

14.272 Recitation Handout 1

Horizontal Mergers with Strategic Substitutes and Strategic Complements

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February 13, 2002

The welfare effects of horizontal mergers can be divided into:

1. Effect on producer surplus (profit) of merging firms;
2. Effect on producer surplus (profit) of other firms in the industry/market;
and
3. Effect on consumer surplus, determined by the level of output/prices.

This handout looks at the general principles which determine how a merger will effect each of the above. A key distinction is whether the industry is characterized by competition in **STRATEGIC SUBSTITUTES** (e.g. Cournot) or **STRATEGIC COMPLEMENTS** (e.g. differentiated products Bertrand)¹. For each I will stress the intuition before stating or developing more formal results. Recall from 14.271:

$$\frac{\partial \pi_i}{\partial a_i \partial a_j} > 0 \rightarrow \text{STRATEGIC COMPLEMENTS}$$
$$\frac{\partial \pi_i}{\partial a_i \partial a_j} < 0 \rightarrow \text{STRATEGIC SUBSTITUTES}$$

As a benchmark consider the case where there is a merger with no effects on cost and *there is no reaction from competitors who keep their strategic choice variable (price or quantity) the same*. It should be obvious that the merger must be (weakly) profitable and will be strictly profitable if the firms directly compete with each other at all. The merged will reduce quantity or increase price and consumer welfare will fall. The non-merging firms will gain.

Are these simple effects preserved once we allow for a competitive reaction? Consider first strategic complements then strategic substitutes (on which I will say more).

¹The distinction is also important in considering the effects of vertical mergers.

1 Strategic Complements

Assume that the firms in the industry produce goods that are substitutes in the eyes of consumers. The logic with no cost efficiencies is that when the two merging firms increase their price it becomes more profitable for me to increase my price (simply definition of strategic complements). When I increase my price this is good for the merging firms and is generally bad for consumers. Therefore relative to the case with no competitive reaction all the firms in the industry are better off and consumers are worse off.

Next imagine the case where cost efficiencies are sufficiently large that the merging firms achieve a large enough efficiency gain that with no competitive reaction they will reduce their prices (e.g., big economies of scale). In response, the non-merging firms will reduce their prices, which makes the merger less profitable for the incumbents but tends to reinforce the gain in consumer welfare.

Example: 3 symmetric firms:

Demand is given by the following linear demand system (with symmetric products):

$$\begin{aligned}q_1 &= 1 - p_1 + 0.165p_2 + 0.165p_3 \\q_2 &= 1 + 0.165p_1 - p_2 + 0.165p_3 \\q_3 &= 1 + 0.165p_1 + 0.165p_2 - p_3\end{aligned}$$

Marginal costs for each firms are $\frac{2}{3}$.

Pre-merger prices are ≈ 1 , quantities $\approx \frac{1}{3}$.

Firms 1 and 2 merge with no cost efficiency. With no competitive response from firm 3, the firms 1 and 2 would set prices of 1.031. With a competitive response we get new equilibrium prices of 1.034, 1.034 and 1.006 i.e., there is a very small increase in the price of the non-merging firm.

Firms 1 and 2 merge with a cost efficiency so that they both have cost of $\frac{1}{3}$ and firm 3 keeps its old technology. After the merger prices are 0.861, 0.861, 0.976 for 1, 2 and 3 respectively. The consumers of the third product benefit from the merger between the makers of the other products. However, all consumers would be better off if the same efficiency could be achieved in some way without the merger (prices would be 0.813, 0.813, 0.967).

Of course, if goods are complements the logic could be different. Firms and consumers could benefit from the merger as in this case the negative externality caused by competition is that it is bad for you when I set a high price. If there is time we will look at an example of antitrust.org.

2 Strategic Substitutes (Farrell and Shapiro, 1990)

When we compete in strategic substitutes (quantities) then when I decrease my output (as a result of a merger) it becomes profitable for you to increase your output. In this case the competitive reaction offsets the unilateral effect of the merger: if the merged firms reduce output, other firms will increase theirs which is bad for the merged firms and good for consumers and the non-merging firms. This simply reflects the fact that the reaction functions are downward sloping.

The classic analysis of these effects is Farrell and Shapiro (1990) and the first question on PS 1 goes through some of the same logic [**HINT** : when you try to do the question first think whether there are likely to be any results that hold completely generally, but only do algebra for specific examples, such as linear demand $P=1-Q$]. You should read F&S and try to understand the intuition clearly, and going through the algebra will help this. Cournot question are also mid-term favourites!

F&S make two weak **assumptions** in a homogenous good, Cournot model:

1. Each firm's reaction function slopes downwards
2. Residual demand intersects MC curve from above (things would look wacky otherwise...)

Note that firms may have asymmetric marginal or fixed costs.

The **results** are:

1. In a Cournot model the **SIGN** of the welfare change resulting from a change in output is the same as the **SIGN** of $\frac{dX}{X} + \frac{1}{2} \frac{dH}{H}$ where X is aggregate output and H is the HHI. This reflects the two welfare effects: (1) the level of output determines the level of prices and consumer surplus, (2) the HHI reflects the efficiency of production, so that redistribution of production towards larger and (therefore) more efficient firms is good. Note that if everyone reduces their output proportionately to their current outputs ($dH = 0$) then welfare must fall.
2. If firm 1's output changes exogeneously and all the other firms behave Cournot then aggregate output moves in the same direction as firm 1's but by less (i.e. other firms offset to some extent: this simply comes from aggregating other firms RFs). This means that to **SIGN** the effects on consumers we only need to look at how the output of the **merging** firms changes.
3. A merger of a group of firms in Cournot oligopoly raises price iff at pre-merger output levels the merged firm would have a mark-up less than the **SUM** of the mark-ups of the pre-merged firms. This may sound strange but it is natural when you think about it, because the merged firm considers the lower price on the combined sum of outputs when it increases output. To see the implication, imagine that

- prior to merger, price is 1 and marginal costs are $\frac{2}{3}$ and $\frac{2}{3}$.
 - then for a merger to reduce the market price, the merged firm must have marginal cost of $\frac{1}{3}$.
4. A natural consequence of this is that with no synergies the market price will go up (consumer welfare down) following a merger. This is true even if one firm is highly inefficient and gets to use the more efficient firm's technology (to get an increase in output the **marginal cost of the lowest cost firm** must fall). If the merger is between two large firms (which will have large mark-ups) costs must fall a lot.
 5. The results for total welfare can be different to those for price. There are two external welfare effects: on consumers and on other producers. The latter gain when the merged firms reduce their output.
 - If there was no offsetting competitive response then consumers and other producers **COMBINED** would lose when merging firms reduced their output.
 - With a competitive response a merger reducing output by a very small amount increases **COMBINED** welfare if $\sum_{i \in O} \lambda_i s_i > s_I$ where O is the set of non-merging firms, I is for the combined merged firms, s is market share and λ is a function of demand parameters and costs. With linear demand and constant marginal cost $\lambda = 1$, so total "outside" welfare goes up if the sum of non-merging market shares is greater than the merged firm's market shares.
 6. F&S integrate over small mergers to get one further result: if the condition above is satisfied, along with certain signs on the third derivatives of demand and costs then a profitable merger which reduces output (and therefore reduces consumer surplus) will increase total welfare. This is clearly a simple development of result 5. above.

What are the implications of F&S for anti-trust?

1. If you are really worried about consumer welfare, then you need to be convinced of large marginal cost savings to allow the merger.
2. If you are equally concerned about all non-parties to the merger then you can be more relaxed about cost savings as long as the market shares of the merging parties are not too big.

Example:

Consider a Cournot industry with linear demand and constant marginal costs. Pre-merger market shares are 35%, 14%,20%,20%,10% and 1%. What would the Merger Guidelines suggest about mergers in this industry (for example between the 35% and 14% firm)? What would F&S's analysis say?