Efficiency claims in merger analysis and firm incentives

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Merger Formation and Post-merger Pricing Incentives

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Abstract: The degree of competition is important for firms’ pricing, but it is not the degree of competition that induces firms to set high or low prices, but the incentives of the firm within the competitive setup. This especially applies for mergers subject to competition authority approval, where they attempt to assess the likelihood of different post-merger scenarios’ effect on the merger’s pricing. The incentive of a merger to change its pre-merger market price is examined. It is found that small efficiency gains provide incentives to increase price above the pre-merger level and large efficiency gains provide incentives to set the same price or lower than as the pre-merger price. The results suggest that merger analysis should focus less on the degree of competition and more on the internal gains of the merging firms.

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1. Introduction

Competition authorities know that some mergers may lead to a shift in market power between firms in a market. The problem is that they rarely know with certainty before the merger has been approved which way the balance is shifted and if this leads to unwanted effects on competition. They also rarely investigate if their pre-merger assessment was correct. Instead they rely on existing firms within the market to report any wrongdoing by the merged firms in the post-merger market.

Different methods have been proposed throughout the history of competition enforcement. The most recent method is merger simulation analysis using an empirical model of the relevant market conditions using among other things demand and supply elasticity estimates. This is not a big change from earlier approaches as merger simulation analysis also rely on historical data and knowledge about the market and firms’ pricing behavior.

The purpose of this paper is not to develop a new method or highlight any of the old, but to build a framework in which a discussion of merger analysis can be made. Though the approach is inherently neoclassical in nature, the model does not make any special claim of belonging only within this approach to competition problems.

To limit the analysis the focus will be on how efficiency claims affect a merger’s incentives to price differently than the pre-merger market price. This is not a new idea as many theoretical and contributions exist with this aim.

To assess whether or not efficiency claims lead to improvements in social welfare Williamson (1968) propose to compare the dead-weight losses due to price increases after merger with internal efficiencies. He concluded that cost savings need not be very high to compensate for dead-weight losses induced by post-merger price increases. Röller et al (2006) show that this conclusion is not general, since this depends on how intense one assumes competition is before and after the merger. They also show that the degree of competition before and after the merger is essential in examining the price effects of merger.

Though no doubt the degree of competition is important for firms’ pricing, it is not the degree of competition that induces firms to set prices in one or the other direction, but the incentives of the firms in this respect to do so. In this sense the model framework developed in this paper is closer to Williamson’s approach than Röller et al. Irrespective of the degree of competition whether or not a
merger with efficiency gains leads to higher or unchanged prices crucially depend on the incentives of the merger to change its prices.

Most models of merger see the degree of competition as exogenously given and only affect the way the firms within the model is supposed to price. It is a rather mechanical way to model competition and pricing choices. The model developed here could be seen as a model where competition depends on the incentives to compete. Competition act as a restraint on price increases independent of how much market power the merger result in, but also price decreases are restrained. Price decreases are legally restrained by the provisions in the EU treaty on the abuse of dominant position. The provision is there to prevent that ‘too’ much market power may lead to anticompetitive behavior and thus decreases the likelihood that for example a merger will decrease its price below the market price.

If the degree of competition is high in the post-merger market it is unlikely that the merger will be able to increase its prices and in combination with the provisions on anti-competitive conduct it also seem unlikely that the merger will decrease its price and it is much more likely that the post-merger price is the same as the pre-merger price. On the other hand, if the degree of competition is low the conventional wisdom tells us that this makes it more likely that the merger will lead to higher prices, as the restraint on price increases is not as strong.

This paper see things somewhat differently as the claim here is that from a theoretical point of view this is not the entire story. The above arguments fail to take into account whether or not it is in the best interest for the merger to price the prescribed way irrespective of the level of competition.

A theoretical model of how efficiency gains of a merger affect its incentives to price is examined in the next section.

### 2. The model

All firms are assumed to produce a homogeneous good for a market characterized by the linear demand function $p = A - q, A > 0$. Assume that all firms in the pre-merger market have the same marginal cost $c_i$. If the firms decide to merge they will be able to generate an efficiency gain that result in a lower marginal cost in the post-merger market of $c_j$. Thus, it is assumed that
$A \geq c_i > c_j \geq 0$. This implies that the merger have real market power. The pre-merger market equilibrium price and quantity in the market is,

\[ p = c_i \text{ and } q = A - c_i \]  

(1)

Efficiency gains can then be defined as the achieved cost improvement from merging and measured as,

\[ \Delta c \equiv c_i - c_j \]  

(2)

Small efficiency gains imply that $\Delta c \to 0$ and large efficiency gains imply that $\Delta c \to c_j$. Irrespective of whether or not the gain is small or large the efficiency gain is an increase in the potential market power of the merger.

To compare the different pricing possibilities of the merger we limit the attention to two cases: one in which the merger increases price to reach the monopoly outcome and at the other extreme is the lowest possible price of the merger, which as explained in the previous section is the pre-merger price. Thus, the lowest possible price in this situation in the post-merger market is $p = c_i$. It is within this price space that the merger has to decide on which price it should choose. It further suggest that increased profits can be achieved not only through pricing, but by focusing intensely on achieving as high efficiency gains as possible when merging. In all circumstances a decision to increase prices will only make sense, if it provides a higher profit than otherwise.

The efficiency gains post-merger may be small or large and the effect on the incentives to price depends on how large the gain is. Essentially the model compares the incentives to raise price to the highest possible level that makes sense which is to the monopoly price. This imply incentives of the areas a plus b, to the cases where the merger use the same price as the pre-merger price, in this case the incentives of the merger corresponds to the areas b plus c in Figure 1.
Figure 1.

If the merger set the highest possible price, the price and quantity is determined by maximizing the profit function \( \pi = (A - q)q - c_j q \). The price and quantity is,

\[
q^M = \frac{A - c_j}{2}, \quad p^M = \frac{A + c_j}{2}
\]  

(3)

The resulting merger profit is,

\[
\pi^M = \frac{A^2 + c_j^2 - 2c_j A}{4}
\]  

(4)

The derivative of the profit function with respect to the relevant cost is,

\[
\frac{\partial \pi^M}{\partial c_j} = \frac{1}{2} c_j - \frac{1}{2} > 0 \text{ for } c_j > 1 \text{ and } \frac{\partial \pi^M}{\partial c_i} = 0
\]  

(5)

If the merger decides not to deviate from the pre-merger price its profits will be 
\( \pi^* = (c_i - c_j)(A - c_i) = Ac_i - c_i^2 - c_j A + c_j c_i \) and its quantity and price is,

\[
q^* = A - c_i \text{ and } p^* = c_i
\]  

(6)

The derivative of the profit function with respect to the relevant cost is,
\[
\frac{\partial \pi^*}{\partial c_j} = -A + c_i < 0 \text{ for } c_i < A \text{ and } \frac{\partial \pi^*}{\partial c_i} = A - 2c_i + c_j,
\]

\[
\frac{\partial \pi^*}{\partial c_i} < 0 \text{ for } c_i > \frac{A + c_j}{2} \text{ and } \frac{\partial \pi^*}{\partial c_i} > 0 \text{ for } c_i < \frac{A + c_j}{2}
\]

(7)

**Proposition 1:** Some levels of efficiency gains will have a tendency to reduce the incentives of a merger to raise price above the pre-merger price.

The most appropriate way to show this is to look at the incentives of the merger. If the merger has no incentive to raise price then there is incentive neutrality between the decision to raise its price and not leave the price alone. This requires in the present set up that \( \pi^M = \pi^* \) or simply that

\[
\Delta \pi = \pi^M - \pi^* \Rightarrow \Delta \pi = 0 \text{ or,}
\]

\[
\Delta \pi = \frac{A^2 + c_i^2 - 2c_jA}{4} - Ac_i + c_j^2 + c_jA - c_i c_j = 0
\]

\[
\therefore
\Delta \pi = \frac{A^2 + c_i^2 + 4c_j^2 - 4Ac_i + 2c_jA - 4c_jc_i}{4} = 0
\]

\[
\therefore
\]

\[
c_j = \begin{cases} 
\sqrt{c_i A - A} & \Rightarrow c_i \leq A \Rightarrow c_j \leq 0 \Rightarrow \text{reject} \\
\frac{4c_i}{\sqrt{c_i A}} - \frac{A}{\sqrt{c_i A}} - 1 & \Rightarrow c_i \leq A \Rightarrow c_j \geq 0 \Rightarrow \text{accept}
\end{cases}
\]

Thus, merger can lead to efficiency gains for which there are no incentives for the merger to set a price above the pre-merger price. □

**Proposition 2:** Small efficiency gains tend to result in a price in the post-merger market above the pre-merger price. Large efficiency gains tend to result in a post-merger price equal to the pre-merger price.

**Proof:** The most appropriate way to show this is to examine what the optimal cost improvement decision is. The optimal decision imply finding the \( c_j \), that optimizes equation (8). Thus, we first have to find the derivative of the condition with regard to \( c_j \), this is,
If the merger is assumed not to price below \( c_j \), the following relation between efficiency gain and pricing incentives emerges from equation (9).

\[
\frac{\partial \pi^M}{\partial c_j} - \frac{\partial \pi^*}{\partial c_j} = 0 \Leftrightarrow \frac{1}{2} c_j - \frac{1}{2} (-A + c_j) = 0 \Leftrightarrow c_j = 2c_i - A \\
\frac{\partial \pi^M}{\partial c_i} - \frac{\partial \pi^*}{\partial c_i} = 0 \Leftrightarrow 0 - (A - 2c_i + c_j) = 0 \Leftrightarrow c_i = \frac{A + c_j}{2}.
\]

\[ (9) \]

If the merger is assumed not to price below \( c_j \), the following relation between efficiency gain and pricing incentives emerges from equation (9).

\[
> c_j = 2c_i - A \Rightarrow \pi^M = \pi^* <
\]

\[ (10) \]

The proof comes from considering equation (10) with respect to different levels of \( c_j \) in relation to \( c_i \). If \( c_j < 2c_i - A \) the merger results in a small efficiency gain, since it imply that \( 2c_i - c_j > A \) and \( \pi^M > \pi^* \), but if \( c_j > 2c_i - A \) the merger result in a large efficiency gain and \( \pi^M < \pi^* \).

The condition in equation (10) suggests a very important thing for merger and merger analysis that whether an efficiency gain is large or small is not just a simple comparison between cost levels before and after the merger, but something that should be considered in connection with the size of the market in which the firm is located, which in the model is the intercept of the demand curve.

The size of the market is what competition authorities try to capture in the definition of the relevant market. Since the definition and procedure is in the hands of the competition authorities, it is appropriate to start the analysis here. The conventional wisdom tells us that if the relevant market is too narrowly defined, it is more likely that the market will be highly concentrated and merger will lead to higher prices. In addition it will also tend to increase the risk of coordination between firms in the post-merger market. All in all, the merger has a much greater chance of harming social welfare. The results found above do not support the conventional wisdom, on the contrary proposition 2 suggest that if the relevant market is defined narrowly, it is more likely that the merger will have large efficiency gains and that the merger will not choose to increase its price, even though it is dominant in the market. Further, as large efficiency gains in turn suggest that prices does not change from the pre-merger level we would not expect any negative consequences for social welfare as such. A definition of the relevant market as being relatively large would also lead to competition concerns, since large markets imply a greater potential for competition. On the
other hand proposition 2 suggest that the incentives to raise price is greater in such a market definition.

Let us turn our attention to the efficiency gains. If the pre-merger firms are characterized by a fairly large $c_i$ we would expect it in more than one way to be an inefficient producer with scope for improvement in productive efficiency by for example increases in the scale of production or learning costs. In this case merger seems likely to be the proper remedy to achieve a higher productive efficiency for similar companies, but the competition analysis will be very different than looking at market characteristics. An analysis of the potential for efficiency gains is more appropriate done with focus on factors within the merging firms and would thus require an entirely different merger procedure and analysis.

### 3. Conclusion

The results suggests that it would be more appropriate to have a different approach to merger analysis than the one sided focus on the degree of competition in the market. The results suggest that merger analysis should have a greater focus on the internal gains of the merging firms. Such a change in focus can in practice only be undertaken with the cooperation of the merging parties. It may also lead to a greater care and attention among merging partners to make sure that the merger actually do lead to efficiency gains.

Further, the relevant market definition may also affect whether or not an efficiency gain is useful for the merger in the post-merger market for example if the competition authorities settle on a too wide market definition and will in doing so render any efficiency claims useless for merger defense even though the evidence for significant improvements may be irrefutable.

The model allow us to show that a successful merger can be one in which the resulting profits are higher than in the pre-merger market and even in some cases higher than the monopoly profits (economic success) and at the same time do not alter the competitive balance (legal or regulator success).
4. Literature


