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Joseph Farrell* Carl Shapiro†

*University of California, Berkeley, farrell@econ.berkeley.edu

†Haas School of Business, University of California, Berkeley, shapiro@haas.berkeley.edu

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Abstract

We reply here to a comment by Epstein and Rubinfeld to our paper on the antitrust evaluation of horizontal mergers.

KEYWORDS: antitrust, mergers, oligopoly, unilateral effects

Roy Epstein and Dan Rubinfeld (ER) recently commented on our article about using measures of upward pricing pressure, or "UPP," to analyze the price effects of horizontal mergers involving differentiated products.[1]

ER agree with us (and, we believe, with most economists) that it is desirable to diagnose unilateral price effects using simplified methods that are well-grounded in economics and not necessarily based on market definition and market shares. As ER state, "in mergers involving differentiated products, it is sensible to employ methodologies such as UPP that do not require a market definition. Instead, one can ask directly whether prices are likely to increase." Relative to traditional concentration-based methods, therefore, we are in accord.

Within that economic consensus, however, we think that some of ER's comments on UPP and on its relationship with merger simulation reflect misunderstandings. In particular, they overstate the links between UPP and Bertrand competition, and overstate UPP's information requirements relative to merger simulation.

1. The UPP Approach and Bertrand Behavior

UPP analysis does not, as ER assert (p. 9), "rely on the computation of a post-merger Bertrand equilibrium", nor does it lead to such a computation.[2] ER also state (p. 3) that "[t]he UPP methodology…assumes that pre-merger prices in the industry are determined by a Bertrand equilibrium." One can indeed conveniently present UPP in that widely accepted framework (and parts of our article did so). However, its basic logic does not depend on that assumption, although unsurprisingly the quantitative measure will vary if one knows how industry conduct departs from Bertrand.

UPP's *fundamental* assumptions are very mild and general. First, when a firm sells substitute Products 1 and 2, sales of Product 1 cannibalize to some degree the sales and profits of Product 2; UPP assumes that multi-product firms (and specifically the merged firm) recognize such cannibalization as a pecuniary (opportunity) cost of selling incremental units of Product 1. Second, UPP assumes that when a product's marginal cost rises, there is a real risk that its price will rise too (or, more broadly, that the seller will respond in a way that harms customers).[3]

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[1] See Epstein and Rubinfeld (2010) and Farrell and Shapiro (2010a).

[2] Schmalensee (2009) and Farrell and Shapiro (2010b) discuss whether it is more informative to undertake a simplified merger simulation or to calculate UPP.

[3] The rate at which increases in marginal costs are passed-through to higher prices depends upon the curvature of demand. An increase in costs can leave price unchanged if there is a sufficiently large kink in demand at the current price, with demand much more elastic for price increases than

These fundamental assumptions, described in our article (Section 2.A and the beginning of Section 2.F), do not even assume profit maximization, let alone Bertrand equilibrium. For instance, they hold if the firm maximizes any strictly increasing function of profits, revenues, and unit sales. They similarly hold if the firm maximizes long-run profits including its estimate (not visible to the outside analyst) of follow-on profits from incremental sales. They are also entirely consistent with a market in which prices are sticky and adjust only occasionally and only part of the way toward profit-maximizing levels.

How in practice should one *quantify* the incremental cannibalization term—the incremental impact on profits from Product 2 for each additional unit of Product 1 sold? In our view a very natural and practical benchmark is that the number of unit sales of Product 2 cannibalized by an additional sale of Product 1 is given by the diversion ratio, D_{12}, and that the incremental profitability of each of those sales is given by Product 2's absolute gross margin, $P_2 - C_2$. The formula $D_{12}[P_2 - C_2]$ flows immediately from these intuitive and reasonable measures.

That formula is precisely correct if one can quantify the impact of an additional sale of Product 1 on Product 2 profits as if prices other than Product 1's price did not change. Thus Bertrand equilibrium is a sufficient condition for the formula to be precise. But it is not a necessary condition, nor even the only known sufficient condition. For instance, Scheffman and Simons (2010) have recently argued that differentiated-product prices are often sticky, which would provide an alternative sufficient condition.

As our earlier article also briefly discussed, Jaffe and Weyl (2010) have shown how to quantify upward pricing pressure for non-Bertrand modes of oligopoly behavior by making two adjustments to our formula.[4] The first adjustment substitutes a modified diversion ratio that holds fixed Product 2's price but allows for equilibrium price responses by firms other than the owners of Products 1 and 2. In the usual case of accommodating responses by differentiated-product rivals, those responses mitigate the demand lost by Product 1 when its price rises, and make it less likely that those consumers who do depart will choose those other products; thus this modified diversion ratio will exceed D_{12}. The second adjustment recognizes that when Product 2's price no longer

for price decreases. Scheffman and Simons (2010) challenge the assumption that higher costs generally lead to higher prices, arguing that substantial kinks at existing prices are common in differentiated-product oligopolies. Werden (2010) criticizes Scheffman and Simons' argument and argues that their claims are not supported overall by the empirical evidence.

[4] Our article (p. 16, footnote 33) cited an earlier version of this article as Weyl (2010a).

responds to changes in Product 1's price, as it would have done pre-merger, that affects the incentive to raise the price of Product 1; in the usual case, this lowers upward pricing pressure. Thus, in the usual case these two adjustments work in countervailing directions, and it seems to us a reasonable practical approach, less heroic than many in alternative methods of merger analysis, to use $D_{12}[P_2 - C_2]$ to gauge incremental profit cannibalization. That practical implementation of the robust core logic of UPP is indeed inspired by, and precise in the case of, Bertrand competition; but, as explained above, the basic UPP approach does not assume Bertrand competition, let alone require calculation of a Bertrand equilibrium.

2. UPP Analysis is Not a Form of Merger Simulation

ER claim (p. 2) to "show explicitly that UPP in fact is a special case of merger simulation." We do not think ER show that, nor that it is the case.

A. Different Outputs

Merger simulation in differentiated-product industries typically does "rely on the computation of a post-merger Bertrand equilibrium" to predict post-merger prices.[5] By contrast, UPP does not predict post-merger prices, but only predicts the *sign* of changes in price. The two methodologies thus have different outputs, with UPP's much less detailed.

Of course, the less detailed prediction can readily be derived from the more detailed. ER note two respects in which this is the case.

First, ER note that if there is upward pricing pressure for both products, merger simulation will predict price increases for both products for a merger generating the default level of efficiencies. We agree: indeed, that is the content of Proposition 1 in our paper.

Second, ER describe the calculation of critical marginal-cost efficiencies, which goes back at least to Farrell and Shapiro (1990) for the Cournot model and to Werden (1996) for Bertrand,[6] and which is closely related to UPP. ER suggest that this is part of merger simulation, and they are of course correct that one can

[5] Because merger simulation normally involves estimating a demand system, it also predicts quantities, although it is common in our experience for only the prices to be reported.

[6] These articles consider the minimum level of marginal-cost efficiencies necessary for a horizontal merger to have no adverse effect on consumer welfare. Williamson (1968) studied the critical level of constant-unit-cost efficiencies for a merger to have no effect on total welfare, but this does depend on non-local demand information.

derive that information from the output of a merger simulation that allows for such efficiencies.

In our experience, however, neither the sign of price changes nor the critical-efficiencies exercise is what antitrust economists generally mean by "merger simulation."[7] And, as we discuss next, if these are the desired outputs, a typical merger simulation is a far more elaborate exercise than is needed to produce those outputs.

B. Different Inputs

Unsurprisingly in view of their different outputs, UPP and merger simulation rely on different input data. ER correctly note that the data required for UPP can be derived from that required for merger simulation, but of course that one-way statement is very far from equivalence of the data requirements. ER miss this point when they state (p. 2): "The main innovation in UPP is framing the analysis in terms of diversion ratios, while merger simulation models are conventionally calibrated using own and cross-price elasticities. But this is often more a matter of form rather than substance because diversion ratios and elasticities measure essentially the same thing."

Certainly one can derive the diversion ratio using the ratio of a cross-price elasticity to an own-price elasticity, as in ER's equation (2). But even if measuring a ratio of two elasticities and a ratio of quantities were "essentially the same thing" as measuring one number,[8] that misses two big differences in information (or assumption) requirements between UPP and merger simulation. First, while those inputs suffice for the diversion ratio, merger simulation requires far more. And second, there are other significant ways to estimate the diversion ratio.

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[7] For instance, while Werden (1996) stressed that the critical-efficiencies calculation is robust to demand specification, Werden et al. (1999) stressed that "merger simulation" seeks to predict post-merger variables and depends sensitively on demand curvature. These results have been explored further in the merger simulation literature (see for instance Froeb et al. 2005; Slade 2009), and prior to ER we have seen no usage suggesting (for instance) that the robust critical-efficiencies calculation disproves concerns that "merger simulation" is sensitive in this way.

[8] ER analogize (p. 5) the difference as "measuring temperature in Fahrenheit or Celsius," but it could be more like measuring temperature by estimating a wind-chill factor and gauging wind speed. Such a roundabout method may not be practical, and even when feasible is prone to additional measurement error.

1. Information Requirements for Full Merger Simulation

Merger simulation requires estimating—or being willing to assume—not only first derivatives (own and cross) at pre-merger equilibrium, but also the behavior of demand away from pre-merger equilibrium. A condensed form of this additional information requirement is that even local pass-through rates depend (as we have known at least since Bulow and Pfleiderer (1983)) on second as well as first derivatives. As Froeb et al. (2005) noted, the "shape" of the demand curve is often not independently estimated but rather assumed by the econometrician's choice of functional form to estimate. Merger simulation also typically requires strong supply-side assumptions, not only about conduct (such as Bertrand equilibrium) but also about cost structure.

ER (p. 5) "stress that knowledge as to the magnitude of the diversion ratio often comes from the specification and estimation of a demand system." But it often does not. And even where it does, it comes from only a little of the relatively grand exercise of specifying and estimating a full demand system.

Returning to the focus on critical efficiencies, ER note (p. 6) that "UPP has requirements that are essentially the same as the requirements of standard merger simulation when the goal is to identify "price neutral" efficiencies." But as noted above, that is not the usual goal of a merger simulation.

2. Other Ways to Learn About the Diversion Ratio

ER acknowledge (p. 8) that "there may be situations in which it is possible to measure diversion ratios directly." In our antitrust experience, these situations are common. For example, historical or documentary evidence from win/loss reports, discount approval processes, or customer switching patterns, can be highly informative about the diversion ratio, but yet may be uninformative about either own or cross-elasticities, and is often available when one cannot promptly and reliably estimate the entire demand system—especially with the (second-order and non-local) precision needed for merger simulation.

Describing one such approach, ER comment (p. 8) that "A plausible assumption in many instances is that diversion is proportional to current market shares." As we discussed in our paper,[9] market shares can indeed be a useful starting point for estimating diversion ratios, when combined with an estimate of market-wide recapture: specifically, if "each product's market share is reflective

[9] See also the 1992 *Horizontal Merger Guidelines*, Federal Trade Commission and Department of Justice (1992), section 2.211. The Guidelines were revised in August 2010.

of not only its relative appeal as a first choice to consumers… but also its relative appeal as a second choice"[10] then $D_{12} \approx Rs_2/[1-s_1]$.[11]

3. Conclusion

ER state (p. 3): "…we show that UPP offers an alternative way to generate approximations to the parameters used in a merger simulation model." This is certainly not how we conceive of UPP. We would say UPP is a simple and very robust method of determining whether a merger with a default level of efficiencies is likely to lead to higher prices.

ER conclude (p. 9) by stating: "Conceptually, UPP is a special case of merger simulation. Both UPP and the more general merger simulation approach rely on the computation of a post-merger Bertrand equilibrium with differentiated products and merger-specific efficiencies." As explained above, this statement is not correct: the UPP approach does not rely on the computation of a post-merger Bertrand equilibrium. Perhaps this misunderstanding explains why ER consider UPP analysis as a "special case of merger simulation." We do not.

By their nature, comments and replies often focus on points of difference rather than points of agreement. Taking a broader view, we agree with ER that both UPP analysis and merger simulation can be very useful tools for analyzing the unilateral price effects of mergers; and both tools draw on some of the same economic logic. For the reasons above, however, we do not agree that they are essentially the same tool. Far less information is needed to determine whether there is upward pricing pressure than to conduct merger simulation. This is not magic: UPP requires less information because it is less ambitious. We see UPP analysis as a useful half-way house between using diversion ratios to gauge whether the merging products are close substitutes, and performing full-fledged merger simulation.

[10] 1992 *Horizontal Merger Guidelines* section 2.211.

[11] ER continue (p. 8), "When that assumption fails to hold the UPP diagnostic is likely to generate misleading results." [footnote omitted] We presume that this simply means that assuming diversion ratios to be proportional to market shares could give misleading results if that assumption is wrong.

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