Chapter X
Unilateral Competitive Effects of Horizontal Mergers I: Basic Concepts and Models
Gregory J. Werden

§ X.0 Introduction

Horizontal mergers give rise to unilateral anticompetitive effects if they cause the merged firm to act less intensely competitive than the merging firms, while non-merging rivals do not alter their competitive strategies. Unilateral merger effects are simplest when there are no non-merging rivals—the case of merger to monopoly. To whatever extent pre-merger competition produces lower prices or higher outputs than those under monopoly, the merger raises price and reduces output by eliminating that competition. Other applications of unilateral effects are variations on the same theme, which depend on the nature of the competitive process in a particular industry. The discussion below first introduces the game theory approach to the analysis of oligopoly then briefly reviews the case law on unilateral merger effects. After these preliminaries, the analysis of unilateral merger is presented in detail within the context of the two classic oligopoly models.

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1 Senior Economic Counsel, Antitrust Division, U.S. Department of Justice. The views expressed herein are not purported to represent those of the U.S. Department of Justice.

2 For introductions to unilateral effects analysis, see Jonathan B. Baker, Unilateral Competitive Effects Theories in Merger Analysis, ANTITRUST, Spring 1997, at 21; Carl Shapiro, Mergers with Differentiated Products, ANTITRUST, Spring 1996, at 23. Unilateral effects contrast with coordinated effects arising if a merger induces rivals to alter their competitive strategies, resulting in some form of coordination or reinforcement of ongoing coordination. From the beginning of the Clinton administration to December 2003, few merger challenges by the federal enforcement agencies were based entirely on coordinated effects, while nearly half were based entirely on unilateral effects. See William J. Baer, Deborah L. Feinstein & Randal M. Shaheen, Taking Stock: Recent Trends in U.S. Merger Enforcement, ANTITRUST, Spring 2004, at 15, 18.

3 The leading treatise endorses four distinct unilateral effects theories. 4 PHILIP E. AREEDA, HERBERT HOVENKAMP & JOHN L. SOLOW, ANTITRUST LAW ¶ 910, at 54 (rev’d ed. 1998). Economic theory embraces even more possibilities.
§ X.1 The Basic Economics of Unilateral Effects

§ X.11 Game Theory Concepts and Two Classic Oligopoly Models

Economists analyze oligopoly using the tools of game theory, so understanding the basics of oligopoly theory requires familiarity with basic concepts of game theory. A game is defined by its players (e.g., the competitors), the actions they may take (e.g., setting prices or setting quantities), and the equilibrium concept that indicates what actions are best and determines the outcome of the game. The key equilibrium concept employed in economics is “Nash, non-cooperative equilibrium,” which in simple terms defines an equilibrium as a set of actions by players such that no player has an incentive to alter its action in light of the actions being taken by the other players.3

Unilateral merger effects arise in a broad class of oligopoly games with Nash, non-cooperative equilibria, including the two classic oligopoly models developed in the nineteenth century. These models posit “simultaneous-move,” “one-shot” games, meaning that the game is played just once and all players select their moves at the same time. Like many game theoretic economic models, these two classic oligopoly models predict an outcome—the equilibrium prices and quantities—while abstracting entirely from the process through which players achieve that outcome.

The first formal model of oligopoly was introduced in 1838 by Antoine Augustin Cournot.4 The usual version of the Cournot model, and the only one considered here, features a single, homogeneous product.5 The actions of Cournot competitors are the quantities they produce, so the Cournot-Nash equilibrium is a set of quantities such that each competitor is happy with its quantity, given its rivals’ quantities.

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3 This concept was introduced by mathematician John F. Nash, Jr., and it earned him a share of the 1994 Nobel Memorial Prize in Economics. Nash’s main contribution on the subject is John Nash, Non-Cooperative Games, 54 ANNALS OF MATHEMATICS 286 (1951), reprinted in COURNOT OLIGOPOLY 82 (Andrew F. Daughety ed., 1988).


The second oldest oligopoly model was introduced by Joseph Louis François Bertrand in an 1883 review of Cournot’s book. Bertrand argued that it was more realistic for competitors to choose prices, rather than quantities. Because the actions of Bertrand competitors are their prices, the Bertrand-Nash equilibrium is a set of prices such that each competitor is happy with its price, given its rivals’ prices. The Bertrand model is applied principally to differentiated products industries, and differentiated products are presumed below when the Bertrand model is referenced.

Although the Cournot and Bertrand models are straightforward applications of Nash, non-cooperative equilibrium, economists have understood the models this way for only a generation. For quite a long time, the models were understood to posit irrational behavior: As the Cournot model in particular was presented verbally and mathematically, each competitor assumed that its rivals would not alter their quantities in response to its quantity changes. That assumption, however, was flatly inconsistent with the behavior of competitors in the model. Understood as presuming irrational behavior, the model was consistently rejected. But after Nash’s work on game theory entered economics’ mainstream, “Cournot [was] reread and interpreted,” and Cournot equilibrium is now viewed as the product of fully rational behavior.
As explained in detail below, the Cournot and Bertrand oligopoly models predict that mergers without offsetting efficiencies produce unilateral anticompetitive effects. In the Bertrand model, a merger combining two competing brands of a differentiated consumer product, and not reducing costs, necessarily leads to price increases, even if only very small price increases. The merged firm accounts for the increase in sales of either of the two brands that results from an increase in the price of the other, and therefore finds it in its unilateral self-interest to raise the prices of both.

§ X.12 A Formal Definition of Unilateral Effects

Before returning to the Cournot and Bertrand models, it is useful to define unilateral effects precisely by considering a very abstract oligopoly model in which \( n \) competitors simultaneously take actions that can be represented by numbers. The Cournot and Bertrand models are the special cases of this general model in which competitors’ actions are their quantities and prices. Let

\[
a_i = \text{the action taken by competitor } i
\]

\[
a_{-i} = \text{the actions taken by competitor } i\text{'s } n - 1 \text{ rivals}
\]

\[
\Pi_i(a_i, a_{-i}) = \text{the profit function for competitor } i, \text{ and}
\]

\[
\Pi_i'(a_i, a_{-i}) = \text{the “partial derivative” of } \Pi_i(a_i, a_{-i}) \text{ with respect to } a_i
\]

A few explanatory remarks are in order. First, the actions of competitor \( i\)’s rivals are denoted by the bold face symbol \( a_{-i} \) to reflect that this is a list of quantities or “vector.” Second, competitor \( i\)’s profit is written as a function of both its action and the actions of its rivals to highlight the interdependence that characterizes oligopoly; each competitor’s actions affect all of its rivals. Third, the “derivative” of a function at any point is its slope, and the “partial derivative” of a function of several variables is the slope of a cross section of that function, holding constant all of the variables except the one with respect to which the derivative is taken. Thus, \( \Pi_i'(a_i, a_{-i}) \) indicates the rate of change of competitor \( i\)’s profit as competitor \( i\) changes its own action, holding constant the actions of its rivals.

Each competitor maximizes its profit by selecting an action such a small change in the action would not increase its profit. For competitor \( i\)’s profit to be maximized therefore requires

\[
\Pi_i'(a_i, a_{-i}) = 0.
\]
This equation is referred to as competitor $i$’s “first-order condition.” It is assumed here that the profit function is such that only one action solves this equation for any actions by rivals. Competitor $i$’s first-order condition defines its best response to any actions by its rivals, and solving the first-order condition for $a_i$ as a function of $a_{-i}$ yields competitor $i$’s “best-response function.” The competitors in this oligopoly game find themselves in Nash, non-cooperative equilibrium if all $n$ operate on their best-response functions, so no competitor has an incentive to alter its action. The equilibrium is computed by simultaneously solving the $n$ first-order conditions. Although the partial derivative in each first-order conditions treats rivals’ actions as constant, competitors are not assumed to naively treat rivals’ actions as fixed.

The merger of competitors $i$ and $j$ produces a new competitor choosing $a_i$ and $a_j$ to maximize $\Pi_i + \Pi_j$. The merger alters the optimal choice of $a_i$ and $a_j$ because the merged competitor accounts for the effect of $a_i$ on $\Pi_j$ and the effect of $a_j$ on $\Pi_i$. Unless both effects are negligible, the merger affects the choice of both $a_i$ and $a_j$. The merger, thus, gives rise to anticompetitive effects. Moreover, changes in $a_i$ and $a_j$ lead non-merging competitors to alter their actions as well. The post-merger equilibrium fully reflects all competitors’ responses to others’ responses and so forth.

What makes the merger anticompetitive is that it internalizes the competition between the merging competitors and thereby causes them to alter their actions. What makes the anticompetitive effect of the merger “unilateral” is that the actions of non-merging firms are determined by the same, Nash-equilibrium, best-response functions before and after the merger. The term “unilateral” is applied even though the non-merging firms do not take the same actions after the merger that they did before it, and even if the changes in their actions increase the merged firm’s profit.

§ X.2 The Emergence of Unilateral Effects Analysis

The basic approach to merger analysis under section 7 of the Clayton Act was crafted by the Supreme Court beginning in the late 1940s. The Court’s 1948 Columbia Steel decision introduced the term “relevant market” and was the first horizontal merger case to focus on market shares. Congressional dissatisfaction with the outcome of

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The Celler-Kefauver Act of 1950 (ch. 1184, 64 Stat. 1125) amended the Clayton Act to prohibit mergers the effect of which “may be substantially to lessen competition . . . in any line of commerce in any section of the country.” 15 U.S.C. 18 (1994).

Brown Shoe emphasized market shares and consequently held that “the proper definition of the market is a ‘necessary predicate’ to an examination of the competition that may be affected by the horizontal aspects of the merger.” Brown Shoe Co. v. United States, 370 U.S. 294, 322 n.38, 335, 343 (1962).

Philadelphia National Bank further held that

Philadelphia National Bank indicated that a market-share-based presumption was “fully consonant with economic theory,” but the only “economic theory” cited was that “[c]ompetition is likely to be greatest when there are many sellers none of which has any significant market share.” Moreover, the presumption did not implement economic theory so much as it avoided economic theory. The Court justified the presumption on the grounds that “intense congressional concern with the trend toward concentration warrants dispensing, in certain cases, with elaborate proof of

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15 The most recent merger decision by an appellate court continues to follow the Philadelphia National Bank approach: “First the government must show that the merger would produce a firm controlling an undue percentage share of the relevant market, and would result in a significant increase in the concentration of firms in that market. Such a showing establishes a presumption that the merger will substantially lessen competition.” FTC v. H.J. Heinz Co., 246 F.3d 708, 715 (D.C. Cir. 2000) (citations and internal quotation omitted).

market structure, market behavior, or probable anticompetitive effects.”

Had the Court embraced economic theory, the Cournot and Bertrand models would not have been any part of that theory. As noted above, they were out of favor with economists during the formative era for merger enforcement policy in the United States. Only coordinated effects were predicted by the then-prevailing view of oligopoly theory, which maintained that cooperation would tend to emerge spontaneously when the number of competitors was sufficiently small. When Judges Bork and Posner explained the theoretical underpinnings of merger law, they naturally articulated only a coordinated effects theory of competitive harm.

In the years immediately following *Philadelphia National Bank*, the Court endorsed nearly every anticompetitive effects theory presented to it. Of particular interest may be *Consolidated Foods*, in which the Court upheld a challenge premised on a danger of “[r]eciprocity in trading as a result of an acquisition.” Reciprocal dealing is not a Section 7 theory likely to be accepted by a court today, but it has the distinction of being a unilateral effects theory. The actions of rivals play absolutely no role in producing the feared anticompetitive effect. The Supreme Court’s merger decisions, thus, plainly embrace at least some unilateral effects theories.

By the 1992 release of the *Horizontal Merger Guidelines* (HMGs), game theory had come to dominate economists’ thinking about oligopoly, and the HMGs drew

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17 Id.


19 See Hospital Corp. of Am. v. FTC, 807 F.2d 1381, 1386 (7th Cir. 1986) (Posner, J.) (“the worry is that [an acquisition] may enable the acquiring firm to cooperate (or cooperate better) with other leading competitors on reducing or limiting output”); FTC v. PPG Indus., Inc., 798 F.2d 1500, 1503 (D.C. Cir. 1986) (Bork, J.) (the concern with increased concentration “rests upon the theory that, where rivals are few, firms will be able to coordinate their behavior, either by overt collusion or implicit understanding, in order to restrict output”).


heavily on the teachings of modern oligopoly theory. The HMGs identified two general categories of competitive effects theories, which were dubbed “coordinated” and “unilateral.” The HMGs also articulated factors to be considered when evaluating the relevance of each theory in any particular case, and when assessing likely magnitude of the anticompetitive effect under each particular theory.

The HMGs explain that unilateral effects “can arise in a variety of different settings,” which “differ by the primary characteristics that distinguish firms and shape the nature of their competition.” The HMGs divide these settings into two classes. In one class, products are differentiated, and firms are distinguished primarily by the products they offer. In the other, the product is homogeneous, and firms are distinguished primarily by their production capacities. Within the latter class are the Cournot and dominant firm models. Within the former class is the Bertrand model. Auction and bargaining models, which are discussed in the next chapter, generally fall in the former class as well.

Since the release of the HMGs, the federal enforcement agencies have brought many unilateral effects cases, few of which were contested. In two cases involving differentiated consumer products, district courts enjoined mergers on basis of

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23 HMGs, supra note 21, § 2.

24 Id.

25 Id., § 2.2.

26 Id., §§ 2.21–2.22.

27 The dominant firm model was proposed by Karl Forchheimer, Theoretisches zum unvollständigen Monopole, 32 JAHRBUCH FÜR GESETZGEBUNG, VERWALTUNG UND VOLKSWIRTSCHAFT 1 (1908). It posits that all firms but one in an industry act as a “competitive fringe,” producing up to the point at which their marginal costs equal the market price. The remaining, dominant, firm acts as a monopolist with respect the portion of total industry demand that the competitive fringe does not supply. The dominant firm model is mentioned as basis for analyzing unilateral effects in United States v. Oracle, Inc., 331 F. Supp. 2d 1098, 1113 (N.D. Cal. 2004), but the Cournot model is not. The dominant firm model is not presented here primarily because its predictions differ little from those of the Cournot model when one competitor is large and its rivals are tiny.

28 The Oracle decision discussed at length what economists call the “Bertrand model,” but the court referred instead to the model of “monopolistic competition.” Id. In economics, the latter term generally is reserved for models with free entry in which the focus is on whether and how the equilibrium number of products or competitors departs from the social optimum.
unilateral effects theories. District courts have rejected several unilateral-effects-based merger challenges but have not questioned the legitimacy of the unilateral effects theories. Only the Oracle decision extensively analyzed unilateral effects, and it concentrated on unilateral effects with differentiated products. Consequently, Oracle is discussed below in the context of the Bertrand model.

§ X.3 Unilateral Merger Effects in Cournot Industries

§ X.31 Mergers in the Basic Cournot Model

In the only version of the Cournot model considered here, there is a single, homogeneous product. The market price for that product is determined by the aggregate output of all of its producers through the industry’s demand curve; the more produced, the lower the price must be to clear the market. Cournot competitors are completely characterized by their cost functions, and a Cournot industry is completely characterized by its competitors and demand curve.

The actions of Cournot competitors are the quantities they produce. Each firm maximizes profit just as in the general model of § X.12 by equating to zero the derivative of its profit function with respect to its output. These equations are the first-order conditions defining the Cournot-Nash equilibrium. Let

\[ m_i = \text{firm } i\text{'s price-cost margin (price minus marginal cost, all divided by price) } \]
\[ s_i = \text{firm } i\text{'s share of total industry output,} \]

\[ 31 \text{ and } \]

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29 See FTC v. Swedish Match, 131 F. Supp. 2d 151, 169 (D.D.C. 2000) (finding that a “unilateral price increase by Swedish Match is likely after the acquisition” and recounting the unilateral effects analysis by the FTC’s expert economist); FTC v. Staples, Inc., 970 F. Supp. 1066, 1083 (D.D.C. 1997) (“Since prices are significantly lower in markets where Staples and Office Depot compete, eliminating this competition with one another would free the parties to charge higher prices in those markets . . .”).


31 Both \( m_i \) and \( s_i \) are expressed as decimal fractions. If price were 2 and marginal cost 1, \( m_i \) would be .5, and if firm \( i \) produced 10 units out of a total of 50, \( s_i \) would be .2.
\[ \epsilon = \text{the industry's elasticity of demand},^{32} \text{ defined to be a positive number} \]

Using this notation, firm \( i \)'s first-order condition can be written
\[ m_i = s_i / \epsilon. \]

This condition indicates one important property of a Cournot industry: The larger a firm’s market share, the larger is its price-cost margin (and the lower its marginal cost).

Multiplying both sides of each firm’s first-order condition by its market share, and summing over all firms, yields an equilibrium condition for a Cournot industry:
\[ m = \text{HHI} / \epsilon. \]

In this condition,
\[ m = \text{the share-weighted industry average price-cost margin}, \]
\[ \text{HHI} = \text{the Herfindahl-Hirschman Index of output concentration}.^{33} \]

Because \( m \) is the average extent to which price is competed down to marginal cost, it is an index of the intensity of competition. This last condition, therefore, indicates that the intensity of competition is related to \( \text{HHI} \).

If a merger affected neither the elasticity of industry demand nor the industry average marginal cost, the industry equilibrium condition could be manipulated to yield the proportionate increase in price following a Cournot merger. If \( \text{HHI} \) before the merger is denoted \( \text{HHI}_{\text{pre}} \) and \( \text{HHI} \) after the merger is denoted \( \text{HHI}_{\text{post}} \), the proportionate price increase is
\[ (\text{HHI}_{\text{post}} - \text{HHI}_{\text{pre}}) / (\epsilon - \text{HHI}_{\text{post}}). \]

If \( \text{HHI} \) increases from .2 to .25, and the demand elasticity is 1.25, the proportionate increase in price is .05, or 5%. This formula, however, is not useful as a predictor of the price effects of proposed mergers because \( \text{HHI}_{\text{post}} \) is not the “post-merger HHI” of the HMGs and cannot be determined at the time a proposed merger is reviewed.

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32 The elasticity of demand measures the responsiveness of the quantity consumers purchase to a change in price. Specifically, it is the proportionate change in the quantity consumed divided by the proportionate change in price that induced the quantity change. Thus, if a 1% increase in price induces a 2% reduction in purchases, the elasticity of demand is 2.

33 \( \text{HHI} \) is the sum of the squares of the \( s_i \), and like the \( s_i \), \( \text{HHI} \) is expressed as a decimal fraction. An HHI of 1800 per the HMGs, supra note 21, § 1.5, translates into an \( \text{HHI} \) of .18.
The HMGs’ post-merger HHI is $HHI_{pre}$ plus the “change in the HHI,” defined as twice the product of the market shares of the merging firms. In other words, the post-merger HHI is what $HHI_{post}$ would be if the merger had no effect on market shares. But an anticompetitive merger in a Cournot industry necessarily affects shares significantly, and $HHI_{post}$ is the actual sum of the squares of the output shares after the merger, which are unobservable prior to the merger. Moreover, industry average marginal cost cannot be the same before and after a merger unless all firms in the industry have the same marginal cost, which does not vary with output.

Mergers in Cournot industries always cause an increase in price unless they generate off-setting synergies that reduce marginal cost. Absent synergies, the merged firm produces less than merging firms had produced; the non-merging firms increase their production; but the net effect is a lower total production and hence a higher price.

The magnitude of the marginal cost reduction necessary to prevent a price increase following a merger in a Cournot industry can be expressed in terms of the pre-merger demand elasticity and pre-merger market shares of the merging firms. Expressed as a proportion of the share-weighted average of the merging firms’ pre-merger marginal costs, the required reduction in marginal cost is

$$2s_is_j/[(\epsilon(s_i + s_j) - (s_i^2 + s_j^2)].$$

Expressed as a proportion of the pre-merger price, the required reduction in marginal cost is

$$2s_is_j/\epsilon(s_i + s_j).$$

If the merging firms are identical, so $s_i = s_j = s$, the former expression simplifies to $s/(\epsilon - s)$ and the latter to $s/\epsilon$. This final expression equals the pre-merger price-cost margin of both merging firms and yields a handy rule of thumb: To prevent a price increase following a merger in a Cournot industry, merger synergies must reduce the merged firm’s marginal cost by at least as much as the pre-merger price exceeds the merging firms’ marginal costs.

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An interesting special case combines linear demand with cost functions that make each firm’s marginal cost inversely proportional to its capital stock or productive capacity. In this special case, a larger change in the HHI from a merger implies a larger price increase, provided that market shares are assigned on the basis of capacity, rather than output.36

§ X.32 Other Insights on Acquisitions in Cournot Industries

Academic literature on mergers in Cournot industries has highlighted the issue of profitability. It was first observed that, with linear demand, equal marginal costs across competitors that are invariant output, and no constraints on capacity, a merger is profitable for the merging firms only if they account for at least eighty percent of industry production.37 But these assumptions were quickly observed to produce an unrealistic notion of a merger,38 and there is much greater scope for profitable mergers if competitors’ marginal costs increase as their outputs increase.39 Furthermore, the profitability of a real-world merger may derive from sources outside the model, i.e., cost reductions or other synergy gains in businesses of the merging firms other than those producing the anticompetitive effects.

36 See Gregory J. Werden, Horizontal Mergers: Comment, 81 AM. ECON. REV. 1002 (1991). Holding constant both the set of firms and their capital stocks, the only way in which to increase the change in the HHI is to replace one of the merging firms with a non-merging firm with a larger share of industry capital stock, and that results in a larger price increase. Holding constant the identity of the merging firms and the capital stocks of the non-merging firms, the only way in which to increase the change in the HHI is to shift capacity from the smaller merging firm to the larger one, and that results in a larger price increase from the merger.


38 Under these assumptions, a merger simply destroys the higher-cost merging firm, and nothing of value is acquired. While real-world corporate acquisitions may be designed to accomplish no more than destroying assets, that is not the usual case. Hence, the Cournot model is apt to be of interest to merger policy only if marginal costs are increasing in the relevant range of output, or if there are significant capacity constraints. As a description of real-world industries, the latter circumstance is apt to be more realistic.

39 See Martin K. Perry & Robert H. Porter, Oligopoly and the Incentive for Horizontal Merger, 75 AM. ECON. REV. 219 (1985). It also has been shown that there is greater scope for profitable mergers in Cournot industries when demand is convex, rather than linear. See David A. Hennessy, Cournot Oligopoly Conditions under which Any Horizontal Merger Is Profitable, 17 REV. INDUS. ORG. 277 (2000); Ramon Fauli-Oller, On Merger Profitability in a Cournot Setting, 54 ECON. LETTERS 75 (1997).
The impact of one competitor’s partial equity interest in another also has been extensively analyzed in the Cournot model. One insight is that a purely financial interest in a competitor causes a unilateral anticompetitive effect, even though that interest does not provide a means to control the actions of the competitor in which the interest is held. The competitor owning the interest has an incentive to restrict its own production and thereby drive up the industry price.

Economic research has begun to explore the incentive for, and effects of, entry following merger in a Cournot industry. This research suggests that mergers are unlikely to induce entry, even if they result in significant price increases, if entry necessarily results in a net price reduction, as is likely in a Cournot industry. Other research suggests that, over the very long-run, Cournot competition in a world with investment, entry, exit, and mergers is likely to result in mergers with price-increasing effects not reversed by investment or entry.

§ X.33 When Does a Cournot Model “Fit” an Industry?

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. 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

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The same discipline is appropriate outside the courtroom whenever a particular oligopoly model is given significant weight in the evaluation of the likely competitive effects of a merger.\(^\text{45}\)

A key test of the fit of an oligopoly model is how well it explains the intensity of competition as reflected in price-cost margins. The Cournot model predicts that the price-cost margin of each competitor equals its output share divided by the industry elasticity of demand. It should not be difficult to determine whether the average level of margins in an industry is roughly as predicted by the Cournot model and whether larger firms have larger margins, as predicted.\(^\text{46}\) Two non-merger antitrust cases have found that a Cournot model was not a good fit. In one case, the court held that a Cournot model specifying equally sized competitors was “not grounded in the economic reality” of an industry in which competitors were far from equal in size.\(^\text{47}\) In the other case, the court held that a “Cournot model does not ‘fit’ the economic reality” of an industry with highly unequally sized firms but not the significant differences in margins the Cournot model predicts.\(^\text{48}\)

To fit an industry, an oligopoly model also must reflect critical features of the competitive landscape, such as whether the product is homogeneous or highly differentiated. Hence, the Cournot model considered here poorly fits a consumer goods industry in which brands are important. An oligopoly model, however, need not reflect the institutional details of an industry. In particular, the fact that

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\(^{44}\) Concord Boat v. Brunswick Corp., 207 F.3d 1039, 1055–56 (8th Cir. 2000).


\(^{47}\) Concord Boat, 207 F.3d at 1056. “The model also failed to account for market events that both sides agreed were not related to any anticompetitive conduct . . . .” Id.

\(^{48}\) Heary Bros. Lightning Prot. Co., Inc. v. Lightning Prot. Inst., 287 F. Supp. 2d 1038, 1066–68 (D. Ariz. 2003). The court also noted an objection to an expert’s model on the grounds that it assumed that competitors compete by setting outputs, while the actual competitors did not literally do so. Id. at 1067. This is the sort of objection courts should overrule.
competitors do not literally set outputs does not imply that the Cournot model cannot be useful in the analysis of mergers. It is essential that a model accurately predict but not that it accurately describe.

§ X.4 Unilateral Merger Effects in Bertrand Industries

§ X.41 Mergers in the Basic Bertrand Model

The only version of the Bertrand model considered here features competing differentiated products, which are referred to as "brands" because consumer products typically are involved. Each competitor maximizes profit, just as in the general model of § X.12, by equating to zero the derivative of its profit function with respect to its price (or each of the partial derivatives with respect to each of its prices, if it sells multiple brands). The Bertrand-Nash equilibrium is the set of prices that simultaneously solves the first-order conditions for the competing brands.

If each competitor has a single brand,

\[ \epsilon_i = \text{the elasticity of demand for brand } i, \text{ and} \]
\[ m_i = \text{the price-cost margin of brand } i, \]

the first-order condition for profit maximization of brand \( i \) can be written as

\[ m_i = 1/\epsilon_i. \]

This condition is termed the "inverse-elasticity rule" or the "Lerner condition."\(^{49}\)

Exactly the same first-order condition defines the profit-maximizing price charged by a monopolist because each Bertrand competitor acts as a monopolist over its particular brand. This is true even for a brand with good substitutes and therefore highly elastic demand; single-brand monopoly may confer very little market power.

The basic intuition for the price-raising effect of mergers can be gleaned from the two first-order conditions for a firm formed by merging the sellers of brands \( i \) and \( j \):

\[ m_i = 1/\epsilon_i + m_i d_{ij} p_i / p_j \]
\[ m_j = 1/\epsilon_j + m_j d_{ji} p_j / p_i. \]

In these conditions, \( p_i \) and \( p_j \) are the prices of brands \( i \) and \( j \), and \( d_{ij} \) and \( d_{ji} \) are the

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\(^{49}\) The name stems from the use of this condition by Abba P. Lerner, *The Concept and Measurement of Monopoly Power*, 1 REV. ECON. STUD. 157 (1934).
“diversion ratios” from brand $i$ to brand $j$ and brand $j$ to brand $i$. That is, when the price of brand $i$ is increased slightly, $d_{ij}$ is the proportion of the decrease in the quantity of brand $i$ purchased that is accounted for by the increase in quantity of brand $j$ purchased. If brands $i$ and $j$ are substitutes, the second term in the equilibrium conditions is positive, and the merger raises the margins and prices of both unless it also reduces marginal costs, induces the entry of a new brand, or induces investments altering consumer perceptions about incumbent brands, which is termed “repositioning.”

Diversion ratios provide a quantitative measure of the closeness of competing brands. As the diversion ratios between pairs of brands increase (other things being equal), the brands become closer substitutes, and the price effects of their merger increase. The two diversion ratios between any pair of brands may be quite different for several reasons. Even if brand $i$ is a close substitute for brand $j$, the reverse may not be true. And highly asymmetric diversion ratios are likely for brands with very different shares, because the amount of diversion to any particular brand tends to be positively related to its popularity as consumers’ first choice.

There are very simple formulas for the price increases caused by the merger of two brands in a Bertrand model, provided that there is symmetry between the merging brands so $m_i = m_j = m$ and $d_{ij} = d = d$, and provided that demand takes either of two special forms. If demand is “isoelastic,” i.e., if all of the relevant demand elasticities are the same at every point on the demand curve, the proportionate increase in price from a merger is given by

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

If demand is linear, the proportionate increase in price from a merger is given by

$$\frac{md}{2(1 - d)}.$$

These formulas are of little value in predicting the effects of actual mergers, but they provide critical insights into the unilateral effects of mergers in Bertrand industries.

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50 Diversion ratios were introduced by Shapiro, supra note 1.

51 For a more general demonstration that Bertrand mergers raise prices, see Raymond Deneckere & Carl Davidson, Incentives to Form Coalitions with Bertrand Competition, 16 RAND J. ECON. 473 (1985).

52 These results were derived by Shapiro, supra note 1, and assume that mergers neither affect costs nor induce entry or repositioning.
These formulas show that significant price increases can result from merging brands that are not exceptionally close substitutes or even the closest substitutes. Suppose the diversion ratios between two merging brands are both one-third, and suppose both have pre-merger price-cost margins of .4. If demand is linear, the merger increases the prices of both merging brands by 10%. While diversions ratios of one-third make these brands close substitutes, each could have an even closer substitute with diversion ratios greater than one-third.

These formulas also show that the magnitudes of the price increases from the merger of competing brands depend not just on demand elasticities and diversion ratios, but also on the “curvature” of demand. In the simple numerical example just presented, the prices of both brands increase 50% rather than 10% if demand is isoelastic rather than linear. The price increases are much greater with isoelastic demand than with linear demand because, with the latter but not the former, price increases cause demand to become more elastic, which makes further price increases less attractive.

The relationship between the curvature properties of demand and the price effects of Bertrand mergers has been explored systematically by comparing the predictions of the model with four commonly assumed demand forms—the linear and isoelastic demands just mentioned, as well as the logit and AIDS demand discussed below.53 The price increases predicted with isoelastic and AIDS demand generally are at least several times those with linear and logit demand. More abstract mathematical analysis also shows that curvature properties of demand that cause greater price effects from mergers also cause marginal-cost reductions to passed through to consumers at a higher rate.54

While the price and pass-through effects of mergers in Bertrand industries both depend on the curvature of demand, there is an important indicator of the unilateral effects of mergers in Bertrand industries does not. For a merger that induces neither the entry of a new brand nor repositioning of existing brands, the compensating

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53 See Philip Crooke et al., The Effects of Assumed Demand Form on Simulated Post-Merger Equilibria, 15 REV. INDUS. ORG. 205 (1999).

marginal cost reductions (CMCRs), i.e., the marginal cost reductions that exactly restore pre-merger prices, do not depend on demand curvature.\textsuperscript{55} With single-brand merging firms selling brands with identical demand and cost conditions, the CMCRs for both brands are

\[ \frac{md}{(1 - m)(1 - d)}, \]

if expressed as a proportion of pre-merger marginal cost. If instead the CMCRs are expressed as a proportion of pre-merger price, they are

\[ \frac{md}{1 - d}. \]

If \( d = .5 \), which makes the merging brands extraordinarily close substitutes, this last result implies the same rule of thumb as in a Cournot industry: To prevent post-merger price increases, the marginal costs of both the merging brands must fall by at least as much as the pre-merger prices exceed the pre-merger marginal costs. Merging brands typically are far less close substitutes, so much smaller cost reductions typically are sufficient to prevent price increases.

\section*{§ X.42 Unilateral Effects Analysis in the Oracle Decision}

The recent Oracle decision was the first by a court to provide an extensive discussion of unilateral effects, and that discussion addressed almost exclusively the analysis of unilateral effects with differentiated products.\textsuperscript{56} The court correctly noted that market delineation is apt to be problematic with differentiated products and that market shares may not be good predictors of competitive effects.\textsuperscript{57} The court also signaled receptivity to model-based economic analysis as an alternative for, or supplement to, the

\textsuperscript{55} The CMCRs for the general case, as well as those for the special case that follows, are derived by Gregory J. Werden, A Robust Test for Consumer Welfare Enhancing Mergers among Sellers of Differentiated Products, 44 J. INDUS. ECON. 409 (1996). The CMCRs do not depend on the properties of demand because they restore the pre-merger prices and quantities, and hence all of the demand elasticities are as well.


traditional structural analysis. In particular, the court declared that “[m]erger simulation models may allow more precise estimations of likely competitive effects and eliminate the need to, or lessen the impact of, the arbitrariness inherent in defining the relevant market.” Merger simulation generates quantitative predictions of unilateral merger effects using one-shot oligopoly models with Nash, non-cooperative equilibria, after first calibrating those models to match critical features of the industry, such as prices and demand elasticities. Over the past decade, economists have advocated and employed merger simulation in cases involving differentiated consumer products.

The dominant theme in the court’s discussion of unilateral effects with differentiated products was that such effects are significant only when “the merging parties would enjoy a post-merger monopoly or dominant position, at least in a ‘localized competition’ space.” The court sounded this theme first in asserting that significant unilateral effects are possible only if substitutes for the merging brands are “sufficiently different.” The court sounded this theme again in declaring that a “presumption of anticompetitive effects . . . is unwarranted” on the basis that the merging firms have “a combined share of 35%.” Most importantly, the court invoked this theme in holding that the evidence failed to establish that the merger would violate Section 7.

The court’s analysis adopted the terminology of one of the defense experts. He

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58 Oracle, 331 F. Supp. 2d at 1122.


60 Oracle, 331 F. Supp. 2d at 1118. The court confused matters by noting that the “‘localized competition’ space” to which it refers “may be much narrower than relevant markets defined in typical cases,” id. at 1118, which suggested that the dominance requirement meant nothing more than that there must have been significant head-to-head competition between the merging brands.

61 Id. at 1117.

62 Id. at 1123. As the court explained, the HMGs invoke a presumption of anticompetitive effects under certain circumstances if the combined share of the merging firms is at least 35%. HMGs, supra note 21, § 2.211.
argued that “product space” is defined by characteristics of the products,” and he used the word “node” to describe a narrow region of that space defined by particular product characteristics. Using this terminology, the court asserted: “The unilateral effects theory is concerned about there being only one vendor operating inside the node, thereby being able to increase price unilaterally.” The court contended that this was the theory on which the government relied, and it concluded that the evidence failed to demonstrate that merging firms operated alone in any such node.

The court’s discussion suggested a spatial model of competition, in which brands with similar characteristics are close substitutes for each other, while brands with significantly different characteristics most likely do not compete at all. Such a model may reflect consumer preferences in some cases, but most often consumer preferences are best modeled as having a significant idiosyncratic component. This component is included because brands themselves matter to consumers, not just the physical attributes brands possess, and consumers differ as to how brands matter and on the ranking of brands. When the price of one brand is increased, customers who cease purchasing it typically spread their purchases over many competing brands,

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63 *Oracle*, 331 F. Supp. 2d at 1170–71. This terminology, particularly this use of the word “node,” was highly unconventional in merger analysis.

64 *Id.* at 1170.

65 *Id.* at 1166 (asserting that the government’s “theory of anticompetitive effects” was that the merging firms operated in “a ‘localized’ competition sphere (a ‘node’)” that did “not include . . . any other vendors”).

66 *Id.* at 1166–69, 1172. There is significant ambiguity in the court’s discussion, particularly as a consequence of the way in which the court began its “Findings of Fact: Unilateral Effects”: “The court finds that the plaintiffs have wholly failed to prove the fundamental aspect of a unilateral effects case—they have failed to show a ‘node’ or an area of localized competition between Oracle and PeopleSoft. In other words, plaintiffs have failed to prove that there are a significant number of customers (the ‘node’) who regard Oracle and PeopleSoft as their first and second choices.” *Id.* at 1172. This passage uses the word “node” to relates to customer preferences, although the court had defined that word to relate to product characteristics. This passage also may be understood as a factual finding sufficient to decide the case under any unilateral effects theory.


including some with quite different physical attributes.

It is also clear that significant unilateral effects are possible when the merging brands are not alone, or even nearly so, in the space of physical attributes. To see this, it suffices to consider the simple formulas presented in § X.41 that give the price increases from Bertrand mergers for certain special cases. As illustrated by the numerical example presented there, significant price increases occur even if the merging brands face significant competition. In that example, only a third of the substitution away from either merging brand goes to the other merging brand, yet the merger results in substantial price increases.

§ X.43 Choice Models and Logit Demand

The demand for differentiated consumer products is often modeled by economists using a “random utility model” of consumer choice, in which each consumer maximizes utility in making a choice among an exhaustive set of alternatives. The utility associated with alternative \( i \) is modeled as the sum of a component, \( V_i \), common to all consumers and a customer-specific component treated as a random variable from the perspective of an outside observer. A convenient assumption as to the statistical distribution of the random component of utility leads to the logit model of demand.

The simplest version of the logit model specifies that

\[
V_i = \alpha_i - \beta p_i.
\]

In this formulation, \( p_i \) is the price of brand \( i \); \( \alpha_i \) is a constant that indicates brand \( i \)’s average preference; and \( \beta \) is a constant that determines the degree of substitutability among brands. If \( \beta \) is quite large, a merger has little effect on prices because non-
merging brands are very close substitutes for the merging brands. If \( \beta \) is quite small, a merger has little effect on prices because there is essentially no price competition between the merging brands before the merger. With intermediate values of \( \beta \), mergers can yield significant price effects.

This model illustrates that significant unilateral effects are possible even if the merged firm is not nearly as dominant, and the merging brands are not nearly as isolated from competing brands, as Oracle might be understood to require for a Section 7 violation. Consider the merger of any two brands in a six-brand market with all brands priced before the merger at $1 and all having the same sales. If we assume that the pre-merger demand elasticity at the market level is 0.5 and that \( \beta \) is 2.9, the pre-merger price cost margins in Bertrand equilibrium are .4, just as in the example above with linear and isoelastic demand.\(^{72}\) The diversion ratios between pairs of brands are half what the were in that example, yet it can be shown that the merger causes the prices of the merging brands to increase by 5.7%, even though they are neither isolated from other brands nor dominant.\(^{73}\)

Mathematical analysis of this model also offers insights into the nature of the price effects of mergers. These insights are always valid with logit demand\(^{74}\) and often valid even with other demands. First, a merger causes a larger increase in the price of the merging brand with the smaller share.\(^{75}\) For any given loss in sales from a price increase for the merging brands, a larger portion is recaptured by the brand with the larger share, making it more profitable to increase the price of the lower-

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\(^{72}\) Under these assumptions, 2.5 is the own-price elasticity of demand for each brand, and .4 is the cross-price elasticity of demand between every pair of brands.

\(^{73}\) The only additional assumption necessary for these calculations is that the marginal cost of each of the brands does not vary with the quantity produced.


\(^{75}\) What matters are the relative unit shares of the merging brands, so those shares need not be predicated on a delineated market.

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share product. The brand with the larger share also has the larger mark-up in the pre-merger equilibrium, making any given sales recapture more profitable, which makes it more profitable to increase the price of the lower-share product. Second, the prices of non-merging brands increase in response to the increases in prices of merging brands, but prices of non-merging brands increase much less than those of the merging brands.

The logit model exhibits Independence of Irrelevant Alternatives (IIA), which means that substitution away from any brand as its price is increased is distributed among other brands in proportionate to their relative shares.\textsuperscript{76} If the consumption of brand $i$ is three times that of brand $j$, the IIA property implies that an increase in the price of any third brand induces three times as much substitution to $i$ as to $j$.\textsuperscript{77} The IIA property provides a useful definition of what it means for a set of brands all to be equally close substitutes for each other. The assumption of equally close substitutes, in turn, is the most sensible one to make in the absence of contrary evidence. But there are many situations in which it is important to model demand in a manner allowing the merging brands can be especially close, or especially distant, substitutes.

The academic literature has employed several variations of the simple logit model, which incorporate brand characteristics in various ways.\textsuperscript{78} In the “nested logit model,”\textsuperscript{79} brands are grouped on the basis of shared attributes, and whether grouped brands are especially close substitutes is determined empirically. Several published

\textsuperscript{76}The IIA property was introduced by a psychologist who termed it the “choice axiom” and found it consistent with some experimental evidence. See R. Duncan Luce, Individual Choice Behavior: Theoretical Analysis 5–6, 12–15 (1959).

\textsuperscript{77}The IIA property is restrictive, and for some choice problems, it is unreasonably so. See Gerard Debreu, Review of Individual Choice Behavior: A Theoretical Analysis by R. Duncan Luce, 50 AM. ECON. REV. 186 (1960). For example, the IIA property may be unreasonably restrictive if it is applied to choice among all automobiles, although not if it is applied only to choice among just economy cars.

\textsuperscript{78}A model adding brand characteristics to the $V_i$ function was used to analyze hypothetical mergers of Japanese long-distance carriers by Luke M. Froeb, Timothy J. Tardiff & Gregory J. Werden, The Demsetz Postulate and the Welfare Effects of Mergers in Differentiated Products, in Economic Inputs, Legal Outputs: The Role of Economists in Modern Antitrust 141 (Fred S. McChesney ed., 1996).

quantitative analyses of mergers employ nested logit models. The most popular approach in the academic literature today treats the coefficients in the $V_i$ function as random variables, resulting in a “mixed-logit model,” and several published quantitative analyses of mergers employ such models. Mixed-logit models have potentially significant advantages because of the flexible way they incorporate consumer heterogeneity, but they are difficult to estimate.

§ X.44 Flexible Functional Forms

Many quantitative analyses of proposed mergers in Bertrand industries use “flexible functions forms” designed to approximate an unknown true demand function. In principle, flexible functional forms do not constrain any of the own-price or cross-price elasticities of demand for the brands of interest. A popular flexible functional form for estimating consumer demand is the AIDS (Almost Ideal Demand System) model, and several published quantitative analyses of mergers employ that model.

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85 The use of the AIDS model in merger analysis was pioneered by Jerry Hausman, Gregory Leonard & Douglas Zona, Competitive Analysis with Differentiated Products, 34 ANNALES D’ECONOMIE ET STATISTIQUE 159 (1994) (hypotheical mergers of North American brewers); Hausman & Leonard, supra note 59 ( merger of U.S. producers of bathroom tissue). For applications to merger analysis of both the AIDS model and another flexible functional form, see Andrew Abere et al., Mergers and Market Power: Estimating the Effect on Market Power of the Proposed Acquisition of The Coca-Cola Company of
The flexibility of flexible functional forms, however, does not extend to the curvature properties critical in determining the price effects of mergers, and AIDS models are apt to predict post-merger price increases several times those from logit or linear demand models.86

Commonly, brands are so numerous that reliably estimating all of the relevant demand elasticities is impossible with the available data. Consequently, considerable structure must be imposed on demand, even when a flexible functional form is employed. In estimating an AIDS model, “multi-stage budgeting” is assumed,87 breaking the consumer choice problem into series of decisions, and leaving a relatively narrow range of brands to be included in the AIDS model. This imposes highly restrictive substitution patterns on many pairs of brands not both included in the AIDS model. Even more restrictions on substitution patterns are imposed by the PCAIDS (Proportionately Calibrated AIDS) model, which assumes AIDS demand but calibrates the demand elasticities by assuming the IIA property holds pre merger (making the pre-merger demand elasticities the same as those in the logit model). Versions of this model have been used in published quantitative analyses of mergers.88

§ X.45 Entry and Repositioning

The foregoing has assumed that a merger would induce neither entry of new brands nor repositioning of existing brands. The HMGs properly note that a “merger is not likely to lead to unilateral elevation of prices of differentiated products if, in response to such an effect, rival sellers likely would replace any localized competition lost

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86 See Crooke et al., supra note 53.


through the merger by repositioning their product lines." And the Oracle decision places on the plaintiff the burden of "demonstrat[ing] that the non-merging firms are unlikely to introduce products sufficiently similar to the products controlled by the merging firms to eliminate any significant market power created by the merger."  

Economic research has begun to examine the incentive for entry following the merger of two brands in a differentiated products industry. This research suggests that most mergers are unlikely to induce entry because they have little effect on the profitability of non-merging brands. The high incidence of new product failure, which is not accounted for in this research, makes it even less likely that a merger would induce the entry of a new brand.

There is also interesting recent work on repositioning, in which competitors are assumed to be arrayed along a line and free to alter their locations just as they can alter their prices. This work finds that neighboring merging brands move away from each other following a merger, to avoid cannibalizing each others' sales. The non-merging brands do not reposition closer to the merging brands in a manner that mitigates the loss of competition from the merger; rather, they merely respond to the repositioning of the merging brands, occupying space the merging firms vacate. This work ignores the critical fact that altering a brand's physical characteristics is risky, as the saga New Coke dramatically illustrates. Moreover, a brand's physical characteristics may not be nearly as important as consumer perceptions, which may cost much more, and take far longer, to alter.

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89 HMGs, supra note 21, § 2.212.


91 See Werden & Froeb, supra note 41, which assumes logit demand.

92 Failure examples are legion, even for products carrying established brand names and backed by substantial marketing expenditures. See generally Robert M. McMath, What Were They Thinking? (1998); Flops, BUSINESS WEEK, August 16, 1993, at 76. High failure rates have been reliably reported. See Abbie Griffin, PDMA Research on New Product Development Practices: Updating and Benchmarking Best Practices, 14 J. PROD. INNOVATION MGMT. 429, 431–34 (1997) (finding a failure rate of 41% and reporting earlier findings of 33–47%).

§ X.46 When Does the Bertrand Model “Fit” an Industry?

The key test for the fit of an economic model in a merger case is its ability explain for the recent past what it is expected to predict for the near future. To the extent that price increases for the merging brands are the focus of the unilateral effects analysis, an oligopoly model fits the industry only if it explains reasonably well the general level of prices for the merging brands before the merger. Because the model is not being relied upon to predict week-to-week price movements or special promotions, it is wholly unnecessary that it explain such things in the past.

The most useful indicator of how well the Bertrand model explains average prices in the past is how well it explains price-cost margins. The first-order conditions for Bertrand equilibrium relate the price-cost margins of individual brands to their demand elasticities. These elasticities can be estimated econometrically, and the margins implied by estimated demand elasticities can be compared to margins derived from accounting data. Accounting data from the merging firms are likely to provide a reasonable indication of the price-cost margins for their brands, and it is important that the model explain those margins reasonably well. Cost data for non-merging brands typically is unavailable, but it is not critical that the model explain those margins, and it is neither unusual nor worrisome that some minor brands are not priced as the model predicts.

The Bertrand model may fit a wide variety of industries in which products are differentiated in important ways, particularly consumer goods industries in which brands are important. The model may fit an industry quite well enough even though it does not fully reflect all of the industry’s institutional detail. Price is the only dimension of competition in the Bertrand model. That typically is not true in a differentiated products industry, although price still may be the principle dimension of competition affected by a merger over the relatively near term on which Section 7 law focuses. Although competitors can change marketing strategies and the characteristics of their products, it may be reasonable to suppose that the proposed

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94 Several published quantitative analyses of merger have tested the fit of the Bertrand model by comparing predicted and actual price-cost margins for all brands. Pinske & Slade, supra note 67, conducted a formal statistical test for the average margin, based on detailed price and cost data. The Bertrand assumption made by Nevo, supra note 82, was supported by a similar test performed by Aviv Nevo, Measuring Market Power in the Ready-to-Eat Cereal Industry, 69 ECONOMETRICA 307 (2001).
merger would not induce such reactions.

The Bertrand model may not fit an industry in which merging manufacturers of differentiated consumer products do not sell directly to consumers. The version of the Bertrand model considered here assumes direct sales, but an intervening retail sector presents no difficulties if retailers apply a constant percentage mark-up to the prices paid to manufacturers. In that event, the relevant demand elasticities at the retail level are exactly the same as those at the manufacturing level, so ignoring the retail sector is an unimportant simplification. In other cases, the relationship between retailers and manufacturers can have important implications for the effects of manufacturer mergers on consumers, so that relationship must be considered in evaluating the fit of the Bertrand model. There is only sparse economic literature on the impact of retailer-manufacturer relationships, and it has addressed only the unrealistic case of monopoly retailers. This literature, however, suggests that, the merger of the manufacturers can have no effect on retail prices, and it can have the same effect as if the manufacturers sold directly to consumers.

If manufacturers and retailers use two-part contracts, with both unit prices and fixed fees, retail prices are unaffected by the merger if the retailer is entirely free to choose which brands to carry and therefore can credibly threaten to deal exclusively with one manufacturer. If the retailer carries both merging brands in the pre-merger equilibrium, the merger increases the merging manufacturers’ share of total profits but has no effect on wholesale unit prices or retail prices, because the same retail prices maximize total profits before and after the merger. Things are quite

95 Werden, supra note 71, found clear evidence that this was their practice in one particular case.


97 Without the use of fixed fees, competition among manufacturers determines the degree to which they price above their marginal costs, and the retailer acts as a monopolist facing the wholesale prices as its brand-specific marginal costs. The effect of a manufacturer merger is to raise the retailer’s marginal costs, and the effect on retail prices is determined by the curvature properties of retail demand, just as it is for the pass-through of marginal-cost reductions.

98 The analysis of this case is that described in the economic literature on vertical restraints. See
different with restrictions on the retailer’s ability to refuse to carry particular brands. The pre-merger equilibrium features wholesale unit prices inducing the retail prices the manufacturers would set if they sold directly to consumers, along with fixed fees that transfer all profits to the manufacturers. The merger has the same effects on retail prices as if the manufacturers sold directly to consumers.