Chapter X
Unilateral Competitive Effects
of Horizontal Mergers II:
Auctions and Bargaining

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§ X.0 Introduction

The previous chapter explained that unilateral merger effects arise in many oligopoly models, which vary with the nature of the competitive process. This chapter considers the unilateral effects of mergers in the particular context of auctions and bargaining. Bidders in an auction model interact in accord with strict rules dictated by the auctioneer. The Cournot and Bertrand models presented in the previous chapter characterize outcomes of a competitive process without detailing the process itself, but auction models specify that process in detail, and different bidding rules give rise to different models. Bargaining is modeled in two quite different ways: Axiomatic bargaining models, like the Cournot and Bertrand models, merely characterize the outcomes of a competitive process. Strategic bargaining models, like auction models, specify in detail how bargainers interact, and variations in the nature of that interaction are likely to affect the bargain they strike.

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§ X.1 Mergers in Auction Models

§ X.11 Auction Formats and Bidder Values

William Vickery initially formalized the analysis of competition in a bidding setting.1 Significant elaboration was provided by others,2 and over the years, the economic literature on auctions grew quite vast as economists studied every form of auction observed in the real world or conceived by academic theorists.3

The form of auction principally discussed here is the English auction. This may be the most familiar form of auction, because English auctions are commonly used to sell art, antiques, and collectibles. When the auctioneer sells items to bidders in an English auction, the level of bids ascends and bidding is open: Bidders shout out their bids or communicate them to the auctioneer and rival bidders in some other manner. The auction continues as long as the bidding is advanced, and the selling price is the final bid.4 Auctions are used not only in selling but also in procurement, when the auctioneer buys from the bidders. An English procurement auction proceeds much like an English selling auction, except that the level of bids descends.

A Dutch auction is organized much like an English auction, except that the level of bids moves in the opposite direction. When the auctioneer sells items to bidders in a Dutch auction, the level of bids descends: The auctioneer announces prices in

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4 At auction houses, like Christie’s or Sotheby’s, as well as countless less well known establishments, the winner pays a “buyer’s premium” over the final bid, or “hammer price.” The hammer price goes to the consignee of the item auctioned, while the buyer’s premium goes to the auction house.
Real world auctions often vary the canonical forms described here. The auctions used by eBay and other on-line auction houses are a variation on second-price auctions. Bidders do not submit bids as such, but rather submit maximum bids, and the computer that hosts the auction then does the bidding. At any time during the auction, the current high bid is “one increment” above the second-highest maximum bid so far submitted. Bidders can increase their maximum bids at any time. On-line auctions generally also have a pre-set ending time for an auction, and the winning bid is one increment above the second-highest maximum bid at the time the auction ends.

In addition to English and Dutch auctions, there are also sealed-bid auctions, with bidders submitting their bids to the auctioneer in confidence. Procurement auctions often have a sealed-bid format. In a first-price sealed-bid procurement auction, the selling price is the amount of the lowest bid. In a second-price sealed-bid procurement auction, the selling price is the amount of the second-lowest bid. Sealed bids may be published after the auction, but no bidder is aware of other bids during the auction.

The optimal strategies of bidders differ across these auction formats. In a second-price sealed bid auction used to sell items to the bidders, the best strategy is simply to bid the valued placed on an item. To bid any more risks having to pay more than an item is valued, and to bid any less risks failing to purchase an item although the winning bid is less than the value placed on the item. In contrast, bidding the amount an item is valued assures that any successful bid produces a gain, because the sale price is not the amount actually bid, but rather the second-highest bid.

In a first-price sealed bid auction used to sell items to the bidders, the best strategy is to bid somewhat less than the value placed on an item. Bidding the full amount an item is valued makes breaking even the best possible outcome, whereas bidding somewhat less makes a financial gain possible. The more a bidder shades a bid below the value placed on an item, the greater the gain if the bid wins, but the lower the probability that the bid does win. Hence, the optimal bid is determined by trading off a reduced likelihood of winning against a larger payoff from winning. The best strategy in a Dutch auction is precisely the same as that in a first-price sealed-bid auction.

The optimal strategy in an English auction is essentially that in a second-price

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sealed bid auction: One continues bidding as long as the value placed on an item exceeds the current high bid, or until all rivals have dropped out of the bidding. Consider, for example, four bidders, labeled 1 through 4, who value an item at $10, $20, $30, and $40. The auctioneer may open the bidding at $10, which any of the four may bid, and bidder 1 is then finished bidding. As the bidding proceeds, bidder 2 drops out at $20, and bidder 3 drops out at $30. When bidder 3 drops out, the auction is over, and bidder 4 wins the auction without having to bid up to the level of the value placed on the item. The precise winning bid depends on the auction rule that specifies the minimum increment by which each new bid must exceed the current high bid. If that increment were $1, the winning bid in this example would be $31. All that follows is simplified by assuming the minimum increment is infinitesimally small.

Despite the difference in optimal bidding strategies in the different auction formats, the Revenue Equivalence Theorem states that, under certain conditions, the auctioneer can expect the same return in all of the formats.6 The Theorem does not hold, however, with important difference among bidders, in which case there is no robust comparison across auction formats.7

Apart from auction formats, another important feature that distinguishes among auction models is the nature of the values bidders place on items auctioned. In some models, bidders have “private values,” while in others, they have “common values.” Private values do not depend on how much rival bidders value an item, while common values do. Values in a selling auction are most apt to be private when an item auctioned is being purchased for personal use, with no anticipation of resale, and bidders value it on the basis of their idiosyncratic tastes. Values are most apt to be common when bidders seek to acquire an item for resale, which causes the value each bidder places on the item to be determined by its value in the resale market. The resale value is unknown, and different bidders have different estimates.

Common values give rise to a phenomenon known as the “winner’s curse.” If

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bidders simply bid their estimates of the value of an item in the resale market, the
winner would have the highest estimate, which, on average, would exceed the true
value. Hence, the strategy of bidding the estimated value of an item causes the
winner to take a loss on average. To avoid this winner’s curse, each bidder’s optimal
strategy is to bid somewhat less than the estimated value.

The effects of mergers in common values auctions are not entirely understood.
Reducing the number of active bidders can have the obvious anticompetitive effect,
but merging two bidders serves to pool their information, which can lead to a more
confident value estimate, producing a smaller adjustment to avoid the winner’s curse,
and possibly a higher bid. Disentangling the competition and information effects is
the subject of current research.

To avoid complications from common values, this chapter considers only private
values. In addition, this chapter concentrates on a single auction format—the English
auction—within which the effect of a merger is particularly straightforward. The
analysis is presented initially in the context of an auctioneer selling to competing
bidders, but nothing of importance changes if the auctioneer instead procures an item
from the bidders. The effects of mergers in sealed-bid auctions are much more
 computationally complex than the effects of mergers in English auctions and are only
briefly mentioned below.

§ X.12 Mergers in Private Values English Auctions

When the auctioneer sells an item to bidders with private values, the bidder placing
the highest value on the item wins the auction, and the winning bid is the maximum
of the values placed on the item by the losing bidders. Adding or subtracting a
bidder in a private values English auction affects the outcome of the auction only if
it alters the second-highest value. Consider again the example above with bidders
labeled 1 through 4, who value an item at $10, $20, $30, and $40. With many
additional bidders just like bidders 1, 2, or 3 participating in the auction, bidder 4
would still win the auction and the winning bid would still be $30, but the presence
of an additional bidder valuing the item at $35 would raise the winning bid to $35.
If bidders 1 and 2 did not participate in the auction, bidder 4 would still win and the
winning bid would still be $30. If bidder 3 or bidder 4 did not participate, the
While mergers in some oligopoly models may be unprofitable for the merging firms, that is not so in an auction model. See George J. Mailath & Peter Zemsky, Collusion in Second Price Auctions with Heterogeneous Bidders, 3 GAMES & ECON. BEHAVIOR 467 (1991).

In modeling a private values auction, each bidder is assumed to draw a value from a statistical distribution attaching probabilities to possible values. If \( F(v) \) is the distribution of a random variable representing a bidder’s private value \( v \), \( F(v_0) \) is the probability that \( v \) is less than some particular value \( v_0 \). Since probabilities fall between zero and one, \( F(v_0) \) is bounded by zero and one. In addition, the area under \( F(v) \) over the range of all possible values of \( v \) must be one.

As a merger in the auction context generally is modeled, each merging bidder continues to take a separate draw from the value distribution, but the merged firm makes a single bid. A merger modeled in this manner affects the winning bid in a private values English auction if, and only if, the merging bidders draw the highest and second-highest values. In the simple numerical example, merging the bidders with the values of $30 and $40 reduces the winning bid to $20, while all other mergers have no effect.\(^8\)

If bidders compete in many separate private values English auctions, the average effect of a merger is the frequency with which the merging bidders draw the two highest values, multiplied by the difference between the second- and third-highest values when they do. Both quantities depend on the distribution of private values, which plays much the same role as the demand function in the differentiated products Bertrand model considered in the previous chapter. While the closeness of merging products in the latter model is determined by cross-price elasticities of demand, closeness of bidders in an auction model is determined by the frequency with which either draws the second-highest value when the other draws the highest value.

The effects of mergers in private values English auctions are similar to the effects of mergers in Bertrand industries detailed in the previous chapter, but there are significant differences. A merger in an industry employing English auctions has no effect in many, probably most, of the auctions for particular items, because the

\(^8\) While mergers in some oligopoly models may be unprofitable for the merging firms, that is not so in an auction model. See George J. Mailath & Peter Zemsky, Collusion in Second Price Auctions with Heterogeneous Bidders, 3 GAMES & ECON. BEHAVIOR 467 (1991).
merging bidders do place the two highest values on many items. Nevertheless, a merger may have a substantial effect on the winning bid for the particular items on which the merging bidders do place the two highest values, and the average effect of a merger may be comparable to that in a Bertrand industry. English auctions also are efficient in the sense the auction allocates an item to the bidder placing the highest value on it, and mergers do not change this. The unilateral exercise of market power following a merger merely transfers wealth from the auctioneer to the bidders by altering the winning bid. In a Bertrand industry, however, all customers face the same prices, so the unilateral exercise of market power following a merger causes some customers inefficiently to switch their purchases.

§ X.12 Mergers with Power-Related Distributions

In modeling the competitive effects of mergers, it is critical to incorporate differences among competitors. Even if all bidders in an auction were the same before a merger, they no longer would be afterward, and some bidders generally are “stronger” than others and win auctions more frequently. Auction theory makes incorporating bidder differences is entirely feasible, but it may create considerable mathematical complexity. A useful way to avoid that complexity is to model differences as if they were generated by bidders taking different numbers of draws from a common distribution, with the maximum among the draws taken being the value a bidder places on an item. This makes it possible to make use of the convenient properties of “power-related” value distributions.

The distributions $F_1(v)$ and $F_2(v)$ are power related if there is a positive number $r$ such that $F_1(v) = [F_2(v)]^r$, for all $v$. A family of power-related distributions consists of all the distributions that can be derived by raising some base distribution, $F(v)$, to

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9 This is not necessarily true if the auctioneer employs a “reserve.” When the auctioneer sells to items to the bidders, an item is not sold if no bid exceeds the reserve. By using a reserve, an auctioneer may prevent the adverse price effect from a merger, but the auctioneer is nevertheless made worse off because of the increase in the probability of no sale being made. See Keith Waehrer & Martin K. Perry, The Effects of Mergers in Open-Auction Markets, 38 RAND J. ECON. 287 (2003).

10 For analyses the effects of mergers in auctions using power-related distributions, see Luke Froeb & Steven Tschantz, Mergers Among Bidders with Correlated Values, in MEASURING MARKET POWER 31 (Daniel J. Slottje ed., 2002); Waehrer & Perry, supra note 9.
some positive power \( r \). It makes no difference which distribution in a power-related family is taken to be the base distribution, and it is convenient to let the base distribution be the distribution of the maximum private value across all bidders. With that normalization, the distribution of the private value of bidder \( i \) is the distribution of the maximum value raised to the power \( \pi_i \), the probability that bidder \( i \) draws the maximum value and wins the auction.

With the introduction of bit more notation, it is possible to state several important results that hold for all families of power-related distributions\(^1\) and allow simple quantitative predictions of the effects of mergers in English auctions. Let \( F(v) \) be the distribution of the maximum private value across all bidders, and let \( \mu(r) \) be the mean, or expected value, of the variable with the distribution \( [F(v)]' \). Thus, \( \mu(1) \) is the mean of the maximum private value over all bidders, and \( \mu(1-\pi_i) \) the mean of the maximum private value over all bidders other than \( i \). In this notation, the expected value of bidder \( i \)'s winning bids is

\[
\mu(1) - [\mu(1) - \mu(1-\pi_i)] / \pi_i 
\]

and the expected value of bidder \( i \)'s profit, i.e., its winning probability times the expected value of the difference between its private value and its winning bid, is

\[
\mu(1) - \mu(1-\pi_i) \equiv h(\pi_i).
\]

These results have the intuitive implication that more-successful bidders, with higher winning bid probabilities, have lower expected winning bids and earn higher expected profits.

These results also are easily used to derive the effects of a merger. The winning probability of the firm formed by merging bidders \( i \) and \( j \) is simply \( \pi_i + \pi_j \), so the merged firm’s expected winning bid and its expected profit can be computed directly from the above results. The total expected profits of all bidders is the sum of the \( h(\cdot) \) functions for all bidders, which the merger increases by \( h(\pi_i + \pi_j) - h(\pi_i) - h(\pi_j) \). English auctions are efficient in the sense that the bidder drawing the highest private value wins, so all of this increase accrues to the merged firm and its gain precisely

equals the auctioneer’s loss.\textsuperscript{12}

\section*{§ X.13 Mergers in Procurement and Sealed-Bid Auctions}

Nothing important in the foregoing analysis changes when it is adapted to procurement auctions. Bidders in procurement auctions generally are modeled as drawing the cost of serving a particular customer from a distribution of possible costs. The results derived for power-related distributions are easily adapted by replacing the private value distributions with cost distributions, and by replacing the maximum private value by the minimum cost. Cost distributions \(F_1(c)\) and \(F_2(c)\) are power related if there exists a positive \(r\) such that \(F_1(c) = 1 - [1 - F_2(c)]^r\), for all \(c\). If bidders in a procurement auction draw their costs from power-related cost distributions, the \(h(\cdot)\) functions is exactly the same as before.

The effect of cost reductions in English procurement auction differs from their effect in many other oligopoly models. In other models, reductions in the merged firm’s marginal cost cause it to lower its price or increase its output. In a Bertrand industry for example, reductions in marginal costs for the merging brands are passed through to some extent in the form of lower prices on those brands. In procurement auctions, mergers similarly cause the merged firm to lower its bids, but the costs of the losing bidders determine the winning bid. In an English procurement auction, a marginal-cost reduction can affect the winning bid either by making the merged firm the low-cost firm when it otherwise would not have been, or by causing the merged firm to bid lower when it has the second-lowest cost and loses the auction.

Things change more significantly when the auction format is changed to a first-price, sealed-bid auction. Unfortunately, there are few general results for sealed-bid auctions when there are significant differences among bidders.\textsuperscript{13} Numerical analysis using the logit model presented in the next section finds that, given the merging firms’ pre-merger winning bid shares, the price effects of mergers in a sealed bid

\textsuperscript{12} The foregoing presumes there is no reserve. \textit{See} note 9 supra.

auction are almost perfectly predicted by taking 85% of the price effect predicted by the corresponding English auction model.\footnote{See Steven Tschantz, Philip Crooke & Luke Froeb, Mergers in Sealed versus Oral Auctions, 7 INT’L J. ECON. BUS. 201 (2000).}

§ X.14 Applying Auction Theory to Proposed Mergers

The economic literature has derived simple \( h(\cdot) \) functions for certain families of power-related value distributions.\footnote{See Froeb, Tschantz & Crooke, supra note 11. With sufficient bid data, it is possible to avoid strong assumptions about the cost or value distributions, by applying techniques have been developed for econometric estimation of auction models. See Susan Athey & Philip A. Haile, Identification of Standard Auction Models, 70 ECONOMETRICA 2107 (2002).} In one of these families, the maximum value among all bidders is uniformly distributed over the interval \((a, b)\), and

\[
h(\pi_i) = \pi_i (b - a) / (4 - 2\pi_i).
\]

This function is exactly the same for a procurement auction with costs uniformly distributed over the interval \((a, b)\), and it is a simple matter to apply this function to a proposed merger.

Suppose that each of the merging firms has a winning bid probability over recent years of \(1/3\). A bit of arithmetic yields \( h(1/3) = (b - a)/10\), and if the average profit per auction for each of the merging firms had been $10, it follows that \((b - a) = $100\). The winning bid probability of the merged firm is just the sum of the winning bid probabilities of the merging firms, so the average profit per auction for the merged firm is \( h(2/3) = (b - a)/4 = $25\). Each of the merging firms had earned an average of $10 per auction, so the merger generates an additional $5 per auction in profit. If there are 30 auctions per year, the merged firm can be expected to win 20 of them, yielding a total annual loss to the auctioneer of $100.

Another useful family of power-related distributions is constructed by assuming the private value or cost distributions have the same form as the random components of utility in the logit model discussed in the previous chapter. Defining \( \sigma \) as the standard deviation of the value or cost distribution, and \( \pi \) as the ratio of the circumference of a circle to its diameter (approximately \(3.14\)),

\[
h(\pi_i) = -\sigma (\sqrt{6}/\pi) \log(1-\pi_i).
\]
Note that $\log(1-\pi_i)$ is negative, so this function is positive and increases with increases in the standard deviation of the value or cost distribution. That is true because a higher variance causes a greater expected spread between the two highest values, or the two lowest costs. The effect of a merger of bidders $i$ and $j$ on expected profits is

$$-\sigma\left(\frac{\sqrt{6}}{\pi}\right)[\log(1-\pi_i - \pi_j) - \log(1-\pi_i) - \log(1-\pi_j)].$$

A higher standard deviation for the value or cost distribution causes a greater effect from the merger because it causes a greater expected spread between the second- and third-highest private values, or the second- and third-lowest costs. Using this family of power-related distributions, it is also straightforward to generate quantitative predictions for proposed mergers. For example, if a firm with a 50% winning probability has an average profit from winning of 5, the implied standard deviation of the value distribution is easily calculated to be 9.25, and the expression immediately above can be used to compute the effect of the merger of any two bidders identified only by their winning bid probabilities.16

§ X.15 The Merger Guidelines and Merger Cases

Auction models are explicitly mentioned in the Horizontal Merger Guidelines,17 and some of the unilateral effects theories in government merger challenges have been

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16 In some auction models, it has been observed that substantial price effects from mergers leaving at least two bidders require an implausibly high variance in the underlying value or cost distribution. See, e.g., Lance Brannman & Luke M. Froeb, Mergers, Cartels, Set-Asides, and Bidding Preferences in Asymmetric Oral Auctions, 83 REV. ECON. & STAT. 283, 287 (2000). This does not suggest that auctions are inherently an especially competitive process; rather, it suggests only that in certain auction settings, there is little differentiation, so the internalization of competition between the merging firms has little impact.

17 U.S. Department of Justice and Federal Trade Commission, Horizontal Merger Guidelines § 2.21 n.21 (1992, rev’d 1997), reprinted in 4 Trade Reg. Rep. (CCH) ¶ 13,104:

[S]ellers may formally bid against one another for the business of a buyer, or each buyer may elicit individual price quotes from multiple sellers. A seller may find it relatively inexpensive to meet the demands of particular buyers or types of buyers, and relatively expensive to meet others’ demands. Competition, again, may be localized: sellers compete more directly with those rivals having similar relative advantages in serving particular buyers or buyer groups. For example, in open outcry auctions, price is determined by the cost of the second lowest cost seller. A merger involving the first and second lowest-cost sellers could cause prices to rise to the constraining level of the next lowest-cost seller.
based on auction models,18 but Oracle is the only court decision that explicitly refers to an auction model.19 One of the government’s experts, R. Preston McAfee, used an auction model to generate a quantitative estimate of the proposed merger’s likely price effects.20 He modeled competition among vendors of highly complex business software as an English procurement auction. His model predicted price increases of 5–11% for one market affected by the merger and 13–30% for another.

The Oracle decision did not comment on the general relevance of auction models to unilateral effects analysis or on the specific relevance of an auction model to that case. It is perilous to read much into silence, but the court seemed open to the use of auction models. Ultimately, the court rejected the predictions of Professor McAfee’s model on the sole grounds that the assumed winning bid shares were based on “unreliable data.”21 The court held that a far greater range of products should have been included in the analysis.22

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18 See, e.g., United States v. Ingersoll-Dresser Pump Co., 2001-1 Trade Cas. (CCH) ¶ 73,154, at 89,581 (D.D.C. 2000) (competitive impact statement) (explaining that the merger would reduce the number of bidders for certain types of pumps and “create an incentive for each bidder to bid a higher amount than it would have”); United States v. Suiza Foods Corp., 1999-2 Trade Cas. (CCH) ¶ 72,645, at 85,790 (E.D. Ky. 1999) (competitive impact statement) (explaining that the merger would reduce the number of bidders for school milk contracts, so the “remaining bidders will bid less aggressively”); see also Jonathan B. Baker, Unilateral Competitive Effects Theories in Merger Analysis, ANTITRUST, Spring 1997, at 21, 25 (explaining the FTC’s analysis of the merger of Turner and Time-Warner, which led to restructuring of the deal, in terms of an auction model). In other cases, there was no clear reliance on auction theory, although the industry explicitly relied on auctions to trade. See, e.g., FTC v. Alliant Techsystems Inc., 808 F. Supp. 9, 14–17, 21 (D.D.C. 1992) (ammunition for tanks); United States v. United Tote, Inc., 768 F. Supp. 1064, 1066–68, 1071 (D. Del. 1991) (totalizers for race tracks); United States v. Baker Hughes Inc., 731 F. Supp. 3, 8–9 (D.D.C. 1990) (mining equipment), aff’d, 908 F.2d 981 (D.C. Cir. 1990).


20 Id. at 1169–70.

21 Id. at 1170.

22 Id. at 1158–61.
§ X.2 Mergers in Bargaining Models

§ X.21 Bargaining Models and Bargaining Outcomes

One prototypical bargaining scenario involves two parties, A and B, splitting a pie, and a model can be constructed by specifying how the bargaining proceeds. Suppose A and B make alternating offers, with A going first. A and B strike a bargain if either accepts the other’s offer, and if no offer is accepted within three rounds, the pie becomes inedible, and neither party gets any. The outcome of the bargaining is determined by working backward from the third round to the first, through “backward induction.” In round three, A offers B nothing, because that is all B can get by rejecting the offer. In round two, A rejects B’s offer if it is less than the whole pie, because A can get the whole pie by waiting until round three. In round one, A offers B nothing, and B accepts, knowing that nothing can be gained by prolonging bargaining.

The foregoing is a strategic bargaining model. Such models have much in common with auction models in their attention to detail about the process, yet they stand in sharp contrasts with auction models because neither party plays the role of the auctioneer by dictating rules and committing to deal only according to those rules. Like many strategic bargaining models, the outcome of this model is highly sensitive to the order of play and number of rounds, and this sensitivity can be disheartening because real-world bargaining normally has no fixed number of rounds nor a designated party to make the first offer.

John F. Nash, Jr. posited axioms for reasonable solutions to the bargaining game that eliminate sensitivity to arbitrary conditions such as which party goes first. Nash’s axiomatic bargaining theory resembles the Cournot and Bertrand models in that it abstracts completely from the process of bargaining. Nash demonstrated that a bargaining outcome satisfying his axioms maximizes the product of the gains the two parties derive from reaching a bargain. In most cases, the result is that each

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player gets half of the total incremental gains to both players from striking a bargain.

Nash hypothesized that his axiomatic solution was the outcome of some strategic bargaining model, and a major step toward confirming Nash’s hypothesis was taken by analyzing the scenario of splitting a pie when the parties make alternating offers and the value of the pie diminishes with each round. In this bargaining scenario, the player making the first offer is able to bargain for more than half of the pie because its value diminishes between that first offer and any counter by other party, but the outcome is close to the even split of Nash’s axiomatic solution. Further analysis demonstrated that the outcome of this bargaining scenario converges to Nash’s axiomatic solution as the time period between offers becomes very small.

§ X.22 The Effects of Mergers on Bargaining Outcomes

The Nash bargaining solution provides intuition as to how a merger may affect the outcome of bargaining, and one possibility is no effect at all. Suppose $A$ bargains with $C$ over splitting a pie, and $B$ bargains with $C$ over splitting a second pie. The merger of $A$ and $B$ has no effect on splitting either pie because it has no effect on the gain to any of the three from striking a bargain. This conclusion holds because $A$ and $B$ are not really in competition. With two separate pies involved, there is no way in which $C$ can play $A$ and $B$ off against each other.

In many real-world situations, the merging firms do compete and can be played off against each other, and in such situations, their merger can have significant effects. For example, the merger of two hospitals may allow them to achieve a better bargain if those hospitals are substitutes in the networks of managed care plans. The merger increases the plans’ gains from striking a bargain because it means that neither merging hospital will be in the network if no bargain is struck. This was the theory in several government challenges to hospital mergers.

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Suppose that a managed care plan can market its network to an employer for $100 if it contains either of two merging hospitals, for $120 if it contains both, and cannot market it all without one of the hospitals. The gain to the managed care plan from adding either of the hospitals to its network when it already has the other is $20. By threatening each of the merging hospitals with being dropped from the network, the managed care plan keep the $100 for itself and make the gain from striking a bargain with a second hospital just $20, which the Nash bargaining solution predicts is evenly split. Thus, before the merger each plan gets $10 for joining the managed care network. Now suppose the hospitals merge and offer both as a package on a take-it-or-leave-it basis. The managed care plan can no longer drop one of the hospitals, and the gain from striking a bargain with the merged hospital is the full $120, which again is evenly split in the Nash bargaining solution. The merged hospital thus can bargain for $60, while the separate merging hospitals could bargain for only a total of $20.

A merger can worsen the bargaining position of the merging firms. This may occur if merging firms bargain with a supplier and the merged firm becomes “pivotal” to the supplier in the sense that the supplier can cover some fixed costs that have not yet been incurred only by striking a bargain with the merged firm. Ironically, the merger reduces the supplier’s gain from striking a bargain with the merging firms and allows the supplier to achieve a better bargain. The merged firm covers the supplier’s fixed costs because they otherwise would not be incurred and the merged firm would lose the entire gain from making a bargain.28

Suppose five national companies own many local monopoly providers of cable television, and each of the five bargains with a content provider over payment for broadcast rights for programming that has not yet been produced.29 The gain in

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29 This example is adapted from Raskovich, *supra* note 28, at 407–408.
subscriber revenue to each of the companies from adding this programming is $20, so the Nash bargaining solution is that each cable company pays $10 for the rights. With a cost of producing the programming of $40, the content provider nets $10 by licensing to all five cable companies. If the content providers’ negotiations with any one of the cable companies were to break down, the content provider would still break even, so no cable company is pivotal, but if two of the cable companies merge, they become pivotal, because the content provider can no longer break even by striking a bargain with all of the other cable companies.

If the merged cable company and the content provider strike a bargain, they earn a total of $30 (the $20 increase in subscriber revenues for each of the cable systems that merged, plus the $30 in revenue from the three other cable companies, less the $40 production costs). The Nash bargaining solution is that each party gets half. Acquiring the programming increases the merged cable company’s subscriber revenues by $40, so netting $15 implies paying $25 for the programming. Before the merger, each cable company paid $10 for the programming, so the merged firm pays $5 more than the two merging firms had paid because the merger weakened their bargaining position.

An interesting feature of bargaining models is their implications for the pass through of cost reductions. A merger that reduces the marginal cost of supplying a customer, increases the gain to the merged firm from striking a bargain with that customer, which causes marginal-cost reductions to be partially passed through. The cost reductions typically are evenly split in the Nash bargaining solution, yielding a pass-through rate of fifty percent. In contrast to essentially all other oligopoly models, fixed-cost reductions also may be partially passed through in a bargaining models, even in the short run. If a customer is large enough that there is a recurring fixed cost associated with its particular account, merger-related reductions in that fixed cost are shared with the customer, just as reductions in marginal cost.
§ X.3 The “Fit” of Auction and Bargaining Models

In Daubert, the Supreme Court declared that expert testimony is admissible only if it “is sufficiently tied to the facts of the case that it will aid the jury in resolving a factual dispute,” i.e., only if there is a good “fit” between the testimony and the pertinent inquiry.30 As one court appeals declared, Daubert requires a “thorough analysis of the expert’s economic model,” which “should not be admitted if it does not apply to the specific facts of the case.”31 The same discipline is appropriate outside the courtroom whenever a particular model is given significant weight in the evaluation of the likely competitive effects of a merger.32

To fit an industry, a model used to analyze a merger should reflect basic aspects of the competitive landscape. For example, the models discussed in the previous chapter do not fit an industry in which the product is customized to a significant extent, or otherwise not subject to arbitrage, and prices vary significantly across transactions. An auction or bargaining model, however, can easily reflect the observed price dispersion the industry, so an auction or bargaining model may fit such an industry.

An auction or bargaining model may fit an industry quite well enough even though it does not perfectly describe the industry. An auction model may be appropriate when the merging firms compete through a process that resembles either open or sealed bidding, even if there is no formal bidding process, and even if competitors’ actions are not limited to the submission of bids. What is most important is the merging firms buy from, or sell to, a firm playing the role of the auctioneer by dictating the rules governing competition and committing to those rules.

In Oracle the defendant objected to the use of an auction model on the grounds that the customers were “extremely powerful at bargaining” and the merging sellers


did “not simply ‘bid’ for business” but rather engaged in “negotiations [that were] extensive and prolonged, with the purchaser having complete control over information disclosure.” But an auctioneer has just this sort of power and control, and in any event, these objections appear to relate only to the descriptive accuracy of an auction model. Oracle did not explain why these objections provided a basis for questioning the predictive accuracy of an auction model, which is what really matters. A model used to predict the effects of a merger must explain for the past what it is expected to predict for the future.

A key test of the fit of an auction model is how well it explains the intensity of competition as reflected in the relationship between winning bids and bidders’ costs or private values. It should be possible to determine whether bidders’ profits are related to their winning probabilities in the manner predicted by the model. If data on costs or values are available, it also useful to estimate the variance of the cost or value distribution and compare that to the variance inferred from bidder profits. If such data are not available, one may still ask whether the implied variance makes sense. If bidders in a procurement setting appear to have very similar costs in different procurements, an auction model may not be able to explain high observed profits.

A critical issue in evaluating the fit of an auction model relates to the manner in which the merger itself is modeled. The discussion above assumes that a merged firm submits a single bid after taking the draws from the cost or value distribution the merging firms would have taken. This may be an entirely sensible way to model a merger, for example, because the cost of supplying a customer depends on location, and the merged firm has all of the merging firms’ locations. In some cases, however,

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33 United States v. Oracle, Inc., 331 F. Supp. 2d 1098, 1172 (N.D. Cal. 2004). The defendants evidently would have preferred a bargaining model, but an auction model is apt to fit better than a bargaining model, even if negotiations follow the submission of bids, when the winner is determined by the bidding process alone, or the party accepting the bids dictates the rules under which bidders compete.

this may be an unrealistic assumption, but it may be possible to model mergers differently, for example, as just the elimination of one of merging firms.

There is relatively little experience in analyzing mergers with bargaining models, and there may be much still to learn about when Nash’s axiomatic bargaining solution should be applied. Even if a merger clearly alters bargaining position, analysis predicated on the Nash solution may not be appropriate because it may not reflect the specific strategic bargaining scenario of the industry.