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Probable Future Competition in Banking Antitrust Determination: Research Findings

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Under federal law, antitrust regulatory agencies are empowered to prohibit corporate mergers which "substantially lessen competition."[1] Since 1966, the Bank Holding Company and Bank Merger Acts have mandated that the Federal Reserve Board shall not approve acquisitions of banks by bank holding companies nor mergers of banks whose surviving bank is a state-chartered Federal Reserve member if the action would substantially lessen competition.[2] The Comptroller of the Currency and the Federal Deposit Insurance Corporation (FDIC) are empowered by the same language to deny mergers involving other banking institutions.

Determining whether or not a banking merger[3] would substantially lessen competition can be a complicated matter, depending on the factors involved. If, for instance, two large banks operating in the same market were to merge (a *horizontal merger*), one might argue that the number of competing firms in that market would be lowered by one firm. If the size of the merged firm would exceed the combined sizes of the remaining firms in that market, one might argue that competition would be substantially lessened by this type of merger.

Suppose instead that a banking merger involved two firms operating in two separate markets (a *market-extension merger*). Would a market-extension merger substantially lessen competition in either market? That depends. If one believes that the number of large firms in each market after the merger will be the same as before the merger, then one might argue that such a merger probably would not substantially lessen competition in either market. But suppose that preventing the merger would result in the would-be acquiring firm later entering the would-be acquired firm's market, either by establishing an independent firm (*de novo* entry) or by acquiring an existing small firm (*toehold* entry). If no existing firms leave the market as a result of the de novo or toehold entry, then it could be argued that denying the merger would eventually increase the competition faced by the large firms in the would-be acquired firm's market. Thus, permitting the merger could be indirectly construed as substantially lessening competition by precluding the possibility that the merger's denial would eventually have caused increased competition to occur. Antitrust regulators have actually used this argument as the basis for preventing market-extension mergers. Dubbed *actual potential competition* or the *deconcentration effect* by various legal authorities, this argument has been termed *probable future competition* by the staff of the Federal Reserve Board and by other analysts, including this author.

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[1] The phrase "substantially lessen competition" comes from Section 7 of the Clayton Antitrust Act and is often used by the Federal Trade Commission and the Department of Justice to challenge the legality of proposed mergers outside the banking sector.

[2] The Acts do allow for exceptions if the "anticompetitive effects of the proposed transactions are clearly outweighed in the public interest by the probable effect of the transaction in meeting the convenience and needs of the community to be served" [Banking Holding Company Act, as amended 12 U.S.C.A. 1842 (c)(2)].

[3] Hereinafter, a merger of two firms into a single surviving firm or a holding company's acquisition of a firm to be operated as its affiliate is referred to as a *merger.*

Background

Since the sixties, the Federal Reserve Board and other antitrust authorities, such as the FDIC and the Department of Justice, have attempted to block numerous banking mergers by invoking probable future competition. As early as 1962, the Federal Reserve Board cited this argument, though not by name, as one reason for denying mergers—as many as nine between 1962 and 1969, according to one estimate (Rhoades and Yeats 1972). Although no one is sure of the exact number of cases, the Board continued to use this argument in numerous merger denial orders between 1970 and 1975, as did the FDIC (Rhoades 1981). The Department of Justice, between 1968 and 1974, also cited the argument in several lawsuits filed to block banking mergers previously approved by banking regulators (Association of Bank Holding Companies 1983). From 1975 until November 1979, according to Smith (1980, p. 18), the Federal Reserve Board "grew increasingly reluctant to deny applications on potential competition grounds alone." Yet between 1979 and 1981, concludes a Federal Reserve Board memo, five of the Board's merger denials were predicated on probable future competition (Cyrnak 1982). Due, in part, to unfavorable court rulings, the Board has not used this argument to deny a proposed merger since 1981.

That the courts have seemed unfavorably disposed toward probable future competition is evidenced by the fact that they have never used the argument to block a banking merger previously approved by a federal regulator. Nor, in handing down decisions on lawsuits brought by merger applicants, have the courts ever upheld a federal regulator's order to block a banking merger on this basis. In 1973, for example, the Justice Department lost its court challenge (based on probable future competition) of the Federal Reserve Board's decision to approve the acquisition of First National Bank of Greeley, Colorado, by First National Bancorporation, headquartered in Denver.[4] The decision was subsequently affirmed by an equally divided Supreme Court. In 1974, the Supreme Court ruled, in *United States* v. *Marine Bancorporation,* that the Justice Department had not established the facts necessary to use probable future competition to block a bank merger.[5] The trend of promerger court decisions culminated in the 1981 ruling of the Fifth Circuit Court of Appeals in *Mercantile Texas* v. *Board of Governors,*[6] in which the court vacated an earlier Board denial predicated on probable future competition.[7] The court's action, however, did not represent a repudiation of probable future competition as an argument. In fact, the court acknowledged its viability as such, but stated that any future denial based on probable future competition would be sustained only if the Board could make explicit certain findings about the potential merger.[8]

In response to the court's decision, the Federal Reserve Board is considering the adoption of quantitative guidelines governing its use of probable future competition—guidelines which attempt to embody the court's requirements (see Winer 1982, pp. 530–31). (The proposed guidelines are summarized in the accompanying Box.) The Board hopes such guidelines can eventually be promulgated so that it can cost-effectively perform its antitrust responsibilities under federal law, as interpreted by the courts. Of course, the Board is also hopeful that the development of such guidelines will serve the public interest.

Economic Research on the Public Interest and Probable Future Competition

Economic research gives little guidance to antitrust authorities who hope to determine whether or not the courts will find their decisions to be in accord with federal law; that job is best left to legal scholars and parapsychologists. But while economic antitrust research has traditionally focused on horizontal merger policy, the current state of such research lends only limited guidance to the task of finding circumstances in which the public interest is served by denying market-extension mergers on the basis of probable future competition. From the broader perspective of public interest, rather than a strictly legal perspective, the design of optimal guidelines for using probable future competition is hampered by our lack of knowledge.

Theoretical Research

Theoretical research could conceivably help antitrust authorities decide when, if ever, the public interest is served by using probable future competition to deny mergers. Such research aims to define and identify those

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[4] *United States* v. *First National Bancorporation,* 410 U.S. 577 (1973).

[5] *United States* v. *Marine Bancorporation,* 418 U.S. 602 (1974).

[6] *Mercantile Texas Corporation* v. *Board of Governors,* 638 F. 2d 1255 (5th Circuit, 1981).

[7] For a summary of court decisions involving probable future competition, see Association of Bank Holding Companies 1983, Section II, pp. 75–92.

[8] For an account of the court's required findings, see note 6.

The Federal Reserve Board's Proposed Guidelines for Invoking Probable Future Competition

On January 22, 1982, the staff of the Federal Reserve Board of Governors proposed four quantitative guidelines that a proposed banking merger should meet before the Board would intensively examine the possibility of denying the merger by invoking probable future competition. After consideration and revision by the Board, a guidelines proposal was published for public comment in the *Federal Register* (March 3, 1982). Paraphrased a bit for ease of interpretation, the guidelines which should be met in order to trigger an intensive examination of a possible merger denial are:

(1) The three-firm deposit concentration ratio of the market to be entered must be at least 75 percent.

(2) There must be fewer than six other commercial banks outside the market to be entered, but within the same state. Each of these banks must either be among the four largest in the state; have assets of at least $1 billion; or, have assets of at least $500 million, if there are no billion-dollar banks outside the four largest.

(3) The bank to be acquired must be located in a standard metropolitan statistical area (SMSA); must be in a market that had more than $250 million in deposits; and must have had a rate of deposit growth over the previous two years which was at least as high as that of all banks in its state or that of all banks in the nation.

(4) The bank to be acquired must be one of the three largest deposit holders in its market and must hold at least 10 percent of its market's deposits.

After considering the comments elicited by its proposal, the Board of Governors is still contemplating possible changes in these guidelines. However, in formulating its recommendations on merger proposals, the Board's staff does use these current guidelines as part of its analytic process.

conditions under which the public interest will be served by invoking this argument to block mergers.

Measuring Public Benefit

Economic theory does yield a quantitative concept of public interest, which I shall call *public benefit.* This concept can help us focus on the measurements relevant to determining when the use of probable future competition works for the public interest. To understand this concept, two terms must first be defined:

- *Consumer surplus* is a generally accepted, approximate measure of consumers' willingness to pay for the right to buy a product at a specified price. Merger policy may change this price, and thereby change the consumer surplus. The change in consumer surplus thus approximates the value consumers place on any product price changes that may be caused by merger policy.
- *Producer surplus* is any profit earned by firms' shareholders that exceeds the minimum profit needed to attract their capital. Merger policy may change the (possibly zero) level of these excess profits; that is, it may change the producer surplus. The change in producer surplus thus measures the value shareholders place on any change in firms' profits that may be caused by merger policy.

The change in the sum of consumer and producer surplus caused by a merger policy measures the value consumers and shareholders place on the effects of that policy. To obtain a measure of the public benefit stemming from a merger policy, we then subtract from the change in the sum of consumer and producer surplus any costs incurred in implementing that policy. Such costs include expenditures for data collection, analysis, and legal fees incurred by antitrust authorities (whose costs are then adjusted to equal private-sector value) and by merger applicants in complying with these authorities' evaluation process.[9] Thus, the public interest is likely to be served by a merger policy when the public benefit of that policy is expected to be positive.

[9]For a welfare theoretic discussion of this public benefit criterion, see Dansby and Willig 1979 (especially p. 250, n. 4).

Determining Relevant Factors

But what factors are relevant for determining whether or not the measure of public benefit is positive? To help see what factors are relevant, let us first consider the change in the sum of consumer and producer surplus that is expected as a result of a merger denial. This change can be divided into the difference of two components: The first component is the expected change from the status quo that results from the prospect that the denied merger applicant will eventually enter the market, either by de novo establishment or by toehold acquisition. (Separate formulas are derived for the change in the sum of consumer and producer surplus resulting from the possibilities of de novo and toehold entry.) The second component is the expected change from the status quo that would have resulted if the merger had been approved and consummated. In essence, this second component is an opportunity cost of the merger denial.

□ *For De Novo Entry*

When entry is de novo, the first component (as shown in Appendix A) is given by

$$(1) \quad dW_1 = \int_0^{\infty} \{[\Sigma_{i=1}^{n}(P - MC_i)dq_i + \pi_s]/re^{rT}\}p(T)\,dT$$

where

dW_1 = the expected change in consumer and producer surplus resulting from the likelihood that the merger applicant will eventually enter the market

n = the number of firms in the market prior to entry

P = the market price before entry

MC_i = the marginal cost of the ith firm

dq_i = the change in the ith firm's output caused by entry

π_s = the excess, or above-normal, profit likely to be earned by the entrant

r = a social discount rate used to discount the assumed perpetual stream of surplus following entry

e = the exponential function

T = the number of years between the date of denial and the date of entry

$p(T)$ = the probability of entry T years after denial.

□ *For Toehold Entry*

When entry is by toehold acquisition (as shown in Appendix B), the first component is

$$(2) \quad dW_1 = \int_0^{\infty} \{[\Sigma_{i=1}^{n}(P - MC_i)dq_i - dC_k]/re^{rT}\} \times p(T)\,dT$$

where

k = the small firm to be acquired in the market

dC_k = the shift (if any) in small firm k's cost curve (that is, the change in its efficiency) that occurs when the firm is acquired by the applicant.

□ *For Merger Approval*

The size of the second component—the change in the sum of consumer and producer surplus resulting from a merger approval—can be estimated from an equation similar to (2). This is because the market-extension merger that would have been swiftly consummated but for the merger denial might change the efficiency (shift the cost curve) of the would-be acquired firm. The second component is thus given by

$$(3) \quad dW_2 = [\Sigma_{i=1}^{n}(P - MC_i)dq_i - dC_j]/r$$

where

dW_2 = the expected change in consumer and producer surplus resulting from a merger approval

j = the firm to be acquired if the market-extension merger is approved.

□ *The Total Change in Consumer and Producer Surplus*

We may now obtain the expected total change in the sum of consumer and producer surplus, denoted dW, resulting from a merger denial. To do so, we take dW_1, which is the expected change due to the possibility of entry, and subtract dW_2, which is the expected change foregone by the possibility that the merger would have changed consumer and producer surplus.

We may also obtain the expected total change in the sum of consumer and producer surplus, denoted dW, resulting from a merger approval. To do so, we must take dW_2, representing the expected change resulting from the merger, and subtract dW_1, which now represents the expected change foregone by the possibility that de novo

or toehold entry would have occurred if the merger had been denied.

Thus, the expected total change in the sum of consumer and producer surplus resulting from a merger decision is

$$(4) \quad dW = \begin{cases} dW_1 - dW_2, & \text{if the merger is denied.} \\ dW_2 - dW_1, & \text{if the merger is approved.} \end{cases}$$

□ Subtracting Costs

Finally, the public benefit of a merger policy is estimated by adding up the dW's resulting from all the merger proposals to be decided, denoted $\Sigma\, dW$, and then subtracting the total costs, denoted $\Sigma\, C$, incurred by the antitrust authorities' evaluation of the merger proposals and by firm's compliance with the policy:

$$(5) \quad \text{Public Benefit} = \Sigma\, dW - \Sigma\, C.$$

That is, for a merger policy to produce positive public benefit, it must cause the total change in the sum of consumer and producer surplus to exceed the total costs associated with implementing the policy.[10]

Estimating Relevant Factors

To determine the total change in the sum of consumer and producer surplus, however, we must estimate all the factors included in equations (1)–(3). For each market where a merger is proposed, these factors are:

- The differences between market price and each firm's marginal cost of operation prevailing in the market.
- The change in each firm's output, if any, which follows an antitrust authority's action.
- The excess profits (profits in excess of the minimum required by shareholders), if any, to be earned by the potential de novo entrant if the proposed merger were denied.
- The cost reduction, if any, realized by the small firm that might be acquired as a toehold if the merger were denied.
- The cost reduction, if any, realized by the large firm to be acquired if the merger proposal were approved.
- The costs incurred in evaluating and complying with the merger application process.
- The probability that either de novo or toehold entry will occur T years after the proposed merger is denied.

□ Theory is Lacking

Unfortunately, economic theory doesn't help much in estimating the size of these relevant factors, nor does it even yield a convincing argument about whether or not many of these factors are likely to be nonzero. Such information is crucial in designing a policy for using probable future competition to deny mergers; without it we can't determine whether or not a merger policy has positive public benefit and therefore works in the public interest.

To see this, let us examine a recent statement of the theory for using probable future competition to deny mergers (Winer 1982, p. 528):

> The theory applies only when the firm to be acquired competes in an oligopolistic market—that is, a market in which a small group of firms possesses the power to determine price. If a firm outside the market acquires one of the oligopolistic firms, according to the theory, the acquiring firm will take the acquiree's place in the oligopoly structure and the market will continue to experience oligopoly pricing. If the merger is prevented, the outside firm will in some cases enter the market through a toehold acquisition or by establishing a new—often called a de novo—office. The theory concludes that the toehold or de novo entrant might then actively compete with the oligopolistic firms and thereby help to improve the market's performance.

To transform this statement into a framework suitable for estimating the magnitudes of the relevant factors for computing public benefit, a mathematical model of the statement, consistent with plausible firm behavior, is helpful. But I will now argue that no such rigorous theory, in which the public interest may be served by a merger denial based on probable future competition, has yet been developed.

First, consider what dW_1 in equations (1) and (2) would be if a merger were denied using probable future competition when the market was in long-run, competitive equilibrium before the denial. In particular, this implies that there are no barriers to entry, either legal or otherwise. Then the mathematical theory of competitive markets predicts that all margins between price and each firm's marginal cost ($P - MC_i$) would be zero. In addi-

[10] Of course, to maximize the public benefit, any individual merger proposal should be denied if $dW_1 - dW_2 > C$, and should be approved if otherwise.

tion, the assumed lack of entry barriers will cause the excess profit π_s that would be earned by a prospective entrant to disappear as the most efficient technology becomes the standard for the industry. A glance at equations (1) and (2) then indicates that dW_1 must be zero when the market is in long-run, competitive equilibrium. In addition, because the most efficient technology has already been and will continue to be adopted, dW_2 in equation (3) must also be zero. Equations (4) and (5) then show that no public benefit would result from merger denials in competitive markets in long-run equilibrium. That is, the preexisting number of firms and their operation is optimal, in the sense of maximizing the sum of consumer and producer surplus. In this special case of competitive markets with no barriers to entry, the public interest cannot be served by using probable future competition to deny mergers.

But the recent statement of probable future competition, quoted earlier, advocates its use only in certain oligopolistic markets, not in competitive markets. This leaves open the possibility that a rigorous oligopoly theory exists in which the public interest is served by merger denials based on probable future competition.

□ *Oligopoly Theories and Barriers to Entry*

Standard oligopoly theories—such as Cournot oligopoly theory and cartel theories—must assume the existence of some barrier to entry that prevents firms from entering the market and thereby reducing all margins between price and firms' marginal costs, all excess profits, and hence dW_1, to zero. For even if the conduct of firms is not competitive, the assumption of free entry has been shown to force dW_1 to become zero (Baumol 1982). But if such a barrier to entry exists, how is it that "if the merger is prevented, the outside firm will in some cases enter the market through a toehold acquisition or by establishing a new— often called a de novo—office . . . and thereby help to improve the market's performance"—as asserted in the statement quoted earlier (Winer 1982, p. 528)? To theoretically justify the statement, the entry barrier must work to prevent only firms that have *not* submitted merger proposals from entering and thereby reducing dW_1 to zero—unless such firms don't exist. But even casual observation reveals firms that enter markets without first having applied to merge with firms within those markets. So the statement can be theoretically justified only if a barrier to entry exists which prevents firms that have *not* submitted merger proposals from entering, but which in some cases permits firms that *have* submitted merger proposals to enter after their proposals are denied.

But commonly suggested barriers to entry don't fit this description. For example, suppose that large firms already in the market can produce at a lower cost than prospective entrants. The implied threat of the large firms' setting a price which undercuts the prices which could be charged by the prospective entrants presents a barrier that excludes the higher-cost entrants and that permits the existence of positive margins between price and firms' marginal costs as well as excess profits. If this barrier to entry keeps firms that have *not* submitted merger proposals from entering, wouldn't it also keep firms that *have* submitted merger proposals from entering after their proposals are denied? If so, as seems reasonable, the latter firms probably won't enter after their merger proposals are denied; that is, the probability of entry is always zero ($p \equiv 0$) in equations (1) and (2). But the zero probability of entry is in contradiction to the statement quoted. Other suggested barriers to entry—such as product differentiation, brand preference, or lack of access to productive resources present only in large firms (see Rhoades and Yeats 1972)—don't overcome this problem, either. For if these barriers to entry work at all, they will work to keep both merger applicants and nonapplicants from entering.

Furthermore, the lack of a suitable barrier to entry isn't the only unresolved difficulty facing attempts to formulate a rigorous theory for justifying merger denials based on probable future competition. An additional difficulty, for example, is explaining, rather than merely taking as given, the preexisting size distribution of firms in a way that admits the possibility that using probable future competition might benefit the public.

A Summing Up

Thus, there is currently no rigorous theory that formalizes statements for using probable future competition to deny mergers. Because of this, theory lends no help in determining the market circumstances when dW_1 in equations (1) and (2) is positive. Unfortunately, theory is also of little value in finding circumstances when dW_2 in equation (3) is likely to be nonzero and in determining the size of costs C in equation (5). Because of this, the value of existing theory in constructing optimal guidelines governing the use of probable future competition lies mainly in suggesting the public benefit formulas of equations (1)–(5).

Empirical Research

Empirical research could also conceivably help antitrust authorities discern when the public interest is served by using probable future competition to deny mergers. One might hope that existing empirical research would shed some light where theory hasn't. While that is indeed the case, the light isn't sufficient to help antitrust authorities find circumstances which warrant the use of probable future competition.

On Costs

Empirical research on private and public merger costs does indicate that in cases involving probable future competition, the cost incurred in the antitrust determination process—that is, ΣC in equation (5)—isn't large. For instance, in a 1978 survey of the compliance costs incurred by 89 bank holding companies applying to acquire banks (Rosenblum 1979), the average compliance cost per application was around $20,000 (1983 dollars). Because this figure includes costs of complying with requirements other than antitrust, the actual cost component incurred during the antitrust determination process was much smaller. However, in the absence of strictly enforced quantitative merger guidelines, additional legal research may be needed to prepare applications in cases involving complicated antitrust issues, such as probable future competition. The additional legal research can drive the private compliance cost incurred in filing a merger application as high as $100,000. The cost of additional legal research could be avoided by the strict enforcement of easily verifiable, quantitative merger guidelines.

While detailed data is lacking, the administrative cost incurred by the Federal Reserve in deciding when to use probable future competition also isn't large. For example, in a recent, extremely complicated case of a merger denied on antitrust grounds, we estimated that the Fed's related administrative cost was only $9,000. This figure includes upward adjustments of actual government outlays that incorporate private-sector equivalent expenses, such as overhead and taxes. Strictly enforcing any form of quantitative merger guidelines would also lower the administrative cost by reducing the research needed to evaluate applications.

On Cost Efficiencies

The empirical evidence, however, is inconclusive about whether or not consumer and producer surplus is foregone by blocking market-extension mergers—that is, whether or not dW_2 in equation (3) is positive. This is due to the conflicting nature of available evidence concerning cost efficiencies—the sign and size of dC_j in equation (3)—which might be obtained by the would-be acquired firm's potential change of organizational status.

It is possible that a unit bank (a bank that is not part of a larger banking organization) might be able to attain lower costs by a market-extension merger, either when acquired by a bank holding company or when acquired by a bank that then operates it as a branch bank. Lower costs, if any, might be due to more efficient management practices, to organizational economies of scale, or to opportunities to specialize bank functions within the larger, postmerger organization.

But Tadesse (1980, pp. 2–3), in his survey of 16 previous studies on cost efficiency in the banking industry, concludes that the evidence about organizational cost efficiencies conflicts:

> With regard to the effects of the legal form of organization (unit bank, branch or holding company) on the long-run average cost, reported findings are also conflicting. Many studies that have compared the long-run average costs of unit and branch banks of the same approximate size, or the costs of collections of unit banks and branch bank systems, have reported that costs are higher under branch banking. Some researchers, however, suggest that while costs may be higher for small branch banks, operating expenses of large branch banks are lower than expenses of large unit banks, implying different economies of scale under the two organizational forms. The few studies that reported on the effect of holding company affiliation are equally divided between those that found that affiliation increased operating expenses and those that reported that affiliation lowered costs. Differences in economies of scale might also explain these results.

Furthermore, studies of cost efficiency in banking conducted after this survey don't resolve the issue either. One recent study (Benston et al. 1983) found that affiliation with a multibank holding company increases the operating costs of unit state banks and that no strong evidence exists of either diseconomies or economies of scale via branching. The most recent study of cost efficiency in banking (Gilligan and Smirlock 1984) doesn't address the issue of organizational form.

On Market Entry After Denial

Empirical research has also failed to uncover circumstances where the use of probable future competition is likely to induce swift entry—that is, to make $p(T)$ in

equations (1) and (2) large when T is small. As a result, little is known about the circumstances in which dW_1 in equations (1) and (2) is likely to be large as a result of a merger denial. Three studies by different investigators (Rhoades 1981, Baxter and Hawke 1982, and Rhoades undated) have extensively examined the Federal Reserve Board's and the FDIC's use of probable future competition between 1970 and 1975. From these studies we can conclude that probable future competition was part of the reason for initially denying as many as 28 merger proposals during that period. By August 1977, we can also conclude that only 4 of these 28 denials caused the desired entry to occur and that these 4 entries were all toehold rather than de novo.[11] Based solely on this extensively examined period, it appears that the probability of swift, denial-induced entry is minimal. Of course, it is possible that other entries caused by these denials have occurred since August 1977. But equations (1) and (2) show that the expected gain in the sum of consumer and producer surplus, dW_1, declines exponentially with the length of time T between denial and entry. Swift entry is thus important in producing a large dW_1. However, other evidence, albeit less extensively examined, indicates that a higher proportion of entry occurred following denials issued between 1960 and 1969 (see Rhoades and Yeats 1972).

On Margins Between Price and Marginal Cost

An examination of equations (1)–(3) shows that the weighted sum of the firms' margins between price and marginal cost and their output changes after entry [that is, $\Sigma\ (P-MC_i)dq_i$ in equations (1)–(3)] is an important factor in determining the size of the change in the sum of consumer and producer surplus—dW in equation (4). Although estimates have been made of firms' margins between price and marginal cost in some markets, no empirical study has estimated this weighted sum.

Evidence Based on Market Concentration

Furthermore, aside from estimates of the factors in equations (1)–(5), there is little alternative empirical evidence that toehold entry in banking markets will benefit the public, even if the use of probable future competition could induce entry. Rather than attempting to estimate the separate factors in equation (2), researchers have attempted to determine this on the basis of an empirical examination of the following joint hypothesis:

- Toehold entry lowers market concentration (that is, it shifts the distribution of business away from large firms).
- Lower market concentration improves market performance.

The few studies that test the first claim have uncovered little evidence to support it. One study (Rhoades and Schweitzer 1978) found that no statistically significant impact on concentration in banking markets followed from toehold acquisitions by bank holding companies. Another study (Schweitzer and Greene 1979), which did find that deconcentration followed toehold acquistions by bank holding companies, has been seriously criticized (Allardice 1979; see also Rose and Curry 1981). Finally, a third study (Alcaly 1978), which only examined cases where probable future competition had been used, found that concentration did not decrease after entry.

Many studies have addressed the second claim—that lower concentration improves market performance. A survey of those studies (Heggestad 1979, p. 484) concludes that "the weight of the evidence supports the view that market structure is an important determinant of performance in banking." Many of the studies discussed in this survey indicate that higher concentration results in higher market prices and/or higher firm profits. But none of the studies examines the relationship between market concentration and the sum of consumer and producer surplus, which is theoretically the better measure of market performance. Furthermore, as Heggestad (1979, p. 456) notes,

> the structure-performance studies in banking suffer a weakness common to all structure-performance studies: There is no rigorous theoretical model that relates concentration to equilibrium price levels, or to any other dimension of performance.

This theoretical weakness will also afflict empirical studies restricted to markets where probable future competition has been used. For example, we might examine those markets where entry did occur after probable future competition was used, hoping to uncover conditions warranting its future use. But in doing so, we implicitly assume that conditions *correlated* with factors producing large dW, such as swift future entry and large

[11] In addition to the three toehold acquisitions cited in Baxter and Hawke 1982, I've added a fourth case (number 27 in Rhoades 1981).

margins between price and firms' marginal costs, actually helped *cause* those factors—and we thus commit the *post hoc ergo propter hoc* fallacy. As a result, inferences based on studies of this nature might be fallacious. A rigorous theory of probable future competition would help guide empirical investigations of the conditions necessary to justify its use.

A Summing Up

To summarize, empirical evidence suggests that the costs incurred in the antitrust determination process aren't large. These costs could be lowered further by strictly enforcing some form of quantitative merger guidelines. Empirical research, however, has failed to uncover circumstances where the sum of consumer and producer surplus is most likely to increase due to the use of probable future competition in blocking mergers—circumstances where dW_1 in equations (1) and (2) is large. Nor has empirical research helped to identify circumstances where consumer and producer surplus is most likely to increase when mergers are approved—circumstances where dW_2 is large. In the absence of a rigorous theory of probable future competition, empirical evidence hasn't helped much in devising the particular form that guidelines for using probable future competition should take.

Conclusion

Certainly guidelines for invoking probable future competition in market-extension mergers are desirable and necessary as a means for reducing costs for merger applicants and antitrust regulators (and, ultimately, for shareholders and taxpayers). Such guidelines must necessarily be consistent with antitrust law, as interpreted by the courts. But unless guidelines for invoking probable future competition are based on sound theoretical and empirical research, they will not necessarily benefit the public. Because such research is lacking, probable future competition should be invoked only with a great deal of caution.

Appendix A
Derivation of dW_1 for De Novo Entry

We assume that before any antitrust regulatory action, there are n profit-maximizing firms in the market which produce a homogeneous product. Each firm falls into one of two possible types: large firms and small firms. We denote the number of large firms by m and the number of small firms by $n-m$.

Denoting the sum of consumer and producer surplus by W, the change in W resulting from an additional small firm is

$$(A1) \quad W(n+1) - W(n) = \int_n^{n+1} (dW/dn)\, dn.$$

If, as is assumed here, $dW_1 = dW/dn$ does not change sign in the interval from n to $n+1$, then its sign is the same as that of (A1). Thus, the sign of dW/dn indicates whether performance is improved or hurt by regulatory denial. Furthermore, assuming that dW/dn is approximately constant in this interval, (A1) is approximately equal to dW/dn. Under these maintained assumptions, the magnitude of dW_1 indicates the size of the performance change resulting from de novo entry of a small firm.

An expression for $dW_1 = dW/dn$ is now derived. To do so, we assume that each of the $n-m$ identical small firms produces a single, homogeneous output q_s at a total cost of $C_s(q_s)$, and each earns equilibrium profits of π_s. Total small-firm output is denoted $Q_s = (n-m)q_s$. Each of the m large firms produces its output q_i at cost $C_i(q_i)$, for all $i = 1, \ldots, m$. The profit of the ith large firm, before any lump-sum redistributions among them, is π_i, for all $i = 1, \ldots, m$. The large firms' total output is denoted $Q_l = \Sigma_{i=1}^m q_i$. The inverse market demand curve for the homogeneous output is denoted by $P = P(Q)$.

With this notation, the sum of consumer and producer surplus is

$$(A2) \quad W = \int_{P[Q(n)]}^{\infty} Q(P)\, dP + (n-m)\pi_s + \Sigma_{i=1}^m \pi_i$$

where $Q(n)$ is the equilibrium output of the n-firm oligopoly. The first term in (A2) is the consumer surplus, and the sum of the other two terms is the producer surplus.

The evaluation of dW_1 proceeds termwise. First, using Leibniz's rule to differentiate the consumer surplus term, we obtain

$$(A3) \quad d/dn \int_{P[Q(n)]}^{\infty} Q(P)\, dP = -(dP/dQ)(dQ/dn)Q.$$

Then substitute

$$(A4) \quad \pi_s = P[Q(n)]q_s(n) - C_s[q_s(n)]$$

into the second term in (A2) and differentiate to obtain

$$\begin{aligned}(A5) \quad d/dn\,(n-m)\pi_s &= \pi_s + (n-m)[(dP/dQ)(dQ/dn)q_s \\ &\quad + P(dq_s/dn) - (dC_s/dq_s)(dq_s/dn)] \\ &= \pi_s + (n-m)(dP/dQ)(dQ/dn)Q_s \\ &\quad + (n-m)[P-(dC_s/dq_s)](dq_s/dn).\end{aligned}$$

Finally, substitute

$$(A6) \quad \pi_i = P[Q(n)]q_i(n) - C_i[q_i(n)]$$

for all $i = 1, \ldots, m$ into the third term in (A2), then differentiate, sum, and simplify to obtain

$$\begin{aligned}(A7) \quad d/dn\, \Sigma_{i=1}^m \pi_i &= (dP/dQ)(dQ/dn)Q_l \\ &\quad + \Sigma_{i=1}^m [P-(dC_i/dq_i)](dq_i/dn).\end{aligned}$$

Remembering that $Q = Q_s + Q_l$, sum (A3), (A5), and (A7) to obtain

$$\begin{aligned}(A8) \quad dW/dn = dW_1 &= (n-m)[P-(dC_s/dq_s)](dq_s/dn) \\ &\quad + \Sigma_{i=1}^m \{[P-(dC_i/dq_i)](dq_i/dn)\} + \pi_s.\end{aligned}$$

Discount at rate r the magnitude (A8), which is assumed to follow perpetually after de novo entry occurs T years after denial; then denote $q_i = q_s$, for all $i = m+1, \ldots, n$; and take the expectation over T with respect to the probability density $p(T)$. Thus, we obtain equation (1) in the paper.

Appendix B
Derivation of dW_1 for Toehold Entry

We assume that the effects of toehold entry, if any, work through changes in the costs of operating the acquired firm. Representing this effect by a cost curve shift parameter, denoted α, the function of the acquired firm, denoted k, is

(B1) $C_k(q_k;\alpha)$.

The sum of consumer and producer surplus is then

(B2) $W = \int_{P[Q(\alpha)]}^{\infty} Q(P)\, dP + \pi_k + \Sigma_{j\neq k}\, \pi_j$.

Differentiating the first term of (B2), we find

(B3) $d(\text{first term})/d\alpha = -(dP/dQ)(dQ/d\alpha)Q$.

Differentiating its second term, we find

(B4) $$\begin{aligned} d\pi_k/d\alpha &= d/d\alpha\, \{P[Q(\alpha)]q_k(\alpha) - C_k[q_k(\alpha);\alpha]\} \\ &= (dP/dQ)(dQ/d\alpha)q_k \\ &\quad + [P-(\partial C_k/\partial q_k)](dq_k/d\alpha) - \partial C_k/\partial\alpha. \end{aligned}$$

Differentiating its third term, we find

(B5) $$\begin{aligned} d\,\Sigma_{j\neq k}\, \pi_j/d\alpha = \Sigma_{j\neq k}\, \{&(dP/dQ)(dQ/d\alpha)q_j \\ &+ [P-(\partial C_j/\partial q_j)](dq_j/d\alpha)\}. \end{aligned}$$

Summing (B3), (B4), and (B5), and rearranging, we get

(B6) $$\begin{aligned} dW/d\alpha = &-(dP/dQ)(dQ/d\alpha)Q \\ &+ (dP/dQ)(dQ/d\alpha)[q_k + \Sigma_{j\neq k}\, q_j] \\ &+ \Sigma_i\, [P-(\partial C_i/\partial q_i)](dq_i/d\alpha) - \partial C_k/\partial\alpha. \end{aligned}$$

Because the first two terms cancel, (B6) yields

(B7) $dW/d\alpha = \Sigma_i\, [P-(\partial C_i/\partial q_i)](dq_i/d\alpha) - \partial C_k/\partial\alpha$.

For simplicity, we denote $\partial C_k/\partial\alpha$ by dC_k in the paper. Discounting and taking the expectation over $p(T)$ yields equation (2) in the paper.

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