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A robust test for consumer welfare enhancing mergers among sellers of a homogeneous product

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Abstract

Antitrust enforcement agencies and courts use net effect on price as a touchstone for the legality of mergers. This paper derives a simple condition for implementing that standard when industry equilibrium is static Nash in quantities (Cournot), and that condition is robust to different specifications of demand and cost. © 1998 Elsevier Science S.A.

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Consider a homogeneous product industry in which the competitive interaction is Nash in quantities (Cournot). With neither entry nor efficiencies, Farrell and Shapiro (1990) demonstrated that a merger causes the merged firm to reduce output, and although non-merging firms increase output in response, total industry output falls and price increases. If, however, a merger also reduces the merging firms' marginal costs, the cost reduction tends to offset the anticompetitive effect of the merger on prices. If the merger reduces the marginal costs of the merging firms by a sufficient amount, it increases industry output and decreases industry price.

Following Williamson (1968), economists generally have favored total economic welfare as the touchstone for antitrust policy toward mergers; however, antitrust enforcement authorities have argued, and courts have agreed, that a merger should be deemed unlawful if its likely effect is to increase prices, i.e., to diminish consumer welfare.[2] We provide a simple calculation determining the marginal cost reduction for the merging firms necessary and sufficient to offset the incentive to restrict output, and hence, the marginal cost reduction necessary and sufficient to prevent a diminution in consumer welfare.[3]

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[1]The views expressed herein are not purported to reflect those of the U.S. Department of Justice.

[2]See FTC v. University Health, Inc., 938 F.2d 1206, 1222–1223 (11th Cir. 1991); United States v. United Tote, Inc., 768 F. Supp. 1064, 1084–1085 (D. Del. 1991).

[3]Werden (1996) showed that, in a Bertrand model with differentiated products, the marginal cost reductions necessary to restore the pre-merger prices can be calculated without making any assumption about demand, and also provided a formula for that calculation.

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Crucially, the analysis holds whenever a unique Cournot equilibrium exists. Robustness to the cost assumption is significant with Cournot models because the literature on Cournot mergers has noted sensitivity to the shape of the marginal cost curve and debated the appropriate assumption (see Perry and Porter, 1985; Werden, 1991).

Define

q_i = the quantity of firm i
c_i = the marginal cost of production for firm i
Q = aggregate industry quantity
s_i = the output share of firm $i = q_i/Q$
p = industry price
ϵ = the equilibrium elasticity of industry demand, defined to be positive

The familiar first-order condition for profit maximization is

$$\frac{p-c_i}{p}=\frac{s_i}{\epsilon}. \tag{1}$$

This first-order condition holds both pre- and post-merger, and a merger that does not change p also must not change Q or ϵ. Thus, the first-order conditions for the non-merging firms are satisfied post-merger by the q_i that satisfy them pre-merger. With both Q and the q_i for the non-merging firms unchanged by a merger, the post-merger output share of merged firm must equal the sum of the pre-merger output shares of the merging firms.

Since our focus is on marginal cost, we rewrite the first-order condition as

$$c_i=(\epsilon-s_i)p/\epsilon, \tag{2}$$

which holds for the merged firm as well. Letting the merging firms be j and k, and substituting the sum of their shares for the merged firm's share, yields $(\epsilon-s_j-s_k)p/\epsilon$ for the merged firm's marginal cost in the post-merger equilibrium. The pre-merger, share-weighed average marginal cost for the merging firms is

$$\frac{p[s_j(\epsilon-s_j)+s_k(\epsilon-s_k)]}{\epsilon(s_j+s_k)}. \tag{3}$$

Consequently, the proportionate reduction in marginal cost necessary to restore the pre-merger price is

$$\frac{2s_js_k}{\epsilon(s_j+s_k)-(s_j^2+s_k^2)}, \tag{4}$$

which, in the symmetric case ($s_j=s_k=s$), simplifies to

$$\frac{s}{\epsilon-s}. \tag{5}$$

The Horizontal Merger Guidelines promulgated by the U.S. Department of Justice and the Federal

Table 1
Percentage marginal cost reduction that restores the pre-merger price

ΔHHI	Elasticity of demand		
	1	2	3
100	7.6	3.7	2.4
500	18.8	8.6	5.6
1000	28.8	12.6	8.1
2500	54.7	21.5	13.4
5000	100.0	33.3	20.0

Trade Commission summarize the shares of the two merging firms by the ''change in the HHI'' (ΔHHI). ΔHHI is defined as twice the product of the shares of the merging firms, with the shares expressed in percentage terms. Table 1 above provides illustrative calculations based on Eq. (5) for plausible elasticities of demand and various ΔHHIS.[4] The table indicates: (1) the necessary marginal cost reductions are quite sensitive to the elasticity of demand, (2) modest marginal cost reductions (e.g. 5%) prevent price increases following mergers of modest size (e.g., ΔHHI = 100), and (3) implausibly large cost reductions (e.g. 20%) may be necessary to prevent very large mergers (e.g., ΔHHI = 2500) from raising price.

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[4] ΔHHI predicts rather well; substituting the geometric mean of the merging firms' shares, $(s_j s_k)^{1/2}$, for s in Eq. (5) provides a good approximation of Eq. (4).