COORDINATED EFFECTS IN MERGER ANALYSIS: AN INTRODUCTION

Janusz A. Ordover*

I. INTRODUCTION

It is in the spirit of Professor Handler's unique blend of scholarly research and antitrust practice that I have approached this Article on the economics of "coordinated effects" in merger assessment. I can only scratch the surface of this issue, of course, but I do hope that this Article will provide an interested practitioner with a quick guide to the modern literature on this topic and also offer some insights into the type of evidence that may be relevant in a coordinated effects merger case.[1] The Article closes with a few remarks on the public policy issues that are triggered by potential challenges to a merger through coordinated effects. In this respect, it is important to recognize that, as compared to unilateral effects analyses, there is much less analytical rigor and much more reliance on a broad range of qualitative indicators when gauging the likelihood of such effects. This

* Professor of Economics, New York University, and Special Consultant, Competition Policy Associates, Washington, D.C.

[1] In the EU, "coordinated effects" go under the rubric of "joint dominance." In the technical economic literature, "coordinated effects" overlap with "tacit collusion."

makes counseling more difficult and litigation much more unpredictable. Indeed, one often hears that while a reduction in a market from "5 to 4" firms likely will be "okay" with the reviewing agency, going from "4 to 3" can create a serious risk of a challenge. Actually, in the coordinated effects area, matters are often more (or less) complicated than that, and good evidence that is clearly presented can overcome initial skepticism by the Agency's staff and also sway the judge.

II. BASIC ECONOMICS OF MERGER EFFECTS

Mergers are typically analyzed under the 1992 Agency Merger Guidelines,[2] which identify two non-exclusive types of competitive effects that a merger may engender. These are classified under the rubrics of unilateral effects and coordinated effects. There may be situations in which both coordinated effects as well as unilateral effects are going to be a subject of concern, and the agencies will devote necessary resources to address both of them, although at some point the focus may shift from one to the other as evidence develops. Consequently, when counseling parties to the merger, it is important that both types of effects are given a preliminary assessment. In this Article, as noted, the focus is on coordinated effects, but these are best introduced by means of a quick run-through of the economics of unilateral effects.

A. Unilateral Effects

Over the past several years, unilateral effects were in the forefront of both technical developments in antitrust economics and complex litigation.[3] At least some readers of

[2] U.S. Dep't of Justice and Federal Trade Comm'n, *1992 Horizontal Merger Guidelines* (1992) (rev'd, Apr. 8, 1997), *available at* http://www.ftc.gov/bc/docs/horizmer.htm [hereinafter *Merger Guidelines*].

[3] *See* Thomas O. Barnett, *Substantial Lessening of Competition—The Section 7 Standard*, 2005 COLUM. BUS. L. REV. 293, 301 (2005) (referring to the "proliferation of unilateral effects theories over the last decade, thanks largely to the work of many excellent economists"); Margaret E. Guerin-

this Article have been exposed to sophisticated analyses by expert econometricians who, by means of complex models, were able to determine the price effects of a merger between brand A of a widget and brand X of a widget (or gadget, which is a weaker substitute for a widget) to the second decimal point only to be confronted with calculations by the Agency's economists showing these effects to be much bigger. All of these battles would have likely left Professor Handler somewhat baffled, as, at their worst, they seemed oddly detached from industry realities. On the other hand, the *Oracle/PeopleSoft*[4] litigation aptly demonstrates the importance of both sophisticated quantitative techniques and the relevance of industry micro-detail for the assessment of the likely unilateral competitive effects.

What, then, are these unilateral effects, and how do they link to coordinated effects, the subject of this Article? To start with, let us proceed on a basis of a convenient simplification that a reduction in the number of firms in a market can have two types of effects on how the industry performs—I will call them "static effects" and "dynamic effects." Static (or unilateral) effects capture the impact of the transaction on the parties' incentives and ability to elevate prices or lower quality of their product as a result of the merger, holding market behavior (e.g., prices) of actual and potential rival firms unchanged. The unilateral effects analysis is concerned with the direction and the magnitude of these unilateral, merger-induced effects on the behavior of merging parties and with the identification of various other market forces that can countervail or exacerbate these unilateral effects. "Dynamic effects," on the other hand, capture the effects of the transaction on how firms compete against each other over time, with their actions dependent

Calvert, *The Role of the Economist/Economics in "Proving" Coordinated Effects*, 2005 COLUM. BUS. L. REV. 345, 353 (2005) (referring to the "extensive empirical analyses of unilateral effects undertaken by economists in agency merger reviews and litigation").

[4] United States v. Oracle Corp., 331 F. Supp. 2d 1098 (N.D. Cal. 2004). It was clear to all parties from early on that coordinated effects were not at issue in this transaction.

on what happened in the "past" and their strategies fully incorporating "future" reactions to rivals' market decisions (such whether to defect from a cooperative mode of behavior).[5]

Static effects have traditionally been easier for economists to model and analyze rigorously. In fact, the two building blocks that underlie unilateral effects analysis are now over 150 years old. There are two key static models of oligopoly used in antitrust that predict unilateral effects. These are the Cournot model, which is best suited to oligopoly markets in which firms sell highly similar products and compete by making output and capacity decisions, and the Bertrand model, which is best suited to oligopoly markets in which firms compete on price and sell differentiated products.[6] The basic idea behind each of these models is that firms make their pricing and output decisions with full regard to the pricing decisions of their rivals but take these decisions as "fixed." For example, in a Cournot model, the owner of a number of coal mines decides how much coal to mine taking as given her best guess as to the mining decisions of rival coal mines. Or, in a Bertrand model, a seller of high-end ice-cream decides on the price of his branded offerings, taking as given his estimate of prices charged by other suppliers of ice-cream and other relevant products.

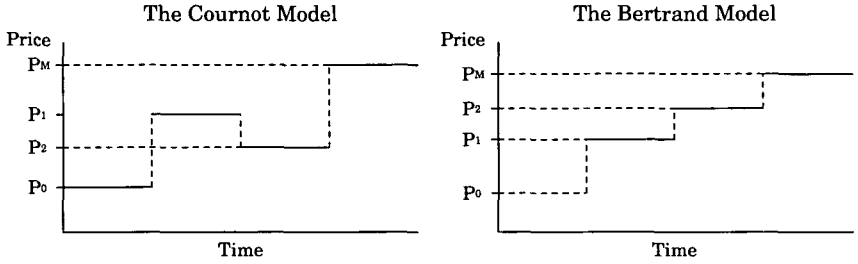
The unfortunate conclusion (for the parties) that emerges from these models is that a reduction in the number of independent firms or brands generally leads to higher price, as illustrated below. It is thus clear why, in order to defeat this "directional" forecast, the merging firms are impelled to develop compelling evidence that they will have no unilateral incentives to raise prices (because of efficiencies) or ability

[5] *See* C. Shapiro, *Theories of oligopoly behavior*, *in* HANDBOOK OF INDUSTRIAL ORGANIZATION, chap. 6 (R. Schmalensee and R. Willig, eds., 1989) for a more complete discussion of dynamics in oligopoly games.

[6] These workhorses of industrial organization economics are discussed in many economics textbooks. *See, e.g.*, D. CARLTON AND J. PERLOFF, MODERN INDUSTRIAL ORGANIZATION (4th ed. 2004) for an introductory treatment and C. Shapiro, *supra* note 5, for a more advanced exposition.

(because rivals will undercut them or expand output). In fact, rival firms will react to the induced changes in the behavior of the merging firms, and the marketplace will move from the pre-merger static equilibrium to another static equilibrium as shown in the figures below.[7]

Figure 1: Hypothetical Post-Merger Price Dynamics



In this diagram, P_0 is the pre-merger price. Following the merger, the reduction in the number of firms enables the merging firms to reduce their aggregate output (in the Cournot case) causing the market price to increase to P_1, or adjust the price(s) (in the Bertrand case) of their brand(s) so that the price of the brand increases to P_1. After this initial market move by the merging firms, other firms respond to the merging firms' initial actions. In the Cournot model, the rival firms respond by expanding their output, if they can. Following a sequence of adjustments by all firms, the final (equilibrium) post-merger price for the merging firm will be P_2. If the market game is Bertrand, rivals will increase their prices in response to the initial price increase by the merging firms and the equilibrium post-merger price for the merged firm is P_2, which is higher than the initial post-merger price. In both models, the resultant post merger price, P_2, is lower than the hypothetical monopoly price, P^M. The increase in price from P_0 to P_2 is the putative unilateral effect from the transaction.

[7] Technically, after the transaction, the market will move from one static *Nash equilibrium* to another. For more on this issue, see the movie *A Beautiful Mind,* or better, read SYLVIA NASAR, A BEAUTIFUL MIND (Simon & Schuster, 1998).

Of course, the story told above is far too simplistic. In a real merger case, numerous market forces will have to be analyzed and accounted for before either the magnitude or even the direction of the postulated static price change can be gauged with the degree of precision that ought to be required by sound merger enforcement policy. For example, if a merger achieves cost efficiencies, the post-merger price may be lower than the pre-merger price. Nevertheless, as I noted earlier, economists have developed numerous merger simulation techniques that can be used to actually calculate the "static" post-merger equilibrium prices. As shown on the diagrams above, unilateral effects will not necessarily result in the industry pricing at the monopoly level. The additional boost to prices—if it occurs at all—will be the product of coordinated effects, to which I now turn.

B. Coordinated Effects

Historically, concerns with enhanced risks of post-merger collusion or coordination (coordinated effects) were the main basis for antitrust challenges to mergers. The basic idea was simply that the reduction in the number of firms active on the market would enable those firms better to coordinate tacitly (or even explicitly) on key dimensions of market rivalry and have an easier time actually implementing the agreement.[8] The empirical evidence for that conclusion, however, is actually quite weak. There are a number of studies showing correlations between concentration and price-cost margins,[9] but those correlations have been attacked by industrial organization economists on the basis that the directionality and causality of these correlations is

[8] *See Merger Guidelines*, *supra* note 2, at §2.1: "A merger may diminish competition by enabling the firms selling in the relevant market more likely, more successfully, or more completely to engage in coordinated interaction that harms consumers."

[9] *See, e.g.*, ANTITRUST LAW AND ECONOMICS 239, 241-42 (Oliver E. Williamson ed., 1980) (referring to forty-six studies showing a positive "relationship between concentration and profits or price-cost margins").

dubious.[10] Rather than evidencing some kind of better cooperation among firms, the correlations can be viewed as demonstrating that in markets with few successful firms, the winners will earn substantial margins. In any event, it is quite clear that when the number of firms goes down from some comfortable level to four, three, or two, it is reasonable for the regulator to become concerned that such reduction in the number of firms will enable the incumbents to coordinate on prices and other key dimensions of competition.[11]

Coordinated effects derive from the notion that a merger will increase the incentive and ability of all (or a subset of) firms in the market to engage in tacit coordination. By tacit coordination, I do not mean coordination that requires direct contact and explicit exchange of information about costs, sales, and so forth, but rather the kind of coordination that can emerge in the marketplace merely through market signals. The basic idea is that by simply signaling across the penumbra of the market, firms are able to come to a tacit agreement on the various strategies that will enable them to restrain the forces of competition and elevate prices above the competitive (or pre-merger) level.[12] As set forth below, attempts at price elevation through coordinated interaction can succeed only if a sufficient number of firms are willing to play the (tacit) coordination game, i.e., to subscribe to the mechanism of coordination. Put another way, what

---

[10] *See, e.g.,* RICHARD SCHMALENSEE, *Inter-Industry Studies of Structure and Performance*, *in* 2 HANDBOOK OF INDUSTRIAL ORGANIZATION 951, 976 (Richard Schmalensee & Robert D. Willig eds., 1989) ("The relation, if any, between seller concentration and profitability is weak statistically, and the estimated concentration effect is usually small. The estimated relation is unstable over time and space and vanishes in many multivariate studies.").

[11] I stress the notion of other key dimensions of competition, because the Merger Guidelines as well as common sense suggest that the price is only one focus of the analysis. Competition can also take place on the quality of service, capacity, innovation, licensing, advertising and marketing, etc. These other dimensions of competition should be part of the analysis.

[12] Of course, a merger can also facilitate express collusion. That issue is beyond the scope of this Article.

distinguishes coordinated effects from unilateral effects is that the former can only come about if a sufficient number of industry participants concludes that less competition is better than more competition and then is able to implement and act upon this belief. Thus, a merger engenders concern about coordinated effects if it allows incumbents to better understand and take advantage of their interdependence, thereby making non-competitive conduct more likely, complete, and stable.

It is worth noting in passing that the procedure outlined in the Merger Guidelines to define the relevant market suggests that in a well-defined antirust market there is at least some prima facie incentive for firms to engage in tacit collusion with the effect of increasing prices above the "current" level. Recall that the Merger Guidelines define the relevant product market using the so-called SSNIP methodology: "Absent price discrimination, the Agency will delineate the product market to be a product or group of products such that a hypothetical profit-maximizing firm that was the only present and future seller of those products ('monopolist') likely would impose at least a 'small but significant and nontransitory' increase in price [SSNIP]."[13] If the relevant market is defined using the SSNIP methodology, it follows that a monopolist over the products in such market would profitably raise prices in the relevant market by roughly five to ten percent. Put another way, the incumbent market participants in the relevant market, defined using the SSNIP methodology, are by definition leaving money on the table (for consumers). This raises the question whether and how the transaction creates an incentive and ability for some or all incumbent firms to raise the price above the pre-merger level and closer to the monopoly level. In other words, the question is the extent to which a particular merger mitigates the existing impediments to acting on the incentive to raise prices.

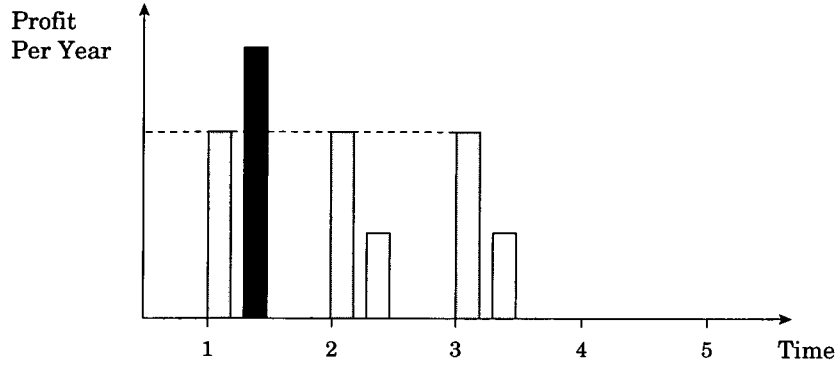
Before we can address this question, it is necessary to explain how firm's incentives enter into the analysis of

[13] *Merger Guidelines*, *supra* note 2, at §1.11.

coordinated effects, and then we can examine how a merger acts on these incentives. The simplest setting in which such analysis can be conducted is that of a market in which firms repeatedly interact with each other. In such a market, which is a reasonable characterization of most real-life markets, firms can base their current decisions on observed past behavior of their rivals and can "signal" how they will act in the future depending on what rivals do. For example, every firm may come to understand that as long as it (and its rivals) price above the benchmark competitive level (say above price that is consistent with Bertrand competition described above) price will stay at that elevated level. On the other hand, if one firm "deviates" from this understanding, prices will fall to that lower level and stay there forever. In such a market, firms may—but only may—end up competing less vigorously than would be predicted by the static models of competition mentioned earlier. For this to happen, market participants must succeed in solving two challenges facing them: (1) the (individual) incentive problem and (2) the coordination problem. The (individual) incentive problem (also referred to as the individual incentive compatibility constraint) is the *sine qua non* of successful collusion. Thus, even if we assume that firms somehow manage to agree on what coordinated course of conduct might entail (e.g., to charge a price close to the "monopoly" level or repress capacity investment), it still does not follow that each firm will be willing to stick to this putative coordination. Each (or some) market participant(s) may prefer to cheat—that is, to deviate from a putative agreement on non-competitive prices and gain transitory profits at the expense of its rivals. It may not be rational for a participant to go along with the signaled proposition in the marketplace to elevate prices or repress output. A firm may want to fake agreement and lure rivals into supra-competitive price only to take advantage of their wrong move. Of course, if everyone understands these incentives then coordination will not likely get off the ground in the first place because no firm would be willing to risk being left in the competitive dust by untrustworthy rivals.

Figure 2 provides the standard illustration of the (individual) incentive problem.

Figure 2: Profit Levels Under Different Competitive Assumptions



☐ Firm's Share of Collective Monopoly Profit
■ Firm's Profit When It Cheats (Deviation Profit)
☐ Firm's Profit When Cooperation Collapses (Punishment Profit)

The light grey bar represents the amount of profit per period that a representative firm in the relevant market will earn if all firms tacitly cooperate by, for example, charging a price above the competitive level or restricting the level of output below the competitive level. The decision faced by any individual firm then is whether to deviate from the tacit cooperation that generates this level of profit. If the firm deviates, it can reap a significant gain. This "deviation" profit is represented by the dark grey bar. However, because the cheating will eventually be discovered, the gain is temporary and will be followed by a period of intense competition, which is referred to as the "punishment period." This level of punishment profits is depicted as a white bar, which is much lower than the light grey bar that indicates the firm's share of collusive profits. While it is not always clear what this punishment entails, it will likely involve a reversion of prices and output to a competitive level, followed

perhaps by a return, at some point, to a more cooperative mode.[14]

As the white bar in this figure reveals, the reason firms in the models of tacit coordination do not cheat is fear of punishment. The fear of punishment must be strong enough to dissuade cheating because otherwise tacit coordination will not get off the ground, as all the possible participants will anticipate such deviations. It follows from the diagram that the longer it takes for the industry participant to detect cheating (so the more there are dark grey bars) and the more focused firms are on current profit flows, the more likely cheating will be attractive to a given firm, if (hypothetically), industry participants have implemented the non-competitive pricing or output.[15] This discussion makes it clear that tacit collusion can only work if sufficient number of firms agrees to the common course of conduct, *and* no firm has an incentive to deviate from that agreement.[16]

Assuming that there exists some common course of action that industry participants could in principle agree upon, there is still the coordination problem to be solved. The coordination problem arises for several reasons. First, there may be several possible collusive outcomes that could, in principle, be "agreeable" to market participants, but different

[14] Now that we are familiar with static models of competition, we may show off and say that punishment may entail reversion to a static Bertrand or Cournot game.

[15] The focus on the present versus future profits is captured in the firm's discount rate. The higher the discount rate, the more impatient or present-oriented the firm, the more likely it is to take advantage of the opportunity to cheat and earn high current profits. In the lingo of coordinated effects, the most impatient firm (which is the one that constrains the ability of industry participants to maintain supra-competitive pricing) is often termed a "maverick."

[16] The predictions of the standard model of tacit collusion regarding ability to sustain supra-competitive pricing are rather unrealistic. For example, Shapiro, *op. cit.*, notes that the basic model of tacit collusion suggest that a market comprising more than 100 identical firms could, in principle, implement and sustain *monopoly* price, provided that the firms are reasonably patient (i.e., do not discount the future income too high). This is plainly unreasonable but cannot be ruled out.

firms may prefer different outcomes.[17] There may be several plausible focal points on which to coordinate, but to collude successfully, market participants must first discover what these possible outcomes are and then select and implement one of them. If firms disagree on which outcome is to be implemented, coordination may fall apart or fail to take root in the first place. Second, firms must have some mechanism for flexibly responding to changing market conditions. This may be impossible or difficult in the absence of explicit communications since "market signaling" may simply be too slow.[18] Third, firms may have to coordinate on "punishment" strategies in the event that such will have to be implemented. While reversion to "competition" seems like a simple prescription, it may mean different things to different market participants. Fourth, because punishment is costly to all market participants, firms may want to coordinate on when to trigger the punishment phase. Jumping the punishment gun may appear to others as cheating and lead to further unraveling of tacit collusion, but too much restraint in punishing can embolden cheating and thus reduce the chances of successful collusion.[19]

C. The Number of Firms

As is now well understood, it is not sufficient when gauging the likelihood of coordinated effects from merger to simply observe that because the merger reduces the number of firms, it automatically lessens the coordination problem and enhances firms' incentives to engage in tacit collusion; far from it. In fact, a merger may turn a docile market

[17] For example, firms A and B may agree that market division is preferable to competition but they likely will have diametrically different opinions on how the market should be divided. Similarly, if firms A and B have different costs, both may agree that $0.90 per widget is better than $0.50 but may disagree about whether $0.90 is better than $1.10.

[18] In fact, when markets are subject to frequent shocks, tacit collusion may simply be impossible.

[19] This conflict can be especially pronounced in those realistic market situations in which firms cannot clearly determine based on private information and public signals whether rivals are cheating or not.

participant into a "maverick" as it improves it costs position or becomes more determined to go after market share. A merger may also change incentives to cheat because deviation profits may be higher than coordination profits. In some scenarios, even profits in the punishment phase may be higher than profits attainable through coordination. Indeed, if we acknowledge that the merger can generate efficiency gains for the parties, then this effect will have to be factored into the analysis of tacit collusion in the same way that an efficiencies defense is factored into the static analyses of merger effects. Moreover, a merger may affect the intensity and direction of innovation in the relevant market, thereby destabilizing the putative collusive outcome. Unfortunately, economists know even less about how to account for these types of dynamic effects of efficiency gains than they know about how to account for the short-term effects.[20] Yet, in my view, these dynamic effects are likely to be important. For example, the merged firm may use the increased cash flow from fixed cost savings to finance new R&D projects, which could be inimical to sustained coordination. In any case, the bottom-line question is always how a merger changes the ability of firms to coordinate successfully on feasible, possibly non-stationary,[21] supra-competitive outcomes.

III. THE POLICY CHALLENGE

From a public policy standpoint, the issue in proving coordinated effects creates what I consider an enforcement challenge—a hurdle much more serious than establishing unilateral effects. This is so only because the economic foundations on which coordinated effects rest are much less developed and much more complex. In my view, the coordinated effects challenge to a merger needs to establish

[20] See, however, M. Katz and H. Shelanski, *Mergers and Innovation*, 74 ANTITRUST L.J. 1 (2007) (discussing potential tension between competition and innovation).

[21] By non-stationary, I mean that firms not only have to agree that today's price or tomorrow's price ought to be $5 per widget, but how to price widgets generally given that the widget market is subject to various unpredictable shocks.

that the merger materially raises both the incentives and the actual ability of the incumbent firms to tacitly collude relative to pre-merger conditions. That is, the merger must materially relax several of the constraints that limited the industry's ability and incentive to maintain prices above competitive levels in a dynamic market environment. This in turn requires showing empirically and qualitatively, in the context of a well-specified model of tacit collusion, that the merger makes it easier to: (1) reach and sustain tacit agreement on key dimensions of competition; (2) detect deviations from the agreement (especially if the industry is not stable) so as to dissuade firms from cheating for fear of punishment; and (3) deter such deviations from coordination by means of more effective (e.g., faster and more costly to the "cheating" firm) punishments. At the same time, in my view, it is not enough in proving coordination to: (1) invoke statistical correlations between prices (margins) and concentration (though structure still matters); (2) invoke the Merger Guideline's "checklist" factors[22] (though these factors can be linked to the "mechanism" of coordination discussed below); or (3) assert that the relevant market is "susceptible" to tacit coordination (though evidence of past or present coordination can be used to defend the "mechanism" of coordination).

In addition to these elements of proof of coordination, an analysis of merger effects must describe the building blocks of the "mechanism" of coordination—that is, by what means coordination was or would be effected.[23] This leg of

[22] *See Merger Guidelines*, *supra* note 2, at § 2.1. *See also* David T. Scheffman, Mary Coleman, *Quantitative Analyses of Potential Competitive Effects from a Merger*, 12 GEO. MASON L. REV. 319, 326-7 (2003) ("The Merger Guidelines also incorporate the Check List approach, identifying the following factors: (i) availability of key information concerning market conditions, transactions, and individual competitors; (ii) the extent of firm and product heterogeneity; (iii) pricing or marketing practices typically employed by firms in the market; (iv) characteristics of buyers and sellers; (v) characteristics of typical transactions; and (vi) previous express collusion.").

[23] *See, e.g.*, FTC v. Arch Coal, 329 F. Supp. 2d 109 (D.D.C. 2004) (in which the FTC opposed the proposed merger "under the theory that the

the analysis must address several questions including: Will the putative collusive conduct consist of output suppression/price elevation, capacity restriction, or customer allocation? Which decisions will remain competitive (semi-collusion)? How will the putative outcome be reached absent direct communications? Can it actually be reached without direct communications or with just "cheap talk"? How will coordination be monitored? How will it be enforced? And how will it be adjusted in response to market shocks? As we shall see in the next section, both economics and merger enforcement made some important advances in analyzing tacit collusion within the context of this analytical paradigm which, as I noted, focuses on a clear specification of the mechanism of coordination.

IV. RECENT DEVELOPMENT IN COORDINATED EFFECTS ECONOMICS

There have been several interesting new analytical breakthroughs in the economic analysis of coordinated effects. This theoretical literature explains how the complexity and volatility of profit-maximizing business strategies can impede pre- and post-merger coordination.[24] If the profit-maximizing monopolist acting alone in the marketplace would have to deploy complex business strategies—such as advertising, investment, pricing, and R&D strategies—and the marketplace is subject to significant volatility, then such a monopolist must have the ability to adjust its behavior frequently, possibly even on a day-to-day basis. The problem this creates for incentives for collusion and for its sustainability is obvious: if profit-maximization requires behavioral flexibility, then, when a given firm makes those adjustments to its behavior, its rivals

mechanism of tacit coordination that is most strongly supported by the evidence is a form of output restriction").

[24] *See* Susan Athey et al., *Collusion and Price Rigidity*, 71 REV. ECON. STUD. 317 (2004); S. Athey & K. Bagwell, *Collusion with Private Information*, 32 RAND J. ECON. 428 (2001). For older but insightful analysis, see also L. PHLIPS, COMPETITION POLICY: A GAME-THEORETIC PERSPECTIVE (1995).

may have a difficult time distinguishing "innocent" strategic adjustments from cheating (that is, deviations from collusion). If rivals cannot predict or effectively "read" each others' profit-maximizing strategies, they may be compelled to forego flexibility and adopt simpler behavioral strategies in order to secure some, perhaps only limited, coordination. Yet simple, stable, and predictable strategies are likely to be far from profit-maximizing. Hence, if these strategies were to be adopted, gains from cooperation would be limited at stabilized prices relative to the benefits of strategic flexibility.[25] At the same time, deviation profits may increase. There is thus a complex tradeoff for the putative colluders between the costs of simplifying their behavioral rules to achieve coordination that can be readily monitored and the gains from coordination. Indeed, the more the profit-maximizing behavioral rules have to be bent to the objectives of facilitating tacit coordination, the less likely it is that a simple coordination mechanism can be designed that would enable the potential colluders to agree on such strategies and maintain them in the face of changing market conditions.

Several recent merger analyses have put new analytical focus on the importance of pricing heterogeneity for the likelihood of coordinated effects. Three cases in which this author was involved exhibit the perils of complexity: Sony-BMG, Carnival Cruise Lines, and MGM-Mandalay Bay. This section will close with a brief discussion of the Arch Coal case, which put the issue of coordination mechanisms at center stage.

The Sony-BMG transaction[26] received very intensive scrutiny in the EU. The EU investigation entailed numerous meetings with the legal staff and economists from the Office of the Chief Economist, as well as a two-day hearing. The case entailed enormous data production, including development of new data sets and data cross-verification

[25] Under the conditions described, firms may tacitly agree to cooperate before all of the pertinent information is revealed, but some may decide to cheat once certain types of information are revealed *ex post*.

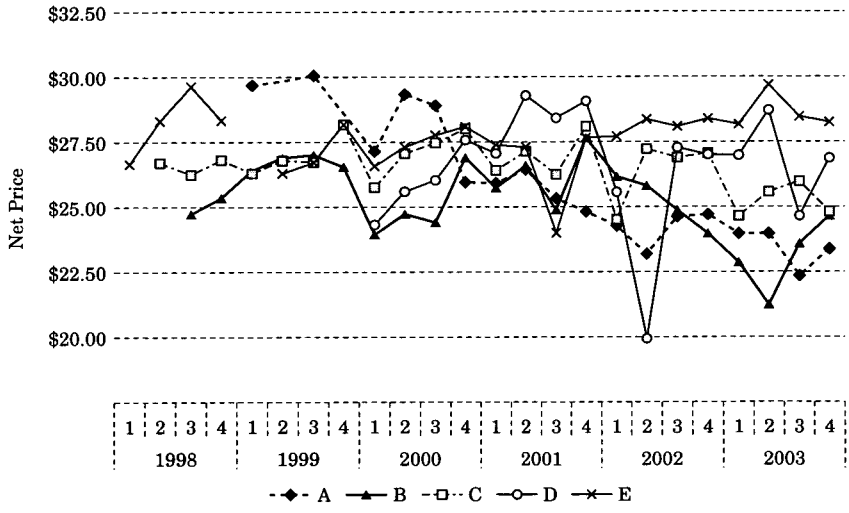
[26] *See* Federal Trade Commission Decision No. 4064/89/EEC (2004).

combined with "technical" papers on the economics of tacit collusion and its detection. The intense scrutiny in Europe was due in part to the case team's notion as stated in the Statement of Objections that the industry was already tacitly colluding, and therefore the transaction would somehow make things worse.[27] Yet, from my perspective, there was little evidence that tacit coordination was already taking place. Indeed, it appears that the argument that tacit coordination in the recorded music industry was unlikely because of the hit-driven and unpredictable nature of the business, which necessitates flexible, complex, and adaptive business strategies that are tailored to individual releases and buyers over time found some receptivity at the Commission, given that the transaction was ultimately cleared. In the music business, the ratio of hits to misses is very low, just a few out of every 100. As a result, when a release is a hit, the firm has a strong incentive to support it fully with a lot of advertising and promotion resources and possibly even with price cuts when the release begins to slow its sales pace. Coordination thus becomes very difficult. The biggest bone of contention between the parties and the Commission was whether evolution of pricing for the releases demonstrated a sufficient degree of price parallelism to suggest that some coordination was taking place and could continue to take place. Figure 3 offers a stylized view of pricing in the record industry and suggests that, in fact, there was little evidence of price parallelism in the industry. Rather, there was evidence of independent and quite volatile pricing behavior that was consistent with competition rather than with coordination. It is important to say that industrial organization economics does not provide a very clear guidance as to the extent of volatility and lack of correlation that is consistent with competition as opposed to some form of coordination. The problem is that co-movements of different prices within a "narrow" range can be entirely consistent with either mode of market behavior. Perhaps

[27] *See* Case T-464/04, Impala v. Commission (Sony/BMG), ruling of July 13, 2006.

based in part on such evidence, the merger was allowed to go through in April 2004.[28] Still, the case left open empirical and theoretical questions regarding the probative value of price parallelism as an element of proof of tacit (or even explicit) collusion.[29]

Figure 3: Hypothetical Average Prices of CDs in an EU country by Record Company



Another matter that also generated intense scrutiny, this time much more so in the U.S. than in Europe, was the Carnival Cruise Line merger.[30] This case also involved

[28] The Commission ultimately had to reopen the antitrust review of the merger, however, after the EU's Court of First Instance found that the regulators' initial ruling was flawed. Case T-464/04, Impala v. Commission (Sony/BMG), ruling of July 13, 2006.

[29] *See also*, Brief of amici curiae economists in support of petitioners, in *Bell Atlantic Corp. v. William Twombly et al.*

[30] At the end of 2001, Royal Caribbean Cruises and Princess Cruises competed to acquire Carnival Corporation. The three firms are the largest in the North American cruise market, and either merger would have resulted in a single firm with a share of about 50 percent of the market. Nonetheless, the FTC by a 3-2 vote closed its investigation of the deals, permitting them to move forward. On October 2, 2002, the FTC took the

extremely complex and detailed empirical analyses, drawing on more than 100 gigabytes of price transaction data. The FTC quickly recognized that neither a unilateral increase in price nor a tacitly coordinated price increase to all passengers was possible. Given that a theoretical monopolist would not find it profitable to raise prices across the board, the critical analytical issue was whether price discrimination was possible—that is, whether there could have been a focused price increase as a result of the merger targeted at some subset of customers. After all, the merger would raise competitive concerns not only if it harmed all consumers but also if it harmed a well-defined (i.e., identifiable) and sizeable subset of consumers. Consequently, the analytical challenge was to determine whether the industry could find a group of consumers that could be susceptible to a coordinated post-merger increase in prices.

The cruise line industry has a special feature, which is that it has a fixed and highly perishable product—the berths on any given sailing of a ship. As a result, pricing in the industry is enormously complex. Determining whether price discrimination was possible was thus not an easy task. Cruise lines are concerned first and foremost with filling as many berths as possible because most of the costs of the berth are sunk, so there is little extra cost to filling an open berth but significant lost revenue from letting a berth sail empty.[31] The industry is therefore driven by "yield management," which is implemented using highly complex models of the evolution of demand over time: sell an empty berth too soon and forego a chance of selling it later to a customer willing to pay more; wait with an empty berth too long and it may never be sold. This yield management model

unusual step of issuing a public statement to explain how it arrived at its decision, http://www.ftc.gov/os/2002/10/cruisestatement.htm (see also the statement of the dissenting Commissioners, http://www.ftc.gov/os/2002/10/cruisedissent.htm).

[31] *See* M. Coleman et al., *Empirical Analysis of Potential Competitive Effects of a Horizontal Merger: The FTC's Cruise Ship Investigation* (unpublished manuscript, on file with REV. IND. ORG.); see also David Scheffman Speeches, http://www.ftc.gov/speeches/scheffman.htm.

results in large variation in day-to-day pricing of product. A key focus of the merger analysis in that case, therefore, was on the role of yield management as a tool for potential price discrimination. Specifically, the question was whether there were patterns to the pricing for specific sub-groups of customers that reduced the complexity of industry pricing in such a way as to allow for coordinated interaction. In particular, if cruise line operators could identify a specific group of potential customers with relatively inelastic demand for cruising, then a tacit increase in price could be confined to that group or, better yet, to the product that this group was (on average) favoring. An analysis of pricing to various groups of customers—those who booked early, those who booked in more attractive cabins, those who were "frequent cruisers," and many others—revealed no such discernible pattern. The failure to find any such ways of reducing pricing complexity was a key factor in the FTC's decision not to challenge the proposed mergers.[32]

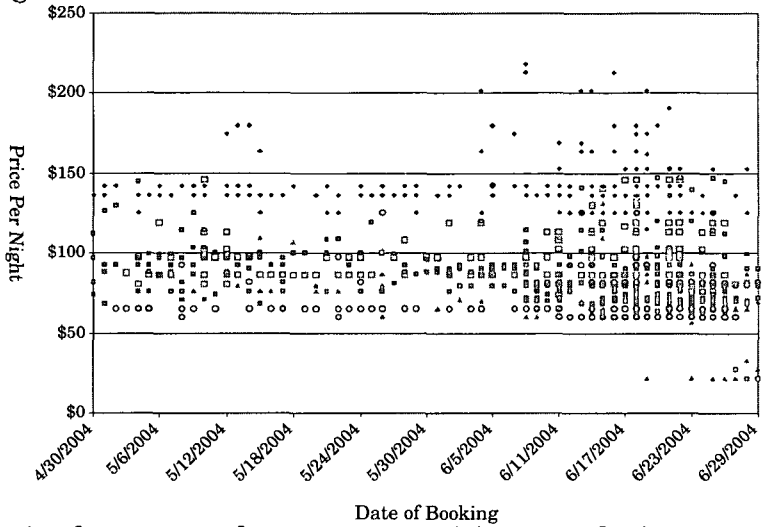
Similarly, yield management played an important role in our analysis of the MGM-Mandalay Bay merger in Las Vegas.[33] Figure 4 shows the price of a standard room in Las Vegas over a period of several months prior to the day of arrival. As one can see, there is extreme variation in hotel pricing over time and even on any given day for a standard room for a booking for a specific day, say 6/30/04. As a result, we argued that it would not be possible for the hotels to coordinate because there was no focal price point off of which hotels could coordinate their pricing behavior. Moreover, in both cases, the need for pricing flexibility would make it difficult to detect legitimate pricing adjustments

[32] For more information about the Carnival Cruise Lines merger, see M. Coleman et. al., *Empirical Analysis of Potential Competitive Effects of a Horizontal Merger: The FTC's Cruise Ship Investigation* (unpublished manuscript, on file with REV. IND. ORG.); see also David Scheffman Speeches, http://www.ftc.gov/speeches/scheffman.htm.

[33] The FTC ultimately closed its investigation of the proposed acquisition of Mandalay Resort Group by MGM Mirage Inc. Letters from Donald S. Clark, FTC Secretary, to Jan McDavid and Charles S. Rule, counsel for MGM Mirage and Mandalay Resort Group (Feb. 16, 2005), *available at* http:// www.ftc.gov/os/closings/staff/050216mgmmandalay.pdf.

from "cheating" even if one could assume that rivals would be able to monitor actual prices paid by hotel guests.[34]

Figure 4: Pricing Patterns for a Hotel Property in Las Vegas



As these cases demonstrate, pricing complexity can make it difficult for firms to coordinate tacitly on price. Yet collusion may take other forms aside from price coordination. For example, incumbents may agree on allocation of customers or territories, or, as in the *Cruise Line* merger, one possibility that was considered entailed a reduction in capacity by taking ships out of service, not constructing some of the planned ships, or moving them to different destinations. Basic economic theory of supply and demand teaches that if firms remove enough capacity from the marketplace, the price may drift up as a result of the decrease in supply. Thus, it is not unusual for economists to find that the object of collusion is controlling quantity or capacity rather than price.

This theory of collusion by capacity restrictions was a key issue in the recent case in which the FTC requested a

[34] In the cruise line business and in the hotel business, rack prices bear little resemblance to the actual prices paid by customers.

preliminary injunction to prevent Arch Coal from acquiring Triton Coal Company. In August 2004, a U.S. District Court denied that request.[35] In that case the FTC relied on a theory of coordinated interaction through output restriction, according to which the major coal producers would limit extraction to drive up price by having supply lag behind rising demand. What was puzzling about the court's opinion is that the judge somehow found the notion of collusion on capacity to be a novel idea.[36] This is surprising given that tacit collusion based on a Cournot model explicitly contemplates the possibility of coordination based on capacity and output. Such coordination can be difficult to achieve, however, especially when the demand is uncertain or growing. There is no such thing as homogeneous "capacity," and capacity decisions must be coordinated on many dimensions. Thus, collusion on output or capacity is not necessarily easier to implement than collusion on prices.[37] Further, in *Arch Coal*, the FTC postulated that the merger would not reduce supply, but rather would slow the growth of supply relative to some unspecified benchmark. Judge Bates correctly found that the merger would have been unlikely to result in that kind of tacit collusion on capacity because it would have been difficult to implement such an agreement, ensure its stability, and detect deviations, especially in the absence of consensus on the likely future evolution of demand and demand volatility.[38]

The few cases briefly discussed in this section illustrate several points. First, tacit collusion, if any, has to take place and be sustained in markets that are much more complex

[35] FTC v. Arch Coal, 329 F. Supp. 2d 109 (D.D.C. 2004), *appeal dismissed per curiam*, No. 04-5291, 2004 WL 2066879 (D.C. Cir. Sept. 15, 2004).

[36] *Id.* at 131.

[37] See AirTours/First Choice merger, Case T-342/99, Airtours v. Commission [2002] E.C.R. II-2585. The Commission decision can be found at http://europa.eu.int/comm/competition/mergers/cases/decisions/m1524_en.pdf, and the court's decision that overturned the Commission decision at http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexplus!prod!CELEXnumdoc&lg=en&numdoc=61999A0342.

[38] *Arch Coal*, 129 F. Supp. 2d at 140-46.

than those that are considered in even the most sophisticated theoretical models of collusion. Second, these models, nevertheless, provide some guidance as to the type of empirical evidence that may be helpful in proving or disproving the risks of collusion after the mergers. In particular, empirical evidence that demonstrates the complexity of business decisions (e.g., pricing) in response to customer heterogeneity and market instability can go a long way to assuage concerns about the risks of collusion post-merger. Thirdly, unlike in the realm of unilateral effects, while the analytical tools are improving, the high-powered econometrics of merger simulation is not yet the standard. This leaves more room for the types of analyses and evidence that Professor Handler would likely find congenial.

V. IMPLICATIONS FOR PUBLIC POLICY, AGAIN

As described above, economics is deepening its understanding of coordinated effects and is developing novel analytical approaches to gauging the risks of such effects. The traditional "policy shortcuts" used for this purpose—as reflected in the "checklists" in the US and in the EU merger guidelines—are still useful but have to be used with care and with attention to the micro-details of the industry or industries involved. The key economic lesson that carries throughout is that a reduction in the number of firms does not mean that a merger substantially increases the likelihood that competition will be lessened. The reasons for this include the presence of effective maverick firms, creating new mavericks through merger, potential entry into the market and expansion by non-collusive firms, overall market conditions such as complexity of pricing, volatility of demand and cost conditions, lack of transparency and a lack of obvious focal points.

Although mergers over the past decade or so were more likely to be reviewed on the basis of unilateral effects concerns, the renewed interest in coordinated effects merger analysis is welcome. If we are to conduct such analyses, however, we need to apply rigorous analytical tools such as critical loss analysis and the like. Critical loss analysis is

often used in the unilateral effects cases to determine whether a SSNIP would be profitable post-merger for the two merged firms. Yet it can also be applied in the coordinated effects setting to determine whether a SSNIP would be profitable post-merger for the putative tacit colluders. If the market is properly defined, a SSNIP would be profitable for all firms in the market acting as a monopolist. However, this does not mean that a SSNIP (or business strategies that result in a SSNIP) can be successfully implemented by the putative collusive group post-merger. First, the industry participants must be able to select a plausible tacitly collusive plan of action. Moreover, for each putative tacit colluder, coordination must be individually rational (so that each firm's expected net present value of profits under the hypothetical collusive strategy is higher than without it) and incentive compatible (that is, the firm has no incentive to cheat once the strategy is implemented). However, there may not exist a tacitly collusive plan for the industry that meets those requirements— i.e., that is individually rational and incentive compatible—for each firm. Thus, the use of critical loss analysis must recognize that what a hypothetical monopolist would do regarding potential price increases may not be feasible for the firm post-merger. Still, the use of a 5-10% SSNIP may anchor the empirical analyses that would shed light on whether such a SSNIP can be implemented and sustained. If, for example, many firms would have an incentive and ability to cheat on a putative SSNIP, then, even if a monopolist would be able profitably to implement it, the industry participants may not be able to do so absent explicit collusion.

In view of this discussion, one plausible standard for gauging the risks of enhanced tacit coordination might be that a merger raises coordinated effects concerns if a five to ten percent tacitly coordinated price increase (or any other suppression in competition leading to an equivalent harm) can be implemented post-merger with substantial likelihood and can be sustained using credible punishments (possibly including reversion to pre-merger pricing or other

strategies). As a part of this analysis, a firm's incentives to join a tacitly collusive group or to cheat on the arrangement ought to be checked under plausible assumptions regarding firms' likely degree of impatience (discount rate) for current versus future profits.[39]

In sum, there has been significant progress made in the area of coordinated effects analysis, as evidenced in several recent merger analyses that highlight the barriers posed by complexity and volatility to coordinated activity. Too often, however, coordinated effects analyses are guided by guesswork and intuition. Some of the tools that we have developed for unilateral effects analysis can be applied to the much more murky area of coordinated effects. In analyzing the potential coordinated effects concerns of a proposed merger, policy makers and analysts must utilize technical and empirical tools in order to make our enforcement in the area of coordinated effects as sound and rigorous as it is in the area of unilateral effects.

[39] As noted earlier, firms' impatience (or discount rate) is an important factor that determines incentives to cheat. Thus, the higher the discount rate, the more impatient firms are and the more inclined they are, *ceteris paribus*, to cheat. *See*, M. Ivalid et al., *The Economics of Tacit Collusion*, Final Report for DG Competition, European Commission, IDEI, Toulouse (2003) for a more complete and accessible exposition.