HORIZONTAL MERGERS-MERGER PARADOX

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1. HORIZONTAL MERGERS

- Definition: Mergers between 2 competitors in a market. We can think of many examples of horizontal mergers, notably in automobiles (Fiat-Chrysler), airlines (Northwest-Delta), mobile phones (Sprint-Nextel), etc.

- Horizontal mergers are part of the core of I.O. There are many socially beneficial reasons to allow horizontal mergers:
  (I) economies of scale
  (II) economies of scope
  (III) cost synergies
  (IV) market expansion
  (V) replacement of management with better teams

- but there are also socially harmful consequences of horizontal mergers, notably market power and deadweight loss.

- We can identify reasons for different mergers that we have observed. For instance the automobile mergers are probably due to better management. The phone company mergers are often due to economies of scale and/or economies of scope.

1.1. Merger paradox (Cournot competition). In general, merger is not to the benefit of the merged firms. Let’s examine the minimum percent of firms need to be part of the merger in order to guarantee an increase in profit. Suppose there are \( N \) firms in the industry competing in the quantity dimension à la Cournot competition.

- Profit per firm before merger:
  \[
  \Pi(N) = \left( \frac{a - c}{N + 1} \right)^2
  \]  

- Profit per firm after \( m \) firms merge:
  \[
  \Pi(N - m + 1) = \left( \frac{a - c}{N - m + 2} \right)^2
  \]

We are interested in \( m/n \) such that \( \Pi(N - m) \geq m \cdot \Pi(N) \) which can be written as

\[
\left( \frac{a - c}{N - m + 2} \right)^2 \geq m \cdot \left( \frac{a - c}{N + 1} \right)^2
\]

\[
\Rightarrow (N + 1)^2 \geq m(N - m + 2)^2
\]

\[
\Rightarrow (N + 1)^2 - m(N - m + 2)^2 \geq 0
\]

Let \( F := (N + 1)^2 - m(N - m + 2)^2 \). Solving for \( F = 0 \) to find the three roots

\[
m^* = 1, 3/2 + N + \frac{1}{2}\sqrt{5 + 4N}, \frac{3}{2} + N - \frac{1}{2}\sqrt{5 + 4N}
\]

We can see these three solutions by fixing \( N \). For example let \( N = 10 \), function F is show in Figure 1. These three roots provide us three regions where \( F > 0 \): \([0, 1], \left[\frac{3}{2} + \frac{1}{2}\sqrt{5 + 4N}, N\right] \) and \([N, \frac{3}{2} + N + \frac{1}{2}\sqrt{5 + 4N}]\).

\[\text{Footnote: Merger to just change the brand name or change of style in operation}\]
Only the second region is feasible. In another words, firms have incentive to merge \( \text{iff } m > \frac{3}{2} + N - \frac{1}{2}\sqrt{5 + 4N}. \)

To find the percentage of the firms that needs to merge in order to be profitable, let \( y = \frac{3}{2} + N + \frac{1}{N}\sqrt{5 + 4N}. \)

A plot of function \( y \) is provided in Figure 2. It shows that for most of ranges of the \( N \), it requires a merger between at least 85% of the firms in order to be profitable.

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We saw last class, that in a homogeneous goods Cournot, industry where there are no capacity constraints and where costs do not drop as a result of the merger, a merger from even 3 to 2 firms
will not be profitable. This point can be extended to show that in this model, even if there are a lot of firms most of them (80% rule) need to merge together for a merger to be profitable.

- Is this phenomenon "real" or an artifact of the model? I believe that in the real world, this phenomenon is there. Big companies tend to price high which lets smaller ones thrive over time. However, it’s not as dramatic as in the model for 2 reasons.
  - (I) We wrote down a model which no capacity constraints, no cost differences across firms and no differentiation in products. With any of these assumptions modified, we would expect to see more value from merger. E.g., in a regular merger, firms gain capacity.
  - (II) Second in some industries, large size itself confers an advantage, in terms of the value of the products or costs. To see this consider the difference between automobiles and Microsoft office. The value of Office is high because everyone is using it. This means that it’s very hard for a new firm to get a leg up in this industry. This is called a network effect and it’s just one example of a case where being large itself gives an advantage.\(^2\)

- In contrast, a small automobile firm would like to have a dominant General Motors that kept prices high. A small Office software firm would rather that the Office software market were fragmented. In another words, it’s often good to be in a industry with a dominant firm because the dominant firm often choose to set a high price while suffering from losing market share in the long run such as in the automobile industry.

1.2. Merged firm as a Stackelberg leader. However, if the merged firm becomes a Stackelberg leader, it can improve its position.

Assume 2 out of \(N\) firms merged and act as a leader à la Stackelberg:

- Leader gets \(\frac{(a-c)^2}{4b(n-1)}\)
- Each follower gets \(\frac{(a-c)^2}{4b(n-1)}\)
- Pre-merger, the two firms gets: \(2 \cdot \frac{(a-c)^2}{b(N-1)}\).
  
  For merger to be profitable, the following condition has to hold,

  \[
  (a - c)^2 > 2 \cdot \frac{(a - c)^2}{b(N + 1)^2}
  \]

  \[
  \Rightarrow (N + 1)^2 > 4(N - 1)
  \]

  \[
  \Rightarrow N^2 - 2N + 5 > 0
  \]

  The last condition is always true since it’s a quadratic concave function with the minimum at \(N = 1\) and the value at this point is 4 which is positive.

- In this model, total output will increase. This leads to a new paradox: Why would antitrust officials want to stop this type of merger?

\(^2\)In the case of Microsoft office, the inherent Monopolist advantage lays at the switching cost and network effect (in terms of comparability)