Mergers

Why merge?

- reduce competition – increase market power
- cost savings – economies of scale and scope

Why allow mergers?

- cost savings
  - Oliver Williamson: the efficiency defense

Merger without cost savings

- Before merger: an \( n \)-firm oligopoly
- After a merger of two firms: an \((n – 1)\)-firm oligopoly
- Before merger: Each of the merging firms had a market share of \(1/n\), totalling \(2/n\)
- After merger: the merged firm has a market share of \(1/(n – 1)\).
- The price may have increased somewhat from the merger, but hardly enough to compensate for a loss in market share.

So why merge? Why not just expand?
The Perry-Porter model

- There is a factor of production whose total supply is fixed in the industry.

- If you want to expand, then you need access to more of this factor, which you can only obtain from other firms in the industry.

- Example: human capital, knowledge on operations.

A merger combines productive resources that are not available outside the industry.

A firm owning a fraction $k$ of that capital stock and producing output in quantity $x$ has costs $C(x, k)$.

Total costs: \[ C(x, k) = \frac{c}{2k} x^2 \]

Marginal costs: \[ \frac{\partial C}{\partial x} = \frac{c}{k} x \]

- The more $k$ you have, the lower are your marginal costs.

- A larger firm is able to make better use of its larger amount of the fixed-supply factor.

- When two firms merge, the merged entity now has higher $k$ than the two separate firms, and therefore lower costs.

Now, the merged firm obtains a market share in excess of $1/(n-1)$ because of its cost benefit. For sufficiently high $c$, this makes a merger profitable.
Merger policy

- In general, welfare analyses of mergers are complex – even within rather simple models.
- An alternative: a sufficient condition for a merger to be welfare improving
- The Farrell-Shapiro criterion

A merger affects
- the merging firms
- the non-merging firms
- consumers

When a merger is proposed, then – presumably – it is profitable for the merging firms. So the competition authority – when looking for a sufficient condition for a welfare-improvement - can limit the analysis to the merger’s effect on
(i) non-merging firms, and
(ii) consumers

→ the external effect of a merger

Cost savings affect to a large extent only the merging parties. So focusing on the external effect, we do not need to assess vague statements about cost savings from a merger.

If the merger leads to a higher price, then non-merging firms benefit, and consumers suffer. But what is the total external effect?
Cournot competition

\( X \) – total output in the industry
\( x_i \) – firm \( i \)’s output
\( y_i \) – all other firms’ output: \( y_i = X - x_i \)

Firm \( i \)’s costs: \( c^i(x_i) \)
Inverse demand: \( p(X) \)

Firm \( i \)’s first-order condition:
\[
p(X) + x_i p'(X) - c^i_x(x_i) = 0.
\]
\[
\Rightarrow \quad p(x_i + y_i) + x_i p'(x_i + y_i) - c^i_x(x_i) = 0
\]
\[
\Rightarrow \quad \text{Firm } i \text{'s response to a change in other firms’ output: Total differentiation wrt } x_i \text{ and } y_i:
\]
\[
\frac{dx_i}{dy_i} = R_i = -\frac{p' + x_i p''}{2 p' + x_i p'' - c^i_{xx}}
\]

From which we find firm \( i \)’s response to a change in total output:
\[
dx_i = R_idy_i \Rightarrow dx_i(1 + R_i) = R_i(dx_i + dy_i) = R_idX
\]
\[
\Rightarrow \quad \frac{dx_i}{dX} = \frac{R_i}{1 + R_i} = \frac{p'(X) + x_i p''(X)}{c^i_{xx}(x_i) - p'(X)} = -\lambda_i < 0
\]
Welfare effects of a merger

Two sets of firms:
- \( I \) – insiders
- \( O \) – outsiders

An infinitesimal merger
- \( dX_I \) – a small exogenous change in industry output

Change in welfare from this merger:
\[
dW = pdX_I - dc^I + \sum_{i \in O} \left[ p - c^I_x \right] dx_i
\]

- changes in output assessed at market price \( p \).
- \( c^I \) – insiders’ total costs
- Note: \( dx_i = -\lambda_i dX_I \) for each outsider firm
- From an outsider firm’s FOC: \( p - c^I_x = -x_i p' (X) \)

\[
\Rightarrow \\
dW = \left( pdX_I + X_I dp - dc^I \right) - X_I dp + \sum_{i \in O} p'(X) \lambda_i x_i dX
\]

\[
dW - d\pi^I = -X_I p'(X) dX_I + \sum_{i \in O} p'(X) \lambda_i x_i dX_I
\]

\[
dW - d\pi^I = \left[ \sum_{i \in O} \lambda_i x_i - X_I \right] p'(X) dX_I = \left[ \sum_{i \in O} \lambda_i s_i - s_I \right] X p'(X) dX_I
\]

Here, \( p' < 0 \) and, typically, \( dX_I < 0 \). So the external effect of a merger (the accumulation of many infinitesimal mergers) is positive if and only if:

\[
\sum_{i \in O} \lambda_i s_i > s_I
\]

→ An upper bound on the merging firms’ joint (pre-merger) market share in order for their merger to improve welfare.
Examples

1. Constant marginal costs, linear demand

\[ c^i_{xx} = 0, \ p'' = 0 \rightarrow \lambda = 1. \]

Before merger: all firms of equal size. The external effect is positive if the set of merging firms is less than half of all firms:

\[ s_I < \sum_{i \in O} s_i \Leftrightarrow m < n/2 \]

- But: will it always be profitable?

2. The Perry-Porter model, quadratic costs, linear demand

\[ \lambda_i = \frac{k_i}{c + k_i} \]

FOC for firm \( i \):

\[ p + x_ip' - C'(x_i) = 0 \Leftrightarrow p - x_i - \frac{c}{k_i}x_i = 0 \Leftrightarrow p = \frac{x_i}{\lambda_i} \Leftrightarrow \]

\[ \lambda_i = \frac{x_i}{p} = \frac{s_i}{\epsilon} \]

The external effect is positive if:

\[ s_I < \frac{1}{\epsilon} \sum_{i \in O} s_i^2 \]

- The size of the external effect depends on how concentrated the non-merging part of the industry is!
- A merger is more likely to be welfare-enhancing if the rest of the industry is concentrated.
- A merger among small firms leads to the other, \textit{big}, firms to expand, which is good.