Economics 431
Winter 2001
Mergers and their effects on market price

Can we distinguish between mergers that enhance monopoly power and those that do not?

Can we explain facts about mergers (domino effect, merger waves)?

Horizontal merger replaces two former competitors with a single firm.

Suppose we have N firms competing in a Cournot market.

$$\pi(N) = Bq^2 = \frac{1}{(N+1)^2}\frac{(A-c)^2}{B}$$

After merger, the number of firms is less, so profit per firm grows, but this is not enough. Two firms must be willing to merge:

$$2\pi(N) < \pi(N-1)$$

After merger profit is more than before-merger profit combined.

$$\frac{2}{(N+1)^2} < \frac{1}{N^2}$$

$$2N^2 < N^2 + 2N + 1$$

$$(N-1)^2 < 2$$

Unless it is a merge to monopoly, two firms will never want to merge! But maybe, not 2, but M firms have an incentive to merge? New number of firms in the industry:

$$N - M + 1$$

$$M\pi(N) < \pi(N-M+1)$$

$$\frac{M}{(N+1)^2} < \frac{1}{(N-M+2)^2}$$

$$(N+1)^2 > M(N-M+2)^2$$

This inequality is very difficult to satisfy - we must merge most of the firms in the industry..

Example: Merge 8 out of 10

$$121 < 8 \cdot 16 = 128$$

It is unprofitable to merge 8 out of 10!

It is only profitable to merge 9 out of 10

Merge 16 out of 20 - unprofitable!

$$289 < 16 \cdot 36 = 576$$

This happens because the merged firm is just another firm in the market: there are two effects: the concentration effect: Lower n means higher markup. And the market share effect. Market share of the merged firm shrinks so significantly, that higher profit is not enough to compensate for it.

What if the merged firm becomes a major player on the market and this is in the position to become a Stackelberg leader?

Let us review Stackelberg model with 1 leader and K followers.

$$p = A - BQ_L - BQ_K$$

$$\max \left(A - c - BQ_L - BQ_{K-i} - Bq_i\right) q_i$$
$$A - BQ_L - BQ_{K-i} - 2Bq_i = c$$
$$A - BQ_L - BQ_K - Bq_i = c$$
$$p - Bq_i = c$$
$$A - c - BQ_L - BQ_K = B\frac{Q_K}{K}$$
$$A - c - BQ_L = BQ_K\frac{K+1}{K}$$
$$Q_K(Q_L) = \frac{K}{K+1}\left(\frac{A-c}{B} - Q_L\right)$$

The leader will produce monopoly quantity as we remember.

$$\max_{Q_L} \left(A - c - BQ_L - BQ_K(Q_L)\right) Q_L = \frac{1}{K+1}\left(A - c - BQ_L\right) Q_L$$

$$p - c = (A - c)\left(\frac{1}{2} - \frac{K}{2(K+1)}\right) = \frac{A-c}{2}\frac{1}{K+1}$$

$$\begin{aligned}
\pi_L &= \frac{1}{(K+1)}\frac{(A-c)^2}{4B} \\
\pi_F &= \frac{1}{(K+1)^2}\frac{(A-c)^2}{4B}
\end{aligned}$$

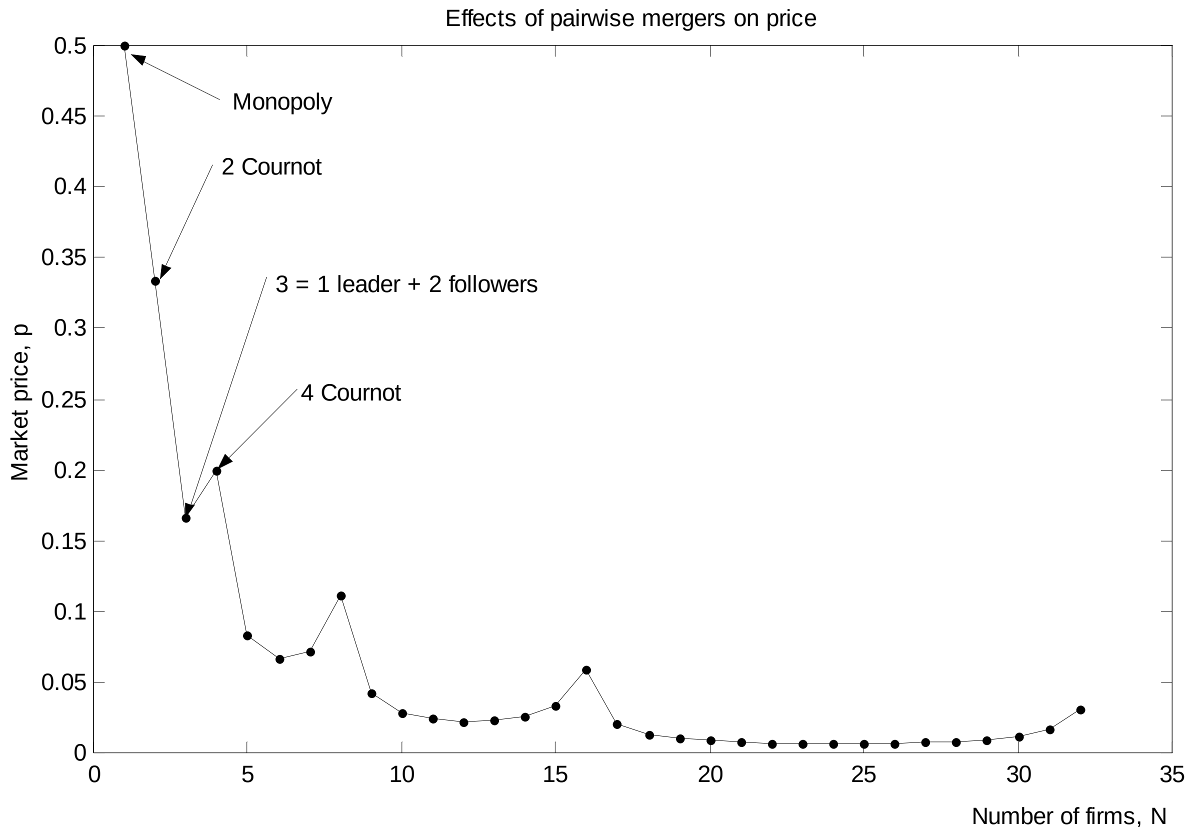
Let us explore the incentive to merge and become a leader. Of course, there will be a profit incentive, because the leader has large market share, and the number of firms in the industry falls at the same time.

$$2\pi(N) < \pi_L(N-1)$$
$$\frac{2}{(N+1)^2} < \frac{1}{4(N-1)}$$
This is satisfied whenever $N \geq 3$.

But look at the price: here is the second merger paradox.
$$\frac{A-c}{N+1} > \frac{A-c}{2(N-1)}$$
The price falls, because total output in the Stackelberg model is greater. If price falls, the total surplus from trade should rise. Then it is not clear why mergers are harmful and how mergers can lead to price increases.

We must allow several big firms on the market.

Several leaders: L leaders, K followers. Leaders engage in Cournot competition knowing how followers will respond. Aggregate quantity.
$$Q = Q_L + Q_F(Q_L) = Q_L + \frac{K}{K+1}\left(\frac{A-c}{B} - Q_L\right) = \frac{K}{K+1}\frac{A-c}{B} + \frac{Q_L}{K+1}$$
$$p - c = A - c - BQ = \frac{A-c-BQ_L}{K+1}$$
The individual leader's problem
$$\max_{q_l}(p-c)q_l = \max_{q_l}\left(A - c - B\left(\frac{K}{K+1}\frac{A-c}{B} + \frac{Q_{L-l}}{K+1} + \frac{q_l}{K+1}\right)\right)q_l$$
$$p - c = A - c - BQ = \frac{A-c-BQ_L}{K+1}$$
$$MB = A - B\left(\frac{K}{K+1}\frac{A-c}{B} + \frac{Q_{L-l}}{K+1}\right) - 2\frac{Bq_l}{K+1}$$
$$MB = p - \frac{Bq_l}{K+1} = c$$
$$q_l = \frac{Q_L}{L}$$
$$p - c = \frac{Bq_l}{K+1} = \frac{BQ_L}{L(K+1)}$$
$$\frac{A-c-BQ_L}{K+1} = \frac{BQ_L}{L(K+1)}$$
$$A - c - BQ_L = \frac{BQ_L}{L}$$
$$\frac{A-c}{B} = Q_L\frac{L+1}{L}$$
$$Q_L = \frac{L}{L+1}\frac{A-c}{B}.$$



First of all, in this model the profit incentive to merge remains. Still

$$2\pi_F(K, L) < \pi_L(K-2, L+1)$$

Second, notice: leaders' quantity grows with L, which reduces the markup. But markup may of may not fall, because it also depends on the number of followers.

When number of leaders is small, quantity grows and price falls with every subsequent merger. However, with every merger, the total number of firms falls - the industry becomes more and more concentrated.

$$Q_L = \frac{L}{L+1}\frac{A-c}{B} \uparrow L$$

$$p - c = A - c - BQ = \frac{A - c - BQ_L}{K+1}.$$

Again there is the quantity-enhancing effect of Stackelberg competition, but there is a concentration effect in the opposite direction:

Quantity effect:

$$\begin{aligned} \text{Quantity effect} &: \quad L \uparrow \Longrightarrow Q_L \uparrow \Longrightarrow (p-c) \downarrow \\ \text{Concentration effect} &: \quad L \uparrow \text{ by } 1 \Longrightarrow K \downarrow \text{ by } 2 \Longrightarrow (p-c) \uparrow \end{aligned}$$