

HMG Review Project – Comment, Project No. P092900
Comment on Proposed Revisions to Horizontal Merger Guidelines
On issues raised in Questions for Public Comment: 2e, 10g, 10h, and 20.

Submission by

Sencer Ecer, Ph.D.

LECG, LLC and Georgetown University¹

November 8, 2009

The role of product differentiation in equilibrium prices in price competition and merger

Product differentiation can be used as a strategic tool to affect equilibrium prices both in price competition or merger. In particular, when firms expect price competition, they strategically maximize horizontal product differentiation to sustain higher prices in equilibrium (d'Aspremont, Gabszewicz, Thisse, 1979).² This is because when a rival's product becomes more differentiated, a given price reduction then induces fewer of the rival's customers to switch. On the other hand, when firms expect merger, they tend to decrease or minimize product differentiation. This is because choosing a product closer to that of the competitor's improves the bargaining power regarding the acquisition price and maximizes the joint profit of the global firm (Jehiel (1992), Friedman and Thisse (1993)).

However, given the uncertainty induced by the very existence of merger control policy, firms that are contemplating a merger rarely know for sure (100%) that they will be successfully merging, or, by the same token, whether they will certainly be competing going forward. As a result, especially in the period prior to the merger where a merger is contemplated or anticipated with some likelihood, equilibrium product differentiation and ensuing equilibrium price levels reflect a "weighted average" of price competition and merger expectations discussed above, where the weight is determined by the level of strictness of merger policy (Ecer, 2002). Now, assume that the contemplated merger attempt is blocked. In response, firms will then adjust their equilibrium product differentiation and hence prices to the expectation of full price competition going forward. That is, by increasing their product differentiation firms will sustain higher prices. Then, this further product differentiation induces higher prices undoing at least some of the benefits of merger blockage. As such, the *pre-merger* and *post-merger-blockage* competitive environments will not be the same, and due to this, the benefits of

¹ Sencer Ecer is a Principal with LECG, LLC at the Washington, DC office and an Adjunct Associate Professor at Georgetown University Public Policy Institute. All errors are solely mine. The views expressed here are mine and should not be construed as representing the positions of other experts at LECG.

² The same applies to vertical product differentiation. See Shaked and Sutton (1982).

the merger blockage will be overestimated. The same logic applies to introducing a stricter merger policy (Ecer (2005a, 2005b)).³

Implication for Econometric Analysis and Practice

Foremost, in a price level estimation in which a measure of the strictness of the antitrust regime (across time or countries) is an independent variable, the estimated coefficient is subject to the critique outlined above, much in the spirit of the Lucas Critique (1976). Similarly, merger simulations should take into account the potential for post-merger-blockage product differentiation relative to pre merger status quo. Specifically, *ceteris paribus*,

- 1) If prior to the merger a decrease in product differentiation is observed⁴ between the merging parties (say in the past year) and product design changes are not too costly, then one can anticipate shifting back to higher product differentiation mode after merger blockage and an increase in prices. Under this circumstance merge blockage may be futile.⁵
- 2) If prior to the merger no significant change in product differentiation is observed and product differentiation is relatively costly, then merger blockage may be beneficial if other analyses suggest so.⁶

Policy Implications viz a viz Merger Guideline Revisions

Regarding 2e, “Evidence that the merging firms have engaged in significant head-to-head competition leading to lower prices or other customer benefits” may not necessarily indicate that the same type of competition will be the case after the merger-blockage, per the discussion above. This is because, such head-to-head competition may simply be due to the anticipation of merger. Thus, it needs to be explored whether head-to-head competition has been relatively 1) more recent or 2) more intense between the merging parties (even though there were other otherwise symmetric competitors). On the other hand, post-merger-blockage, firms may still immediately stop head-to-head competition and switch to product differentiation in order to sustain higher prices.

Regarding 10g and 10h “The use of merger simulation models to predict unilateral effects” and 10h “The role of product repositioning in evaluating unilateral effects,” product repositioning after merger blockage will unequivocally imply higher

³ See also Brito and Lopes (2006).

⁴ Empirically, product differentiation can be measured by technical and engineering specifications, such as the speed of a microprocessor in a computer as well as different variables such as locations or the extent and depth of loyalty rewards, such as frequent flier miles.

⁵ See Young and Shughart II (forthcoming) for empirical evidence on U.S. antitrust policy generating no subsequent offsetting increases in productivity to the negative transitory technology shocks that it generates.

⁶ See Cosnita (2006), Cosnita-Langlais, A.(2008), Cosnita and Tropeano (2006, 2007, 2009), and Rainelli (2006) for implications on efficiency defense and optimal merger control analysis.

differentiation, *ceteris paribus*, due to the expectations model discussed above. Both the simulations and product repositioning analyses should adjust for that phenomenon.

Regarding 20 “Should the Guidelines be revised to reflect learning based on merger retrospective studies?” the above discussion definitely warrants such studies. Specifically, in the cases of blocked mergers, one can study whether the blocked parties have been able to differentiate their products resulting in higher prices compared to pre-merger levels.

I appreciate the opportunity to submit these comments, and I am prepared to discuss them at the Washington DC workshop if deemed beneficial.

References:

d’Aspremont, C., Gabszewicz, J.J., Thisse, J.-F., 1979, On Hotelling’s Stability in competition, *Econometrica* 47, 1145–1150.

Brito, D. and Lopes M.C., April 2006, *Mergers and Acquisitions: The Industrial Organization Perspective*, Kluwer Law International.

Cosnita, A., 2006, *Essais Sur Les Concentrations Horizontales, Stratégies Des Entreprises Et Stratégies Des Autorités De Concurrence* Université Paris I — Panthéon — Sorbonne U.F.R. De Sciences Économiques Thèse De Doctorat.

Cosnita, A., Tropeano, J-P, 2006, On the Effective Design of the Efficiency Defence, Centre d’Economie de la Sorbonne, UMR 8174, 2006.30

Cosnita, A., Tropeano, J-P, 2007, Do Remedies Affect the Efficiency Defence? An Optimal Merger Control Analysis, Centre de recherche en économie et management

Cosnita, A., Tropeano, J-P, 2009, Do Remedies Affect the Efficiency Defence? An Optimal Merger Control Analysis, Université Paris Ouest Nanterre La Défense and EconomiX.

Cosnita-Langlais, A., 2008, Horizontal market concentration: Theoretical insights from the spatial models, Université Paris Ouest Nanterre La Défense and EconomiX Working Paper 2008-42

Ecer, S., 2002, *Strategic Product Design*, Department of Economics, University of Texas.

Ecer, S., 2005a, A Rational Expectations Critique of Merger Policy Analysis, *Economics Letters* 86, 1, 73–77.

Ecer, S., 2005, Post-Merger-Blockage Strategic Product Design Changes, American Bar Association Economics Committee Newsletter, Spring.

Friedman J.W. and Jacques-Francois Thisse, 1993, Partial Collusion Fosters Minimum Product Differentiation, RAND Journal of Economics 24, 4, 631-645, Winter.

Jehiel, P., 1992, Product differentiation and price collusion, International Journal of Industrial Organization 10, 633-641.

Lucas Jr., R.E., 1976, Econometric policy evaluation: a critique, Carnegie-Rochester Conference Series on Public Policy 1, 19-46.

Rainelli, M., 2006, A propos du reglement europeen n°o 139/2004 relatif au controle des concentrations entre entreprises: une vision sceptique de la prise en compte des gains d'efficacite - Revue internationale de droit économique 20, 1, 45-54.

Shaked, A. and Sutton, J., 1982, Relaxing Price Competition Through Product Differentiation, Review of Economic Studies 49, 3-14.

Young, A.T., Shughart II, W.F., forthcoming, The Consequences of the US DOJ's Antitrust Activities: A Macroeconomic Perspective, Public Choice.



ELSEVIER

Available online at www.sciencedirect.com

SCIENCE @ DIRECT®

Economics Letters 86 (2005) 73–77

**economics
letters**

www.elsevier.com/locate/econbase

A rational expectations critique of merger policy analysis

Sencer Ecer*

LECG, LLC, 1725 I Street NW, Suite 800, Washington, DC 20006, United States

Received 5 December 2003; received in revised form 14 April 2004; accepted 18 June 2004

Available online 27 September 2004

Abstract

A stricter merger control policy increases the expectation of future price competition. In response, firms increase product differentiation to sustain higher prices. Failing to account for such policy-variant prices may lead to overestimation of the increase in consumer surplus due to the stricter merger policy, rendering the policy analysis subject to the Lucas Critique.

© 2004 Elsevier B.V. All rights reserved.

Keywords: Antitrust policy; Product differentiation; Merger; Lucas Critique

JEL classification: L41; L13; L12

1. Introduction

In the few months before their merger, Zdnet and Cnet, two online companies that provide information on high-tech products, made their products more and more substitutable.¹ Such product design changes are consistent with Jehiel (1992), who shows that in anticipation of price collusion (or equivalently merger) firms decrease product differentiation to increase the “pie” of future collusive profits and their respective shares from this pie via increasing their bargaining powers. On the other extreme, d’Aspremont et al. (1979) show that anticipating price competition leads firms to strategic

* Tel.: +1 202 973 0502; fax: +1 202 466 4422.

E-mail address: secer@lecg.com.

¹ <http://www.businessweek.com/bwdaily/dnflash/june2000/nf00613g.htm?scriptFramed>.

product differentiation to sustain higher prices in equilibrium. In general, however, uncertainty prevails about the future state of competition, and firms may adjust their product designs in response to changes in their expectations.

A major source of uncertainty for firms that are contemplating a merger is the antitrust policy. In the face of such uncertainty, firms consider the relative probabilities of merger and price competition, and engage in corresponding strategic product design and pricing decisions. In this paper, I consider the introduction of a stricter merger policy, which increases the expectation of competition. In response, firms increase product differentiation to sustain higher prices, decreasing consumer surplus both directly and indirectly through higher equilibrium prices. Thus, the principle of maximum product differentiation has an important implication for measuring the effects of the stricter merger policy on consumer welfare when assessing the merits of antitrust policy.²

2. Model

Consider a single market with a duopoly protected by entry barriers, which I model by a version of Hotelling (1929) linear city model specified in Mas-Colell et al. (1994). In the linear city, consumers' total measure is normalized to 1, and they are evenly located and indexed by $z \in [0, 1]$. The two firms have fixed locations at respectively 0 and 1. The unit cost of production is $c > 0$. The utility of a consumer from the product of firm i is

$$U_i(z, p_i) = v - p_i - td,$$

where $v > 0$ is the common product valuation, p_i is the price of firm i , t is the rate that disutility increases as the consumer is located further away from the firm's product, and the distance $d = z$ when $i = 1$ and $(1 - z)$ when $i = 2$. The parameter t also determines the specificity level of the product since the higher t is, the smaller the market share of a given firm and the less substitutable the two products are, ceteris paribus. Consumers can purchase at most one unit and purchase firm i 's product if and only if $U_i \geq U_{-i}$ and $U_i \geq 0$. The consumer surplus in this market is given by the area under the utility curves and U_i 's, and it decreases with both p and t .³

I define the merger policy as the expectation of the probability of a successful merger $\Pi_0 \in [0, 1]$ common to both firms. That is, in a "policy period", firms merge with probability Π_0 and keep on competing with probability $(1 - \Pi_0)$. Thus, if there is no policy change, the expected consumer surplus in the current policy period equals

$$CS_0 = \Pi_0 CS^m + (1 - \Pi_0) CS^d,$$

where CS^m and CS^d represent the respective consumer surpluses under merger (or multi-product monopoly) and duopoly. It is straightforward to show that merger decreases consumer surplus when firms determine only the prices and when the whole market is covered, i.e., $CS^m < CS^d$, so CS_0 decreases with Π_0 .⁴

² The arguments in this paper on merger policy also apply to the policy towards price collusion.

³ The consumer surplus seems to be the primary concern of the U.S. federal antitrust authorities (Lande, 1988).

⁴ A technical appendix is available from the author for this and other results in the paper.

3. Firms' reactions

In this section, in response to a stricter merger policy $\Pi_1 < \Pi_0$, each firm strategically changes its product specificity level t . Let x_i represent the design changes of firm i , so that the final product specificity level is $t - x_i > 0$, where x_i may be positive or negative. The fixed (one-time) cost of the design change is given by $f(x_i)$, where $f(\cdot)$ is an even and strictly convex function, where $f(0) = 0$ and $f'(0) = 0$, so that the status quo is the minimum cost position and small design changes are almost free. After the policy change is in effect, the firms play the following game:

Stage 1: Firms choose x_i 's

Stage 2: Antitrust Authority reveals the merger decision (merger is approved with probability Π_1)

Stage 3: Firms choose p_i 's (if they merge, the central management chooses p_i 's)

The equilibrium prices and designs in this game are functions of Π_1 .⁵ To find the equilibrium price of this three-stage game, consider two related games.⁶ First, consider the game where duopoly is for certain, i.e.,

Stage 1: Firms choose x_i 's

Stage 2: Firms choose p_i 's

This game can be readily solved by finding the market shares from $U_1 = U_2$ and maximizing the second stage profits with respect to x_i 's. The equilibrium price equals $p^{d*} = c + t^{d*}$, where $t^{d*} = t - x^{d*} = t - f'^{-1}(-1/12) > t$, and f'^{-1} is the inverse of the derivative of f . The new consumer surplus in duopoly is given by

$$CS^{d*} = \int_0^1 \text{Max}\{U_1(p^{d*}, t^{d*}), U_2(p^{d*}, t^{d*})\} dz.$$

Note that $t^{d*} > t$ and $p^{d*} > p^d = c + t$, where p^d is the equilibrium price in duopoly without the design changes, and that U_i 's decrease with both p and t . Thus, strategic product design changes decrease consumer surplus both directly and through higher prices, i.e., $CS^{d*} < CS^d$.

In the merger game, let T_i represent the equilibrium duopoly profits of firm i . Assume that ex post monetary transfers are possible, and that the firms divide the post-merger surplus over duopoly profits via the Nash (1950) bargaining solution.⁷ Then, the game is a one-stage game where each firm i solves

$$\max_{x_i} \frac{1}{2} [T^m + T_i - T_{-i}] - f(x_i),$$

⁵ In practice, Π_0 , that is, the antitrust policy might be influenced by the degree of industry product differentiation, as Π_0 may decrease when the products are closer substitutes. The present model may be a good starting point of an analysis where Π_0 also depends on the degree of substitutability of products.

⁶ I confine the analysis to symmetric equilibria in all the games I consider. The condition $3/4(2t - x_1 - x_2) - f''(x_i) < 0$, which implies sufficient convexity of f relative to the index of substitution $1/(2t - x_1 - x_2)$ guarantees the existence of respective equilibria.

⁷ This assumption can be justified on many indirect forms of payment, for example, underpricing of intermediary goods or research joint ventures, and even with no monetary transfers the results in the current paper still hold (Jehiel, 1992).

where T^m represents the multi-product monopoly's post-merger profits as a function of x_i . The equilibrium price in this game equals $p^{m*} = v - (t^{m*}/2)$, where $t > t^{m*} = t - x^{m*} = t - f'^{-1}(7/24) > 0$. The consumer surplus is given by

$$CS^{m*} = \int_0^1 \text{Max}\{U_1(p^{m*}, t^{m*}), U_2(p^{m*}, t^{m*})\} dz.$$

With product design changes the multi-product monopoly sets a higher price than without design changes, that is, $p^{m*} > p^m = v - (t/2)$. Notwithstanding the increase in consumer surplus due to less specific product designs in this case ($t^{m*} < t$), the effect of such higher prices is a net decrease in the consumer surplus, that is, $CS^{m*} < CS^m$. To see how consumer surplus decreases, note that in both cases the multi-product monopoly prefers to “barely cover” the market, i.e., the consumers who are indifferent to purchasing are also indifferent to the firms, given $v - c - (3/2)t^{m*} > 0$. Since the market shares are symmetric, the multi-product monopoly with the higher price p^{m*} necessarily provides lower utility to all the consumers (except the consumers located in the middle, who have measure 0).

In the original three-stage game, the equilibrium specificity level equals $t^* = t - x^* = t - (\Pi_1 \cdot x^{m*} + (1 - \Pi_1)x^{d*})$. These average consumer surplus after the policy change is lower with reactionary product design changes than that without design changes if

$$CS_1^* = \Pi_1 CS^m(t^*) + (1 - \Pi_1) CS^d(t^*) < CS_1 = \Pi_1 CS^m + (1 - \Pi_1) CS^d.$$

Thus, CS_1 may overestimate the resulting consumer surplus. Furthermore, consumer surplus increases relative to the pre-policy change environment if and only if $CS_0 < CS_1^*$. This result tends to hold if Π_1 is sufficiently low relative to Π_0 and if f is more convex, and consequently f'^{-1} is more concave.

4. Discussion

In contrast to the current paper, the literature generally assumes ‘static’ product designs between pre- and post-merger blockage. For example, [Deneckere and Davidson \(1985\)](#) suggest that all mergers decrease consumer welfare in a differentiated Bertrand model where product designs are unaltered. The current paper shows that the post-merger blockage strategic product differentiation to relax price competition also decreases consumer welfare, and these incentives need to be taken into account to properly assess the merits of a merger blockage, or in general a stricter antitrust policy. The following example illustrates how this static approach involves an overestimate of the post-merger blockage consumer surplus.

Example. Let $v=100$, $c=10$, $t=50$, $f(x)=(1/300)x^2$, and hence $f'^{-1}(x)=150x$. Also let $\Pi_0=0.75$ and $\Pi_1=0.05$. It is straightforward to show that $CS^d = v - c - (5/4)t$ and $CS^m = (t/4)$, so that $CS^d(t^*) = v - c - (5/4)t^*$ and $CS^m(t^*) = (t^*/4)$, where $t^* = 59.69$. It follows that $p^d = c + t = 60$, $p^m = v - (t^*/2) = 75$, and similarly, $p^d(t^*) = 69.69$ and $p^m(t^*) = 70.16$. Finally,

$$CS_0 = \Pi_0 CS^m + (1 - \Pi_0) CS^d = 16.25,$$

$$CS_1 = \Pi_1 CS^m + (1 - \Pi_1) CS^d = 26.75,$$

$$CS_1^* = \Pi_1 CS^m(t^*) + (1 - \Pi_1) CS^d(t^*) = 15.37.$$

Comparing CS_0 with CS_1^* would be more accurate than comparing CS_0 with CS_1 to measure the effects of merger blockage on consumer welfare, because CS_1^* incorporates post-merger blockage strategic product differentiation. In this example, CS_1 not only overestimates the post-merger blockage consumer surplus CS_1^* by 74%, but CS_1^* is even lower than CS_0 , so blocking a merger based on a comparison of CS_0 and CS_1 would be to the detriment of consumers.

5. Conclusion

The fundamental argument in the current paper is that the competitive environment does not remain the same under different antitrust policies. This argument has implications for the proper measurement of the effects of antitrust policy on consumer welfare. In particular, a stricter merger policy tilts the expectations of firms about the future state of competition towards price competition as opposed to merger. To relax the forthcoming price competition firms engage in strategic product differentiation that has negative effects on consumer welfare both directly and indirectly through higher prices. The benefits of a stricter antitrust policy to consumers can be measured more accurately if post-*policy-change* strategic product differentiation by firms are taken into account. That is, an analysis of merger policy change is subject to the “Rational Expectations Critique of Policy Analysis” or the [Lucas Critique \(1976\)](#) if it does not account for the effects of changes in the expectations of the concerned agents due to the new policy.

Acknowledgement

I thank Preston McAfee and Max Stinchcombe for encouragement, and especially to Valter Sorana for suggestions. I also thank Richard Higgins, Jeroen Hinloopen, Henry Kahwaty, Çağatay Koç, David Mandy, Mark Manuszak, James Nieberding, Cleve Tyler, David Weiskopf, Jeffrey Wilder, LECG Brown Bag and IIOC 2004 participants, and an anonymous referee for comments. All errors are solely mine. The views expressed here are mine and should not be construed as representing the positions of other experts at LECG.

References

- d’Aspremont, C., Gabszewicz, J.J., Thisse, J.-F., 1979. On Hotelling’s ‘Stability in competition’. *Econometrica* 47, 1145–1150.
- Deneckere, R., Davidson, C., 1985. Incentives to form coalitions with Bertrand competition. *Rand Journal of Economics* 16, 473–486.
- Hotelling, H., 1929. Stability in competition. *Economic Journal* 39, 41–57.
- Jehiel, P., 1992. Product differentiation and price collusion. *International Journal of Industrial Organization* 10, 633–641.
- Lande, Robert H., 1988. The rise and (coming) fall of efficiency as the rule or antitrust. *Antitrust Bulletin* 33, 429.
- Lucas Jr., R.E., 1976. Econometric policy evaluation: a critique. *Carnegie-Rochester Conference Series on Public Policy* 1, 19–46.
- Mas-Colell, A., Whinston, M.D., Green, J.R., 1995. *Microeconomic Theory*. Oxford University Press, New York.
- Nash, J.F., 1950. The Bargaining Problem. *Econometrica* 55, 935–962.