CHOOSING AMONG TOOLS FOR ASSESSING UNILATERAL MERGER EFFECTS

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A. INTRODUCTION

In 2010 a raft of articles offered contrasting views on analytic tools for assessing unilateral effects from differentiated products mergers. They provided some useful insights but did not acknowledge that this is just one of many scenarios encountered in merger assessment, and they paid insufficient attention to the problems faced by a competition agency. We revisit this debate to clarify the issues and place them in context.

We first review the basics of unilateral merger effects, the model-based analytic tools used for assessing unilateral effects, and the contrasting views expressed in the recent debate. With this foundation, we consider the choice among analytic tools at three stages of a merger assessment—initial screening, ultimate decision, and courtroom presentation.

We explain how the proper analytical tool for a particular merger depends on the information available. We also explain how the proper analytic tool for a particular merger depends on the competitive process in which the merging firms engage and how the merger is apt to affect it. Our experience has been that short-run price competition among differentiated products most often is not a satisfactory characterization of the process, and we offer two scenarios that require tools very different than those applicable to differentiated consumer products.

In addition, we address the Upward Pricing Pressure Index (UPPI), which was a focal point in the recent debate. We find some merit in the idea of a very simple tool for differentiated products mergers and suggest a slightly simpler calculation. We also conclude that either as a screen or as part of a full assessment of a merger, other tools are preferable to the UPPI.

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B. USES OF ECONOMIC MODELS IN ASSESSING UNILATERAL MERGER EFFECTS

1. Unilateral Effects from Horizontal Mergers

Horizontal mergers give rise to unilateral anticompetitive effects if they cause the merged firm to compete less intensely than the merging firms had done, while non-merging rivals respond in accord with their unchanged self-interests. In competing less intensely, the specific actions of the merged firm would be to raise price, reduce promotions, restrict output, contract capacity, and the like.[1] Unilateral effects contrast with coordinated effects arising when non-merging rivals cooperate with the merged firm on the choice of competitive actions.

Economists gain insights into unilateral effects by modeling them.[2] With models of competition, economists employ game theory concepts, especially non-cooperative equilibrium. In this context, a non-cooperative equilibrium is a state in which each competitor is happy with its chosen action in view of the actions its rivals have chosen. Mergers give rise to differing unilateral effects in different contexts, which differ with respect to how firms interact and the actions they take. The US competition agencies have articulated five distinct categories of unilateral effects theories in describing their analyses of actual mergers.[3]

Non-cooperative equilibrium in a model of competition results from each firm pursuing its self-interest and therefore taking actions that increase its own profits

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[1] We focus on purely horizontal mergers and assume that the merging firms compete in selling rather than in buying.

[2] Economists also analyze data. Demand estimation, for example, supplies critical inputs to model-based tools and can be decisive in market delineation. In addition, variation in market structure over time or across locations can be exploited to gain insights into the likely effects of mergers through "reduced-form" estimation, which relates market structure to prices or other measures of performance without specifying a model of competition. As we have explained, analyzing such data without a model of competition is apt to lead to mistaken inferences. See G Werden and L Froeb, "Unilateral Competitive Effects of Horizontal Mergers" in P Buccirossi (ed), *Handbook of Antitrust Economics* (Cambridge, MA, MIT Press, 2008), 43, 85–96. Academic work has made initial efforts to supply a model. See M Manuszak and C Moul, "Prices and Endogeneous Market Structure in Office Supply Superstores" (2008) 56 *Journal of Industrial Economics* 94; M Mazzeo, "Product Choice and Oligopoly Market Structure" (2002) 33 *RAND Journal of Economics* 221; M Mazzeo, "Outcomes in Product-Differentiated Oligopoly" (2002) 84 *Review of Economics and Statistics* 716.

[3] US Department of Justice and Federal Trade Commission, *Commentary on the Horizontal Merger Guidelines* 25–36 (2006), http://www.justice.gov/atr/public/guidelines/215247.pdf. The agencies presented 23 brief case histories, 8 of which were categorized as relating to pricing of differentiated products. Two categories not mentioned in this article are unilateral effects from mergers to monopoly and those relating to bargaining.

even at the expense of its rivals. The presence of substitute products offered by rival firms, each pursuing its self-interest, generates competition benefitting the firms' customers but not the firms themselves. The merger of firms offering substitute products produces unilateral effects because combining the products this way changes self-interest. Prior to merging, the self-interest of firm A does not extend to effects its action has on firm B and vice versa, but the merged firm A+B accounts for the effect of A's actions on B and of B's actions on A. In this way, the merger internalizes the competition between A and B, and that is the source of the unilateral anticompetitive effect.

By specifying what actions firms can take and the context in which they are taken, economists have constructed many models in which mergers give rise to unilateral effects. Examples include two textbook models originating in the Nineteenth Century. The Cournot model sometimes is used to assess homogeneous products mergers, and actions in that model are the quantities competing firms produce. The Bertrand model often is used to assess differentiated products mergers, and actions in that model are the prices competing firms charge their customers. Various auction models also are used to assess mergers in bidding contexts, and actions in those models are bids.[4] Finally, specialized models have been developed to analyze competition in particular industries, and actions in these models are many and varied.

In assessments of unilateral effects, formal economic models can be useful in three distinct ways. First, models build a solid foundation for concerns about unilateral effects. Formal modeling brings mathematical rigour to the theoretical demonstration of unilateral anticompetitive effects. Second, models clarify the precise nature of unilateral effects in particular contexts. Analysis of economic models indicates what factors give rise to unilateral anticompetitive effects, how they do so, and how important each factor is likely to be.[5] Third, models permit a quantitative analysis of unilateral effects, including an explicit trade-off of

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[4] A comprehensive treatment of unilateral effects in these three contexts is provided by Werden and Froeb, *supra* n 2. An overview stressing the range of models and modes of analysis is provided by G Werden and D Hay, "Unilateral Competitive Effects of Horizontal Mergers—Markets, Models, and Modes of Analysis" (2007) 14 *Competition & Consumer Law Journal* 217.

[5] On the serious shortcomings of differentiated merger assessment without the benefit of a model, see G Werden, "Simulating the Effects of Differentiated Products Mergers: A Practical Alternative to Structural Merger Policy" (1997) 5 *George Mason Law Review* 363, 364–74.

efficiencies and anticompetitive effects. This third way of using models is illustrated prominently by merger simulation.[6]

2. Merger Simulation

Merger simulation begins by selecting a specific model to capture the essence of the competition in a particular industry. The model is calibrated to match features of the industry considered critical, such as prices and relative outputs. The calibrated model is used to compute the post-merger values of the variables of interest, especially prices. Available data are used to define a pre-merger benchmark for comparison. The predicted unilateral effects of the merger are the differences for relevant variables between the computed post-merger values and the benchmark values.

In the process of merger simulation, the pre-merger benchmark is assumed to be the unique non-cooperative equilibrium produced by the pre-merger industry structure. This assumption can be very useful because it allows unobserved variables, such as marginal costs, to be inferred from the observed variables. The predicted values for post-merger variables are derived by finding the unique non-cooperative equilibrium for the calibrated model with the post-merger industry structure. The post-merger values of the relevant variables are the end point of what can be imagined as a sequence of actions and reactions by the competing firms as they adjust to the merger.

Merger simulation provides a precise, quantitative prediction of the unilateral effects of the merger; however, the prediction is valid only if the model actually does capture the essence of competition in a particular industry, and only if the merger itself does not fundamentally change how competitors interact. Merger simulation has been used most often with the Bertrand model and branded

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6 See O Budzinski and I Ruhmer, "Merger Simulation in Competition Policy: A Survey" (2009) 6 *Journal of Competition Law & Economics* 277; G Leonard and JD Zona, "Simulation in Competitive Analysis" in WD Collins (ed), ABA Section of Antitrust Law, *Issues in Competition Law and Policy*, vol 2 (Chicago, IL, American Bar Association, 2008), 1405–36; G Werden, "Merger Simulation: Potentials and Pitfalls" in P van Bergeijk and E Kloosterhuis (eds), *Modelling European Mergers: Theory, Competition Policy and Cases* (Cheltenham, UK, Edward Elgar, 2005), 37–52 ; G Werden and L Froeb, "The Effects of Mergers in Differentiated Products Industries: Logit Demand and Merger Policy" (1994) 10 *Journal of Law, Economics, & Organization* 407.

consumer products,[7] but many other models of competition also have been used in merger simulations.[8] They include some highly specialized models constructed around the unusual features of particular industries.[9]

A drawback of merger simulation is its sensitivity to functional-form assumptions required to fully specify the underlying model. In simulating branded consumer products mergers, for example, it is necessary to assume a functional form for demand, which fixes its degree of curvature, and different assumptions can yield substantially different price-increase predictions.[10] This drawback is eliminated by manipulating the model at the heart of a merger simulation in a different manner.

3. Compensating Marginal Cost Reductions

Rather than compute post-merger prices, it is possible to compute Compensating Marginal Cost Reductions (CMCRs), the reductions in marginal cost (from merger synergies) required to prevent price increases.[11] This has several advantages over

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[7] See, eg, J Hausman and G Leonard, "Economic Analysis of Differentiated Products Mergers Using Real World Data" (1997) 5 *George Mason Law Review* 321; A Nevo, "Mergers with Differentiated Products: The Case of the Ready-to-Eat Cereal Industry" (2000) 31 *RAND Journal of Economics* 395; J Pinske and M. Slade, "Mergers, Brand Competition, and the Price of a Pint" (2004) 48 *European Economic Review* 617; G Werden, Expert Report in *United States v. Interstate Bakeries Corp. and Continental Baking Co.*, (2000) 7 *International Journal of the Economics of Business* 139.

[8] For an application of merger simulation in an auction context, see Claes Bengtsson, "Simulating the effect of Oracle's takeover of PeopleSoft" in P van Bergeijk and E Kloosterhuis (eds), *Modelling European Mergers: Theory, Competition Policy and Cases* (Cheltenham, UK, Edward Elgar, 2005), 133–49.

[9] See, eg, L Filistrucchi, T Klein and & Thomas Michielsen, "Merger Simulation in a Two-Sided Market: The Case of the Dutch Daily Newspapers", NET Institute Working Paper No. 10-15, 30 Sept. 2010, http://ssrn.com/abstract=1694313; G Fournier and Y Gai, "What Does Willingness-to-Pay Reveal about Hospital Market Power in Merger Cases", 11 April 2007, http://ssrn.com/abstract=993213; L Froeb, S Tschantz and P Crooke, "Bertrand Competition with Capacity Constraints: Mergers among Parking Lots" (2003) 113 *Journal of Econometrics* 49; N Hill, "Analyzing Mergers Using Capacity Closures", Economic Analysis Group Discussion Paper 08-8, Aug. 2008, http://ssrn.com/abstract=1262317; A Kalnins, L Froeb and S Tschantz, "Mergers Increase Output when Firms Compete by Managing Capacity", Vanderbilt University Law School Law and Economics Working Paper 10-21, 15 Sept. 2010, http://ssrn.com/abstract_id=1670278.

[10] See P Crooke, L Froeb, S Tschantz and G Werden, "The Effects of Assumed Demand Form on Simulated Postmerger Equilibria" (1999) 15 *Review of Industrial Organization* 205.

[11] See L Froeb and G Werden, "A Robust Test for Consumer Welfare Enhancing Mergers Among Sellers of a Homogeneous Product" (1998) 58 *Economics Letters* 367; G Werden, "A Robust Test

merger simulation: CMCRs do not require fitting the model to the pre-merger industry; CMCRs do not require any data on non-merging firms; and CMCRs do not require functional-form assumptions. But, just as with merger simulation, the computation of CMCRs assumes that firms interact in accord with some particular model with a unique non-cooperative equilibrium.

The CMCRs are quantitative measures of a merger's unilateral effects expressed in terms of the magnitude of the reduction in marginal cost required to neutralize the anticompetitive effects.[12] The insight behind CMCRs is that marginal cost reductions of just the right amounts exactly offset the price-increasing effect of the merger, and prices would increase with lesser cost reductions. CMCRs can be expressed as proportion of pre-merger marginal cost or as a proportion of pre-merger price, and we use the latter here because the formulas are slightly simpler.

As noted above, firms' actions in the Cournot model are their outputs. The CMCR for the merger of firms 1 and 2 can be written as a function of their pre-merger quantity shares s_1 and s_2 and the pre-merger industry elasticity of demand (expressed as a positive number) e. The Cournot CMCR is $2s_1s_2/e(s_1+s_2)$. The numerator, $2s_1s_2$, is the increase in the Herfindahl-Hirschman Index (HHI), which is widely used to indicate the significance of mergers. The CMCR formula, therefore, indicates that the anticompetitive effects of Cournot mergers are closely related to, but not strictly proportionate to, the increase in the HHI.

Also as noted above, firms' actions in the Bertrand model are their prices. In this model, the CMCRs for the merger of single-product firms 1 and 2 can be written as a function of their margins and diversion ratios. The margins, m_1 and m_2, are the firms' prices minus their short-run marginal costs, all divided by their prices. The diversion ratio from firm 1 to firm 2, d_{12}, is the increase in the quantity sold of firm 2 divided by the decrease in the quantity sold of firm 1, both resulting

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for Consumer Welfare Enhancing Mergers Among Sellers of Differentiated Products" (1996) 44 *Journal of Industrial Economics* 409. For generalizations and extensions of the analysis see M Goppelsroeder, MP Schinkel and J Tuinstra, "Quantifying the Scope for Efficiency Defense in Merger Control: The Werden-Froeb-Index" (2008) 56 *Journal of Industrial Economics* 778.

[12] Gauging anticompetitive effects this way is possible because factors determining the pass through of marginal cost reductions also determine the price effects of mergers. This is formally demonstrated for differentiated products mergers by L Froeb, S Tschantz and G Werden, "Pass-Through Rates and the Price Effects of Mergers" (2005) 23 *International Journal of Industrial Organization* 703.

from an increase in the price charged by firm 1. The diversion ratio from firm 2 to firm 1 is similarly defined and is denoted d_{21}. As neither the margins nor the diversion ratios are constants, the merger would cause both to change, but the relevant values for the CMCRs are those observable pre-merger. Using the foregoing notation, and denoting the merging firms' pre-merger prices as p_1 and p_2, the Bertrand CMCR for firm 1, is

$$\frac{m_1 d_{12} d_{21} + m_2 d_{12} p_2 / p_1}{1 - d_{12} d_{21}}$$

The Bertrand CMCR for firm 2 is the same except that the 2 subscript replaces the 1 and vice versa. In the symmetric case, with equal prices, equal margins of m, and equal diversion ratios of d, the Bertrand CMCR for both merging firms is

$$\frac{md}{1 - d}$$

If the diversion ratios are low, the product of the two diversion ratios is close to zero, and the Bertrand CMCR for product 1 is approximately $m_2 d_{12} p_2 / p_1$. This approximation is well suited for use in initial screening because it is accurate for the mergers that would be screened out because of low apparent diversion ratios. Indeed, the accuracy of this approximation vastly exceeds the precision with which diversion ratios could be estimated at the screening stage.

Suppose information available at the screening stage indicates that $m_1 = 0.4$, $m_2 = 0.3$, $p_1 = 1$, $p_2 = 1.2$, and suggests that $d_{12} < 0.05$ and $d_{21} < 0.10$. With these parameter values, the CMCR for firm 1 is at most 0.020, so a 2% reduction in its marginal cost would prevent it from increasing price. The approximation is 0.018, which is so close to the true value of the CMCR that using the approximation makes no difference. The even simpler approximation of $m_2 d_{12}$ can be used if the two prices are reasonably close, and this simpler approximation is 0.015.

4. Upward Pricing Pressure

A decade ago, Daniel O'Brien and Steven Salop put forward the idea of a Pricing Pressure Index for differentiated products mergers.[13] More recently, Joseph Farrell and Carl Shapiro proposed the similar Upward Pricing Pressure Index (UPPI) for use as "a simple diagnostic test to flag horizontal mergers that are most

[13] D O'Brien and S Salop, "Competitive Effects of Partial Ownership: Financial Interest and Corporate Control" (2000) 67 *Antitrust Law Journal* 559, 598–602.

likely to lead to unilateral anti-competitive effects in markets for differentiated products."[14] Their proposal elicited substantial reaction because both held important positions in US competition agencies and because they argued that the use of their UPPI "is often simpler and more disciplined than flagging mergers based on market definition" and market shares. In a later paper, Farrell and Shapiro similarly described their UPPI as a "practical" tool "for initial screening purposes" but insisted that they "are not suggesting that antitrust enforcement . . . drop market definition."[15]

The UPPI is motivated by the following thought experiment: Assume firms 1 and 2 had set pre-merger prices to maximize their separate profits. After merger, they are operated as separate divisions by a central manager who realizes that a tiny increase in the price charged by division 1 does not affect profits from division 1's sales (because of the mathematics of profit maximization) but it does affect the profits from division 2's sales, with the magnitude of that effect given by the diversion ratio from division 1 to division 2, multiplied by the difference between division 2's price and its marginal cost. Expressed in terms of the margin, this product is $d_{12}m_2p_2$.

This experiment considers only the most direct and immediate effect of a change in either division's price on the other division's profits, and Farrell and Shapiro observe that a test with "greater accuracy" could be derived by also taking the indirect effects into account, including the effect each division's cost reduction has on the other's price. Taking all effects into account yields what is essentially the CMCR formula.[16] Ignoring indirect effects yields the approximation to the CMCR multiplied by the pre-merger price of division 1.

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[14] J Farrell and C Shapiro, "Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition" (2010) 10(1) *B.E. Journal of Theoretical Economics*, article 9, 34, http://www.bepress.com/bejte/vol10/art9.

[15] J Farrell and C Shapiro, "Upward Pricing Pressure and Critical Loss Analysis: Response" (2010) *CPI Antitrust Journal*, Feb., 5, https://www.competitionpolicyinternational.com/file/view/6426.

[16] Farrell and Shapiro, *supra* n 14, 12–14. See also M Doane, L Froeb and S Tschantz, "WARNING: Improper Use of the New *Horizontal Merger Guidelines* Can Result in Overly Narrow Markets, Mistaken Inferences of Market Power, and Wrong-Headed Analyses" (2010) *CPI Antitrust Journal*, Oct., release 2, https://www.competitionpolicyinternational.com/file/view/6373.

The UPPI proposed by Farrell and Shapiro includes a second term reflecting an "efficiency credit", an amount by which the marginal cost of each merging firm is assumed to fall because of merger synergies. The efficiency credit is neither a measurement nor a prediction but rather a tool used for "screening purposes", and Farrell and Shapiro suggest crediting a 10% reduction in marginal cost.

Farrell and Shapiro show that a positive UPPI for both divisions leads to price increases for both, provided that the optimal price for each division is an increasing function of that division's own marginal cost and a non-decreasing function of the other division's marginal cost. Rather than assume Bertrand competition, as is done in deriving the CMCR formulas, Farrell and Shapiro prefer a weaker assumption, but they also recognize that the gross UPPI is "precisely correct" only within the context of the Bertrand model, in which case the CMCRs provide "greater accuracy".[17]

We prefer to express the UPPI as a unit-free number rather than as monetary amount. Thus, we divide the UPPI for merging firm 1 by its price to yield $m_2 d_{12} p_2 / p_1 - (1-m_1)/10$. And we divide the UPPI for merging firm 2 by its price to yield $m_1 d_{21} p_1 / p_2 - (1-m_2)/10$. Farrell and Shapiro propose to flag mergers for closer scrutiny on the basis of whether the UPPI is positive despite the efficiency credit. To see how this screening might work, consider the parameter values used to illustrate the CMCRs. The UPPI for firm 1 is less than –0.042, and the UPPI for firm 2 is less than –0.037, so this hypothetical merger would not be investigated past the initial screening.

C. Contrasting Perspectives on Using Models to Assess Mergers

1. Perspectives on the UPPI versus Merger Simulation

Farrell and Shapiro are of the view that merger simulation "can be a valuable part of the full analysis of competitive effects" from mergers but the UPPI serves "a very different role". They see the UPPI as an "informative diagnostic" on likely unilateral effects from differentiated products mergers and not a prediction of those effects.[18] They argue that the UPPI avoids significant problems, suggesting that merger simulation "risks mis-specification" of competition in "complex

[17] Farrell and Shapiro, *supra* n 14, 16.

[18] Farrell and Shapiro, *supra* n 15, 29.

industries" by unnecessarily fitting a structural model, while the UPPI gauges the change in incentives caused by the merger and thus "nets out such complexities that are present both before and after the merger". They also opine that merger simulation "tends to be opaque to non-specialists" and "can be demanding in terms of data requirements".[19]

Joseph Simons and Malcolm Coate see merger simulation as not "very successful" because it requires "reasonably precise estimates of a demand system", which they see as typically infeasible.[20] Among other critiques, they argue that merger simulation focuses just on prices and "appears to ignore more complex competitive processes".[21] They additionally argue that, because merger simulation has "not been shown to reliably predict price effects from mergers", it likely would not be admissible evidence in a US court.[22] They make this argument for the UPPI as well, but they additionally argue that using a variation on the UPPI rather than merger simulation for making the ultimate assessment of unilateral effects "reduces the black box nature of merger simulation and minimises the data requirements".[23] In stark contrast to Farrell and Shapiro, Simons and Coate oppose using the UPPI as a screen absent empirical evidence that it "actually predicts concerns reasonably well".[24]

In reaction to the proposal of Farrell and Shapiro, Roy Epstein and Daniel Rubinfeld[25] explained that the data required by the UPPI could be used to

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19 *Ibid*.

20 J Simons and M Coate, "Upward Pressure on Price Analysis: Issues and Implications for Merger Policy" (2010) 6 *European Competition Journal* 377, 378. In particular, they (*ibid*, 378 n 4) argue that merger simulation models "have had no success in the courts", citing *United States v. Oracle, Inc*, 331 F Supp 2d 1098 (ND Cal 2004). That decision (at 1122), however, encouraged the use of merger simulation in assessing differentiated products mergers:

> Despite the problems with qualitative analyses, modern econometric methods hold promise in analyzing differentiated products unilateral effects cases. Merger simulation models may allow more precise estimations of likely competitive effects and eliminate the need to, or lessen the impact of, the arbitrariness inherent in defining the relevant market. For example, some merger simulation methods compensate for potential errors in market definition.

21 Simons and Coate, *supra* n 20, 383.

22 *Ibid*, 378.

23 *Ibid*, 393.

24 *Ibid*, 378, 386–87, 392–96.

25 R Epstein and D Rubinfeld, "Understanding UPP" (2010) 10(1) *B.E. Journal of Theoretical Economics*, article 21, http://www.bepress.com/bejte/vol10/iss1/art21.

calibrate a two-firm merger simulation. They also argued that this simple merger simulation would make better use of the data by going beyond the most direct impact of the merger on incentives. What they actually proposed, however, was not merger simulation, but rather use of the CMCRs.

In response to Epstein and Rubinfeld, Farrell and Shapiro[26] argued that the derivation of the UPPI is significantly more general than the derivation of CMCRs, in particular because the latter requires the assumption of Bertrand competition, while the former requires no specific assumption about competition. Farrell and Shapiro also noted that merger simulation requires functional-form assumptions, but of course the CMCRs advocated by Epstein and Rubinfeld do not.

For much the same reason as Epstein and Rubinfeld, Jerry Hausman[27] proposed doing crude merger simulations instead of computing the UPPI. He also argued that a crude merger simulation would yield results calibrated in easier-to-understand terms—potential price increases. Hausman suggested doing two merger simulations, both calibrated using margins and diversion ratios for just the merging firms. He suggested that a merger simulation with linear demand could generate a lower bound on the likely price increases, and a merger simulation with constant elasticity demand could generate an upper bound. Both of these simulations would ignore pricing responses of the merged firm's rivals, but with constant demand elasticities, the rivals have no reason to respond.

Richard Schmalensee[28] also expressed a preference for going beyond the most direct impact of the merger on incentives and for calibrating unilateral effects in terms of price increases. He suggested making the assumption that the merging firms face linear demand, and ignoring pricing responses from rivals. With symmetric merging firms, these assumptions lead to a simple formula for the post-

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[26] J Farrell and C Shapiro, "Upward Pricing Pressure in Horizontal Merger Analysis: Reply to Epstein and Rubinfeld" (2010) 10(1) *B.E. Journal of Theoretical Economics*, article 41, http://www.bepress.com/bejte/vol10/iss1/art41.

[27] J Hausman, "2010 Merger Guidelines: Empirical Analysis" (2010) 10 (1) *Antitrust Source*, Oct,, http://www.americanbar.org/content/dam/aba/publishing/antitrust_source/Oct10_Hausman10_21f.authcheckdam.pdf.

[28] R Schmalensee, "Should New Merger Guidelines Give UPP Market Definition?" (2009) *CPI Antitrust Journal*, Dec., release 1, https://www.competitionpolicyinternational.com/file/view/6222.

merger price increases, and he proposed to use comparable but much more complex calculations with asymmetric merging firms.

Simons and Coate proposed implementing Schmalensee's idea, or a slight variation on it, in the ultimate assessment of a merger (albeit only if empirical evidence demonstrates its accuracy). They asserted that this approach "has significant advantages over the standard simulation analysis" as it "serves to eliminate the black box concerns".[29] Yet they made no attempt to explain how merger simulation, which is totally transparent as to the assumptions made, raises such concerns; nor did they explain how such concerns are eliminated by invoking a formula with no indication of its derivation or limitations.

Responding to Schmalensee, Farrell and Shapiro argued that their approach is "more practical, more robust, and more transparent for initial screening purposes".[30] The asserted practicality and transparency advantages appear to derive from the simplicity of the UPPI, but they did not explain why simplicity is so important. We presume that Farrell and Shapiro preferred a simple formula associated with a simple intuition because their tool was not designed for use by PhD economists, and we agree that simplicity is a cardinal virtue in designing tools for competition lawyers.

On this point, we take a lesson from the negative reaction in 1982 when the Merger Guidelines of the US Department of Justice replaced the four-firm concentration ratio with the HHI.[31] If the HHI, or the increase in the HHI, is to be partially supplanted now, it is necessary to overcome inertia in the legal system and math anxiety on the part of competition lawyers.[32] To do so is easiest if computations no more complicated than those associated with the increase in the HHI.

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[29] Simons and Coate, *supra* n 20, 391.

[30] Farrell and Shapiro, *supra* n 15, 5.

[31] See S Calkins, "The New Merger Guidelines and the Herfindahl-Hirschman Index" (1983) 71 *California Law Review* 402, 423–25 (offering a list of reasons why "the costs of changing indexes outweighs the benefits").

[32] Speaking of merger enforcement, current FTC Commissioner J Thomas Rosch declared a few years ago that his "eyes start to glaze over" whenever he sees "an economic formula." JT Rosch, "Litigating Merger Challenges: Lessons Learned", remarks presented at the Bates White Fifth Annual Antitrust Conference, 2 June 2008, 9, http://www.ftc.gov/speeches/rosch/080602litigatingmerger.pdf.

In crudely characterizing the unilateral effects of differentiated products mergers, we suggest the simpler of the approximations to the CMCRs, denoted aCMCRs: m_2d_{12} and m_1d_{21}. The aCMCRs also are approximations to the gross UPPI, which omits the efficiency credit. Thus, they indicate roughly how large the marginal cost reductions from the merger would have to be in order to prevent price increases, and they indicate roughly how much pressure to increase price is created by the internalization of competition from the merger. The aCMCRs provide an "informative diagnostic", as Farrell and Shapiro have said of the UPPI.

2. Implications of Using the UPPI as a Screen

Simons and Coate argued that adopting the UPPI as a screening device would produce a dramatic increase in the proportion of mergers that survive the initial screening process.[33] They made this argument with tables of UPPI values reflecting all arithmetically possible combinations of margins and diversion ratios. They then posited various numbers of symmetric competitors and derived implied diversion ratios from the assumption of equal diversion to all products in the market. Because the 10% efficiency credit often was insufficient to prevent the UPPI from being positive, they inferred that reliance on the UPPI as a screen often would lead to further investigation even when reliance on the market shares would not. Thus, they argued that reliance on the UPPI "would mark a substantial break with historical enforcement patterns over the past two decades".[34]

Simons and Coate consider margins and diversion ratios outside the context of the competitive process,[35] but the UPPI is "precisely correct" only in the context of Bertrand competition among differentiated products, and we think that how the UPPI performs as a screen should be assessed (at least initially) in that context. In that context, a high degree of differentiation implies low diversion ratios causing

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[33] Simons and Coate, *supra* n 20, 393–96. Similar concern was expressed by J Harkrider, "A Return to *Von's Grocery*?" (2010) 10(1) *Antitrust Source*, Oct., http://www.americanbar.org/content/dam/aba/publishing/antitrust_source/Oct10_Harkrider10_21f.authcheckdam.pdf.

[34] Simons and Coate, *supra* n 20, 389.

[35] This is also true of the calculations presented by E Bailey, G Leonard, GS Olley and L Wu, "Merger Screens: Market Share-Based Approaches Versus 'Upward Pricing Pressure'" (2010) 9(3) *Antitrust Source*, Feb., http://www.americanbar.org/content/dam/aba/publishing/antitrust_source/Feb10_Leonard2_25f.authcheckdam.pdf.

high margins, and a low degree of differentiation implies high diversion ratios causing low margins.

As Simons and Coate did in some of their tables, we posit *n* symmetric firms with equal substitution from each firm's product to those of its *n*–1 rivals. Economists term this pattern of substitution IIA (Independence of Irrelevant Alternatives), and it is exhibited by the logit demand model, so we assume logit demand. In particular, we adopt the Antitrust Logit Model (ALM), which has two demand parameters.[36] One parameter is the aggregate elasticity of demand for all *n* products, and the other parameter controls the degree of substitutability among the *n* products. Following the suggestion of Farrell and Shapiro, Simons and Coate assumed an aggregate recapture rate of 80%, ie, that 80% of the substitution away from any one of the *n* products, as its price increases, goes to other *n*–1 products, while 20% goes to products outside the market. In the ALM, this assumption fixes the ratio of the two parameters.[37] We adopt this assumption and perform a simple exercise that varies both *n* and the aggregate elasticity of demand and that assumes Bertrand competition to make the UPPI "precisely correct".

We link our exercise to "historical enforcement patterns", with respect to the number of competing firms and the aggregate elasticity of market demand. The latter linkage comes through the hypothetical monopolist test, which effectively bounds that elasticity.[38] By design, the hypothetical monopolist test precludes

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[36] The ALM is presented by G Werden and L Froeb, "The Antitrust Logit Model for Predicting Unilateral Competitive Effects" (2002) 70 *Antitrust Law Journal* 257; Werden and Froeb, *supra* n 6.

[37] The ALM is a "choice model" which indicates the probability with which a consumer will choose each product in the model or alternatively choose none of them. The ratio of the two parameters in the ALM is the probability of the latter choice, p. With n symmetric choices in the model, a recapture rate of $1-r$ is achieved by setting $p = r(n-1)/(n-r)$. The probability of each inside choice is $(1-p)/n$, and the substitutability parameter equals the aggregate elasticity of demand for the n products divided by p. Consequently, the model is fully specified by r, n, and the aggregate elasticity.

[38] See generally G Werden, "Demand Elasticities in Antitrust Analysis" (1998) 66 *Antitrust Law Journal* 363, 387–394. Application of the hypothetical monopolist test also causes market shares to be related to both margins and diversion ratios. This relationship is explored by S Moresi, "The Use of Upward Pricing Pressure Indexes in Merger Analysis" (2010) 9(3) *Antitrust Source*, Feb., 7–8, http://www.americanbar.org/content/dam/aba/publishing/antitrust_source/Feb10_Moresi2_25f.authcheckdam.pdf; C Shapiro, "The 2010 Horizontal Merger Guidelines: From Hedgehog to Fox in Forty Years" (2010) 77 *Antitrust Law Journal* 49, 99–100.

overly narrow markets in which demand is more than a little elastic. Yet the test also provides a rationale for not delineating very broad markets, and the new US Horizontal Merger Guidelines state that "when the Agencies rely on market shares and concentration, they usually do so in the smallest market satisfying the hypothetical monopolist test".[39]

Our experience has been that markets delineated using the hypothetical monopolist test generally have elastic demand, ie, the demand elasticities exceed 1.0 (in absolute value). Assuming Bertrand competition among *n* symmetric firms, logit demand, and an aggregate recapture rate of 80%, our analysis shows that only a market with three or fewer competing firms never yields a positive UPPI (which incorporates the 10% efficiency credit) with elastic demand. With four competing firms, a positive UPPI requires that the demand elasticity be less than 0.875. And with six, a positive UPPI requires that the demand elasticity be less than 0.625, which is exceptionally low in our experience.

When a product grouping has an exceptionally low elasticity of demand, a narrower grouping almost certainly would pass the hypothetical monopolist test, and such a grouping typically would be delineated as the relevant market. That is especially likely if the result would be fewer rivals for the merging firms within the relevant market. A competition agency would have no reason to delineate a relevant market with both many competitors and a very low elasticity of demand.

Screening with the UPPI would not radically alter historic practice, but it could make a difference. If information on diversion ratios is available, it could indicate that diversion between the merging firms is much greater than proportionate to share, and it could indicate that diversion is much less than proportionate to share. Consequently, use of the UPPI in screening could lead to investigating some mergers that would have been screened out if market shares had been used, and could lead to not further investigating some mergers that would have gotten closer scrutiny on the basis of market shares.[40]

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[39] US Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines* s 4.1.1 (2010), http://www.justice.gov/atr/public/guidelines/hmg-2010.pdf.

[40] This is what another interesting analysis indicates, provided that markets are delineated relatively narrowly. See G Das Varma, "Will Use of the Upward Pricing Pressure Test Lead to an Increase in the Level of Merger Enforcement" (2009) 24(1) *Antitrust*, Fall, 27. Das Varma examined randomly generated industries with linear demand. He found that using the UPPI as a screen resulted in the same outcome as using market shares in 84% of the cases, with the

D. Optimally Using the Available Information

We now discuss choice among analytic tools at particular stages of a merger assessment using the information then available to the competition agency. We begin with the initial screening, normally done with very limited information. We then consider an agency's ultimate decision on the merger, made after a full investigation. Finally, we comment on court proceedings.

1. Agency Screening of Mergers

A full assessment of every notified merger would be impossible in most jurisdictions due to time and resource constraints, and it would be inefficient absent such constraints. Agencies charged with merger assessment, therefore, do an initial screening. In the United States, over 95% of transactions notified to the competition agencies are investigated no further than the initial screening.[41] In screening mergers, an agency reviews the available information for indications that the merging firms compete, and when they do appear to compete, the agency looks for indications that the competition is significant.

The information available to an agency at the screening stage typically is severely limited, but a competition agency often has data on sales, or some other potentially relevant datum such as capacity, from which it can construct crude market shares. Prior experience with the industry could allow an agency to delineate relevant markets at the screening stage, but an agency typically has only rough ideas about relevant markets at that stage. And even if the agency could delineate relevant markets accurately, data limitations at the screening stage likely permit only crude market shares.

In what appear to be reasonably symmetric industries, the screening rule could be to close the investigation if the merging firms have at least a set number of rivals (eg, 3) in every potentially relevant market. In what appear to be significantly asymmetric industries, the screening rule could be to close the

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remaining 16% almost evenly divided between mergers screened out using market shares but not using the UPPI (9%) and mergers screened out using the UPPI but not using market shares (7%).

[41] See Federal Trade Commission and US Department of Justice, Annual Reports to Congress Pursuant to the Hart-Scott-Rodino Antitrust Improvements Act of 1976, http://www.ftc.gov/bc/anncompreports.shtm.

investigation if the sum or product of the market shares exceeds an established threshold (eg, a sum of 30 or a product of 200) in no potential relevant market.[42]

For mergers involving differentiated products, a better screen might be applied when the available information allows the agency usefully to characterize the closeness of the products of the merging firms. Estimates of diversion ratios, however crude, are needed, and as the prior discussion has indicated, they are useful in conjunction with margins. But our experience is that a competition agency at the screening stage normally does not have the information necessary to estimate diversion ratios or determine margins. Thus, the UPPI normally cannot be used as a screen,[43] nor can the CMCRs.

Of course, an agency occasionally could have the information required to compute the UPPI or CMCRs. The information might have been obtained in a prior investigation, and it might be volunteered by the merging firms. In either event, the agency could devote its resources to estimating diversion ratios and determining margins rather than delineating a relevant market and assigning shares. But before deciding on that allocation of resources, the agency must determine that the most plausible anticompetitive effect from a particular merger is a unilateral effect involving marginal changes in price. Consequently, we are inclined to devote screening resources to margins and diversion ratios mainly for mergers involving branded consumer products,[44] and for those mergers, we would screen on the basis of CMCRs or simple merger simulations.

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[42] The product of the market shares is half of the increase in the HHI, which is used in characterizing the potential competitive impact of mergers. As a general rule, the product of the merging firms' shares is a better indicator of the competitive significance of their merger than is the sum of their shares. For example, the merger of two 20% firms is apt to have a much greater overall impact on customers than the merger of a 39% firm with a 1% firm. In randomly generated differentiated products industries, we have shown that the increase in the HHI is better than the sum of the merging firms' shares as a predictor of unilateral effects. See G Werden and L Froeb, "Simulation as an Alternative to Structural Merger Policy in Differentiated Products Industries" in M Coate and A Kleit (eds), *The Economics of the Antitrust Process* (Boston, MA, Kluwer Academic Publishers, 1996), 65, 73–76.

[43] A similar observation was made by Bailey et al, *supra* n 35, 5–6.

[44] We single out mergers involving branded consumer products mainly for two reasons: First, we think that unilateral effects involving marginal changes in prices normally are the principal concern for such mergers, yet we are not prepared to say the same for any other category of mergers. Second, we have found with branded consumer products that good approximations of true marginal cost typically can be constructed from accounting data.

As a simple index designed to give a general idea of potential unilateral effects, we prefer the aCMCRs. They are more like the increase in the HHI than any other index of which we are aware; they have an intuitive interpretation (how large a marginal cost reduction is needed to offset anticompetitive effects), and they allow quick mental calculations. If the margins appear to be about 50% and the diversion ratios appear to be about 10%, the aCMCRs are about 5%. In our view, an aCMCR of 5% engenders concern, and one of 10% engenders substantial concern. In the former case, a marginal cost reduction of roughly 5% of the pre-merger price is required to offset the unilateral anticompetitive effect of the merger, and in the latter case 10% is required. In relation to the pre-merger marginal cost, the required cost reductions are much greater, perhaps double (as with a margin of 50%).

Contrary to the suggestion of Farrell and Shapiro, simple merger simulation is well suited for use in screening. And contrary to the suggestion of Simons and Coate, it can be performed with crude estimates of diversion ratios.[45] Moreover, merger simulation can be less demanding in terms of data requirements than the UPPI, since a merger simulation can be calibrated with just data on margins or with just data on diversion ratios. Having less data requires making more assumptions, and at the screening stage, assumptions frequently must be used to fill in gaps in the data. By making the strong assumption that diversion is proportionate to market share, a merger simulation can be calibrated with only market shares, a single margin, and a rough idea of the aggregate elasticity of demand for the market.[46] Merger simulation combines information from the shares with the information from the margin and elasticity in a manner that can greatly increase the predictive accuracy of the shares alone.[47] And even if merger

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[45] Indeed, we have advocated the use of merger simulation as tool for systematically exploring plausible merger effects based on guesses of possible parameter values informed only by experience. We have computed post-merger prices for thousands of plausible sets of parameters and plotted iso-price-increase contours against elasticity values. See G Werden and L Froeb, "Calibrated Economic Models Add Focus, Accuracy, and Persuasiveness to Merger Analysis" in *The Pros and Cons of Merger Control* (Stockholm, Swedish Competition Authority, 2002), 63, 75–77.

[46] See R Epstein and D Rubinfeld, "Merger Simulation: A Simplified Approach with New Applications" (2002) 69 *Antitrust Law Journal* 833; Werden and Froeb *supra* n 6; Werden and Froeb *supra* n 36.

[47] In random industries exhibiting the IIA property, and thus assuring that the shares have some predictive power, we found that any given increase in the HHI can be associated with a wide

simulation added no information content, it nevertheless would usefully transform the available information into price increase predictions.

Farrell and Shapiro tout the robustness of the UPPI as compared with that of a simple merger simulation, but we think they exaggerate a small point and overlook a larger one. The economic analysis motivating the UPPI is more general in a technical sense than that driving a Bertrand merger simulation or the Bertrand CMCRs, but we question the practical significance of the extra generality. All of these tools are specialized and therefore ill-suited to many mergers. Indeed, our experience has been that the principal competitive concern raised by most mergers is not a change in pricing incentives resulting from diversion from one merging firm's product to the other.

As Farrell and Shapiro suggest, a conventional Bertrand merger simulation could mis-specify the competitive process to a degree that its predictions would be useless,[48] but in that event, the same almost certainly is true for the UPPI. Simulation using a different model often is nevertheless feasible, so we see merger simulation as more robust than the UPPI. And, if robustness were the critical factor, the index of choice would be the increase in the HHI. Under any circumstances, either a very large increase in the HHI, or a very small one, is an "informative diagnostic" even if not an accurate predictor.

2. Agency Decisions after Full Investigation

Over the course of a full merger investigation, a competition agency expends substantial resources processing a wealth of information from a variety of sources. Competition agencies around the world are generally agreed that focusing principally on market delineation and market shares is not the best approach.[49] Rather, an agency tries to understand how and to what extent the merging firms compete, and as a consequence, how their merger likely would alter their actions

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range of price effects, which can be narrowed greatly using margin and elasticity information. See Werden and Froeb *supra* n 42, 76–78.

[48] If, for example, the competing sellers of differentiated consumer products can change their product positioning just as easily as their prices, the effects of mergers are drastically different than those in the Bertrand model, and the UPPI (as well as the CMCRs) is grossly misleading. See A Gandhi, L Froeb, S Tschantz and G Werden, "Post-Merger Product Repositioning" (2008) 56 *Journal of Industrial Economics* 49.

[49] See International Competition Network Recommended Practices for Merger Analysis (2009), available at http://www.internationalcompetitionnetwork.org/uploads/library/doc316.pdf.

and those of rivals. An agency tries to identify the dimension(s) of competition most likely to be affected significantly (eg, price or new product development), the nature of the likely effects, and the mechanism through which each could be produced. By focusing on the foregoing issues, an agency can sensibly determine which tools are best suited to assessing the likely competitive effects of a merger.

Before considering some specific unilateral effects scenarios that could emerge in the full investigation of a merger, we mention coordinated effects in passing to note one substantial limitation on the application of the modeling tools we discuss. Coordinated effects do not arise from the internalization of the competition between the merging firms, so no UPPI-type formula reflecting the magnitude of internalized competition can be useful in gauging coordinated effects.[50] Economic models can be employed in a quantitative assessment of coordinated effects, but only limited progress has been made in doing so.[51]

Returning to unilateral effects, we first revisit branded consumer products. In the full investigation of a merger involving such products, the logic of the UPPI is correct and important in pointing up the importance of diversion ratios, so an agency should devote substantial resources to estimating them. A competition agency should examine both qualitative and quantitative evidence bearing on the issue and employ econometrics if suitable data are available. The amount of effort required to estimate diversion ratios reliably is no different depending on how they are then used. Contrary to the suggestion of Simons and Coate, merger simulation is not more data intensive or time consuming than the analysis they favor.

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[50] The competitive effects of a merger in a particular market can involve both unilateral and coordinated effects but not in the same dimension of competition at the same time. For example, a merger could have an immediate effect on prices and a long-term effect on capacity expansion, and one of those effects could be unilateral while the other is coordinated, but the immediate effect on price cannot be both unilateral and coordinated as a matter of definition.

[51] For efforts in this direction, see P Davis and E Garcés, *Quantitative Techniques for Competition and Antitrust Analysis* 426–33 (Princeton, NJ, Princeton Univesity Press, 2010); P Davis and C Huse, "Estimating the 'Coordinated Effects' of Mergers", working paper, U.K. Competition Commission, Jan. 2010, http://www.competition-commission.org.uk/our_role/analysis/Peter%20Davis_Cristian%20Huse_2010.pdf.

With reliable diversion ratios and margins,[52] any of the analytic tools discussed here could be applied, but none should be without first examining prevailing patterns of competitive interaction. The available qualitative (and sometimes also quantitative) information should be examined to ascertain whether it is appropriate to focus on marginal price adjustments as the unilateral effect of concern, while holding constant all other dimensions of competition (at least for the purpose of determining the relatively short-term impact of the merger).

As many have observed, Bertrand merger simulation ignores complexities in the competitive process, but there is no basis for the belief which some seem to hold that ignoring these complexities presents major difficulties when, and only when, performing merger simulation. Ignoring complexities is not necessarily problematic at all. The pricing story told by merger simulation is never the whole story of any real-world competitive process, but it often is the part of the story that really matters in determining the relatively near-term effects of a merger. Ignoring complexities is highly problematic, however, if they make the pricing story told by the merger simulation mostly wrong, but then the pricing pressure story underlying the UPPI and all related calculations is mostly wrong as well.

We turn now to unilateral effects scenarios illustrating that the economic forces critical with differentiated consumer products often are not the forces that really matter. In one scenario, the anticompetitive effect of the merger does not manifest itself in a short-run marginal decision on price or output. In the other scenario, the anticompetitive effect of the merger does manifest itself in a short-run marginal pricing decision, but the particularities of the competitive process greatly affect the nature and extent of the anticompetitive effects.

In an industry with standardized products and no brands of significance, a merger assessment should not focus on the demand side of the market, as with branded consumer products, but rather should focus on the supply side. In this context, a merger can produce a unilateral anticompetitive effect only if the merged firm can materially reduce the available supply and thereby drive up the market price. That can be achieved either by a simple reduction in output or by

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[52] Our experience has been that accounting measures of variable costs normally are an adequate proxy for true marginal costs for branded consumer products. Nevertheless, efforts must be made to verify that is so. Moreover, numerous minor complications inevitably present themselves, so the effort required to determine margins reliably often is substantial.

shutting down productive facilities. Either strategy can be profitable if capacity is fairly tight and demand is not especially elastic. But the strategy of shutting down capacity can dominate that of just reducing production because it can avoid substantial costs that otherwise would be incurred.[53] And the cost avoidance can be greatest when capacity is actually decommissioned because machinery and land then can be reallocated to other productive uses. With some mergers, therefore, the most plausible unilateral anticompetitive effect would be manifest in the post-merger decision to dismantle a manufacturing facility.

The plant-closing decision implicates benefits and costs to the merging firm not implicated by a marginal reduction in production. The analysis of the effects of a merger on the plant-closing incentive must focus largely on those particular benefits and costs, which are not reflected in conventional margins or diversion ratios. Important factors with plant decommissioning could be the value of land in alternative uses, the amount of required severance payments to workers, and the cost of mandated environmental remediation.

Unilateral effects involving plant closings can be predicted using simple merger simulation, and such simulation has been used by one of the US competition agencies.[54] It is possible to derive a formula akin to the UPPI that crudely gauges the effect of the merger on the plant-closing benefits from a higher market price, but such a formula cannot answer the critical question, which merger simulation can answer—does the merger make closing a plant profitable when it otherwise would not be?

A second scenario involves competition that occurs essentially through a procurement auction. We posit that each procurement entails an entirely separate price determination in which each competitor knows what its rivals are offering. We also posit that customers are differently situated in a way that affects potential suppliers' costs of serving them. For example, suppliers and customers could be

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[53] In this respect, the assessment of unilateral effects entails an analysis similar to that in delineating a relevant market, as discussed by G Werden, "Beyond Critical Loss: Tailored Application of the Hypothetical Monopolist Test" (2005) 4 *Competition Law Journal* 69. The information required for the analysis likely can be assembled without great difficulty because plant closing is a decision many businesses contemplate and plan for.

[54] Application to several mergers in the paper industry is discussed by K Heyer and N Hill, "The Year in Review: Economics at the Antitrust Division, 2007–2008" (2008) 33 *Review of Industrial Organization* 247, 253–58; Hill, *supra* n 9.

differentiated by location with transportation sufficiently costly to make the differentiation meaningful.[55] Competition under these circumstances can be modeled as a second-price (or Vickrey) auction, in which the contract is awarded to the low bidder at the second-lowest bid.[56] The outcome of a second-price auction is exactly the same as that of an oral (or English) auction.

In a second-price procurement auction, the optimal strategy for each participant is to bid its cost. Consequently, the winning bidder is the lowest-cost supplier and its profit is its cost advantage over the second-lowest-cost supplier. If two suppliers merge with no synergies, they submit the lower of the two bids the two merging firms would have submitted. If the merging firms would have submitted the two lowest bids, the next-lowest-cost supplier now sets the price, and the increase in the amount the customer pays is the difference between the costs of the second- and third-lowest-cost suppliers.

A merger in this auction setting has no marginal effect on the level of bids that could be gauged with a UPPI-type formula, and the effect of the merger on the amount customers pay is determined by characteristics of non-merging suppliers. Something akin to a diversion ratio determines the frequency with which the merger affects what a customer pays, but nothing like a diversion ratio determines the magnitude of the effect when it does occur.[57] Indeed, there is no actual diversion in this context; the lowest-cost supplier is awarded every contract, and absent synergies, a merger does not alter the identity of the lowest-cost supplier.

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[55] The economic analysis of competition is essentially the same when the bidders offer different products that suit the needs of different customers in different ways, provided that the bidders understand the needs of the customers. This was the government's theory in *United States v Oracle, Inc.*, 331 F Supp 2d 1098 (ND Cal 2004). For a discussion of case and the court's decision, see G Werden, "Unilateral Effects from Mergers: The *Oracle* Case" in P Marsden (ed), *Handbook of Research in Trans-Atlantic Antitrust* (Cheltenham, UK, Edward Elgar, 2006), 1–15.

[56] For a discussion of unilateral merger effects in this context, see Werden and Froeb, *supra* n 6, 57–62; L Brannman and L Froeb, "Mergers, Cartels, Set-Asides and Bidding Preferences in Asymmetric Second-Price Auctions" (2000) 82 *Review of Economics and Statistics* 283; L Froeb and S Tschantz, "Mergers Among Bidders with Correlated Values" in D Slottje (ed), *Measuring Market Power* (Amsterdam, North-Holland Publishing, 2002), 31–46.

[57] Even in this particular auction scenario, the determinants of the unilateral effects of mergers have some other parallels to those in a Bertrand model with differentiated products. The parallels are much stronger in some other auction scenarios, and the fact that firms submit bids rather than quote prices is not necessarily of any significance.

If the merger generates synergies and thus reduces the cost of either merging firm, the impact of the cost reduction is quite different from that with a merger involving branded consumer products. When the merged firm is awarded the contract, the customer pays the cost of the next-lowest-cost supplier, so the reduction in the merged firm's marginal cost has no effect unless it causes the merged firm to become the lowest-cost supplier. But the reduction in marginal cost from the merger does affect what the customer pays when the merged firm is not awarded the contract but sets the price as the second-lowest bidder.

The assessment of unilateral effects arising in the context of various types of auctions can be performed through merger simulation, and such simulation has been used in court by both US competition agencies.[58] Calibration of an auction model is facilitated by making simplifying assumptions,[59] and a suggested UPPI-type analysis is made possible only by making more and stronger assumptions.[60]

The foregoing scenarios are illustrative of the fact that many specialized tools are required to assess unilateral effects: If a model of competition with a unique non-cooperative equilibrium fits the industry under investigation, a merger simulation is possible and often quite useful. In some cases, the model of competitive interaction at the heart of the merger simulation could not be taken off the rack, but rather must be tailored to particular industry under investigation. In some cases, no tractable model fits well enough to be worth pursuing, and in still others, difficulty in calibrating a merger simulation greatly limits its utility.

3. Courtroom Presentation of a Merger Case

Merger challenges made by the US competition agencies usually are resolved by a consent judgment implementing a remedy tailored to the specific harm to

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[58] See *Federal Trade Commission v CCC Holding Inc*, 605 F Supp 2d 26, 69–71 (DDC 2009); *United States v Oracle, Inc*, 331 F Supp 2d 1098, 1169–70 (ND Cal 2004). In both cases, the court declined to place any weight on the merger simulation. In *CCC Holding* the court found that the calibration of the model relied on assumptions unsupported by the evidence. In *Oracle* the calibration of the model relied on assumptions that were contrary to the court's findings.

[59] See G Werden and L Froeb, "Unilateral Competitive Effects of Horizontal Mergers II: Auctions and Bargaining" in WD Collins (ed), ABA Section of Antitrust Law, *Issues in Competition Law and Policy*, vol 2 (Chicago, IL, American Bar Association, 2008), 1343–57.

[60] See S Moresi, "Bidding Competition and the UPP Test", http://www.ftc.gov/os/comments/horizontalmergerguides/545095-00040.pdf. Moresi makes very strong assumptions about when the merging firms are the two lowest-cost suppliers and about their cost advantage over the third-lowest-cost supplier.

competition the agency has identified. When merging firms do not consent to the remedy sought by the agency, it applies to a federal court for an injunction. The nature and extent of subsequent court proceedings varies, but the agency always presents to the court both a theory of harm to competition and supporting evidence that includes analysis and opinions of an economic expert.

A threshold issue is admissibility of the expert evidence, which is governed by the Federal Rules of Evidence. Rule 702 requires that every expert witness be qualified as such and testify on the basis of "sufficient facts or data" by applying "reliable principles and methods . . . reliably to the facts of the case."[61] With the selection of analytic tools in merger cases, Rule 702 raises three questions that must be answered in the negative for testimony to be admitted: Is the tool inherently unreliable because it has no sound basis in economics? Is the tool applied in an unreliable manner? And is the tool unsuited to the case?

Each of the tools discussed here has a sound basis in economics, as each is grounded in mainstream thinking among economists.[62] Each of the tools surely could be applied badly enough as to render a particular application inadmissible, but avoiding serious mistakes is not a matter of great difficulty for qualified economists. The only significant admissibility issue is whether the tool fits the facts of the case.[63]

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[61] For a comprehensive treatment of what this means, see D Kaye, D Bernstein and J Mnookin, *The New Wigmore: Expert Evidence* (Austin, TX, Wolters Kluwer Law and Business, 2010). For an application to economic testimony in antitrust cases, see G Werden, "The Admissibility of Expert Testimony" in WD Collins (ed), ABA Section of Antitrust Law, *Issues in Competition Law and Policy*, vol 1 (Chicago, IL, American Bar Association, 2008), 801–17.

[62] Perceived departure from standard methods used by economists has been the basis for excluding expert economic testimony in a significant number of antitrust cases, and the methods in question most often have been those for delineating relevant markets. Recent examples are *Kentucky Speedway, LLC v National Association of Stock Car Racing*, 588 F3d 908, 916–19 (6th Cir 2009); *Nilavar v Mercy Health System–Western Ohio*, 244 F App'x 690, 696–99 (6th Cir 2007).

[63] Simons and Coate suggest that admissibility of any tool used to predict merger effects requires a track record of accurate predictions. See Simons and Coate, *supra* n 20, 378, 383, 392. But no method of predicting competitive effects from mergers has been shown to predict well, so this touchstone would exclude all testimony by economists predicting anticompetitive effects from mergers. The Supreme Court has held that Rule 702 demands only that the expert "employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field." *Kumho Tire Co v Carmichael*, 526 US 137, 141, 147–49 (1999). See Kaye, Bernstein and Mnookin, *supra* n 61, ss 8.1–8.3, 10.1–10.3.

The "fit" requirement of Rule 702 was made explicit following the landmark 1993 *Daubert* decision.[64] Since then, courts in antitrust cases occasionally have excluded economic testimony because it was premised on a model not sufficiently grounded in the facts of the case. The leading example is *Concord Boat*, in which the appeals court declared that an expert's economic model "should not be admitted if it does not apply to the specific facts of the case" and excluded the opinions on which the plaintiff's case rested because they were based on a symmetric Cournot model when the competing firms were highly asymmetric in both their sales and the appeal of their products to customers.[65]

Only when a particular analytic tool of the sort discussed here is poorly suited to the task at hand is a court apt to exclude testimony related to that tool,[66] and the fit requirement for the Bertrand model is not fundamentally different from that for the UPPI. The UPPI fits when the competitive process is such that the relatively short term effect of the merger is most likely to be a marginal increase in the merged firm's market-wide pricing as a consequence of the internalization of the competition between the merging firms. The Bertrand model fits when that is so and the model explains the merging firms' pre-merger prices reasonably well.[67] The fact that a model paints a simplistic picture of competition is not a sufficient basis for rejecting it, as that is inherent in economic modeling. But a critical test of a model used to predict merger effects is whether it explains those aspects of past industry performance the model is being used to predict for the future. In our view, competition agencies should impose this fit requirement in their internal merger assessments even if litigation is not a possibility.[68]

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64 *Daubert v Merrell Dow Pharmaceuticals*, 509 US 579, 591 (1993).

65 *Concord Boat Corp v Brunswick Corp*, 207 F3d 1039, 1055–56 (8th Cir 2000).

66 Analytic tools related to economics usually are not held inadmissible even with good grounds for so holding.

67 When the Bertrand model does not explain pricing by one of the merging firms, for example, because it has been charging a much lower price than the Bertrand model indicates that it should, we seriously question the reliability of a Bertrand merger simulation. We also question the utility of the UPPI for that merging firm. With no understanding of why a price has been so low, we see no basis for predicting how the merger is likely to affect it.

68 See G Werden, L Froeb and D Scheffman, "A *Daubert* Discipline for Merger Simulation" (2004) 18(3) *Antitrust*, Summer, 89. For a discussion of criteria for assessing the fit of particular models that can be used in merger simulation, see Werden and Froeb, *supra* n 2, 70–75.

The potential difficulty with the use of analytic tools is not that judges might refuse to admit the evidence, but rather that judges might give it little weight because they do not understand it. But as a general rule, we believe that judges are entirely capable of understanding all of the tools discussed here, provided that they are adequately explained. Judges in the United States are required to cope with technical analysis from experts in many fields, and the economics of unilateral effects is not difficult in comparison.[69] Moreover, the litigation process can be facilitated by the appointment of a technical advisor who would conduct a tutorial for the court. In our experience, the greatest obstacle to greater reliance on analytic tools in merger litigation is that competition lawyers undervalue such tools and do make the best use of them.

E. CONCLUSIONS

Economic reasoning in merger assessments is based on models.[70] Economists have developed many distinct models of competition, and they create new models as needed when no existing model is a good fit for an industry under study. Absent from the recent debate over tools for evaluating unilateral effects has been clear recognition that one "size does not fit all".[71] The debate has focused on unilateral effects from differentiated products mergers without acknowledging that is merely one of many scenarios encountered in merger assessment. Often, the main concern is coordinated effects. Also often, the main concern is unilateral effects of a sort quite different from those associated with differentiated products.

A competition agency is apt to can go badly astray if it chooses an analytical tool for merger assessment without first identifying the dimension(s) of competition most likely to be affected significantly, the nature of the likely effects, and the mechanism through which each could be produced. The analytic tools used in merger assessment can be, and always should be, specialized tools designed for particular applications.

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[69] What might be too difficult to judges to grasp are econometric techniques used to estimate demand elasticities and hence diversion ratios. Despite limited comprehensibility, we favour the use of whatever techniques make the best use of the data.

[70] See generally G Werden, "Economic Reasoning in Merger Cases and How Courts Should Evaluate It" (2009) 5 *European Competition Journal* 701.

[71] This phrase has several attributions, including the theme song of an early 1980s U.S. situation comedy television program.

Insufficiently appreciated in the debate has been the dependency of the choice among analytical tools on the stage of the assessment and the available information. The guiding principle is: "Do the best you can with what you have where you are."[72] An analytical tool is useless if it requires unavailable information, and a tool is inefficient if it does not make the best use of available information. The UPPI has been proposed for use in screening, but the required information normally will not be available at the screening stage. And in later stages, when much more information is available, the information required to compute the UPPI can be put to better use.

Through months of intensive investigation, a competition agency attempts to assemble the accumulated facts into a mosaic using the blueprint of a model. The process is subtle and complex because the blueprint governs the assembly of the facts, while the facts govern the selection of the blueprint. Through this process, an agency seeks to understand how competition works and how the merger is apt to affect competition. To the extent that an agency is successful, it knows in the end which, if any, economic model of competition fits the industry and hence on which analytic tools it should rely in making its ultimate assessment of the merger. And when an agency elects to rely on a particular analytic tool, it should make explicit its selection among models, the assumptions made, and the factual basis for both.

[72] This quotation is attributed to Theodore Roosevelt, who is said to have offered this explanation of his approach to a particular battlefield situation.