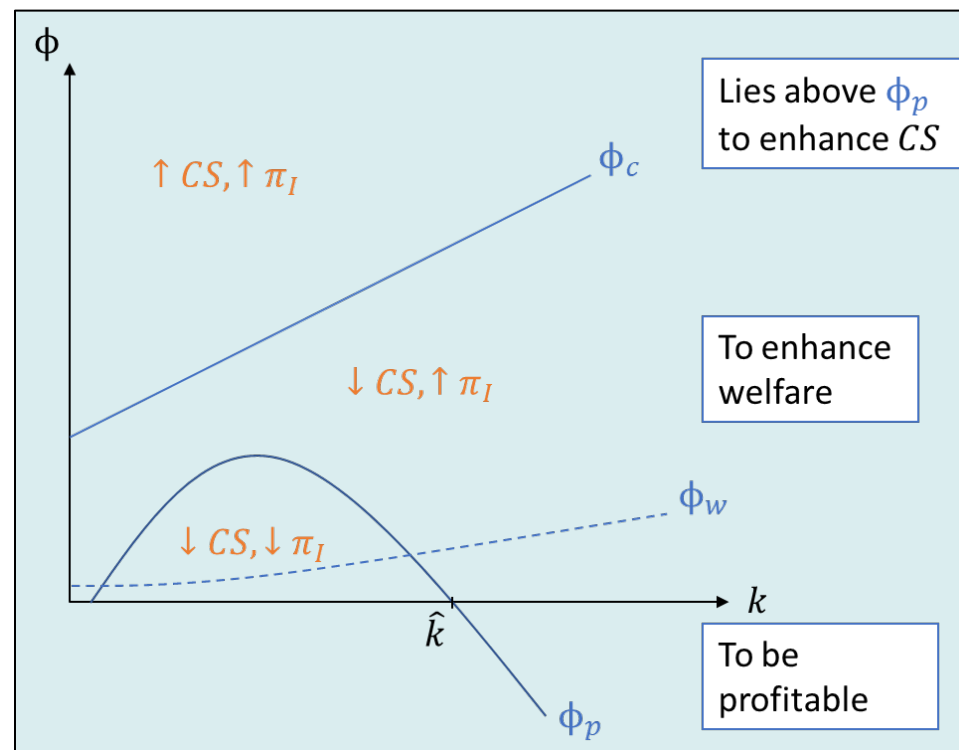
- **CS criterion:** merge if merger enhancing,

$$q_I = k q_{ea} = \frac{(a - c) + (n - k + 1)x}{n - k + 2} = k \frac{a - c}{n + 1}$$

Aggregate output merger Output before merger

- We define that $\phi \equiv \frac{x}{a - c}$.
- Then $\phi > \frac{k - 1}{n + 1} = \phi_c(k, n)$
- $\pi_I \geq k\pi_{ea}$
- $\phi_p > \frac{(n - k + 2)\sqrt{k} - (n + 1)}{(n - k + 1)(n + 1)}$

- $\uparrow CS$ iff $\phi \geq \phi_c$
- $\uparrow \pi_I$ iff $\phi \geq \phi_p$
- Note $\phi_c \geq \phi_p$, for all k and n
- $\frac{k-1}{n+1} \geq \frac{(n-k+2)\sqrt{k}-(n+1)}{(n-k+1)(n+1)}$
- Since $(n-k+1)(k-1) + (n+1)$
- $= k(n-k+2) \geq (n-k+2)\sqrt{k}$



- **Welfare criterion**

- Recall that aggregate output post merger is

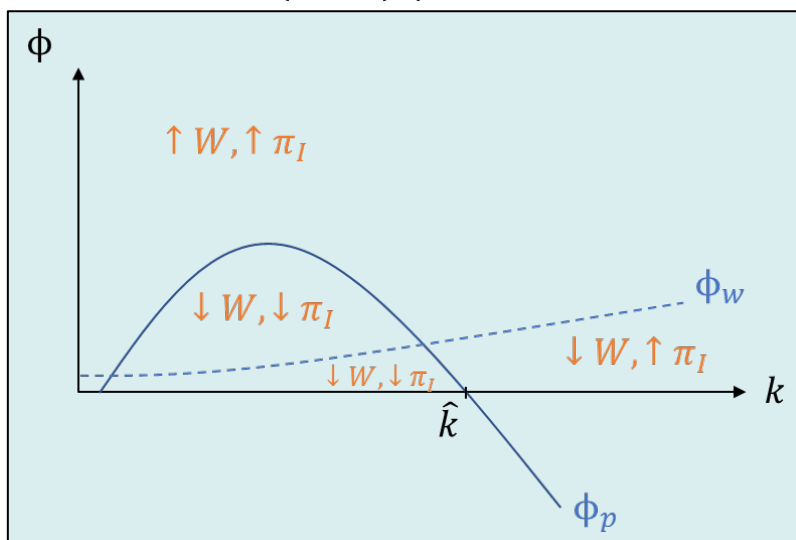
- $q_I + (n - k)q_O = \frac{(a-c)+(n-k+1)x}{n-k+2} + (n - k)\frac{a-c-x}{n-k+2} = \frac{(a-c)(n-k+1)+x}{n-k+2}$

- $W^{pre} = \frac{1}{2} \left(\frac{n(a-c)^2}{(n+1)^2} \right) + n \left(\frac{a-c}{n+1} \right)^2$

- $W^{post} = \frac{1}{2} \left(\frac{(a-c)(n-k+1)+x}{n-k+2} \right)^2 + \left(\frac{(a-c)+(n-k+1)x}{n-k+2} \right)^2$

- $W^{post} \geq W^{pre}$, solve for ϕ

- $\phi \geq \frac{-(n+1)(n-k+3)+(n-k+2)\sqrt{n^2-2k^2+4kn+6k}}{(n+1)(2n^2+2k^2+6n-4kn-6k+3)} \equiv \phi_w$



Welfare analysis of Cournot mergers (cont'd)

- welfare = total surplus
- **Lesson:** Suppose that mergers among Cournot competitors induce synergies. When a merger does not make the market too concentrated, profitability of the merger is a sufficient condition for welfare improvement. However, if the merger results in a highly concentrated market, it could be profitable and welfare-detrimental at the same time.

General welfare analysis

- A profitable merger among the insiders ($\Delta\Pi_I > 0$) is necessarily welfare-increasing if its ‘external effect’ on consumers and outsiders is positive ($\Delta CS + \Delta\Pi_O > 0$).
- The estimation of the external effect requires much less information than the estimation of the overall welfare effect.
 - Estimation of impact on insiders’ profits requires estimation of synergies (hard to get).
- What matters for consumers and outsiders is the change in the equilibrium output of the insiders.

General welfare analysis (cont'd)

- Suppose $P'(q) < 0$, $MR = P'(q) + P''(q)q_i < 0$, $C_i'' \geq 0$
- PMP \rightarrow FOC:

$$\frac{\partial \pi_i}{\partial q_i} = P(q) - P'(q)q_i = C_i' \Rightarrow P(q) - C_i' = P'(q)q_i$$

- $\frac{FOC_i}{FOC_j} = \frac{P(q) - C_i'}{P(q) - C_j'} = \frac{\frac{q_i}{q}}{\frac{q_j}{q}}$

\leftarrow s_i , market share of firm i

\leftarrow s_j , market share of firm j

- Define total surplus as follows:

- $CS + \pi_o = \int_0^q P(q) dq - P(q)q + \sum_{i \in O} [P(q)q_i - C_i(q_i)]$

General welfare analysis (cont'd)

- $dCS + d\pi_o$

$$= P(q)dq - P'(q)qdq - P(q)dq + \sum_{i \in O} P'(q)q_i dq + \sum_{i \in O} [P(q) - C'_i]dq_i$$

$$= -P'(q)qdq + P'(q) \sum q_i dq + \sum [P(q) - C'_i] dq_i$$

$$= -P'(q)q_I dq + \sum -P'(q)q_i \frac{dq_i}{dq} dq$$

$$= -P'(q)q_I dq + \sum -P'(q)q_i(-\lambda_i) dq_i$$

$$= -P'(q)q_I dq + \sum P'(q)q_i \lambda_i dq$$

$$= P'(q)dq[\sum \lambda_i q_i - q_I]$$

$$q = q_I + q_o$$

$$\Rightarrow q + q_o = -q_I$$

Let $q_i = q - q_i$,
 $r_i = \frac{dq_i}{dq_{-i}} \Rightarrow r_i \in (-1, 0)$.
 $\Rightarrow r_i dq_{-i} = dq_i$
 $\Rightarrow r_i dq_{-i} + r_i dq_i = dq_i + r_i dq_i$
 $\Rightarrow r_i dq = dq_i + r_i dq_i$
 $\Rightarrow \frac{dq_i}{dq} = \frac{r_i}{1+r_i} = -\lambda_i$,
 where $\lambda_i > 0$.

General welfare analysis (cont'd)

$$\bullet \Delta CS + \Delta \pi_O$$

$$= \int_{\text{initial } q_I}^{\text{final } q_I} \frac{dCS + d\pi_O}{dq_I} dq_I$$

$$= \int_{\text{final } q_I}^{\text{initial } q_I} -\frac{dCS + d\pi_O}{dq_I} dq_I$$

$$= \int_{\text{final } q_I}^{\text{initial } q_I} \underbrace{-P'(q)}_{\ominus} \underbrace{\frac{dq}{dq_I}}_{\oplus} \left(\sum \lambda_i q_i - q_I \right) dq_I$$

The sign dictates if the merger is welfare increasing or not.

$$\sum_{i \in O} \lambda_i q_i > q_I \Rightarrow \sum_{i \in O} \lambda_i \frac{q_i}{q} > \frac{q_I}{q} \Rightarrow \lambda_i s_i > s_I$$

$$\lambda_i = -\frac{r_i}{1 + r_i} = 1 \Rightarrow \lambda_i = -\frac{1}{2}$$

If $\lambda_i = 1$:

$$\sum s_i > s_I \Leftrightarrow (1 - s_I) > s_I, \Rightarrow s_I < \frac{1}{2}$$

General welfare analysis (cont'd)

- Merger within a subset of firms

- Positive external effect if

$$s_I < \sum_{i \in O} \lambda_i s_i, \text{ with } \lambda_i \equiv -dq_i / dq$$

firm i 's equilibrium response to a total output change dq caused by a change in production of some firms

- Upper bound on the combined share of the merging firms (at pre-merger equilibrium) for their merger to generate positive external effects

- Intuition

- If combined share of merging firms is small, they will not find it profitable to restrict output much.
- Outsiders react by expanding their output
 - output is shifted towards larger firms with lower pre-merger marginal costs
 - beneficial from welfare point of view

General welfare analysis (cont'd)

- **Lesson:** In a Cournot industry, a merger within a subset of firms (the ‘insiders’) has a positive external effect on the other firms (the ‘outsiders’) and on consumers if the combined share of the insiders is below some threshold, which depends on the way outsiders react at equilibrium to the change in total output generated by the merger. If there exists a positive external effect, a profitable merger is welfare-increasing.

Successive mergers

- If 2 mergers \uparrow consumer surplus in isolation, they also \uparrow consumer surplus when they take place together.
 - Conditional on one merger being proposed and approved, because (i) it is profitable, and (ii) it increases consumer surplus,
 - 2nd merger remains profitable and beneficial to consumers
- \rightarrow Competition authority can use a myopic policy (i.e., look at one merger at a time).

- **Lesson:** In environments where multiple disjoint mergers can be proposed over time, an antitrust authority that is concerned with the maximization of (discounted) consumer surplus can use a myopic policy that approves mergers if they do not decrease consumer surplus at the time of approval.

Case. Consolidation in the US airline industry?

- February 2008:
 - Delta Airlines and Northwest Airlines announce their plan to merge.
 - Other rumours of mergers
 - United Airlines and Continental
 - Continental and American Airlines
- Airlines executives declared:
 - Mergers were conditional on one another.
 - 2 major airlines needed to merge for the other airlines to follow suit.
 - OK with status quo if 1st merger did not take place.



Mergers and entry

- The profitability of a merger should be questioned if entry can occur.
 - If the entry threat is immediate, there does not exist any rationale for a merger except for efficiency motives.
- Shows that entry barriers are at the heart of the competitive effects of mergers.
- **Lesson:** If a merger only temporarily leads to a smaller number of firms because there is subsequent entry, a merger in a Cournot model is not profitable when firms are sufficiently patient (unless the merged firm enjoys a much higher productive efficiency).

Mergers under price competition

- Suppose that firms set prices in a differentiated product market.
→ stronger incentives to merge
- **Why?** With price competition, firms compete less aggressively after a merger.
 - Outsiders set a higher price.
 - Merged firm then benefits from these higher prices.
- With price competition, there is a rationale for mergers even in a non-concentrated industry.

Mergers under price competition (cont'd)

- **Lesson:** If firms have differentiated products and compete in prices, a merger between two firms leads to higher prices for all firms.
- In contrast to quantity competition there are strong private incentives to merge absent any efficiency gains.
- Merger is profitable and necessarily welfare-reducing if there are no efficiency gains.

Coordinated effects

- Possibility that a merger could increase the incentives of the remaining firms to engage in tacit collusion (**coordinated effects**)
- Contrasting impacts on sustainability of collusion
 - Merger ↓ number of firms in the market → makes tacit collusion easier to sustain.
 - Merger affects asymmetries among colluding firms.
 - In a market which is symmetric prior to the merger, a merger introduces asymmetries.
 - In the presence of synergies, merged entity may become a more efficient producer than outside firms.
 - In differentiated good industries, merged entity may own a larger set of brands.

Coordinated effects (cont'd)

- **Contrasting impacts (cont'd)**
 - Asymmetries among firms make tacit collusion harder to sustain.
 - More difficult to define the common collusive price (more efficient firms prefer lower prices than less efficient ones).
 - Allocation of production quotas is also harder to agree upon (equal sharing would typically be inefficient when some firms are more efficient than others).

- **Lesson:** A merger may exert 2 conflicting effects on the sustainability of collusion: a positive effect through the reduction in the number of firms and a negative effect if it increases the asymmetry among firms.



Case. Nestlé-Perrier merger

Pre-merger		Proposition 1		Proposition 2		Proposition 3	
Perrier	36%	Nestlé + Perrier	53%	Nestlé + Perrier	38%	Nestlé + Perrier – Volvic – other brands	
Nestlé	17%			– Volvic			
BSN	23%	BSN	23%	BSN + Volvic	38%		
Others	24%	Others	24%	Others	24%		

Refused because dominant position

Refused because coordinated effects

OK

Event studies

- Analysis of stock market performance of merging firms and outsiders following
 - a merger announcement,
 - the eventual investigation and subsequent decision of the competition authority.
- Learn the potential effects of a merger from the reaction of the stock market.
 - Increase in the equity value of the merging firms and of the outsiders indicates that the merger is likely to result in
 - higher prices
 - thus higher profits,
 - at the expense of consumers.

Event studies (cont'd)

- Not clear
 - when stock market participants learn about a merger announcement
 - what they learn from it
 - the announcement may simply inform about the good health of the industry.

Direct price comparisons

- Direct comparisons of prices before and after the merger
- Can help competition authorities to identify the characteristics that are likely to make a merger anticompetitive or efficiency-enhancing.
- Ex post analysis may be used to assess the performance of ex ante analyses.

Merger simulations

- 2 steps
 - Collect pre-merger market information
 - To estimate direct and cross elasticities
 - To calibrate a one-shot-non-cooperative oligopoly model that matches the critical features of the industry under review.
 - Use calibrated model to calculate post-merger equilibrium
- *Almost Ideal Demand System (AIDS)* or nested / random coefficient logit models to analyse markets with differentiated consumer products
- Quantify and disentangle the impacts a merger is likely to have on concentration and efficiencies

Merger simulations (cont'd)

- Serious limitations
 - Price predictions subject to modelling error
 - In their current form, focus on the immediate price and output effects of mergers
 - Leave aside longer-term potential impacts of the merger
 - Usually assume that the firms' behaviour does not change as a result of the merger.

Review questions

- Explain why mergers that do not involve efficiency gains are rarely profitable in Cournot industries.
- What is the main advantage of assessing the welfare impact of a merger by looking at its 'external effect'? Explain in words the condition under which this external effect is positive.
- Taking successive mergers and entry into account, discuss whether and, if yes, how merger analysis has to be reconsidered.
- Explain the fundamental differences between mergers in Cournot and in Bertrand industries.
- What is meant by 'coordinated effects' of a merger. Discuss.