

The Price-Concentration Hypothesis and Horizontal Merger Policy

John T. Scott^{*}
Department of Economics
Dartmouth College
Hanover, NH 03755

March 24, 2006

Abstract: This chapter addresses a fundamental question in the antitrust law of horizontal mergers. Namely, does an increase in seller concentration increase the price in a market? The question and its affirmative answer constitute the price-concentration hypothesis. First, the chapter places the hypothesis in the context of horizontal merger policy, explaining that the role of seller concentration in antitrust merger policy has evolved from the Supreme Court's decisions in early cases under Section 7 of the Clayton Act as amended by the Celler-Kefauver Act to the enforcement agencies' current applications of the *Horizontal Merger Guidelines*. Second, the chapter reviews the theory underlying the hypothesis and states the predictions of the theory. Third, the chapter reviews the empirical evidence on the hypothesis, identifying the range of that work but focusing on a subset of it for use in the fourth task. For that fourth task, the theory and the evidence are used to address the antitrust policy question of whether a significant increase in market share through a merger in a concentrated industry is enough to presume that the merger is likely to lessen competition substantially (the *Philadelphia National Bank* presumption), and if so, what should be the evidentiary

^{*} I thank Wayne Dale Collins, Stephen Martin, and Lawrence J. White for helpful discussion and comments.

threshold for rebutting that presumption. The conclusion regarding the answer to that two-part policy question is: yes, and the *Guidelines*' Hirschman-Herfindahl Index (HHI) thresholds for concern are supported by the evidence; yet while the logic of the *Guidelines*' approach to the evidentiary requirements for rebuttal of the presumption is well-grounded in theory, in practice there is reason to believe that the threshold for rebuttal should be higher than the threshold implied by current enforcement practice.

I. Introduction

Seller concentration refers to the number and size distribution of a market's sellers; hence, it measures the concentration of a market's resources under the control of its leading firms. The price-concentration hypothesis predicts that seller concentration in a well-defined market will be an important determinant of price in that market, with the distortion of price upward from the competitive level being greater in more concentrated markets, other things being the same. The price-concentration hypothesis is fundamental to merger law because it is a hypothesis grounded in noncooperative game theory. Thus, the higher prices predicted by the hypothesis do not necessarily involve behavior subject to scrutiny under the Sherman Act. They do not involve conspiracy or unilateral exploitation of monopolizing monopoly power. Instead they are a direct result of noncooperative behavior among independent firms in the context of a more concentrated market structure, and a central concern of the merger law, Section 7 of the Clayton Act, is the performance of markets with concentrated market structures.

The price-concentration hypothesis, therefore, is central to horizontal merger policy.¹ The Supreme Court interpreted Section 7 of the Clayton Act, as amended by the

¹ This chapter will focus on horizontal mergers; non-horizontal mergers are considered in other chapters.

Celler-Kefauver Act of 1950, in several decisions in the 1960s and 1970s. Seller concentration played a central role in the Court's analyses and decisions. The early cases, *Brown Shoe* in 1962 – *Brown Shoe Company v. U.S.*, 370 U.S. 294 (1962) – and *Philadelphia National Bank* in 1963 – *U.S. v. Philadelphia National Bank*, 374 U.S. 321 (1963) – and many subsequent decisions, featured an emphasis on the importance of the market shares of the merging firms and on the seller concentration anticipated because of a merger. In the *Brown Shoe* case, the Court's interpretation of the statute law was that Congress wanted to stop in their incipency trends in markets toward increased seller concentration. Following that interpretation, these early decisions in the 1960s and 1970s considered significant the reduction in independent control of even fairly small shares of a market. The Court's use of seller concentration did evolve to include less reliance on the seller concentration data based on current sales. In the *General Dynamics* case of 1974 – *U.S. v. General Dynamics Corporation*, 415 U.S. 486 (1974), the Court assessed the ability of sellers to compete for new sales; competitors' current sales reflected commitments under long-term contracts, while their control of resources allowing them to compete for new sales was not reflected in those current sales figures. The merger's impact on competition appeared less significant to the Court than to the government which had presented concentration data reflecting the extant long-term contracts.

Baldwin (1987, pp. 380-385) explains and traces the decline in the use of the case law developed in the Court's decisions about horizontal mergers and the increase in the role of the Department of Justice (DOJ) and the Federal Trade Commission (FTC). The federal enforcement agencies, of course, did in the early cases select the mergers considered to pose an anticompetitive concern that then were examined by the courts.

However, with the introduction of the first merger guidelines in 1968 and the new versions of the guidelines – in 1982, 1984, and then again in 1992 with some additional revisions to the 1992 guidelines in 1997 – introduced after the Hart-Scott-Rodino Act of 1976, the enforcement agencies clearly moved their attention away from the types of relatively small-share cases that had occupied the Supreme Court in its early decisions after the Celler-Kefauver Act. The agencies’ threshold for concern for anticompetitive consequences from a horizontal merger has moved toward higher levels of post-merger seller concentration and greater increases in seller concentration. Further, when possible cases are settled without trials in Federal District Court – without the trials and therefore without the appeals such as those that resulted in the case law of the 1960s and 1970s. Mergers that the enforcement agencies have found to be objectionable are often “fixed first” with a negotiated divestiture of some of the merging firms’ overlapping assets that caused the anticompetitive concerns, thereby maintaining the pre-merger amount of competition in the market or markets affected by the merger, and then approved.² The courts oversee the process and approve the negotiated settlements, but the trials with the finding of facts and decisions in the lower courts and the appeals to the higher courts are no longer the typical course of events for a merger case.³

² Of course, some mergers present competitive problems that the enforcement agencies will decide are too great to be fixed by divestiture, and in those cases the agency will bring an antitrust suit to block the merger completely. For example, see the Department of Justice’s complaint about the proposed merger of Hughes Electronics Corp. and Echostar Communications Corp. at the web site of the Antitrust Division of the Department of Justice: <http://www.usdoj.gov/atr/index.html> on the web page for the case filings, at *U.S. v. Echostar*, “Complaint (10/31/2002)”. After the DOJ filed the lawsuit to block the merger, the merging parties cancelled their proposed merger, rather than fighting the DOJ in court in hope of winning the case and preserving the planned merger.

³ The entire process of first delaying the merger while the enforcement agencies evaluate its competitive effects, and then reaching a settlement that satisfies the enforcement agencies, is carried out under the oversight of the courts. Examining the documents posted for some of the mergers listed on the DOJ or FTC web pages illustrates the process. For example, see the FTC’s Wal-Mart/Supermercados Amigo Case. The complete record of actions in the case is available on-line at the Federal Trade Commission’s web site

The purpose of this chapter is to review the price-concentration hypothesis, explaining its theoretical basis, identifying its key predictions, reviewing the evidence about the hypothesis, and then explaining the implications of our knowledge about the hypothesis for antitrust policy toward horizontal mergers. Section II reviews the theory behind the price-concentration hypothesis and explains that the theory – based in noncooperative game theory – predicts that an increase in seller concentration will, *ceteris paribus*, increase the price in a market, but that the magnitude of that increase will be uncertain *even given* control for the other factors that affect price and that can reasonably be identified and used as evidence in a court. Section III reviews the evidence supporting the price-concentration hypothesis and concludes that there is ample evidence to support it and its principal predictions. Section IV discusses the implications of the hypothesis for horizontal merger policy, concluding that in terms of the general economic analysis the *Horizontal Merger Guidelines* are in accord with the hypothesis and the theory underlying it and the evidence supporting it. However, with regard to the use of seller concentration in the *Guidelines*' five-step protocol for analyzing the competitive impact of mergers, the review of the theory and evidence about the hypothesis implies that the *Guidelines* are very conservative even as they are written. They are even more conservative in their actual application. By conservative, I mean that the combination of seller concentration and other factors needed to find a substantial lessening of competition to be likely is quite demanding – to the extent that even those prone to think

at <http://www.ftc.gov/> under "Antitrust/ Competition," "Public Documents," and then "Commission Actions." Then, under November 21, 2002, is the case Wal-Mart Stores, Inc., and Supermercados Amigo, Inc., File No. 021 0090, Docket No. C-4066. A settlement was reached that allowed the merger subject to divestiture of some of the overlapping competing assets of the two firms in specified geographic markets where the FTC found that the merger would otherwise lessen competition substantially.

markets work quite well might be concerned about potential anticompetitive effects of approved mergers.

II. Theory

Competitive pressures reduce a firm's freedom to set price above the competitive level where price equals marginal cost. Cooperation among rivals can eliminate competitive pressures, allowing price to rise above the competitive level because of agreements not to compete. Even without cooperation, price can rise as the number of competing organizations falls. Modeling the Nash game-theoretic noncooperative equilibrium for the competitive process leads to the hypothesis that the equilibrium price will rise as the organizations that compete for sales in a market decrease in number (or more generally – using the industrial organization concept of the concentration of sellers – as the concentration of sellers increases). The hypothesis that price will increase as the competitors decrease in number follows from the theoretical prediction for Nash noncooperative equilibrium in a single-period game in which competitors make their decisions without coordination with their rivals, and also from the theoretical prediction that in repeated versions of such games, multiple cooperative-like noncooperative equilibria are more likely as the competitors decrease in number.

I emphasize that many different theoretical models – both game theoretic models with their mathematical formality and older descriptions of mutual dependence recognized among concentrated sellers – generate the price-concentration hypothesis. Herein, I shall make the theoretical link from seller concentration to price by using the simplest, most uncluttered models available to make the points discussed. Thus, to show

the link from seller concentration in single-period Nash noncooperative equilibrium, I shall use the well-known Cournot-Nash equilibrium for quantity-setting oligopolists selling homogeneous goods. The Bertrand-Nash equilibrium for price-setting oligopolists selling differentiated goods also yields the expectation that prices will increase with seller concentration, but the presentation of the result requires a parametric complexity that is not “uncluttered” at all. Turning to the price-concentration hypothesis in the context of repeated games, the simplest, most uncluttered presentation examines the Bertrand-Nash equilibria for price-setting oligopolists selling homogenous goods in an infinitely repeated game, and that is what I shall use to discuss the relations. The points to be made about incentive constraints could be made for quantity-setting oligopolists selling homogeneous or differentiated goods, but again the model would have complications and be unnecessarily cluttered with distractions from the key points to be made. Finite games that are sufficiently realistic to discuss the price-concentration hypothesis require incomplete information and associated complexities. Thus, for the points that I want to make, I choose the simplest possible models to demonstrate the points, observing that the results are similar to what emerges when examining more complex models or the older discussions of the expectations in the context of sellers’ recognition of their mutual interdependence.

The model of Nash equilibrium for a market of profit-maximizing firms suffices to make the general point that competition for sales can reduce the price in the market. The model is simple, and, as we shall explain, it can be embellished without changing the point to be made. Suppose that n firms selling a homogeneous good compete in a market.

Each firm then maximizes:

$$\pi_i = pq_i - c_i q_i$$

where q_i is the quantity of output sold by the i th firm, c_i is the constant unit cost for the service, and p is the price. The lower the price p , the greater will be the number of units of the good purchased. Each organization chooses the amount of output that it will provide to maximize its profits given the amounts of output provided by the rival organizations. The organizational reality here is the provision of the output by rivals and that determines the optimal output for the firm.

The Nash noncooperative single-period equilibrium for the n competing firms is then seen to imply:

$$\frac{p - \bar{c}}{p} = \frac{HHI}{\eta} \quad .^4$$

The left-hand side shows the equilibrium price-cost margin relative to price (the Lerner Index), with \bar{c} denoting the weighted-average unit cost for the n firms with the weights equal to each firm's share of the market's output, where HHI is the Hirschman-Herfindahl index of seller concentration for the market, and where η is the price elasticity of demand for the good.⁵

In the formulation here, the HHI is defined to be the sum of the squared market shares (measured as proportions) for the organizations in the market; it ranges from zero

⁴ Scherer and Ross (1990, equation 6.3, p. 229).

⁵ Elasticity here is the absolute value of the percentage change in the amount of output demanded per unit percentage change in the price of that output. The profit maximization for the individual firm, given the output provided by its rivals, implies that the reciprocal of the firm's own demand elasticity will equal the ratio of price to price minus the constant unit cost. In the Nash noncooperative equilibrium, for all firms the foregoing profit maximization condition holds. Hence, in the equilibrium, with none of the firms finding it advantageous to change the amount of output they offer given what their rivals are doing, the reciprocal of each firm's own price elasticity of demand equals the ratio of its share of the market to the price elasticity of demand in the market. Then, for each firm in the Nash equilibrium, the ratio of price minus constant unit cost to the price is equal to the ratio of the firm's share to the price elasticity of demand in the market. Multiplying both sides of the equation by the firm's share of output and summing across firms implies that in the market, the deviation of price from share-weighted average costs relative to price will equal the ratio of the HHI to the price elasticity of demand in the market.

(when there are innumerably many competitors) to one (when there is but one organization providing the services). The HHI can be shown to equal the reciprocal of the number of firms plus the variation in their shares.⁶ Thus, if all of the firms were the same size, the HHI equals one divided by the number of organizations competing and will increase as the number of competitors decreases. More generally, the HHI increases as more of the market's activity is concentrated in the control of a few leading firms. Thus, the equilibrium Lerner Index falls toward zero as the number of competitors increases or, more generally, as the seller concentration in the market decreases.

A quantity-setting game for homogeneous goods will be described as our illustrative case, because that type of noncooperative – competitive – game is both broadly sensible and easily described. The essential effect of competition on prices would remain if the quantity-setting game were for differentiated goods or if a price-setting game with differentiated products were modeled, but the expositions of such games are considerably more complicated than the exposition for the simple, homogeneous good, quantity-setting game. Modeling a price-setting game with homogeneous products would change the results for the single-period game, but for two reasons, that fact does not change the essential conclusion that price in a market is expected to increase as seller concentration increases.

First, in many if not most cases, the homogeneous good price-setting game is unrealistic. If price-setting behavior were considered the appropriate behavior for a group of firms, assuming that they offered somewhat differentiated goods – products with somewhat different physical features, with different ancillary services provided, with different sellers' locations, different subjective images, and so forth – would typically be

⁶ Scherer and Ross (1990, note 45, p. 73).

the appropriate assumption, and in that case the result about competition and price obtains given appropriate treatment of the parameters for demands as the numbers of firms (and substitutable products) change in the more complicated model with multiple substitutable products.

Second, even if one assumes homogeneous goods and price-setting behavior, most of the games of interest are repeated, and for repeated games given realistic assumptions about their information structure, greater seller concentration is expected to make a higher price more likely. We have described the simple, homogeneous good, quantity setting case in a single period, and now provide a brief overview of the generalization to games played repeatedly. The illustrative example was chosen to make the mathematical formulation as simple as possible. but the essential point about seller concentration and price remains in the messier cases when the assumptions are not chosen to minimize the complexity. That is true not only for the single period games for which we have price setting rivalry with differentiated goods. It is true as well in multiperiod games that we can simplify to make the essential point without complexity, yet preserve that positive effect of seller concentration on price in the messier multiperiod games.⁷

The form of the essential point in the context of multiperiod games is that as the competitors decrease in number, the likelihood of cooperative-like noncooperative equilibria in the context of repeated games increases. In that essential point, the game theoretic literature reaffirms the intuition of the earlier literature about the implications of

⁷ For the multiperiod games, the simplest mathematical formulation that shows the relation between seller concentration and price is the homogeneous price-setting game. The single-period game's Nash noncooperative equilibrium is for price to equal marginal cost; yet, the monopoly price can be the equilibrium for a noncooperative repeated game if sellers are sufficiently few given the interest rate.

sellers' recognition of their mutual interdependence.⁸ Cooperative-like outcomes are price outcomes that exceed the single period equilibrium and are closer, or even equal, to the extreme single period case where $HHI = 1$ and, hence, the maximum Lerner Index that would occur in the complete absence of competitive pressure. The result follows from the "incentive constraint" faced by the organizations. With an interest rate that is sufficiently low, the value of a firm's share of the cooperative-like profit exceeds the value of undercutting the cooperative-like price and gaining profit – in the short run until rivals retaliate with their own low prices – at the expense of rivals.⁹ The result holds most simply for infinitely repeated games, but it holds for finite games as well given incomplete information with sellers having subjective probabilities of dealing with rivals who would offer cooperative-like prices until close to the end of the finite game.¹⁰

In all, our review of the theory – based in noncooperative game theory – behind the price-concentration hypothesis predicts that an increase in seller concentration will, *ceteris paribus*, increase the price in a market, but that the magnitude of that increase will be uncertain *even given* control for the other factors that affect price and that can

⁸ Note that once we move to the multiperiod games and incentive constraints in the context of trigger strategies, there is no theoretical reason to focus on the HHI rather than other measures of seller concentration such as the four-firm concentration ratio and the shares of individual firms that must decide whether to defect from an oligopolistic consensus on price. Further, the multiperiod games are typically the realistic ones; consequently the game theory points us back to earlier literature that used many varied descriptions of industry structure.

⁹ The single-period game noncooperative outcomes for the price-cost margins relative to price (for the simplest homogeneous quantity-setting games, the ratio equals HHI divided by the price elasticity of demand) are the outcomes for the classic "prisoner's dilemma" game. That is, the single-period Nash equilibrium is the outcome for the "prisoner's dilemma" game. In the multi-period game in which the prisoner's dilemma game is played repeatedly and for which the incentive constraint is satisfied, the prisoner's dilemma is avoided and the cooperative-like outcome is the Nash noncooperative equilibrium. There are multiple equilibria for these games, although it is typically sensible to believe that oligopolists using various forms of "trigger" strategies to effect a cooperative-like noncooperative equilibrium would focus on a profitable equilibrium and in particular on the monopoly equilibrium. If the monopoly result is sustained as the equilibrium in a noncooperative game without the use of obvious industry practices to facilitate the maintenance of the high price, it may not be culpable under Section 1 of the Sherman Act or Section 5 of the FTC Act. The merger law – Section 7 of the Clayton Act – is one approach to reducing the likelihood of such cooperative-like noncooperative equilibria.

¹⁰ See Scherer and Ross (1990, pp. 219-220) and Kreps et al. (1982).

reasonably be identified and used as evidence in a court. Why do we reach that conclusion?

First, the Nash noncooperative equilibrium in the single period game – with either quantity setting or price setting given differentiated goods – clearly implies that price will increase with seller concentration, *ceteris paribus*. Although the prices diverge from the competitive price where price equals marginal cost, those single-period noncooperative equilibria are the “competitive” results for the markets in the sense that the results are the unique noncooperative results for the single period games with the stated seller concentrations. Second, in repeated games – surely the realistic scenario in most cases – cooperative-like noncooperative outcomes – that is, prices exceeding the single-period game equilibria – can be noncooperative equilibria.

Further, in those realistic repeated games, there are multiple equilibria, and although the sellers might sensibly choose the monopoly equilibrium as their focal point, any other price from the single-period noncooperative “competitive” price to that monopoly price could also be an equilibrium. Circumstances such as the firms’ ability to communicate in ways not susceptible to being uncovered in evidentiary proceedings could vary and cause equilibrium prices to vary, even though other important factors such as the interest rate, the amount of monopoly profits to be shared in the market, extreme barriers to entry, and various facilitating practices could – at least potentially – be identified and introduced as evidence.

Circumstances that cause miscommunications about the focal price points for the strategies that could support cooperative-like equilibria in noncooperative games are very important because of the way the typical “trigger-price” strategies work.

Miscommunication can cause firms to “pull the trigger” and defect from the cooperative-like price. Strategies can be devised that are less unstable than the “grim trigger” strategy (for which any defection from the cooperative-like price triggers reversion to the single-period equilibrium forever), but nonetheless instability given incomplete and even uncertain information would be likely. Apart from instability, in the context of heterogeneous firms with different preferred high prices, changing circumstances – such as relative bargaining strengths – that are difficult to document as evidence, can affect the focal cooperative-like price. In that regard, the predictions of modern game theory are in agreement with the earlier literature that summarized cooperative-like oligopoly behavior as recognized mutual interdependence and emphasized critical levels of concentration and the importance of factors that economists are not particularly adept at identifying and documenting.^{11, 12}

III. Evidence

¹¹ For a concise statement of the association of seller concentration with price via recognition of mutual interdependence, see Bain (1956, pp. 25-27). See also Scherer and Ross (1990, pp. 205-206) and their discussion of Chamberlin (1929) who emphasized a critical level of concentration, although his model of recognized mutual interdependence is quite different from the modern game theoretic supergame for which, given the interest rate, sufficient concentration can support the monopoly price as a noncooperative equilibrium. In his 1929 model, Chamberlin worked with the implication of constant market share for each seller in a group of sufficiently concentrated sellers who could observe the pricing behavior of each seller and would match any price cut to preserve market share. For that model to be a description of an equilibrium, it essentially assumed that the market could not clear until all sellers had the opportunity to match, and indeed did match, the price of its rivals. If each firm's share was preserved at any price, then the optimal price for each to choose was the monopoly price. Regarding the importance of factors that are not readily quantified by economists, see Fellner (1949).

¹² I have taken a very direct approach to delineating the price-concentration hypothesis as the clear prediction of noncooperative game theory. Doing so eliminates the great richness of our theoretical literature in industrial organization; for that I apologize but plead space constraints. For review and an appreciation of both early and modern oligopoly theory, see Martin (2002) and also Tirole (1988).

Testing the price-concentration hypothesis requires researchers to confront issues not addressed in the foregoing stark exposition of the theoretical hypothesis.¹³ A market's demand may grow unexpectedly; its barriers to entry may be important or not; its sellers may consider potential entrants and behave strategically to deter entry; its sellers may use practices that facilitate cooperative-like prices; some of its sellers may be price takers while others behave as noncooperative oligopolists. The hypothesized relation between price and seller concentration requires other things be held constant, and for empirical research another key issue is controlling for differences in costs that may offset to some extent the predicted increases in price.

Martin (2002) describes the vast literature testing the hypothesis, and he emphasizes – wisely – that economists differ on whether or not they find the various types of hypothesis tests to be acceptable evidence. Necessarily then, my opinion about where the evidence points is a personal one. My opinion is based on my own research and my critical reading of the many studies available. Those studies range from those studying prices for a well-defined product or service sold in many geographic markets to those studying profits for large samples of manufacturing firms operating in the complete set of manufacturing industries. They include as well studies using special methods to tease information from time series data or from experimental data. Not only will others disagree with my opinion, but, indeed, a great many will do so.

¹³Of course, the simple theory can be embellished to include the additional considerations – for example the simple single period model with the Lerner Index equaling the ratio of the HHI to the price elasticity of demand can be expanded to have a group of price-taking firms (a competitive fringe to the market), whether foreign firms, whose products are imported into the market, or small, price-taking domestic firms. But, the point is that while theory can abstract from all the details that do not change the basic point to be made – here the illustration of the price-concentration hypothesis, empirical researchers cannot avoid modeling the details because they must be controlled if the price-concentration relation is to be observed in the data.

My opinion is that the evidence available in the industrial organization literature amply supports the theoretical prediction embodied in the price-concentration hypothesis – there is an expected positive relation between seller concentration and price, *ceteris paribus*, but while the expected outcome for price increases with seller concentration, a range of outcomes is anticipated *even holding constant* the usual list of factors that economists identify – barriers to entry, practices (such as most-favored customer contracts) facilitating the maintenance of cooperative-like prices, interest rates, and so forth – and that play an evidentiary role in the *Horizontal Merger Guidelines*.

Martin (2002) and Scherer and Ross (1990, chapter 11) provide reviews of the voluminous literature that – in my opinion – supports the price-concentration hypothesis. Having spent a considerable time researching the question myself, I shall focus on my own reasons for finding support for the hypothesis in the literature. The extant reviews are available for all to see; here, in order to provide the verisimilitude of a researcher's perspective, I shall emphasize a few key observations about which I have first-hand knowledge.¹⁴ For that reason, I shall focus on examples of the studies of price for a product offered in many geographic markets and on profits observed across firms operating in many different manufacturing industries. My view of the literatures focusing specifically on time series – whether to estimate markups over marginal costs

¹⁴ I preface my brief overview of key observations by noting that – for the theoretical reason that the hypothesized relation between price and seller concentration is positive but variable – I do not believe imposition of functional forms closely tied to the predictions for single-period noncooperative games is at all appropriate. Hence, my own models reviewed here are estimated without attempt to impose such precise functional forms. Instead, they use the basic model that is linear in the parameters estimated and imposes theoretical expectations of nonlinearities within that framework. The test of the price-concentration hypothesis does require a great deal of thought and careful development to measure price or profits and to control for costs and then various characteristics of firms and industries in addition to seller concentration for the markets where the firms operate. For detailed discussion of the development of the measures and controls, see Martin (2002).

for an individual firm (Baker and Bresnahan, 1988) or to estimate the impact of a merger on an industry's price (Schumann, *et al.*, 1992) or to estimate a merger's announcement effect in stock prices of rivals to the merging firms and thereby infer the merger's competitive consequences (Hergott, 1997) – is that the literature broadly supports the price-concentration hypothesis. Similarly, the experimental literature provides support as well. Such an evaluation of the broad range of the empirical literature requires the details of a major treatise such as Martin (2002) and Scherer and Ross (1990) have provided. My focus herein, however, will be on my first-hand beliefs – that is, my beliefs based on my own research. I do believe that those beliefs are not at all out of step with the views of many industrial organization economists, but whether that is the case is for my readers to decide.

In the mid-1970s, the *Philadelphia National Bank* precedent was directly scrutinized in the context of the bank mergers of the day. The usefulness of measures of seller concentration was questioned anew because the regulatory boundaries between commercial banks and other financial institutions had just begun eroding. Thrifts for the first time could offer accounts that were essentially checking accounts. Were traditional measures of seller concentration among the commercial banks of a geographic market still important for predicting prices? The answer was yes, both a priori – small businesses still relied on commercial banks – and empirically – *ceteris paribus*, prices for small business loans increased with the seller concentration in geographic markets where banks competed to provide those loans (Scott, 1977a, 1977b, 1980). Using an estimated model to predict the effect of deconcentrating the commercial bank market, *ceteris paribus*, showed for example a drop in the price of loans to small business that was

substantial given the level of interest rates during the sample period of mid-1972 to mid-1974.¹⁵

To illustrate the effect of the HHI on price, the effect of “homogenizing deconcentration” – a restructuring of a market by equalizing the sizes of firms but preserving their number – was simulated in Scott (1980) for two markets using the estimated model of price as a function of the HHI, *ceteris paribus*. One market was quite large; its HHI (with firm shares measured as proportions) was 0.15 for a numbers equivalent of 6.7 banks for the market.¹⁶ The actual number of banks was 72; thus, homogenizing deconcentration reduced the HHI to 0.0139. The average price (the rate for small business loans) in the market was estimated to fall by 53 basis points, where a basis point is one-hundredth of one percent. Thus, on a \$10,000 loan, deconcentrating the market would be expected to result in a price savings of \$53 per year. The other market was a much smaller one with just eight banks, and the HHI fell from 0.32 (with a numbers equivalent of 3.125) to 0.125. In that case, the predicted fall in price was 76 basis points, or a price savings of \$76 per year for a \$10,000 loan. Of course, such deconcentration is not practical – it would never be carried out as a policy. But the point is to illustrate the effect of seller concentration on price. Having illustrated the effect, one can begin to evaluate the importance of merger policy as a way to avoid higher prices caused by seller concentration.

¹⁵ The pooled cross-section and time-series data gave robust results in a variety of specifications, including cross-sectionally heteroskedastic and time-wise autoregressive models and models with various fixed effects.

¹⁶ The numbers equivalent is the market’s number of firms that would result in the observed HHI if all of the market’s firms were the same size. With n firms and all firms of identical size, HHI, with shares measured as proportions, is computed as n terms with each term equal to $1/n^2$; hence, $HHI = 1/n$ and $n = 1/HHI$.

There are many studies – of banks, grocery stores, gasoline stations, and so forth – showing higher prices in geographic markets when those markets are more concentrated, other things being the same. But for industrial markets what is the evidence? In those markets, with the variety of products included in the statistical studies, the evidence has typically focused on the relation between seller concentration and profits, *ceteris paribus*. Martin (2002) reviews the evidence from the earliest studies by Bain to the voluminous literature that followed. A careful look at the literature provides evidence, as revealed by the study of profitability across the operations of firms in different environments, that supports the price-concentration hypothesis. That is, the empirical findings support the view that, *ceteris paribus*, greater seller concentration is associated with higher prices, as reflected in higher profits, and that the relation is variable.

Importantly, I believe that my own research contradicts somewhat the view stated by Scherer and Ross (1990, p. 446) at the conclusion of their review of the empirical literature. They observe:

Profitability is positively associated with a seller's own market share, but there is little evidence, at least in recent richly disaggregated data, of a positive association between profitability and indices of seller concentration independent of the profit-market share correlation.

In my work reviewed next, I use the very data that Scherer and Ross are referencing. Further, I control for market share and *still* find the expected effect of seller concentration.¹⁷

Arguably the best industrial data to address the hypothesis was provided by the Line of Business (LoB) Program of the Federal Trade Commission (FTC). The LoB data allow researchers to examine each firm's activities in the various markets in which it operated. Importantly, some of the results from studies using those data appear to contradict the price-concentration hypothesis.¹⁸ In some of the studies, market share has a positive effect on price, but not seller concentration. That result suggests that what appeared as a collective, industry-wide effect of seller concentration on profits, might not reflect higher prices because of *oligopolistic interdependence* of sellers. Instead, the result might reflect efficiencies for large-share firms that had grown to dominate their markets because of better products, or lower costs, or better management. High seller concentration would reflect the large shares of the efficient dominant firms whose profits were high not because of collective market power predicted by the price-concentration hypothesis, but instead because of the efficiencies that spurred their growth to dominance.¹⁹ Alternatively, the importance of market share rather than seller concentration could reflect luck or simply a dominant firm protected by barriers to mobility (Caves and Porter, 1977), but in any case, the challenge to the price-concentration hypothesis is significant.

¹⁷ Scherer and Ross (1990, p. 442) observe that the Census data used by Domowitz et al. (1986a, 1986b, 1988) did not allow the share/concentration hypothesis tests – tests that I was able to construct in my LoB studies discussed herein.

¹⁸ For an important example, see Ravenscraft (1983).

¹⁹ Discussion of the literature about the market share hypothesis as contrasted with the seller concentration hypothesis is provided in Scott (1993, pp. 75-76) and in Scherer and Ross (1990, chapter 11).

In fact, for some specifications, the FTC's LoB data do show a positive effect for seller concentration on profits, even after controlling for the market shares of the firms' lines of business and other control variables. The FTC LoB data are available for the mid to late 1970s, and when examining data for that period, the evidence suggests the importance of an interaction of seller concentration with capital intensity and with the multimarket contact of sellers. During the period, demand in many industries was quite variable. Concentrated industries with high capital intensity and accompanying high fixed costs were evidently especially likely to experience price cutting as oligopolists attempted to win larger shares of their markets to spread fixed costs and improve profit margins. The FTC LoB data for 1974 through 1976 show – with control for market share and other conventional controls – a positive effect of seller concentration on profits when the ratio of assets to sales was less than 0.59 and a negative effect when capital intensity exceeded that level.²⁰

Not only were demands quite variable during the mid 1970s, as well the leading manufacturing firms in the FTC's LoB sample were highly diversified – more so than in many other periods of U.S. economic history. The interaction of seller concentration with the multimarket contact of those sellers potentially affected tests of the price-concentration hypothesis as reflected in studies of LoB profitability and seller concentration – with market share and other variables held constant. A priori, when the oligopolistic firms meeting in a particular market are diversified, their ability to reach a consensus on a supra-competitive price in the market may be increased by their multimarket contact across their other markets. Arguably, multimarket contact is

²⁰ The result is from Scott and Pascoe (1986). Discussion of the result in the context of the literature and alternative interpretations is in Scott (1993, pp. 76-79).

necessary for oligopolistic market power when a market's sellers are highly diversified.²¹

In fact, in the FTC LoB data, seller concentration is associated with higher profits when the competing sellers have high multimarket contact. *Ceteris paribus*, the rate of profits on sales was between 2.6 and 3.0 percentage points higher in 1974 for manufacturing lines of business where seller concentration and multimarket contact were both higher than their median values, as compared with lines of business where multimarket contact was high but seller concentration was low.²²

Both the capital intensity study and the multimarket contact study include market share in the controls. Thus, even in the FTC's LoB data, the positive effect of seller concentration on price as reflected in the effect of concentration on profits, *ceteris paribus*, is evident. What do the data tell us about the expectation that although the relation between seller concentration and price is positive, the relation will be highly variable and depend on factors that are unlikely to be quantified in evidentiary proceedings? The expectation of a highly variable relation follows from the multiple equilibria that occur for noncooperative repeated games. The expectation's empirical manifestation is that the explanatory variables for price or profits enumerated in the industrial organization literature and in the *Horizontal Merger Guidelines* – variables including industry variables (like seller concentration and measures of barriers to entry) and firm variables (like size and diversification) and line of business variables (like

²¹ Scott (1991 and 1993, pp. 56-67) states that argument. A more general review of the multimarket contact hypothesis is provided in Scott (2005).

²² Scott (1982 and 1993, pp. 42-55). The rate of profits on sales was measured as operating income to sales. The effect for seller concentration here is quite large – roughly a third of even the most profitable group's average of 8.2% for manufacturing LoB profits to sales in 1974 when both multimarket contact and seller concentration were greater than their means.

market share or its interaction with industry variables) – do not explain much of the systematic variance in performance across firms and industries.

For one example using the FTC LoB data and a traditional model with explanatory variables characterizing firms, industries, and lines of business, unidentified firm and industry effects together accounted for at least 70 percent of the explainable variance in the “complete” model that swept out all firm and industry effects using qualitative variables.²³ In the FTC LoB data, there are economically important and statistically significant effects for both firms and industries, and the extant evidence suggests that the sources of those effects have not been collected into a readily documented set of variables that could be evaluated and used as evidence in merger cases.²⁴ Certainly the explanations may be at hand; for example, some part of the unidentified effects could be associated with mobility barriers enumerated by Caves and Porter (1977). Other partial explanations for the effects may be found in the information structure of the strategic games that engage the sellers. The point, however, is that we have reason to believe that neither theoretical nor empirical studies have cast up an enumerated, complete list of factors needed to satisfy the evidentiary requirements of a trial in Federal District Court for a merger challenged under Section 7 of the Clayton Act.

IV. The Antitrust Policy Question

²³ Scott and Pascoe (1986) and Scott (1993, pp. 71-83).

²⁴ Note that the presence of firm effects in the FTC’s LoB data has been prominently questioned. The effects do exist, however. The effects are large and statistically significant. Discussion of the differences in the study finding strong firm as well as industry effects and the prominent study that did not find the firm effects is provided in Scott and Pascoe (1986) and in Scott (1993, pp. 231-232). The point here is that the firm effects exist in the exceptionally fine LoB data; the subsequent management literature has identified firm effects with different methods and data.

Shepherd *et al.* (2000) argue that the *Horizontal Merger Guidelines* should be revised to focus on market shares for the merging firms. They explain that the key evidentiary issue of market share is obscured in the complexities of the Guidelines that introduce consideration of concepts – such as potential entry and strategic behavior by sellers – that are difficult to evaluate with confidence and indeed are on examination rather vague. In their proposed revision of the *Guidelines*, the focus would be on market shares of the merging firms, and even seller concentration would play a secondary role, being used as one environmental factor affecting the competitive impact of the larger share for the new firm created by the merger. This chapter's evaluation of the price-concentration hypothesis could be used to explain why seller concentration should be the *central* issue in the *Guidelines*, yet it is instructive to think about the Shepherd *et al.* view, and to note that the review here does support their proposed use of seller concentration as a supporting consideration. Their view is instructive here because of their emphasis that merger policy needs to be based on readily measurable aspects of a scrutinized merger and, further, that those aspects should be ones linked to competitive effects by both theory and evidence. They make a strong case that their suggested focus on market share conforms to those conditions. I believe the literature about the price-concentration hypothesis supports as well greater focus on seller concentration, with anticompetitive concerns more readily triggered by increases in seller concentration *per se* than is the case in current enforcement procedures. The HHI thresholds (using shares measured as percentages rather than proportions) identified in the *Guidelines* strike me as broadly sensible; however, the actual cases for which the enforcement agencies block mergers or require divestitures before approval typically entail post-merger seller

concentration and concentration increases that far exceed the *Guidelines*' stated threshold for concern at the moderately concentrated level with HHI between 1000 (with numbers equivalent of 10 firms) and 1800 (with numbers equivalent of 5.5 firms) and with a merger-induced change in the HHI by more than 100 points. Yet evidence suggests that the stated threshold is sensible.

For example, in the large market simulation in Scott (1980) that was discussed in Section III above, seller concentration measured by the HHI was 0.15 with firms' shares measured as proportions, or 1500 when shares are measured as percentages as in the *Guidelines*. Thus, in that case, seller concentration is in the lower range of 1000 to 1800 where, in their stated guidelines, the enforcement agencies begin to express concern about anticompetitive consequences for post-merger seller concentration. Seller concentration for that large banking market was in the *Guidelines*' moderately concentrated range – just above the range of HHI values falling within the safe harbor of post-merger HHI less than 1000, yet the simulated effect of reducing that modest level of seller concentration was substantial – 53 basis points (somewhat more than half of 1 percent) for the complete “homogenizing deconcentration” and roughly 4 basis points for each HHI change of 100 points with shares measured as percentages. Reviewing the record of recent merger enforcement actions, though, clearly the enforcement agencies are in practice setting the HHI threshold, for likely anticompetitive effects from a merger, at a much higher level than even the high-end of 1800 for the post-merger threshold. I believe the evidence about the effects of seller concentration on price, *ceteris paribus*, supports the belief that the enforcement agencies are certainly not overreaching when concluding that the mergers in recent cases, where they require divestitures or where the

mergers are simply blocked, may lessen competition substantially. To the contrary, one might well believe that mergers with smaller effects on seller concentration may do so as well.

Using the FTC LoB study (Scott, 1982) of the impact of seller concentration on profitability of manufacturing lines of business, the large estimated effect of three full percentage points in operating income to sales was for seller concentration greater than its median value in the sample as compared with it being less than its median value. The median value of seller concentration as measured by the four-firm concentration ratio was 39 percent – or roughly an average of 10 percent share of the market for each of the leading four firms. Assuming that the leading four firms each had 10 percent of the market, and further biasing the HHI upward by assuming that the remaining firms were as large as the four leading firms, the median seller concentration in that sample would correspond to a HHI of 0.1000 with shares measured as proportions or 1000 when the shares are measured in percentage form as in the *Horizontal Merger Guidelines*. Thus, the large effect of seller concentration comes for markets exceeding the safe harbor threshold. Again, regarding seller concentration, the *Guidelines* seem sensible as they are stated. In practice, the enforcement agencies appear to be willing to accept much greater levels of seller concentration before becoming concerned about anticompetitive effects.

Turning again to a banking study, evidence about nonprice competition viewed in the context of the Dorfman-Steiner condition supports the *Guidelines*' threshold of concern at $HHI = 1000$. The Dorfman-Steiner condition for profit-maximizing advertising states that advertising intensity equals the product of the Lerner index and the advertising elasticity of demand. At the threshold for oligopolistic distortions of price

from marginal costs, the oligopolists are expected to engage in nonprice competition in their attempts to increase their shares of the profitable market. Well above the threshold concentration, the sellers may learn to control their urge to compete with nonprice competition that ultimately serves only to lower their profits. The foregoing story implies the expectation of an inverted-U relation between advertising intensity and seller concentration, with the peak advertising intensity coming for a threshold of seller concentration just sufficient to allow oligopolistic consensus on a price greater than marginal cost, yet not sufficient for the sellers to avoid the prisoner's dilemma with regard to advertising expenditures aimed at increasing market share. Scott (1978, Table 4, p. 603) studying advertising by banks across many geographic markets finds the peak advertising intensity – corresponding to the threshold concentration for which price is distorted above marginal cost and nonprice competition is strong – at $HHI = 1000$, *ceteris paribus*. The evidence there also aligns with the *Guidelines*' designation of HHI greater than 1800 as high concentration, because the advertising intensity is expected to turn down substantially once seller concentration is high, and in Scott (1978, Table 4, p. 603) the excessive advertising is no longer present once HHI reaches 2000.

The enforcement agencies have in the last quarter century become increasingly willing to accept increases in concentration associated with horizontal mergers. That is, as compared with the earlier enforcement stances in the period after the Celler-Kefauver Amendment to Section 7 of the Clayton Act, under the current guidelines greater increases in seller concentration are accepted as unlikely to cause competitive harm. Pryor (2001) finds that seller concentration has been on the rise since Shepherd (1982) took stock of it, and in part the reason, Pryor observes, has been the relaxed stance

toward horizontal mergers – that is, the willingness of the enforcement agencies to accept greater increases in concentration before blocking a merger or requiring divestitures.

Perhaps it is, as Shepherd *et al.* say, because of the complexities of the *Guidelines* and the considerations of difficult to quantify concepts like strategic factors and potential competition, that the enforcement agencies accept even greater increases in seller concentration than the *Guidelines*' statements suggest for the thresholds for concern for the HHI and merger-induced changes thereto. In terms of the empirical literature discussed in Section III, one could restate the Shepherd *et al.* observation to say: It is as if the *Guidelines* introduce as important deciding factors in the evaluation of the competitive consequences of a merger the at least 70 percent of the systematic variance in industrial performance for which we do not have readily quantifiable variables to use in evidence. Further, the enforcement record since the introduction of the *Horizontal Merger Guidelines* in 1992 suggests that the enforcement agencies put considerable stock in those factors not readily quantified. Stated differently, the evidence required – to rebut the presumption that anticompetitive effects would be likely to result from stated increases in seller concentration and stated levels of post-merger concentration – is at once too difficult to develop convincingly and too easy to develop in less than convincing form. The result is that the enforcement agencies, having largely taken over the interpretation of Section 7 of the Clayton Act from the courts in the decades since the Hart-Scott-Rodino Act, can readily convince themselves of the wisdom of their enforcement choices, even as other observers such as Shepherd *et al.* raise serious questions about those choices.

Returning to the fundamental question, there is evidence that a significant increase in market share through a merger in a concentrated industry creates the presumption that the merger is likely to lessen competition. Further, the evidence appears to be roughly consistent with the concentration levels and changes stated in the *Horizontal Merger Guidelines* as the thresholds for concern about anticompetitive effects. Juxtaposing the threshold concentration for enforcement concerns with the evidence from the banking study of prices, the banking study of advertising, and the FTC LoB study of seller concentration in the context of multimarket contact, the choices for the thresholds are supported. But then the observations about concentration increasing effects for *challenged* mergers suggest that the thresholds for enforcement actions are considerably higher than the thresholds for concerns.²⁵ Is the method in the *Guidelines* somehow flawed in the way the evidence is developed to rebut the presumption that competition is lessened by a merger substantially increasing concentration?

Regarding the evidence needed to rebut that presumption, the *Guidelines* are focused on factors that in theory can offset the anticompetitive potential in seller concentration. However, the effectiveness of some factors – such as the competition that might subsequently materialize from sellers not currently serving a market – are difficult to assess with confidence. The lengthy list of mitigating factors may explain the large changes in seller concentration and the high levels of post-merger seller concentration that are in practice typically required before mergers are challenged. Why are the enforcement actions so conservative? The complexity and the abstraction of the

²⁵ White (2006, p. 8) observes: “It has been well known -- for almost two decades . . . -- that actual enforcement trigger levels are generally well above the HHI levels of 1000 and 1800 that have been specified in the *Guidelines*. The recently released FTC-DOJ data on merger challenges for the years 1999-2003 . . . and the FTC data for 1996-2003 . . . strongly confirm this pattern.”

concentration mitigating factors make those factors much more difficult to quantify than the seller concentration itself. Rebuttal of the presumption of anticompetitive effects of concentration increasing mergers may be coming from the concepts behind the roughly 70 percent of firm and industry effects in performance that are not identified with the usual collection of variables. If so, then it may be too easy to rebut the presumption that a large increase in seller concentration is likely to lessen competition substantially.

When the evidence implies that an anticompetitive effect depends on the interaction of seller concentration with other conditions, then those other conditions need to be evaluated, yet per the Shepherd *et al.* argument, such evaluation can become too complicated and abstract and can be overemphasized if in fact the complications mean that the evaluation serves only to divert attention and concern with the increase in seller concentration and to block – with a welter of uncertainties that have little chance of being quantified satisfactorily – appreciation of the likely effects of the concentration increasing merger.

Observe that the complexities just discussed are not the result of difficulties in evaluating the efficiency effects of mergers, although evaluating such effects does add great uncertainty and complexity in the evaluation of the effects of mergers.²⁶ Although the evaluation of the efficiency consequences of a merger is a part of the *Guidelines*' evaluation process, given the Supreme Court's decisions in *Brown Shoe – Brown Shoe*

²⁶ Neither are they the result of the complexities introduced by the “theory of second best” (Scherer and Ross, 1990, pp. 33-38). Typically, policy – and often even theoretical analysis and commentary – ignore the second best issue and simply describe policy to promote competition. That is, competition in a given market is pursued, even if there are distortions in other markets that would make some distortion of price from marginal cost desirable for the given market in question. It is generally not practical to selectively pursue competition or market power in various degrees depending on detailed knowledge about price distortions in many markets. Further, of course, there are other reasons – such as avoiding wasteful nonprice competition, promoting technological change, and promoting dispersion of power for social and political reasons – to promote competition other than static allocative efficiency of price and output combinations across markets.

Company v. U.S., 370 U.S. 294 (1962) – and in *Procter and Gamble – Federal Trade Commission v. Procter & Gamble Co.*, 386 U.S. 568 (1967) – treatment of efficiency effects in merger policy is subtle, although clearly they effect the net change in economic surplus from a merger and mitigate the loss in economic surplus associated with market power and the concomitant restriction in output and increase in price. From a narrowly economic standpoint, efficiencies are important for the social economic welfare consequences of a merger. In the context of merger policy under the *Horizontal Merger Guidelines*, the presence of efficiency effects perhaps conditions the ultimate judgment about whether a merger is likely to lessen competition substantially. Yet in the end, the conclusion that there would be a lessening of competition is focused on increased market power – control over price – rather than on the effect on total economic surplus which could of course increase as market power increased if concomitant cost reductions existed and were important and if there were no adverse effects of increased market power for nonprice competition such as advertising or for research and development investment and technological change.

Apart from effects on price and on production costs, a concentration increasing merger can have other narrowly economic effects as well, in part because of the effects on price. The performance of advertising expenditures and of research and development investments may be affected. Pressure to reduce costs to their minimum may be lessened. Finally, even if there are no adverse narrowly economic effects, a concentration increasing merger may be undesirable for social and political reasons associated with the Jeffersonian ideal espousing the dispersion of power simply for the sake of that dispersion, apart from any effects on cost of the fragmentation of industry.

That view seems to underlie some of the reasoning in the case law – for example, in the *Brown Shoe* case.

In sum, some of the empirical studies (Scott, 1978, 1980, 1982) used to illustrate the effects of seller concentration on performance were researched and written before the series of modern *Merger Guidelines* that specified the thresholds for competitive concerns, *ceteris paribus*, at the moderately concentrated levels (from post-merger HHI between 1000 and 1800 with the merger induced increase in HHI greater than 100 points), and specified concern was especially likely for the highly concentrated levels (for post-merger HHI above 1800 with increases of more than 50 points). The findings in those papers align well with the thresholds for concern and also with the *Guidelines*' analytical process that in essence specifies the evidentiary standards for rebuttal based in the factors affecting the competitive significance of market shares and concentration – other competitive conditions and barriers to entry. However the finding in Scott and Pascoe (1986) that at least 70 percent of the systematic variance in profitability is the result of unidentified firm and industry effects may explain the conservative bent to the actual application of the *Guidelines* as enforcement actions have evolved in the roughly quarter of a century since the Hart-Scott-Rodino Act.

It is difficult to quantify variables associated with large differences in performance; there are theories that might explain such differences; and without readily quantifiable evidence that most observers find an acceptable measure of a theoretical abstraction, merger policy is understandably conservative. Is it too conservative? If a significant increase in seller concentration itself – as indicated by post-merger concentration and concentration changes falling into the threshold categories of levels

between 1000 and 1800 and changes greater than 100 – implied a strong likelihood of reduced competition, then the answer would be yes. The conservative bent comes when the many other factors affecting the significance of market shares and seller concentration are evaluated. Some theoretical reasoning and empirical studies showing separable effects for seller concentration support a significant reduction in competition based on the observation of increased seller concentration alone. Namely, if increased seller concentration itself makes the exchange of information supporting higher prices easier (Stigler, 1964) and itself creates increased barriers to entry (Scott, 1981), then the increase in seller concentration itself can imply significant reduction in competition.²⁷ In that light, the current enforcement practices for Section 7 of the Clayton Act may be too conservative.²⁸

References

- Bain, Joe S., *Barriers to New Competition* (Cambridge: Harvard University Press, 1956).
- Baker, Jonathan B., and Timothy F. Bresnahan, “Estimating the Residual Demand Curve Facing a Single Firm,” *International Journal of Industrial Organization*, Vol. 6 (1988), pp. 283-300.

²⁷ Stigler (1964) explains that with higher seller concentration, *ceteris paribus*, detection of price cuts from a cooperative-like level is easier; they are therefore less profitable and less likely. Scott (1981) observes that seller concentration, *ceteris paribus*, is associated with lower capital costs. Incumbent firms in a concentrated market can therefore raise price above costs without attracting entry. Entry would lower concentration and raise capital costs. The pre-entry price-cost gap is no gap at all if post-entry capital costs are used.

²⁸ White (2006) suggests that the analysis of “close-call” mergers could offer import insights about whether or not the current enforcement efforts are too lenient or instead too strict. He observes (White, 2006, abstract): “The broad body of evidence – from profitability studies, from pricing studies, and from auction studies – indicates that seller concentration matters. But these studies do not provide adequate guidance as to whether current antitrust enforcement is too strict or too lenient with respect to mergers. Research on the consequences of the “close call” mergers that were not challenged might well provide such guidance, as might a “meta analysis” of the extant price-concentration studies.”

Baldwin, William L., *Market Power, Competition, and Antitrust Policy* (Homewood, Illinois: Richard D. Irwin, 1987).

Caves, Richard E., and Michael E. Porter, "From Entry Barriers to Mobility Barriers: Conjectural Decisions and Contrived Deterrence to New Competition," *Quarterly Journal of Economics*, Vol. 91 (May 1977), pp. 241-261.

Chamberlin, Edward H., "Duopoly: Value Where Sellers Are Few," *Quarterly Journal of Economics*, Vol. 43 (November 1929), pp. 63-100.

Domowitz, Ian, R. Glenn Hubbard, and Bruce C. Petersen, "Business Cycles and the Relationship between Concentration and Price-Cost Margins," *Rand Journal of Economics*, vol. 17 (Spring 1986a), pp. 1-17.

Domowitz, Ian, R. Glenn Hubbard, and Bruce C. Petersen, "The Intertemporal Stability of the Concentration-Margins Relationship," *Journal of Industrial Economics*, vol. 35 (September 1986b), pp. 13-33.

Domowitz, Ian, R. Glenn Hubbard, and Bruce C. Petersen, "Market Structure and Cyclical Fluctuations in U.S. Manufacturing," *The Review of Economics and Statistics*, vol. 70 (February 1988), pp. 55-66.

Fellner, William, *Competition among the Few* (New York: Knopf, 1949).

Hergott, Matthew J., "Airport Concentration and Market Power: An Events Study Approach," *Review of Industrial Organization*, Vol. 12 (1997), pp. 793-800.

Kreps, David M., et al., "Rational Cooperation in the Finitely Repeated Prisoners' Dilemma," *Journal of Economic Theory*, Vol. 27 (August 1982), pp. 245-252.

Martin, Stephen, *Advanced Industrial Economics*, Second Edition (Oxford: Blackwell Publishers, 2002).

- Pryor, Frederic L., "New Trends in U.S. Industrial Concentration," *Review of Industrial Organization*, Vol. 18, (2001), pp. 301-326.
- Ravenscraft, David J., "Structure-Profit Relationships at the Line of Business and Industry Level," *The Review of Economics and Statistics*, Vol. 65 (February 1983), pp. 22-31.
- Scherer, F. M., and David Ross, *Industrial Market Structure and Economic Performance*, Third Edition (Boston: Houghton Mifflin, 1990).
- Schumann, Laurence, Robert P. Rogers, and James D. Reitzes, *Case Studies of the Price Effects of Horizontal Mergers* (Washington, D.C.: Bureau of Economics, Federal Trade Commission, 1992).
- Scott, John T., "Public Policy Toward Competition in Banking," *New England Economic Review*, Federal Reserve Bank of Boston, July/August 1977a, pp. 44-50.
- Scott, John T., *Price and Nonprice Competition in Banking*, (Boston: Federal Reserve Bank of Boston, 1977b).
- Scott, John T., "Nonprice Competition in Banking Markets," *Southern Economic Journal*, Vol. 44, No. 3 (January 1978), pp. 594-605.
- Scott, John T., "Homogenizing Deconcentration: Estimation and Simulation," *The Review of Economics and Statistics*, Vol. 62 (November 1980), pp. 612-615.
- Scott, John T., "The Pure Capital-Cost Barrier to Entry," *The Review of Economics and Statistics*, Vol.63 (August 1981), pp. 444-446.
- Scott, John T., "Multimarket Contact and Economic Performance," *The Review of Economics and Statistics*, Vol. 64 (August 1982), pp. 368-375.

Scott, John T., "Multimarket Contact among Diversified Oligopolists," *International Journal of Industrial Organization*, Vol. 9 (June 1991), pp. 225-238).

Scott, John T., *Purposive Diversification and Economic Performance* (Cambridge, England: Cambridge University Press, 1993).

Scott, John T., "The Multimarket Contact Hypothesis," *this volume*, 2005.

Scott, John T., and George Pascoe, "Beyond Firm and Industry Effects on Profitability in Imperfect Markets," *The Review of Economics and Statistics*, Vol. 68 (May 1986), pp. 284-292.

Shepherd, William G., "Causes of Increased Competition in the U.S. Economy, 1939-1980," *The Review of Economics and Statistics*, Vol. 64 (1982), pp. 613-626.

Shepherd, George B., Helen S. Shepherd, and William G. Shepherd, "Sharper Focus: Market Shares in the Merger Guidelines," *The Antitrust Bulletin* (Winter 2000), pp. 835-885.

Stigler, George J., "A Theory of Oligopoly," *Journal of Political Economy*, vol. 72 (February 1964), pp. 44-61.

Tirole, Jean, *The Theory of Industrial Organization* (Cambridge, Massachusetts: The MIT Press, 1988).

White, Lawrence J., "Horizontal Merger Antitrust Enforcement: Some Historical Perspectives, Some Current Observations," Remarks prepared for the Antitrust Modernization Commission's Roundtable on Merger Enforcement, January 19, 2006.