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Abstract

We modify the UPP test of Farrell and Shapiro (2010) to take into account the possibility that a merger weakens (or eliminates) a vertical supply relationship. After deriving a general effect of the merger, we provide an example of simple estimation strategy when only prices, costs and market shares are available as a snapshot.

JEL-codes: K210, L490.

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1 Introduction

Upward pricing pressure (UPP) index was proposed by Farrell and Shapiro (2010) as a simple method of screening for likely unilateral effects resulting from a merger. In this short paper, we show how the UPP index can easily be modified for the screening of mergers in which one or more of the non-merging parties are in a supplier-buyer relationship with a competitor in the downstream market. This is often the case when several functional components are combined into a final product.[1]

Competition authorities have long recognized that vertical relations have implications in mergers between firms which compete horizontally. In particular, the European Commission's 2008 Non-horizontal mergers Guidelines state that "... mergers may entail both horizontal and non-horizontal effects" and that in the assessment the "Commission will appraise horizontal, vertical and/or conglomerate effects...". Vertical mergers indeed provide substantial scope for efficiencies, in particular because the "activities and/or the products of the companies involved are complementary to each other." The Guidelines identify efficiencies both on supply and demand sides of the market. The former include the removal of double marginalization, decrease in transaction costs and better coordination between the merging firms. The latter stem, for example, from product portfolio effects such as one-stop shopping.

We consider an alternative mechanism through which pro-competitive merger effects can materialize in the presence of vertical relationships. In particular, we are interested in the effect which stems from the changed incentives for the upstream supplier of inputs to compete downstream after the merger. Moresi and Salop (2013) develop a set of indices to score the upward or downward pricing pressure resulting from unilateral incentives following a vertical merger (vGUPPIs). While related to ours, their indices do not take account of a vertical relationship that existed before the merger but will be broken (and replaced with another vertical relationship) after the merger.

As a simple example, consider a situation in which three manufacturers compete by combining two components into a product. One of the merging manufacturers is in a long-term vertical relationship and must purchase one of the components from a downstream competitor who is not a party to the merger.[2] Due to the vertical relationship, the firm that also acts as a supplier in the upstream market will have weaker incentives to compete in the downstream market. The merger, to the extent it would result in a termination of the long-term vertical relationship, may eliminate this rivalry-reducing effect and this should be taken into account in the UPP screening test.

[1] A recent example is a merger between manufacturers of large industrial gas compressors Siemens and Dresser-Rand. Prior to the merger, Dresser-Rand used to purchase gas turbines for its compressor packages from General Electric. Reportedly, General Electric recently terminated its 16-year OEM supply agreement with Dresser-Rand and Dresser-Rand is said to be seeking a new supplier. (http://www.poweronline.com/doc/ge-cancels-oem-agreement-dresser-rand-looks-f-0001)

[2] This could be due to the technical specifications of the product or due to a long-term supply agreement in place.

Our contribution is twofold. Theoretically, we identify a pro-competitive effect of a horizontal merger that disrupts an existing vertical relationship. Empirically, we propose a simple modification of the UPP test that takes into account the identified pro-competitive effect before taking into account usual efficiencies. The modified index that we derive can be applied to industries in which firms compete in price with differentiated products; it can also be applied for the screening of merger in industries in which firms set prices through bidding competitions (Moresi, 2010).

In the next section, we focus on the theoretical model; in section 3, we describe a simple estimation strategy. We summarize our findings in conclusion.

The Model

Assume that N firms compete in a standard Bertrand setting in a differentiated product market facing demand function d that maps the price vector p into quantity demanded $d(p)$. The constant marginal cost vector is c. Absent any merger efficiencies, the effect of the merger of firms i and j on prices of product variety i can be illustrated by the differences in first-order conditions before and after the merger. In particular, before the merger, optimality implies (see Appendix A1 for the formal derivation)

$$p_i = c_i - d_i / \frac{\partial d_i}{\partial p_i}, \tag{1}$$

whereas after the merger it implies

$$p_i = c_i - d_i / \frac{\partial d_i}{\partial p_i} - (p_j - c_j) \frac{\partial d_j}{\partial p_i} / \frac{\partial d_i}{\partial p_i}. \tag{2}$$

Strictly speaking, we cannot evaluate the effect of the merger by eliminating the similar terms in (1) and (2), because they should be evaluated at different optimal prices before (denoted as p^0) and after the merger (denoted as p^1), respectively. However, following Farrell and Shapiro (2010), the pricing pressure of the merger can be roughly estimated by evaluating the right-hand side in (1) and (2) at pre-merger (observable) prices p^0:

$$p_i^1 - p_i^0 \approx -(p_j^0 - c_j) \left. \frac{\partial d_j}{\partial p_i} / \frac{\partial d_i}{\partial p_i} \right|_{p^0}.$$

In parsimonious notation of Farrell and Shapiro (2010), we have

$$p_i^1 - p_i^0 \approx D_{ij} \left(p_j^0 - c_j \right), \tag{3}$$

where D_{ij} is the diversion ratio from product i to product j, or the impact on sales of j when the price of i falls enough to sell 1 unit less of product i. Clearly, the diversion ratio proxies the term $\left. \frac{\partial d_j}{\partial p_i} / \frac{\partial d_i}{\partial p_i} \right|_{p^0}$.

We now outline a mechanism through which pro-competitive merger effects can materialize in the presence of vertical relationships between non-merging firms. Note that our setting is not a classical vertical merger scenario whereby before the merger the firms are in a vertical relationship before the merger - instead, before the merger the firms are purely in a horizontal competitive relation. However, one of the merging firms and one of the non-merging firms are in a vertical relationship, whereby the former buys an important input from the latter. Formally, firm k sells the input to firm i before the merger. Then firms i and j merge and the merged firm only uses its own input. We do not model why firm i only buys its input from firm k before the merger. We simply assume that it does not have any other choice, perhaps because of historical choices related to product design.

Clearly, when firms i and j merge, the expressions evaluating the "first-round"effects of the merger are the same as (3). These are well known effects that stem from elimination of competition between i and j. However, in our setting, there is also an effect the increased competition between k and i after the merger - after the merger, k does not supply the input to i and, because of this, its incentives to compete are enhanced. This is the effect which we are interested in.

In particular, assuming that firms have no marginal costs other than cost of input, optimality for firm k before the merger implies (see Appendix A2 for the formal derivation)

$$p_k = c_k - d_k / \frac{\partial d_k}{\partial p_k} - (c_i - c_k) \frac{\partial d_i}{\partial p_k} / \frac{\partial d_k}{\partial p_k}, \tag{4}$$

whereas after the merger it implies

$$p_k = c_k - d_k / \frac{\partial d_k}{\partial p_k}. \tag{5}$$

As before, a rough approximation of the pricing pressure of the merger on product variety k is

$$p_k^1 - p_k^0 \approx (c_i - c_k) \left. \frac{\partial d_i}{\partial p_k} / \frac{\partial d_k}{\partial p_k} \right|_{p^0},$$

or, in parsimonious notation of Farrell and Shapiro (2010),

$$p_k^1 - p_k^0 \approx -D_{ki}(c_i - c_k). \tag{6}$$

If the products are substitutable, $D_{ki} > 0$, and thus there is a downward pressure of merger on the price of product k. The intuition for this effect is as follows: k is i's rival in downstream markets for final products, but it is also i's supplier. While a price increase for k's product decreases its demand, it also increases demand for i's product and, in turn, k's sales of input to i. As a result, k competes less aggressively in the downstream market as compared to the situation when such a vertical relationship is absent.

A simple estimation strategy

The diversion ratios can be measured directly by using surveys or they may be estimated using econometric techniques applied to market level data. In practice, time constraints or limited data will often render direct estimation of diversion ratios difficult. In such circumstances, following Farrell and Shapiro (2010), one might proceed as follows. Define market recapture ratio R_i to be the fraction of sales lost by i and gained by i's competitors due to a marginal increase in p_i. The empirical counterpart of diversion ratio from firm i to firm j, D_{ij} can then be approximated by $R_i \frac{S_j}{1-S_i}$,where S_i is the market share of firm i. Thus, the empirical counterparts of the measure in (3) is

$$R_i \frac{S_j}{1-S_i}\left(p_j^0 - c_j\right)$$

and of the measure in (6) it is

$$R_k \frac{S_i}{1-S_k}(c_i - c_k)$$

As a first approximation, market recapture ratio can be assumed to be equal across different brands ($R_i = R$). If the aggregate demand is not very elastic, R is likely to be relatively close to 1. As a robustness check, the UPP indices can be computed for different values of R.

Typically, the antitrust authority will want to balance the upward pricing effects against the identified downward pricing effect due to the removal of the rivalry-reducing vertical relationship. Therefore, the different price indices for products i, j and k would have to be aggregated in some consistent way. This can be done relatively easily once we note that the UPP index is by construction an approximation of the difference between the post-merger and pre-merger price. Therefore, we can weigh the effects for each brand by its respective market share and sum these values as the first approximation of the aggregate pricing pressure of the merger:

$$\frac{\Delta}{R} \approx S_i \frac{S_j}{1-S_i}\left(p_j^0 - c_j\right) + S_j \frac{S_i}{1-S_j}\left(p_i^0 - c_i\right) - S_k \frac{S_i}{1-S_k}(c_i - c_k).$$

Note that the sign of aggregate pricing pressure does not depend on R as long as R does not vary across the pairs of products. The upward pressure positively depends on the market shares of the merging firm j and negatively on the market share of the firm k supplying the input before the merger. It is also increasing in the markups in selling the input of the merging firms and decreasing in the margin of the firm k.

The above formula can also be used in industries where the prices are set in bidding competitions along the lines of Moresi (2010). The market shares in that context would be replaced by the share of winning bids for each respective brand.

Conclusion

We proposed a simple extension of Farrell and Shapiro (2010) UPP test for mergers involving an existing vertical relation between a merging firm and a non-merging supplier, which both also compete in the downstream market. Our pricing pressure index captures the rivalry enhancing effect that such mergers involve. For a screening purpose, the index can be estimated relatively easily and does not impose heavy data requirements on the authority screening the merger.

Appendix

A1. Standard effect

Firm i maximizes profit $(p_i - c_i)d_i$ before merger and $(p_i - c_i)d_i + (p_j - c_j)d_j$ after merger.

The first order condition of firm i can be written as

$$\frac{\partial d_i}{\partial p_i}(p_i - c_i) + d_i = 0,$$

before merger and

$$\frac{\partial d_i}{\partial p_i}(p_i - c_i) + d_i + \frac{\partial d_j}{\partial p_i}(p_j - c_j) = 0$$

after the merger. Rearranging, we immediately get (1) and (2).

A2. Pro-competitive effect

Firm k as a supplier of input to firm i (at certain price c_i) maximizes profit $(p_k - c_k)d_k + (c_i - c_k)d_i$ before merger and $(p_k - c_k)d_k$ after the merger, as the supply relation is eliminated.

The first order condition of firm k can be written as

$$\frac{\partial d_k}{\partial p_k}(p_k - c_k) + d_k + \frac{\partial d_i}{\partial p_k}(c_i - c_k) = 0,$$

before merger and

$$\frac{\partial d_k}{\partial p_k}(p_k - c_k) + d_k = 0.$$

after merger. Rearranging, we get (4) and (5).

References

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[3] Joseph Farell and Carl Shapiro (2010) "Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition," The B.E. Journal of Theoretical Economics: Vol. 10: Iss. 1