

Lecture 6

Agenda

- Introduction
- Mergers in Cournot Oligopoly
 - Extension 1: number of firms
 - Extension 2: fixed cost
 - Extension 3: asymmetric costs
 - Extension 4: Stackelberg mergers
 - Extension 5: Bertrand competition with differentiated goods
- Other explanations of the merger paradox
 - Role of Managers
- EU Merger Policy
 - An empirical assessment

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Aims

- be familiar with the logic of unprofitable mergers at an advanced level.
- have critical knowledge of why mergers may still occur.
- be familiar with the basic functioning of European merger control

Introduction I

- In this lecture, we will see that horizontal mergers can often be unprofitable and, therefore, should not occur; they also often reduce welfare
- If there are efficiency gains from mergers or if the merging firms behave like a Stackelberg leader, mergers will be profitable
- Manager behaviour and “preemptive” mergers may explain why unprofitable mergers may still occur

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Introduction II

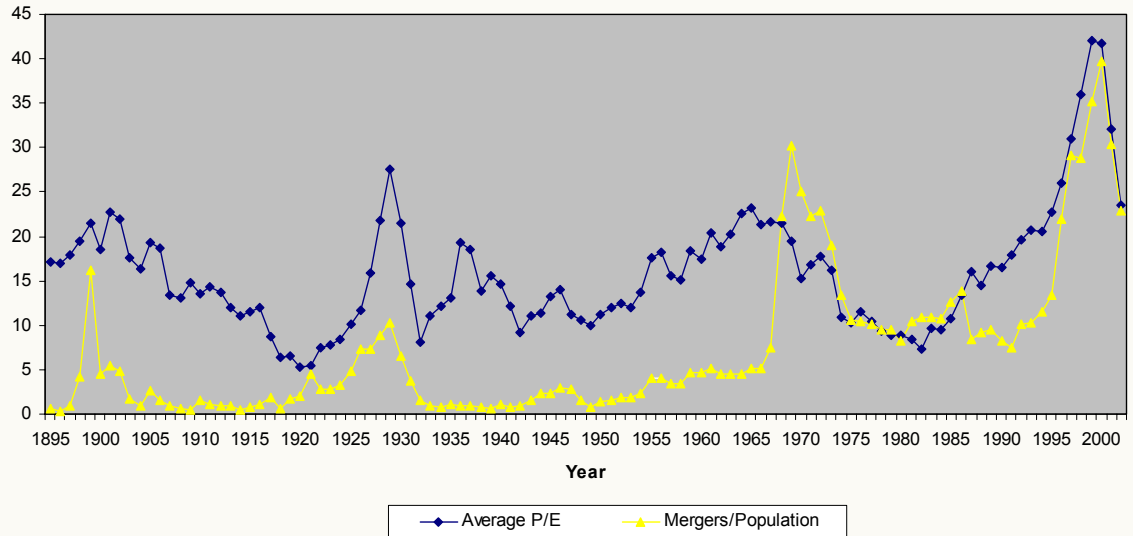
Why might a merger be bad for welfare?

- Two reasons why a merger could hurt welfare:
 - ① Collusion among the (remaining) firms in the market may be easier after the merger than it was before. [The **coordinated effects**.]
 - This is what the repeated game theory of collusion would predict: a smaller number of firms makes it easier to sustain collusion as an SPNE.
 - ② Even if the merger does not facilitate collusion, the fact that there is a smaller number of firms in the market will give each of them more market power [the **unilateral effects**]:
 - consumer surplus and total surplus become smaller.
- The discussion below is most relevant for the second point (the unilateral effects).

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Introduction III

- Volume of mergers worldwide



Sources: Mergers: 1895-1920 from Nelson (1959); 1921-67 from FTC; 1968-2002 from M&A.

P/E ratios: Homepage of Robert Shiller: <http://aida.econ.yale.edu/~shiller/data.htm>. Population: Statistical Abstract of United States (several years).

Source: Gugler K., Mueller D. C., Yurtoglu B. B. (2006),
"The Determinants of Merger Waves"

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Introduction IV

- Why do firms merge?
 - Greater market power?
 - Efficiency?
 - Increase of the stock market value?
- Increase profits! But: what are the implication for economic welfare?

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Mergers in Cournot oligopoly I

Assumptions:

- n symmetric firms
- no cost for simplicity, i.e., $mc = 0$
- linear demand:

$$p = 1 - \sum_{j=1}^n q_j$$

Profit of firm i :

$$\Pi_i = (1 - \sum_{j \neq i} q_j - q_i)q_i$$

Profit maximization:

$$\begin{aligned} \frac{\partial \Pi_i}{\partial q_i} &= 1 - \sum_{j \neq i} q_j - 2q_i = 0 \\ \Leftrightarrow 1 - \sum_{j=1}^n q_j &= q_i \end{aligned}$$

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Mergers in Cournot oligopoly II

From symmetry, we get $q_1 = q_2 = \dots = q_n \equiv q^*$ and therefore

$$1 - nq^* = q^* \Leftrightarrow q^* = \frac{1}{n+1}$$

Aggregate output, $\sum_{j=1}^n q_j = n/(n+1)$, increases in n . So, reducing the number of firms from n to $n-1$ through merger reduces total output (and therefore welfare) unambiguously.

Equilibrium profits are

$$\Pi^*(n) = (1 - n \cdot q^*)q^* = \left(1 - \frac{n}{n+1}\right) \frac{1}{n+1} = \frac{1}{(n+1)^2}$$

Reducing the number of firms from n to $n-1$ increases profits of all firms. But, do the two merging firms earn more than before as separate entities?

For a merger of two firms to be profitable, we need

$$\Pi^*(n-1) > 2\Pi^*(n)$$

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Mergers in Cournot oligopoly III

⇔

$$\frac{1}{n^2} > \frac{2}{(n+1)^2}$$

⇔

$$n < 1/(\sqrt{2} - 1) = 2.41$$

⇒ Mergers of two firms are only profitable if $n = 2$. (This would be a merger to monopoly!) With $n \geq 3$ firms, mergers of two firms are not profitable → Merger paradox

We will now try to resolve the paradox by extending the basic model:

- number of firms
- fixed cost
- asymmetric marginal cost

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Extension 1: number of firms

- Mergers involving more than two firms:
For a merger of $x \geq 2$ firms to be profitable, we need

$$\Pi^*(n - (x - 1)) > x\Pi^*(n) \Leftrightarrow \frac{1}{(n - x + 2)^2} > \frac{x}{(n + 1)^2}$$

- Solving for n , this is the case if and only if

$$x > \frac{2n + 3 - \sqrt{5 + 4n}}{2} \equiv x^{\min}$$

- Some numerical results for this condition:

n	2	3	4	5	6	10	15	20	30	100
x^{\min}	1.7	2.4	3.2	4.0	4.8	8.2	12.5	16.9	25.9	91.4
integ.	2	3	4	5	5	9	13	17	26	92

→ Paradox remains → Welfare is reduced again

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Interim discussion

- We found that mergers are often predicted to reduce welfare
- Since they are predicted to be not profitable, they should not occur
- However, many mergers occur
- Either the model is wrong (or incomplete)
- Or the model is right, but unprofitable mergers still occur

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Mergers in experimental markets

- The experiments by Huck, Konrad, Mueller and Normann (2007) show that the model is perhaps inappropriate
- n firm Cournot experiments with linear demand and cost as above
- “4 \rightarrow 3” treatment
 - 25 periods with 4 firms
 - then two firms merge and 25 periods with 3 firms follow
 - profits of the merged firm are equally shared between the two subjects
- The effects of mergers on total output are in line with the prediction (from Nash with n firms to Nash with $n - 1$)
- Merged firms produce more than unmerged firms, they also produce more than a firm in a market with the same number of firms but no merger history
- Control treatments indicate that the result is driven by aspiration levels; players have become used to a certain payoff level and do not want to lose

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Extension 2: fixed cost I

- Back to mergers of two firms but now there is a fixed cost K per production plant. A merger of two firms saves K : mergers yield efficiency gains!
- For a merger of two firms to be profitable,

$$\Pi(n-1) - K > 2\Pi(n) - 2K$$

or

$$\frac{1}{n^2} > \frac{2}{(n+1)^2} - K$$

must hold

- Define $K \equiv k/(n+1)^2$, i.e., $k \in (0, 1)$ is a percentage of the pre-merger gross profit

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Extension 2: fixed cost II

- The merger is profitable only if

$$\frac{1}{n^2} > \frac{2}{(n+1)^2} - \frac{k}{(n+1)^2}$$

that is,

$$n < \frac{1}{\sqrt{2-k}-1}.$$

- As $k \rightarrow 1$, the r.h.s. $\rightarrow \infty$ and we get $n < \infty$ (i.e., finite)
That is, mergers of two firms become more profitable the higher k (or K) is
So mergers of two firms can be profitable for any number of firms, even for large n
The reduction of output remains, but the saved fixed cost increases welfare. The total effect is ambiguous.

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Extension 3: asymmetric marginal cost I

- Asymmetric marginal cost. A merger of two firms yields efficiency gains as the inefficient plant can be shut down
- Suppose the merging firms get a lower (constant) marginal cost thanks to the merger.
 - Two versions of this:
 - ① Prior to the merger, the merging firms have different marginal costs, and after the merger the merged unit uses the lowest one of these.
 - ② There are truly *synergies*, so that the new marginal cost may be lower than any of the pre-merger marginal costs.
- The book shows in an example that the first kind of cost saving can make the merger profitable.
 - However, the price rises and consumers are made worse off.
- The second kind of cost saving can also make the merger profitable.

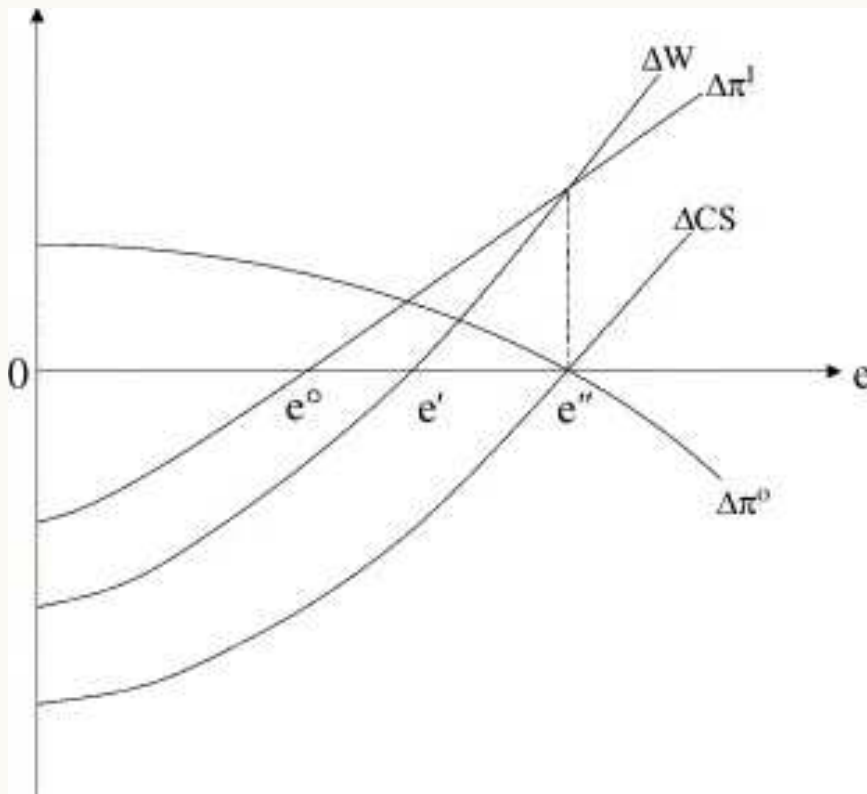
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Extension 3: asymmetric marginal cost II

- In addition, for large enough cost savings, consumers are better off, and the non-merging firms are worse off.
- See the figure (taken from Lagerlof and Heidhues, IJIO 2005), based on a linear Cournot model.
 - In the figure, e is a measure of the cost saving (i.e., $e = 0$ means no cost saving at all).
 - I stands for Insiders (= the merging firms) and O stands for Outsiders (= the other firms).
 - ΔW is the difference (post-merger minus pre-merger) in total surplus.
 - ΔCS is the difference in consumer surplus.
 - $\Delta \pi^I$ is the difference in the insiders' profit.
 - $\Delta \pi^O$ is the difference in the outsiders' profit.
 - For cost savings larger than $e = e''$, market price will go down thanks to the merger.

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Extension 3: asymmetric marginal cost - revisited III



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Extension 4: Stackelberg Merger I

- In line with the experimental results, suppose firms 1 and 2 merge and become the Stackelberg leader, firms 3, ..., n are followers
- Profit of follower firm i :

$$\Pi_i^F = (1 - q^L - \sum_{j \neq 1, 2, i} q_j^F - q_i^F) q_i^F$$

$$\Pi^L = [1 - q^L - (1 - q^L) \frac{n-2}{n-1}] q^L = \frac{1 - q^L}{n-1} q^L$$

- Profit maximization yields:
 - $q^{L*} = 0.5$ (note that this is independent of n)
 - $\Pi^{L*} = \frac{1/4}{n-1}$

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Extension 4: Stackelberg Merger II

- For a merger of two firms to be profitable, we need $\Pi^{L*} > 2\Pi^*(n)$, that is,

$$\frac{1/4}{n-1} > \frac{2}{(n+1)^2} \text{ or } \frac{n^2 - 6n + 9}{8(n+1)} > 0$$

→ For $n < 3$, too few firms for this analysis.

→ For $n = 3$, firms are indifferent about merger

→ For $n > 3$, we get profitable mergers

→ It appears that Stackelberg leadership can make mergers profitable and explain why they occur

Try to answer this:

How do such “Stackelberg mergers” affect welfare?

How are the non-merging Stackelberg followers affected?

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Extension 5: Bertrand competition with differentiated goods I

- Bertrand competition with a *homogeneous* good wouldn't solve the merger paradox.
 - This would yield zero profit both before and after the merger (as long as we don't have merger to monopoly, of course).
- Suppose we have Bertrand competition with *differentiated* goods.
 - In the book they show in an example that this model also solves the paradox: the merger is profitable for the merging firms (and also for the non-merging firms).
- Intuition:
 - One reason why we obtained the paradox in the Cournot model is that there the firms' choice variables are *strategic substitutes*:

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Extension 5: Bertrand competition with differentiated goods II

- When two firms merge, they will reduce their joint output compared to pre-merger, in order to exploit their greater market power and thereby increase their profit.
- The non-merging firms will respond by *increasing* their outputs.
- This undermines the effect of the merger.
- In the Bertrand model, however, the firms' choice variables are *strategic complements*:
 - When two firms merge, they will increase their price compared to pre-merger, in order to exploit their new market power and thereby increase their profit.
 - The non-merging firms will respond by increasing their prices too (which is helpful for the merging firms).
 - Thus, the response of the rivals strengthens the effect of the merger.

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Summary

- paradox remains:
 - number of firms:
- paradox can be solved:
 - fixed cost
 - asymmetric marginal cost
 - leader/follower
 - price setting (Bertrand)

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Other Explanations

- Mergers often occur in big merger waves
- Mergers often turn out to be unprofitable, but they still improve the stock market value of the firms (pre-emptive merger)
- Role of managers
U. Malmendier and G. Tate (forthcoming) "Who Makes Acquisitions? CEO Overconfidence and the Market's Reaction" Journal of Financial Economics.

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Role of Managers (Malmendier and Tate, forthcoming)

- Research question:
 - Does CEO overconfidence help to explain merger decisions?
- Intuition:
 - Overconfident CEOs overestimate their ability to generate returns. As a result, they overpay for target companies and undertake value-destroying mergers.
- Measure of overconfidence
 - CEOs' personal overinvestment in their company
 - their press portrayal.
- Results
 - The odds of making an acquisition are 65% higher if the CEO is classified as overconfident. The effect is largest if the merger is diversifying and does not require external financing.
 - The market reaction at merger announcement (-90 basis points) is significantly more negative than for non-overconfident CEOs (-12 basis points).

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EU Merger policy I

Merger policy is not covered in Art. 81 or 82 but in the Merger Regulation which became effective in 1989, much later than the Treaty of Rome (1956)

- The Merger Regulation defines the “Community dimension” of a merger using thresholds based on the turnover of the companies involved.
 - The most important are the worldwide threshold (euro 5,000m) and the Community-wide threshold (euro 250m)—unless each of the undertakings concerned achieves more than two-thirds of its aggregate Community-wide turnover within one and the same Member State.
 - Below these thresholds, merger control is carried out by the authorities in the Member States under their own legislation.
 - In 1996, these thresholds were indirectly lowered and the Commission still thinks that “too many mergers ... still fail to meet the turnover thresholds”

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EU Merger policy II

- Mergers and acquisitions with a Community dimension must be notified to the Commission for its agreement before they are put into effect.
- Generally, the attitude towards merger is a positive one: “When companies combine via a merger, an acquisition or the creation of a joint venture, this generally has a positive impact on markets: firms usually become more efficient, competition intensifies and the final consumer will benefit from higher-quality goods at fairer prices.”

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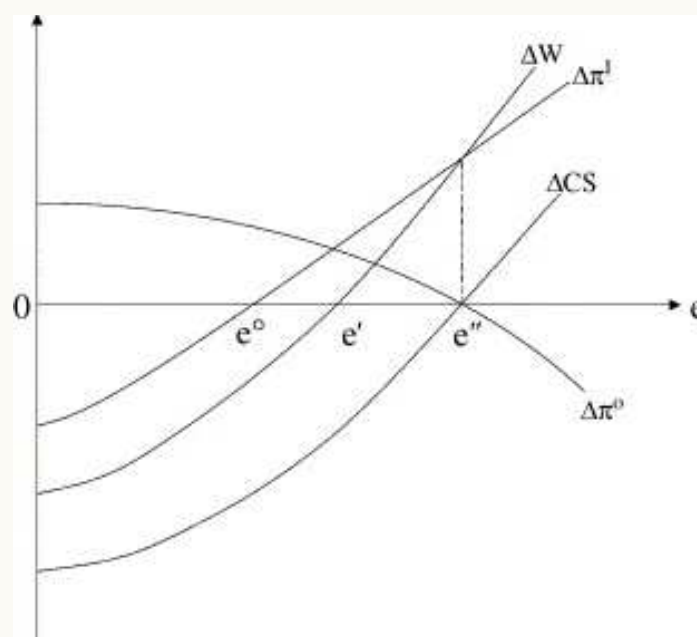
EU Merger policy III

- Some facts
 - ① merger control activity has increased: 60 notifications in 1991, 110 in 1995, 292 in 1999, 211 in 2003, 402 in 2007
 - ② in total the commission investigated 3586 mergers from 1990 - 2007
 - most of them are compatible with EU-Law
 - only 20 mergers were prohibited
 - 245 mergers were only compatible with remedies
 - ③ cross border transactions are only 1/4 to 1/3 of all mergers
- It appears that only a very small percentage of mergers is actually affected by the Commission. But
 - the deals affected will be large and important ones
 - the amendment will have value as a signal
 - it requires a lot of bureaucracy
 - will this bureaucracy select the truly problematic case?

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Evaluating the EU Merger policy I

A recent study estimated whether the decision of the European Commission were right or wrong. The analysis is based on the stock market reaction of competitors of the merging firms.



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Evaluating the EU Merger policy II

If the value of the shares of the competitors ...

- ... rose the merger is classified as anti-competitive
- ... decreased, the merger is classified as pro-competitive

Results

- 29% of the decisions are estimated to be a type-II-error: 49 out of 167 mergers were allowed although they are anti-competitive
- 21% of the decisions are estimated to be a type-I-error: 34 out of 167 mergers were prohibited or allowed with remedies although they are pro-competitive

Source: T. Duso, D. J. Neven, and L.H. Roeller (forthcoming)
"The Political Economy of European Merger Control: Evidence using Stock Market Data" The Journal of Law and Economics.