THE STRUCTURE-CONDUCT-PERFORMANCE PARADIGM AND ANTITRUST

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I. INTRODUCTION: THE GOALS OF COMPETITIVE POLICY

This paper will discuss the relevance of the structure-conduct-performance approach to antitrust and demonstrate its practical utility in analyzing an important case. After sketching out the main elements of the approach, the paper will apply it to the facts of *United States v. IBM*.¹

The structure-conduct-performance approach was developed by Joe Bain,² although many persons have added to and enriched his basic outline. The main goals set for antitrust by this approach are elements of performance. Bain himself and most who have followed his lead put their main emphasis on the extent to which concentration elevates price above minimum average cost due either to higher than normal profits or increased costs.³

The rationale for this concern may be the effect that such elevated prices have either on efficiency or on the distribution of wealth. The classic dead weight loss due to allocative inefficiency⁴ received little emphasis in Bain, which I believe is correct. Not only are all estimates of this welfare loss minuscule, but the true loss in efficiency is ambiguous because of second best considerations.⁵ In any case, it seems certain that Congress never thought in terms of

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¹ *United States v. IBM*, No. 69 Civ. 200 (S.D.N.Y., filed Jan. 17, 1969).

² J. BAIN, *INDUSTRIAL ORGANIZATION* (2d ed. 1968).

³ Chapters 10 and 11 of Bain's book are especially relevant in this respect. See J. BAIN, *supra* note 2, at 372-468.

⁴ Professor Posner offers a lucid explanation of this phenomenon:

When market price rises above the competitive level, consumers who continue to purchase the seller's product at the new, higher price suffer a loss. . . exactly offset by the additional revenue that the sellers obtain at the higher price. Those who stop buying the product suffer a loss . . . not offset by any gain to the sellers. [The latter] is the "deadweight loss" from supracompetitive pricing and in traditional analysis its only social cost, [the former] being regarded merely as a transfer from consumers to producers.

Posner, *The Social Costs of Monopoly and Regulation*, 83 J. POLITICAL ECON. 807 (1975).

⁵ For a discussion of the implications of second best analysis on estimation of the classic deadweight loss, see F. SCHERER, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 404 (1970).

the welfare triangle when it passed the antitrust laws and that the public and Congress do not concern themselves with it today.

However, other considerations associated with prices in excess of minimum average cost *do* seem important and to be likely concerns of Congress and the public. If non-competitive structure or conduct results in the elevation of costs above minimum levels, there is direct inefficiency that does not depend on the allocation of resources, and that is probably much larger than any likely estimate of allocative inefficiency.⁶ Such elevation of cost may arise because of non-price competition among members of a cartel seeking to increase their market shares in the presence of monopoly price, or it may be due to excess capacity resulting from entry induced by monopoly prices.⁷ If monopoly price does not result in an increase in costs it should lead to monopoly profits, and these too may be a legitimate public concern. A typical political discussion of the cost of monopoly will emphasize the fact that consumers pay more and that the beneficiaries of monopoly earn more than they would in the presence of competition. This emphasis may arise from a concern about income inequality, because the owners of monopolies are apt to be rich, or from a feeling that it is unfair for some to receive exceptional incomes (or more realistically, to experience capital gains) merely because of the powerful position they may occupy in society. Whatever the basis for concern about monopoly pricing may be, there is something there worth worrying about.

II. THE BASIC ELEMENTS OF STRUCTURE-CONDUCT-PERFORMANCE

The main predictions of the structure-conduct-performance paradigm are: (1) that concentration will facilitate collusion, whether tacit or explicit,⁸ and (2) that as barriers to entry rise, the optimal price-cost margin of the leading firm or firms likewise will increase.⁹ This section will discuss the validity of these hypotheses. In addition to considering the relationship between concentration and price/profits, however, the section will also describe the effects of concentration on the extent of sub-optimal capacity.

⁶ See Posner, *supra* note 3, at 815-21.

⁷ See *id.* 809-11. Posner's example of nonprice competition in the regulated airline industry is particularly apt.

⁸ J. BAIN, *supra* note 2, at 462-63.

⁹ *Id.* 252-55, 269-76.

A. *The Effect of Concentration on Price*

The concentration-price-cost margin relationship rests on two elements of analysis. First, and least controversial, is the prediction that dominant firms (perhaps those with half or more of the market and no close rivals) control price on the basis of their own demand curves—these demand curves consisting of the market demand minus the supply of their small rivals.¹⁰

The second, and much less tidy, part of the hypothesis involves oligopoly theory. Modern oligopoly theory is based on the effectiveness of collusion, whether tacit or explicit. Both Stigler¹¹ and Chamberlin¹² predicted that the effectiveness of collusion and therefore the level of price-cost margins will rise with concentration. The effect of oligopoly on profits or price-cost margins¹³ has been widely studied. In a survey of that literature, I reviewed forty-six studies of the relationship between concentration and profits or price-cost margins in the United States, Britain, Canada, and Japan from 1936 to 1970.¹⁴ The bulk of these studies yielded significant positive relationships between concentration and profits or price-cost margins. Exceptions to this general finding were attributable to factors such as time period (unanticipated inflation and/or price controls), or collinearity between the concentration ratio and the ratio of minimum efficient scale (MES) to value of shipments.¹⁵ In addition, I argued that the crudeness of the concentration data, the increasing diversification of firms, and many distortions in accounting profits all bias the observed relationship between concentration and profits toward zero.¹⁶ Because of these biases, I argued that

¹⁰ The dominant-firm theory has not been subjected to extensive empirical testing. One exception to that general rule is a study that I authored, in which it was found that fourteen apparently dominant manufacturing firms earned an average return on equity of 16.0% during the 1960's, compared with an 11.0% figure for manufacturing firms generally. Weiss, *The Concentration-Profits Relationship and Antitrust*, in *INDUSTRIAL CONCENTRATION: THE NEW LEARNING* 184, 186-87 (H. J. Goldschmid, H. M. Mann, & J. F. Weston eds. 1974).

¹¹ Stigler noted that collusion breaks down when formerly cooperative firms secretly cut prices in an effort to gain a larger share of the market. He argued that the incentive to engage in price cutting increases with the number of firms because price cutting becomes increasingly difficult to detect. Stigler, *A Theory of Oligopoly*, 72 J. POLITICAL ECON. 44, 51-56 (1964).

¹² Chamberlin theorizes that because each oligopolist expects his rivals to respond to his pricing practices, there is no incentive to engage in price competition. E. CHAMBERLIN, *THE THEORY OF MONOPOLISTIC COMPETITION* 46-51 (8th ed. 1962).

¹³ Price-cost margin is the difference between variable costs and price, divided by price. See Weiss, *supra* note 10, at 199.

¹⁴ *Id.* 184-233.

¹⁵ *Id.* 200-03, 223-26.

¹⁶ *Id.* 203, 221-23.

the effect was probably understated when observed, and that it might well have been present when it was not detected.¹⁷

The predictions of oligopoly theory have to do with high prices, not high profits. High profits may disappear in spite of effective collusion because of excess capacity resulting from entry induced by the high prices or due to any other costs that members of the cartel incur in efforts to increase or protect their market shares. If so, the expected relationship between concentration and profits may disappear. Accordingly, we would have a better basis for judging the effect of concentration if we could see its relationship to price rather than to profit.¹⁸

Fortunately, a few studies have used price rather than profit as the dependent variable. The earliest was Reuben Kessel's analysis of underwriting spreads and re-offering yields in municipal bond markets.¹⁹ Underwriter's spread is the difference between the buying and selling price of the underwriter. Re-offering yield is the selling price of the underwriter. These two elements of the cost of issuing tax-exempt bonds are separate and addable. The issuer receives more for its bonds when the underwriter's spread is low and the re-offering yield is high. Kessel measured competition among the underwriters by the number of underwriter bids submitted for 9,420 tax-exempt bond issues. In addition to the number of bidders, Kessel introduced a number of variables that affect the terms of the transaction,²⁰ such as issue size, borrowers' outstanding securities, market interest rate level and change, maturity date, call date, quality of the issue as measured by Standard and Poor's rating, a revenue bond dummy,²¹ and trend. Using a series of dummy variables, Kessel estimated the effect of increasing the number of bids from one to eleven. Underwriting costs were significantly lower with each additional bid through six bids for reve-

¹⁷ *Id.* 201.

¹⁸ The establishment of a relationship between price and concentration would offset an argument made by Harold Demsetz, who found a significant positive relationship between concentration and profits for large firms, but not for smaller firms. H. DEMSETZ, *THE MARKET CONCENTRATION DOCTRINE* (1973). From that finding, Demsetz inferred that the concentration-profits relationship reflected economies of scale, superior management, superior products, or just plain luck that worked both to increase profits and to increase market share. If concentration can be shown to have a positive effect on price, however, this argument would not hold.

¹⁹ Kessel, *A Study of the Effects of Competition in the Tax-Exempt Bond Market*, 79 J. POLITICAL ECON. 706 (1971).

²⁰ *Id.* 710.

²¹ Interest and principal payments on general obligation bonds are met through the use of the issuer's general taxing power. Similar charges on revenue bonds are paid through specific taxes or user charges.

nue bonds and nine bids for general obligation bonds. In short, as the degree of competition increased, the underwriter's spread decreased.²² Kessel also found that the price at which the underwriters resold the bond to the investing public increased with the number of bids up to but not including seven for revenue bonds and eleven for general obligation bonds.²³

Although his results have been cited as evidence concerning critical concentration levels,²⁴ Kessel interpreted his findings in light of Stigler's work on the economics of information.²⁵ Because no single underwriter possesses perfect information about the market for a prospective bond offering, Kessel concluded that "the larger the number of bids submitted, the greater the probability of discovering the underwriter who knows who will pay the most for a prospective issue; this is apt to be the underwriter who submits the winning bid."²⁶

Further evidence on the effect of concentration on price was provided by a study of supermarkets prepared for the Joint Economic Committee of the United States Congress.²⁷ The authors, members of the University of Wisconsin-Madison Food Systems Research Group, investigated both the profitability and prices of food chains on a metropolitan area basis. Although concentration did have a significant positive effect on the profit-sales ratios of six grocery chains in fifty Standard Metropolitan Statistical Areas (SMSAs),²⁸ that is not our primary concern here. They used prices of a large number of food items based on intra-firm price tabulations made by three chains in thirty-two SMSAs in October 1974.

The regression analysis employed in the study used the price of a "market basket" of comparable items as the dependent variable. Differences in the competitive environments of the various metropolitan areas were reflected in the following independent variables:

²² Kessel, *supra* note 19, at 722-23.

²³ *Id.* 727.

²⁴ See R. A. POSNER, *ANTITRUST LAW: AN ECONOMIC PERSPECTIVE* 112 (1976). For a discussion of the significance of critical concentration levels, see notes 60-71 *infra* & accompanying text.

²⁵ See Stigler, *The Economics of Information*, 69 J. POLITICAL ECON. 213 (1961).

²⁶ Kessel, *supra* note 19, at 729.

²⁷ STAFF OF JOINT ECONOMIC COMM. (B. MARION, W. MUELLER, R. COTTERILL, F. GEITHMAN & J. SCHMELZER), 95th Cong., 1st Sess., *THE PROFIT AND PRICE PERFORMANCE OF LEADING FOOD CHAINS 1970-1974* (Comm. Print 1977) [hereinafter cited as *SUPERMARKET STUDY*].

²⁸ The authors concluded: "The structure-price relationships strongly suggested that the higher observed profits are due, at least in part, to the higher prices chains are able to charge in less competitively structured markets." *Id.* 66.

the four-firm concentration ratio, the relative market share, the average store size, market growth, market size, and market rivalry.²⁹

TABLE 1

MULTIPLE REGRESSION EQUATIONS "EXPLAINING"
COST OF A MARKET BASKET AT THREE CHAINS
IN 36 SMSAs IN 1974

(T RATIOS IN PARENTHESES)

	<i>National & Private Brands</i>	<i>National Brands</i>
Constant	90.67	90.74
Relative Market Share	6.449 (2.714)	6.604 (2.929)
4 Firm Concentration Ratio	15.259 (4.249)	14.624 (4.607)
Average Store Size	-.005 (-1.931)	-.004 (-2.048)
Market Growth	-.078 (-3.975)	-.069 (-3.655)
Market Size	-.158 (-.259)	not included in this regression
Market Rivalry	-.485 (-4.875)	-.527 (-5.898)
R ²	.65	.68

²⁹ The *Supermarket Study's* independent variables, measured for 1974 unless otherwise noted, were the following:

Four-Firm Concentration Ratio is the percentage of the total market sales made by the leading four firms in the SMSA. As the ratio increases, the few firms controlling a sizable part of the sales will tend to behave interdependently with resulting explicit or implicit forms of collusion.

Relative Firm Market Share is the ratio of the firm's market share to the four-firm concentration ratio, given by the equation: Market Share/Four-Firm Concentration Ratio. It reflects the firm's size relative to the largest firms in the market.

Average Store Size is dollars of sale per grocery store in each SMSA for 1972.

Market Growth is the percentage change from 1967 to 1972 in grocery store sales in each SMSA. This variable was intended to measure the increase in demand.

Market Size is total 1972 sales of grocery stores in the relevant SMSA.

Market Rivalry measures the absolute change in the market shares of the four leading firms from 1972 to 1974. The study's authors hypothesized that rivalry among firms would lead to price cutting as these firms jockeyed for increased market shares. *Id.* 39-43, 61-62.

Representative regressions are shown in Table 1.³⁰ They reflect the cost of a market basket containing both national and private label brands and of a basket of only nationally known brands. Concentration and relative market share had highly significant positive effects on price.

TABLE 2

ESTIMATED COSTS OF GROCERY BASKETS FOR DIFFERENT
COMBINATIONS OF RELATIVE MARKET SHARE AND 4-FIRM
CONCENTRATION, OCTOBER 1974 *

Relative firm market share	4-firm concentration ratio							
	40		50		60		70	
	Cost	Percentage change	Cost	Percentage change	Cost	Percentage change	Cost	Percentage change
10	\$90.95	0	\$91.84	1.0	\$93.64	3.0	\$95.78	5.3
25	91.65	.8	92.54	1.8	94.34	3.7	96.48	6.1
40	93.16	2.4	94.05	3.4	95.85	5.4	97.99	7.7
55	94.18	3.6	95.07	4.5	96.87	6.5	99.01	8.9

* Percentage changes were calculated from the base of \$90.95.

Table 2³¹ shows the estimated effect of concentration and relative market share on price when all other variables are held constant at their mean values. For example, an increase in concentration from 40 to 70 when relative market is held at 10% yields a 5.3% increase in price. Similarly, with the concentration ratio held constant at 40, increasing relative market share from 10 to 55 results in a price increase of 3.6%. Where the concentration ratio was 70, a firm with a relative market share of 55 (absolute market share of $.55 \times .70 = 38.5\%$) would have prices 8.9% higher than a firm with a relative market share of 10 in a SMSA where the concentration ratio is 40 (absolute market share of $.10 \times .40 = 4\%$). These changes in price are especially important when compared with the average supermarket gross margin of 17.7% in 1974.³² The effect of mar-

³⁰ Table 1 is taken from *id.* 63.

³¹ Table 2 is taken from *id.* 66.

³² *Id.* 83. The study also found evidence which suggested that higher prices are only partially reflected in higher profits. In one comparison, higher profits accounted for about 37% of the increase, thus leaving 63% that was presumably absorbed in increased expenses. *Id.* 77-78. Because the data series was not designed to make this particular test, the authors are reluctant to describe these results as definitive. *Id.* 77. Even with that caveat, the figures are very interesting. They suggest that in the absence of competition, per-unit costs tend to rise, thus supporting my argument that increased prices in a concentrated market can reflect not only increased profits, but also increased costs. See note 18 *supra* & accompanying text. For this reason, studying only the effects of concentration on profit tends to understate the problems caused by a monopoly.

ket share on profitability is equivocal because it could well represent the effect of economies of scale, superior products, superior management, or luck. The effect of market share on prices seems less equivocal. A chain can charge more for the same products in cities where its market share is large than where it is small and where concentration is high compared with where it is low. To my mind, both of these effects are most easily explained by varying degrees of recognized interdependence.

In his comments at the conference, Almarin Phillips pointed to common elements in several of the independent variables in these regressions. However, there are no common elements between the dependent variable and the independent variables, so these regressions cannot be criticized for spurious correlation. The common elements tend to introduce collinearity among the affected variables that contain them, and this should result in high standard errors, if anything, thus reducing the likelihood of finding significant effects for those variables. The variables so affected are relative market share, concentration, market growth, and market size.

Concentration was also shown to have an effect on the price of gasoline in two studies by Marvel.³³ Both studies used gasoline price data compiled by the Bureau of Labor Statistics (BLS) for the consumer price index in the years 1964-1971. BLS collects these prices monthly for ten SMSAs and quarterly for twelve others.³⁴ It released only the high and low prices of premium and regular gasoline sold in each city. Marvel took the average high and low prices for premium and regular gasoline as four alternative dependent variables and regressed each on transport costs from Oklahoma, mean gasoline taxes, SMSA population, and the Herfindahl index.³⁵ For the 1964-1971 period as a whole, the coefficients and t ratios³⁶ for the Herfindahl index were .229 ($t = 1.79$) for premium

³³ Marvel, *Competition and Price Levels in the Retail Gasoline Market*, 60 REV. ECON. & STATISTICS 252 (1978) [hereinafter cited as Marvel]; Marvel, *The Economics of Information and Retail Gasoline Behavior: An Empirical Analysis*, 84 J. POLITICAL ECON. 1033 (1976) [hereinafter cited as Marvel, *Information*].

³⁴ Because of uncertainty over transport costs, Marvel excluded from his analysis data about Honolulu, another SMSA for which the BLS provided quarterly reports. Marvel, *supra* note 33, at 254 n.5.

³⁵ The Herfindahl index is a measure of concentration. It is the sum of the squared market shares of the firms selling in a market. In a pure monopoly, it reaches its maximum value of 1.0. As the number of firms increases, the index decreases, thus showing the lessening of concentration. When the number of firms is held constant, the index increases as differences in market shares become more pronounced. If all firms are of equal size, the index is equal to $1/N$, where N is the number of sellers. See G. STIGLER, *THE ORGANIZATION OF INDUSTRY* 29-38 (1968).

³⁶ The coefficient describes the relationship between market price and concentration. As the value of the coefficient increases, it signifies larger price increases attributable to concentration.

high price, 0.901 ($t = 4.70$) for premium low price, .203 ($t = 1.48$) for regular high price, and .807 ($t = 4.84$) regular low price.³⁷ He reported individual year results for regular gasoline. The effect of the Herfindahl index on the *low* price was positive in every year in the 1964-1971 period, and statistically significant in every year except 1965. The coefficient became larger in later years. The coefficient for the high price was non-significant and sometimes negative in the years 1964-1968 but was positive and significant in the years 1969-1971.³⁸ Marvel interpreted these coefficients as indicating effective collusion in the mid-1960's that became less and less effective as time passed. He pointed to extensive gas wars in the early 1960's which ended with Texaco's March 17, 1965 announcement that it was withdrawing its allowances to its dealers nationwide.³⁹ Other marketers apparently followed Texaco's lead, which resulted in an end to the gas wars and a tacitly agreed upon differential between high and low regular prices of about 3¢. In later years, this pattern broke down, as evidenced by an increasing differential (3¢ in 1965 and 1966, 4¢ in 1967 and 1968, 5¢ in 1969, 6.5¢ in 1970, and an astounding 8.6¢ in 1971).⁴⁰ The increasing effect of concentration on low prices in the late 1960's and early 1970's was apparently due to increasing price competition on the part of the independents. After 1968 it apparently affected the high-priced major brand statistics as well.⁴¹

These results are again important. Marvel reported that the Herfindahl index ranged from an average of .067 for the midwest to .101 for the west coast,⁴² so in the regressions for the whole period the effect of concentration on the price of regular ranged from 6.0¢ to 9.1¢, or 3.1¢ for the high price, and from 5.4¢ to 8.15¢, or 2.75¢ for the low price.⁴³ Because the price of regular averaged 33.43¢ in the 1964-1971 period, the range in price due to concentration was about 9.3% for the high price and about 8.2% for the low price. This is particularly striking when compared with the average gross margin on regular gasoline of 6.20¢ or 18.5%

³⁷ Marvel, *supra* note 33, at 255.

³⁸ *Id.* 257.

³⁹ *Id.* 257-58.

⁴⁰ *Id.* 257.

⁴¹ *Id.* 258.

⁴² *Id.* 256 n.10.

⁴³ These estimated effects were computed by multiplying the relevant regression coefficient by the high and low Herfindahl indexes, and subtracting the estimate for the low index from that of the high index.

over the same years.⁴⁴ The range of effects of the Herfindahl indexes are shown in Table 3 and compared with the average price of regular and the average margins in each year of the 1964-1971 period. In another study using the same data, Marvel found that the Herfindahl index had a significant negative effect on the intertemporal variability of price.⁴⁵ He drew no definite conclusion from this result, noting that the greater price stability in concentrated markets could be due to more effective collusion or to the fact that prices vary less when there are fewer prices to observe.⁴⁶

TABLE 3
RANGE IN PREDICTED PRICES OF REGULAR BETWEEN
HERFINDAHL INDEXES OF .067 AND .101

	<i>High Price</i>	<i>Low Price</i>	<i>Average Price of Regular</i>	<i>Average Margin</i>
1964	3.4¢	2.3¢	30.35¢	5.16¢
1965	—0.5	1.0	31.15	5.32
1966	—0.3	1.1	32.08	5.74
1967	—0.2	1.7	33.16	6.24
1968	0.6	2.6	33.71	6.42
1969	1.0	3.0	34.84	6.74
1970	1.9	5.1	35.69	6.87
1971	1.6	4.5	36.43	7.09
Average			33.43	6.20

Finally, Donald Hester has made a very careful analysis of a sample of 674 commercial loans collected by the Federal Reserve Board from a group of weekly reporting member banks.⁴⁷ The por-

⁴⁴ These figures were derived from information contained in [1973] NAT'L PETROLEUM NEWS FACT BOOK 101. The gross margin is the difference between the tank wagon price and the dealer's price, before taxes are added.

⁴⁵ Marvel, *Information*, *supra* note 33, at 1056.

⁴⁶ *Id.* 1056-57.

⁴⁷ D. Hester, *Customer Relationships and Terms of Loans: Evidence from a Pilot Survey* (forthcoming in J. MONEY, CREDIT & BANKING (1979)) (manuscript copy on file with *University of Pennsylvania Law Review*) [hereinafter cited as Hester, *Publication Version*]. The sample was drawn as a pilot survey for a larger survey that was never made. *Id.* 1 (pages are those of manuscript). Each Federal Reserve Bank asked five banks in its district (seven in the case of New York) to answer detailed questions about up to 20 business loans with note values of \$10,000 or more made during the two weeks beginning August 1, 1972. Each bank was asked to select every *n*th loan made at one of its offices (designated by the Fed), where *n* varied across banks. The total sample contained 1072 loans, but editing

tion of the study that is relevant to this paper is a set of three cross-bank regressions where the dependent variables were certain loan characteristics averaged over all reported loans made by a bank.⁴⁸ In each regression, ten independent variables were included, consisting of eight bank balance sheet variables (including the bank's total assets), the mean of the log of the borrowers' total assets, and a Herfindahl index based on the deposits of all insured commercial banks in the SMSA in which the bank office was located. The three dependent variables were the following: (1) the fraction of the bank's loans that were secured by collateral; (2) the log of the geometric mean of the loan amounts; and (3) the log of the geometric mean of the loan interest rates.

The effect of the Herfindahl index was significant at the .05 level in each of the four regressions. When concentration was high the borrower paid a higher interest rate, received a smaller loan amount, and was more likely to face collateral requirements.⁴⁹ Professor Hester informs me that the Herfindahl indexes in his study ranged from .052 to .441. The coefficient of the Herfindahl index in predicting the log of the average interest rate was .269 ($t = 2.62$), and the mean log of the interest rate was 1.92. This means that the log of the interest rate ranged from about 1.934 to about 2.039 as the Herfindahl index increased from its lowest to its highest level. The anti-logs of these figures imply interest rates of 6.92% and 7.68%, so that concentration raised interest rates on business loans by about 0.76 points (or by about 11%), from the least concentrated to the most concentrated market. Similarly the mean log of loan amount was 10.96, and the coefficient of the Herfindahl index for that variable was -1.331 ($t = 2.11$), so that the average loan size varied from about \$31,984 in the most concentrated market to \$53,690 in the least. This is not due to the size of the bank or of the borrower. Both bank assets and mean borrower assets were controlled for in estimating these relationships.

reduced the same to 674 loans from 62 banks. *Id.* 3. The main criteria for excluding observations were where (a) balance sheet identity was violated by more than 5% (98 exclusion), (b) the most recent borrower balance sheet was more than 18 months old (44 exclusions), (c) the bank had no information about a borrower's net income (245 exclusions), and (d) where an observation showed a zero for any continuous variable used in the study (11 exclusions). This last criterion was adopted because it was impossible to distinguish between a no response and an actual value of zero. D. Hester, Customer Relationships and Terms of Loans: Evidence from a Pilot Survey, Federal Reserve Special Studies Paper No. 102 (August, 1977) (original version of study substantially abridged as Hester, Publication Version, *supra*) (copy on file with Federal Reserve Board).

⁴⁸ Hester, Publication Version, *supra* note 47, at 12-16.

⁴⁹ *Id.* 15.

In general, all four studies yielded price increases due to concentration that were statistically significant and economically important. In the banking study, concentration also bore the expected relationship to loan size; collateral requirements were also affected by concentration in the expected way. In short, this evidence shows that concentration really makes a difference in prices as well as in profits.

B. Concentration and the Extent of Suboptimal Capacity

The emphasis of most studies of the effect of concentration has been on profits, margins, and prices. The relationship between concentration and the extent of suboptimal capacity is another important element of performance that has received much less attention. The term "suboptimal capacity" describes a condition in which some plants are too small to be efficient. Bain concluded that a fringe of suboptimal plants accounted for 10% to 30% of shipments in the twenty industries he studied and that the size of that fringe was not affected by the degree of concentration or the height of barriers to entry.⁵⁰ However, recent studies by Scherer⁵¹ and by me⁵² have shown a quite different result.

In my own study, estimates of the minimum efficient scale (MES) of plants in 33 industries were taken from work done by Scherer,⁵³ Pratten,⁵⁴ and me.⁵⁵ I concluded that suboptimal plants often accounted for over 30% of industry shipments; more precisely, such shipments averaged 58.2% over the 12 industries for which Scherer made estimates, 47.9% over the 22 industries for which Pratten made estimates, and 52.8% over the 16 industries for which I made estimates.⁵⁶ More to the point for present purposes, when the percentage of shipments from suboptimal plants was regressed on concentration, industry shipments divided by MES, the rate at which costs decline as size increases for suboptimal plants, and an index of geographic market size, there was a systematic tendency

⁵⁰ J. BAIN, *BARRIERS TO NEW COMPETITION* 185-87 (1956) [hereinafter cited as BAIN, *BARRIERS*].

⁵¹ Scherer, *The Determinants of Industry Plant Sizes in Six Nations*, 55 REV. ECON. & STATISTICS 135 (1973).

⁵² Weiss, *Optimal Plant Size and the Extent of Suboptimal Capacity*, in *ESSAYS ON INDUSTRIAL ORGANIZATION IN HONOR OF JOE S. BAIN* 123 (Masson & Qualls eds. 1976).

⁵³ Scherer, *supra* note 51, at 137-38.

⁵⁴ C. PRATTEN, *ECONOMIES OF SCALE IN MANUFACTURING INDUSTRIES* 269-77 (1971).

⁵⁵ Weiss, *supra* note 52, at 126.

⁵⁶ *Id.* 138.

for the suboptimal fringe to decrease as concentration increased. This result was significant for each of the three samples (Scherer, Pratten, or Weiss), and for the three samples combined.⁵⁷

It was also important. A 1.0 point increase in concentration led to a 0.95 ($t = 2.92$) point reduction in the percentage of shipments from suboptimal plants using Scherer's estimates and sample, a 0.61 ($t = 1.79$) point reduction using Pratten's estimates and sample, and a 0.83 ($t = 4.31$) point reduction using my own estimates and sample.⁵⁸ Combining the three samples, the figure was 0.86 ($t = 4.57$) using Scherer's estimates where samples overlapped, 0.56 ($t = 2.86$) using Pratten's estimates where they overlapped, and 0.76 ($t = 3.96$) using my own where they overlapped.⁵⁹

The strong negative effect of concentration on the percentage of output from suboptimal sized plants occurs despite the fact that MES averaged only 3.1% of industry shipments for Scherer's data, 6.5% using Pratten's data, and 4.2% using mine.⁶⁰ The traditional statement, that there is room for many plants of MES in most American industries, is still correct.⁶¹ It does not follow, however, that industries in which MES is small relative to market size will in fact combine low concentration and low percentages of suboptimal capacity. In fact, the percentage of suboptimal capacity is systematically larger in unconcentrated industries, and this is *not* simply a matter of geographically fragmented markets or relatively flat scale curves. Even when these variables are controlled for, the effect of concentration is very significantly negative.⁶²

The model that yielded this result was developed by Scherer. He argued that if transportation costs are important, firms will find smaller scales optimal (after adding average transport costs to average production costs) the smaller their market shares because the amounts that can be sold close to the plant are limited by the firm's low market shares. Scherer also argued that an oligopolist trying to maintain his market share in the face of growing demand must choose between excess capacity and suboptimal increments. If he builds an optimal scale plant he will have to wait a long time

⁵⁷ *Id.* 137-41.

⁵⁸ *Id.* 140.

⁵⁹ *Id.*

⁶⁰ *Id.* 127-31.

⁶¹ There are some industries in which this statement is not correct. MES is estimated to have been 10% or more of United States industry shipments in 1967 for diesel engines, steam turbine generators, commercial aircraft, computers, refrigerators, automobiles, and rayon. *Id.* 127-31.

⁶² *Id.* 141.

before it is fully used. If he builds a smaller plant the period of excess capacity will be shorter. He argued that, without enforceable collusion, mutual distrust among firms would prevent them from making staggered additions to capacity and accepting fluctuating market shares.⁶³

This analysis implies that within a given market, firms with large market shares would have lower average production plus transportation costs and/or less excess capacity than their smaller rivals. If so, one would expect the smaller firms to be driven from the market in the long run. However, it would still be true that an industry where "large" firms had ten percent of the market would have smaller plants and higher average production costs than one where "large" firms had twenty percent of the market. The survival of smaller plants *within* any given industry may be due to their specialization in items with short production runs or to their service of small geographic markets within which their relatively small national market share is irrelevant. To the extent that such explanations hold, small plants are not necessarily suboptimal. However, such explanations seem unlikely to hold for a number of the industries where the percentage of suboptimal capacity is large (over 40%). This is true of the flour, tufted rugs, paper, paperboard, synthetic rubber, detergents, petroleum refining, shoes, glass containers, steel, and household laundry equipment industries.⁶⁴ None of these industries is characterized by geographically restricted markets or especially large proportions of specialty products.

This evidence on the relationship between concentration and the extent of suboptimal capacity has led me to reconsider my views on merger policy. In the past, I have approved of the policy of challenging most substantial horizontal mergers among viable firms in even moderately concentrated markets⁶⁵ because of our apparent inability to deal with oligopoly by application of either the anti-collusion or anti-monopolization law.⁶⁶ I felt that society had little to gain from mergers among firms that had attained MES and that the effect of concentration on price-cost margins was well established. With a considerable amount to lose and apparently nothing much to gain from such mergers, a tough policy seemed appropriate.

It now appears that increased concentration creates social gains in the form of less suboptimal capacity, so merger policy must trade

⁶³ Scherer, *supra* note 51, at 138-40.

⁶⁴ See Weiss, *supra* note 52, at 138.

⁶⁵ Weiss, *supra* note 10, at 232.

⁶⁶ Sherman Act, 15 U.S.C. §§ 1-2 (1976).

off that gain against the social losses caused by more effective collusion. Although the equation is no longer so clearly one-sided, not enough is known to balance precisely these two effects. However, if we could determine a critical concentration ratio or ratios (perhaps for producer and consumer goods separately), the antitrust authorities could safely permit mergers that increased concentration short of the critical level. Within that range, increased concentration would gain economies of scale for us without the undesirable effect on price.

Our knowledge about critical concentration ratios is still rudimentary. Using data from seventy-seven industries for the years 1963-67, White found a critical four-firm concentration ratio of 57, but did not test to see whether concentration had a further effect above or below that level.⁶⁷ Using 1967 price-cost margins of 352 industries, Rhoades and Cleaver initially found a critical four-firm concentration ratio of 51, but, on closer analysis, concluded that margins rose with concentration above that level but were unaffected by concentration below it.⁶⁸ A more complete study on this subject is the recently published paper of John Kwoka.⁶⁹ He worked with market-share data derived from the 1972 Economic Information System, Inc. tapes and price cost margins and other appropriate variables obtained from the 1972 *Census of Manufacturers*.⁷⁰ He concluded that increasing the shares of only the top two firms increased price-cost margins. An increase in the share of the third firm decreased them, and the shares of the fourth and smaller firms had no effect. There did appear to be a distinct critical two-firm concentration ratio of 35 which is roughly consistent with the four-firm concentration ratios of 51 and 57 cited above.

Many other variables affect ability to collude besides concentration. The number and size of buyers, the possibility of secret price concessions, and the turnover among buyers are all likely to affect the possibility of collusion. The cross-industry studies ignore these important factors and are based on profit rates or price-cost

⁶⁷ White, *Searching for the Critical Industrial Concentration Ratio: An Application of the "Switching of Regimes" Technique*, in *STUDIES IN NONLINEAR ESTIMATION* 61, 64-75 (S. Goldfeld & R. Quandt eds. 1976). As noted above, the four-firm concentration ratio represents the percentage of market share held by the leading four firms in a market. See note 29 *supra*. In this context, a critical four-firm concentration ratio would define the point at which price begins to be affected by concentration.

⁶⁸ Rhoades & Cleaver, *The Nature of the Concentration-Price/Cost Margin Relationship for 352 Manufacturing Industries: 1967*, 40 S. ECON. J. 90, 96-100 (1973).

⁶⁹ Kwoka, *The Effect of Market Share Distribution on Industry Performance*, 61 REV. ECON. & STATISTICS 101 (1979).

⁷⁰ U.S. DEP'T OF COMMERCE, 1972 CENSUS OF MANUFACTURERS (1976).

margins—measurements in which the possibility of error is large. The concentration-price studies summarized above are much more reliable bases for determining critical concentration ratios. Kessel's study of underwriters' spreads and reoffering yields suggests that the degree of competition is increased as the number of firms rise, at least up through eight firms.⁷¹ With equal-sized firms, this would imply a four-firm concentration ratio of 50. In an as yet unpublished extension of the supermarket study,⁷² only four percent of the total increase in price due to concentration occurred as the four-firm concentration ratio increased from 30 to 40, but twelve percent of it occurred over the range from 40 to 50.⁷³ Finally, the Herfindahl indexes in the gasoline study all fell between .067 and .101,⁷⁴ which would imply a range of ten to fifteen equal-sized firms⁷⁵ and a range of minimum concentration ratios of 27 to 40. Yet, concentration over that range had a significant effect on price. At least in food and gasoline retailing, the critical concentration ratio appears to be below 50.

It is obviously much too early to make precise recommendations to the antitrust authorities. However, if Kwoka's results withstand subsequent research and analysis, they would mean that we should not contest horizontal mergers that cannot increase the two-firm concentration ratio above 35 or the four-firm ratio above 50 *and* we should not contest horizontal mergers unless they affect firms that rank first or second in the market or would rank first or second after the merger. By these criteria, many of the horizontal merger cases that reached the Supreme Court in the 1960's were decided too strictly.⁷⁶

C. Barriers to Entry

The other important element of structure emphasized in the structure-conduct-performance paradigm is barriers to entry. Of course the main work in this area is that of J. S. Bain.⁷⁷ Because the whole concept of barriers to entry is to some extent controversial, I will outline Bain's approach and then review Stigler's criticism of it.

⁷¹ See notes 14-27 *supra* & accompanying text.

⁷² See notes 27-32 *supra* & accompanying text.

⁷³ These figures are based on computations done by F. E. Geithman, one of the authors of that study.

⁷⁴ See notes 33-44 *supra* & accompanying text.

⁷⁵ See note 35 *supra*.

⁷⁶ See, e.g., *United States v. Pabst Brewing Co.*, 384 U.S. 546 (1966); *United States v. Von's Grocery Co.*, 384 U.S. 270 (1966); *Brown Shoe Co. v. United States*, 370 U.S. 294 (1962).

⁷⁷ BAIN, BARRIERS, *supra* note 50.

Bain identifies as barriers to entry the economies of large scale and the advantages of established firms in terms of absolute cost and product differentiation.⁷⁸ When these barriers to entry are relatively low, Bain predicts that the industry leaders will price above the entry-impeding level in order to earn greater than normal near-term profits. In the long run, entry by other firms eventually causes a decline in the shares of the existing firms.⁷⁹ This aspect of Bain's analysis is relatively uncontroversial.⁸⁰

On the other hand, when barriers to entry are relatively high, Bain predicts that industry leaders will set prices below the entry-inducing mark. This policy would yield a higher present discounted value of their anticipated stream of profits than if an entry-inducing price were charged with its resulting loss of market share.⁸¹

Bain evaluated barriers to entry on the basis of several characteristics of markets. The barrier that has attracted the most attention is the scale barrier. If minimum efficient scale is large relative to market size, new entrants must either enter with sub-optimal plants and suffer from the resulting higher costs, or expect lower prices or excess capacity and therefore lower profits after they have entered, compared with the present profits of the established leading firms.⁸²

Bain's second barrier arose because insiders had lower costs than potential entrants because of their ownership of low-cost resources (*e.g.*, ore deposits) or technology (*e.g.*, patents) or, perhaps, because of very large capital requirements that the established firms had attained but that very few outsiders could meet.⁸³

Finally, Bain envisioned a product differentiation barrier that arises when consumers have strong preferences for insiders' brands⁸⁴ and that entrants must overcome by price discounts or large promotional expenditures.

The difference between Stigler's and Bain's analyses of barriers to entry is in part semantic. Stigler defines barriers to entry as costs of production that must be borne by entrants but not by firms already in the industry.⁸⁵ He focuses on the extreme case of continuously decreasing cost—the situation where costs decrease

⁷⁸ *Id.* 43.

⁷⁹ *Id.* 21-22.

⁸⁰ G. STIGLER, *supra* note 35, at 96-97.

⁸¹ BAIN, *BARRIERS*, *supra* note 50, at 36-37.

⁸² *Id.* 53-55.

⁸³ *Id.* 144-47.

⁸⁴ *Id.* 114-17.

⁸⁵ G. STIGLER, *supra* note 35, at 67.

indefinitely as scale increases.⁸⁶ He concludes that "[i]f we define a barrier as differentially higher cost of new firms, there is no barrier and the firm size is governed by economies of scale and demand conditions."⁸⁷ I have two objections to this statement. First, by defining barriers to entry as arising from cost differences and nothing else, he excludes what to me is a very important entry barrier. Can anyone doubt that entry into an industry is prohibitively difficult when there is only enough demand to support one efficient firm? If an efficient firm already operates in that industry, its pricing policy will not be significantly affected by the threat of entry of outsiders even if the new entrant would have the same costs as the existing firm if it attained the existing firm's size. To characterize such a situation as displaying "no barrier" is to give the term barrier to entry a meaning that is not very useful in evaluating market power.

My second comment is that Stigler has chosen an extreme case. There probably are some industries with continuously decreasing costs—some utilities, pipelines, and some newspapers—but the case where unit costs decrease with scale up to a point and are constant or increasing after that are surely sufficiently common to warrant consideration. In addition, it seems obvious to me that entry into a market where there is room for only seven efficient plants (*e.g.*, refrigerators) is bound to be more difficult than entry where there is room for 532 efficient plants (*e.g.*, shoes),⁸⁸ even if a new entrant, once established in the refrigerator or shoe industry, had access to the same cost function as the previous insiders. The struggle to enter a market in the form of price cuts or promotional expenses and the excess capacity that is likely to occur as a result of entry are surely much greater when the entrant must attain one-seventh of the market to be efficient than where he must attain $\frac{1}{532}$ of it.

Stigler says there is no capital requirements barrier because existing firms have raised and continue to raise the requisite capital. His conclusion does not automatically follow from his statement.⁸⁹ The supply of capital to a firm is not infinitely elastic.

⁸⁶ *Id.* 67-69.

⁸⁷ *Id.* 67.

⁸⁸ These are estimates of the number of plants of minimum efficient size that the United States domestic market could support, taken from F. SCHERER, A. BECKENSTEIN, E. KAUFER & R. MURPHY, *THE ECONOMICS OF MULTIPLE PLANT OPERATIONS* 94 (1975).

⁸⁹ Stigler states:

Capital requirements are often listed as a barrier to entry. Since existing firms also have to meet these requirements, they are not a barrier in our

This means that most firms must find it impossible to enter industries like steel and automobiles which require billions of dollars in assets to be efficient. If the number of firms capable of raising such large lumps of capital are few relative to the investment opportunities of such magnitudes, then firms in such industries could earn more without attracting entry than in industries in which capital requirements are low. An empirical test by Hall and me apparently yielded a mild but significant positive relationship between firm size and profit rates among the few hundred largest industrial firms—a relationship which would have implied a capital-requirements barrier.⁹⁰ I am more skeptical now because in subsequent unpublished work I have often found the relationship not to be significant. The capital requirements barrier *may* be low or nonexistent, but not because of Stigler's argument.

Stigler doesn't address other sources of Bain's "absolute cost barriers,"⁹¹ such as the ownership of low-cost ore reserves or of patents. Since these barriers *do* rest on cost differences between established firms and new entrants, there is no inherent problem with Stigler's definition in these cases. What really counts from a social point of view is whether prices are raised above minimum average cost. They surely can be as a result of a patent, although society can quite rationally accept the resulting monopoly profits as a price worth paying for the innovations that are encouraged by the patent system. Similarly, if most low-cost iron ore reserves, say, were in the hands of one or a few firms, the price of the ore and of products made from it would be higher than if the ownership of ore reserves were unconcentrated. This is a matter of monopoly pricing—more than just the scarcity rents would accrue to the owners of low-cost reserves in competitive markets. The reason why the insiders have the power to elevate prices above competitive levels is because of high concentration in ownership of the scarce resource *and* the fact that entrants would experience higher costs whether they bought from the ore monopolist or turned to high-cost sources of ore.⁹²

terminology. They are a determinant (if they are relevant at all) of the economics of scale—the shape of the long-run average cost curve.

G. STIGLER, *supra* note 35, at 70.

⁹⁰ Hall & Weiss, *Firm Size and Profitability*, 49 REV. ECON. & STATISTICS 319, 324-27 (1967).

⁹¹ J. BAIN, *BARRIERS*, *supra* note 50, at 144-66.

⁹² The iron ore example is an approximation of the situation in the American steel industry in the first half of this century. A crucial element of the 1901 merger that created U.S. Steel was the acquisition of a large proportion of Great Lakes ore reserves. As late as 1948, U.S. Steel had 62% of Great Lakes reserves and 85.5%

Finally, Stigler feels that product differentiation is only a barrier if the costs of differentiation, such as design or advertising, are higher for new firms than for existing firms.⁹³ The relevant question with respect to the product differentiation requirements of new entrants is whether those expenses can be reduced, rather than how they compare with the past and present product differentiation expenditures of the existing industry leaders. For instance, the tie between tin cans and can-closing machines created strong loyalties of packers to American Can and Continental Can until that tie was broken as a result of an antitrust case.⁹⁴ The result of that decision was a sharp reduction in barriers to entry.⁹⁵ Since that decision, a good deal of entry has occurred. The four-firm concentration ratio in the tin-can industry has fallen from 78 in 1947 to 66 in 1972.⁹⁶ This change seems to have created a far more competitive industry. In general, if consumer loyalties to leading firms are reduced, either by government actions or by changing market conditions, the threat of new competition will be more serious and immediate than without such a change.

One more way in which the conflict between Stigler and Bain can be at least partially resolved is to consider the time required for an entrant to become a meaningful competitor. Even if entry is "free" in Stigler's sense that given enough time a new entrant would have no higher costs than existing industry leaders, actual entry is likely to be much slower if large market shares are required for efficiency, if established firms control most of the essential natural resources or patents, if huge amounts of capital are required, and if consumers have strong loyalties to existing firms. If entry takes a generation instead of a year, existing industry leaders can raise prices substantially above cost for many years as a result. If so, most of Bain's predictions will follow regardless of what terms are used in describing market structure.

of the low cost open pit reserves compared with an output share of only 33% of ingot steel in that year. FEDERAL TRADE COMMISSION, REPORT ON THE CONTROL OF IRON ORE 7, 34, 133, 157 (1952). The example is less of a description of the steel industry today because of the shift to taconite and the development of many new sources of ore overseas.

⁹³ G. STIGLER, *supra* note 35, at 70.

⁹⁴ *United States v. American Can Co.*, 87 F. Supp. 18 (N.D. Cal. 1949).

⁹⁵ See McKie, *The Decline of Monopoly in the Metal Container Industry*, 45 AM. ECON. REV. 499, 506-08 (1955) (contained in the Papers and Proceedings of the Seventy-Seventh Annual Meeting of the American Economic Association).

⁹⁶ 1 U.S. DEP'T OF COMMERCE, 1972 CENSUS OF MANUFACTURERS (SUBJECT AND SPECIAL STATISTICS) SR2-30 (1976).

III. THE IBM CASE FROM THE STRUCTURE-CONDUCT-PERFORMANCE PERSPECTIVE⁹⁷

The remainder of this paper will apply the structure-conduct-performance approach to the Justice Department's case against IBM under section 2 of the Sherman Act.⁹⁸ Specifically, this section of the Article will demonstrate that IBM is a dominant firm, that it is protected by high barriers to entry, and that it has earned exceptionally high profits. Finally, the Article will comment on the requirements of proof in monopolization cases, and will comment briefly on proposals for reform in that area.

A. Market Definition—IBM as a Dominant Firm

Market definition is crucial in a structure-conduct-performance analysis. Concentration and market share are only meaningful within markets that are correctly defined, and, of course, concentration and market share are leading indexes of market power. This subsection of the Article will show that IBM is a dominant firm in the computer-systems industry, and that, as such, it has the power to control price.

The Justice Department has proposed that the market be defined as that for "general purpose electronic digital computer systems."⁹⁹ For this purpose, a "computer system" includes one or more central processing units (CPUs), various peripheral devices attached to the CPU (but not terminals), and the operating software and service necessary to make this hardware useful. By its definition, "general purpose" systems are those optimized for a broad range of commercial applications. The Justice Department excludes special purpose systems, such as process-control computers and "ruggedized" military computers, on the grounds that these are

⁹⁷ Much of the material in this section of the Article was developed in connection with my preparation for testimony as an expert witness for the Justice Department in the *IBM* case. *United States v. IBM*, No. 69 Civ. 200 (S.D.N.Y., filed Jan. 17, 1969). However, the views expressed in this section are my own and do not necessarily represent those of the Justice Department.

⁹⁸ Section 2 of the Sherman Act provides in pertinent part: "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be guilty of a misdemeanor. . . ." 15 U.S.C. § 2 (1976).

⁹⁹ Amended complaint, at 8-9, *United States v. IBM*, No. 69 Civ. 200 (S.D. N.Y., filed Jan. 17, 1969). In addition, the Justice Department identified three submarkets: "Tape drives and their controllers for attachment to IBM systems," "disk drives and their controllers for attachment to IBM systems," "and add-on memory for attachment to IBM systems." *Id.* This Article will not discuss these submarkets.

not realistic alternatives for business users. Their definition also excludes scientific computers, although a significant number of those systems are widely used for both commercial and scientific purposes. However, the Justice Department includes both scientific and what it calls general purpose systems when it computes market shares. Finally, mini-computers are not included in the market because they lack sufficient operating software to accommodate a large proportion of business data-processing needs.

The Justice Department depended heavily on the testimony of F. G. Withington, an expert from Arthur D. Little, in arriving at this definition. He included in a system the CPU and the peripheral equipment that are typically ordered as a unit, are controlled by the same operating programs, and are physically contiguous. Because terminals do not have any of these three characteristics, he excluded them.¹⁰⁰

The Justice Department measures the market in terms of the lease value of United States installed base—that is, the one month rental value of all general purpose systems in use whether leased or purchased. In most industry studies market shares are measured in terms of value of shipments. However, in a lease-oriented market such as computers, where many shipments are replacements for returned systems, net shipments (shipments minus returns) is a more appropriate measure. A shipment that merely replaces an older system of the same manufacturer does not represent an increase in the manufacturer's revenues in the same way that a new system with no return does. The installed base is an approximation of the average of *net* shipments over several previous years. A number of other observers in the computer industry measure market share in terms of installed base. This is true of International Data Corporation (IDC),¹⁰¹ Arthur D. Little,¹⁰² and IBM's own COMSTAT,¹⁰³ an internal system measuring market shares on the basis of salesmen's reports.

A problem with market-share measurement in the computer industry is how to treat independents' peripheral equipment attached to IBM CPUs. The Justice Department excludes this equipment from both the numerator and the denominator in its

¹⁰⁰ Transcript, at 55523-24, 55740, 55756, 56865-69, *United States v. IBM*, No. 69 Civ. 200 (S.D.N.Y., filed Jan. 17, 1969) [hereinafter cited as *IBM Transcript*] (testimony of F.G. Withington).

¹⁰¹ EDP INDUSTRY REPORT, May 19, 1978, at 2.

¹⁰² ARTHUR D. LITTLE, *THE WORLD COMPUTER INDUSTRY 1975-1980* (1976).

¹⁰³ Government Exhibit 4929, *United States v. IBM*, No. 69 Civ. 200 (S.D.N.Y., filed Jan. 17, 1969).

market-share calculations. Because these peripherals are virtually perfect substitutes for those supplied by systems producers, it seems incorrect to exclude them from the market. IDC treats them as part of IBM's market share, a position that seems much more plausible.¹⁰⁴ In a structure-conduct-performance analysis, the primary concern is whether IBM has a large enough share of the market to control systems prices. IBM effectively sets the total price of its systems, including the independents' peripherals attached to those systems, in the sense that the independents' peripheral equipment must be priced at IBM's prices less a discount. Therefore, I conclude that the value of independents' peripherals attached to IBM systems should be included in IBM's share. It might have been better to measure IBM's share of CPUs by value, excluding everybody's peripherals from the calculation, but that data is not available. In its absence, I believe that total-system values is the best index.

Using its definition, the Justice Department calculated that IBM's share of the total United States installed base in 1972 was 69.3%, down from 75.1% in 1964, and that its closest competitor was Univac with 10.5%, which had 7.6% in 1964.¹⁰⁵ IDC calculated that IBM's 1972 share of installed base of general purpose systems was 67% (63.2% excluding independents' peripherals and terminals attached to IBM CPUs from the numerator), down from 70% in 1964.¹⁰⁶ In 1975, IDC showed IBM with a 68% share (60.3% excluding independent attachments from the numerator).¹⁰⁷ Arthur D. Little fixed IBM's market share at 76.3% in 1964, 67.8% in 1972 and 68.4% in 1977.¹⁰⁸ IBM's own COMSTAT figures yielded an IBM share of 71.4% in 1972 against 79.8% in 1961.¹⁰⁹ In general, these various sources yield similar results.

IBM has not yet addressed the question of market definition in the Justice Department case, but in *ILC Peripherals Leasing Corp.*

¹⁰⁴ EDP INDUSTRY REPORT, May 19, 1978, at 2.

¹⁰⁵ Government Exhibit 5448, United States v. IBM, No. 69 Civ. 200 (S.D.N.Y., filed Jan. 17, 1969).

¹⁰⁶ Calcomp Exhibit No. 227, California Computer Products, Inc. v. IBM, No. C-73-2331-RM (C.D. Cal., dismissed Feb. 11, 1977). Using the Justice Department definition that excludes independents' peripheral equipment from both the numerator and denominator of the market share equation, IBM's share in 1972 would be 65.7%, and in 1975, 65.3%, down from its 1964 share of 70%. *Id.*

¹⁰⁷ *Id.*

¹⁰⁸ Government Exhibit 4827A, United States v. IBM, No. 69 Civ. 200 (S.D. N.Y., filed Jan. 17, 1969).

¹⁰⁹ Government Exhibit 4929, United States v. IBM, No. 69 Civ. 200 (S.D. N.Y., filed Jan. 17, 1969).

*v. IBM*¹¹⁰ (*Memorex*), its economic witness, James W. McKie, defined the market as that for "electronic data processing" (EDP). This definition included makers of central processing units, peripherals and terminals, as well as software houses, maintenance and service firms, leasing companies, and service bureaus.¹¹¹ Special purpose computers and mini-computers were both included.

In *Memorex*, IBM deposed representatives of over 800 firms and asked each firm to disclose its United States EDP revenues and the sources of those revenues. The depositions were then screened to determine whether the revenues could legitimately be included in the EDP industry. For example, IBM excluded the revenues of producers of "media" (e.g., tapes or cards) from its measure of total EDP revenue. The United States EDP revenues of some 637 firms were ultimately included.¹¹² The result was that IBM had 33% of the market, and its closest competitor was American Telephone and Telegraph (AT&T) with 8%.¹¹³ On this basis, IBM's market share had declined from 74% in 1952 to 33% in 1972. AT&T's share was largely attributable to two products—its teletypes (that could be attached to computers),¹¹⁴ and its Number One Electronic Switching System, which is used by AT&T subsidiaries for message switching. An IBM witness testified that this latter system can be used for accounting functions and is so used by some AT&T subsidiaries.¹¹⁵ It is sold to non-AT&T companies abroad but not in the United States. Finally, IBM made no distinction between revenues from sales or from rentals, simply adding the two together.

The IBM market definition seems highly questionable. Including leasing companies and service bureaus in the same market with manufacturers has the effect of double-counting, because the sales revenues of the manufacturers and the rentals of the leasing companies and service bureaus refer to the same machines, at least when several years' results are used. Leasing companies do put some competitive pressures on IBM by facilitating sales by independent peripheral suppliers and by keeping older computers on the market that would have been withdrawn had they been on lease from IBM. Moreover, leasing companies limit IBM's price-lease multiple.¹¹⁶

¹¹⁰ *ILC Peripherals Leasing Corp. v. IBM*, 458 F. Supp. 423 (N.D. Cal. 1978).

¹¹¹ Transcript, at 16504, *ILC Peripherals Leasing Corp. v. IBM*, 458 F. Supp. 423 (N.D. Cal. 1978) (testimony of McKie).

¹¹² *Id.* 16282-95 (testimony of McKie).

¹¹³ *Id.* 16729 (testimony of McKie).

¹¹⁴ *Id.* 16719.

¹¹⁵ *Id.* 16805, 16809.

¹¹⁶ The price-lease multiple is simply the purchase price divided by the monthly rental fee.

However, this kind of competition differs fundamentally from that which IBM experiences from other producers of computer systems. An apt analogy would be inclusion of the revenue of independent auto-rental companies in determining General Motors' share of the automobile market. Similarly, including service bureaus in the computer markets is like including taxicab operators in the automobile market. And the inclusion of software houses and maintenance firms in the EDP market seems comparable to including auto-repair services in the automobile market.

Special purpose military and process control systems raise a different issue. Although they may be technically capable of performing business calculations, they are seldom used for those purposes because their prices and operating software reflect their special uses. The inclusion of mini-computers is a less obvious issue. Groups of mini-computers are sometimes substituted for a larger CPU, but the operating software of mini-computers is not adequate for many business applications.

One industry source, the trade journal *Datamation*, compiles and publishes EDP revenues of the fifty largest United States EDP companies each June in a tabulation somewhat resembling IBM's. It excludes special military systems and "special purpose systems in which the general public would have no interest."¹¹⁷ It includes a number of firms that offer primarily services, and although it does not include any exclusively separate software, maintenance or leasing companies, it does include the software, maintenance and service-bureau revenues of general purpose companies that sell such services.¹¹⁸ In particular, the leading independent maintenance and service-bureau firms (COMMA, a maintenance firm, and Service Bureau Corporation) are included as subsidiaries of Control Data Corporation.¹¹⁹ *Datamation* includes media¹²⁰ and foreign EDP¹²¹ revenue, both of which IBM excluded. The only part of AT&T included in the market is Teletype Corporation, a subsidiary of Western Electric, with less than 0.4% of *Datamation's* "DP revenue."¹²² By *Datamation's* calculations, IBM has 50.5% of the top fifty firms' "DP revenue."¹²³ It estimates that its fifty firms ac-

¹¹⁷ DATAMATION, June 1977, at 62.

¹¹⁸ *Id.*

¹¹⁹ *Id.* 66.

¹²⁰ *Id.* 62.

¹²¹ *Id.* 64.

¹²² *Id.* 64, 71; *see id.* 61.

¹²³ *Id.* 61, 64.

count for 95% of United States EDP firms' revenue, so IBM's share of the total would be 47.8%.¹²⁴

In general, we need a market definition and a market measurement to judge whether a firm is "dominant" in the technical economic sense of that term. For this purpose, we need well-defined groups of products that are close substitutes for one another. Neither the Justice Department's nor IBM's definitions meet this criterion perfectly, but Justice's "general purpose electronic digital computer systems" seems more valid than IBM's "electronic data processing" formulation. The only serious defect in the Justice Department definition is its exclusion of independents' peripheral equipment from the market. However, as I have argued above,¹²⁵ this exclusion actually underestimates IBM's market share, because that equipment should be included in both the numerator and denominator of IBM's market share.

On the other hand, the defects in the market definition that IBM adopted in the *Memorex* case are much more numerous and distorting. The inclusion of leasing companies, service bureaus, software houses and maintenance firms, special purpose military and process control systems, and mini-computers in the market cannot be justified on close economic analysis and severely understates the degree of IBM's dominance.

The Justice Department, Arthur D. Little, IDC and COM-STAT data put IBM's 1972 market share in the area of 67% to 71% of the general purpose market (63% in 1972 using IDC's figures if independents' peripherals are excluded from IBM's share and 66% if they are excluded from the denominator as well).¹²⁶ IBM has no close competitors by anyone's count, including its own. In my mind, IBM's market share is high enough relative to its rivals' to make it a dominant firm in the technical economic sense. That is, it is large enough that it must make the pricing decisions in the systems market on the basis of its own demand curve, which is the market demand minus the supply from its small rivals. It is true that IBM's smaller rivals do not generally match its price precisely, but that is a minor consideration. If IBM charged a higher or lower price, I feel certain that the smaller rivals would follow suit. If IBM is a dominant firm in the systems market, it follows that it has the power to control price without any agreement with the other firms in the market.¹²⁷

¹²⁴ *Id.* 62.

¹²⁵ See notes 103-05 *supra* & accompanying text.

¹²⁶ See text accompanying notes 104-09 *supra*.

¹²⁷ See text accompanying notes 8-10 *supra*.

The optimal price for IBM to charge depends on its costs, the long-run elasticity of demand for its product and the threat of new entrants. The next section of this Article will examine the nature and strength of the barriers to entry in this industry.

B. Barriers to Entry in the General Purpose Systems Market

The only academic estimate of economies of scale in the systems market is that of C. F. Pratten,¹²⁸ whose analysis referred to "electronic capital goods" in Britain in the late 1960's. Pratten estimated that "for a firm attempting to compete with a comprehensive range of electronic data processing equipment," minimum efficient scale (MES) might be 100% of the British market,¹²⁹ an amount which corresponded to 10% of the United States market for computers in 1968.¹³⁰ Elsewhere in the same study, he estimated that for "[a] firm which manufacturers [sic] a range of E.D.P. equipment," MES would be "[a]n output of at least £200 million per year,"¹³¹ which would correspond to about \$500 million at the exchange rates that applied then. By his calculations, this would have meant 15% of United States output of computers excluding peripherals.¹³² Using Census value-of-shipments data, it would have been equivalent to 12% of United States shipments in 1968.¹³³

The Justice Department case contains several relevant estimates. Robert McDonald, president of Sperry Rand (Univac), testified that a Univac study which was conducted in the late 1960's concluded that to be viable in the general purpose computer business a firm would need an annual revenue of \$400-500 million.¹³⁴ He described viability as "enough gross profit . . . to finance the development of new products and development of new market capability."¹³⁵ That need not correspond directly to MES because prices on computer markets which Sperry Rand assumed when making its study were above competitive levels.

Several other witnesses in the case made similar statements. John Hangen, senior vice president of NCR, estimated that his firm

¹²⁸ C.F. PRATTEN, *ECONOMIES OF SCALE IN MANUFACTURING INDUSTRY* (1971).

¹²⁹ *Id.* 225.

¹³⁰ *Id.* 328. This measurement excludes peripheral equipment.

¹³¹ *Id.* 274.

¹³² *Id.* 328.

¹³³ 2 U.S. DEP'T OF COMMERCE, *1972 CENSUS OF MANUFACTURERS* (1976). 1968 value of shipments was reported as \$4163.4 million. Because of the inclusion of a good deal more than general purpose systems, and some double counting, the 12% figure is a lower bound.

¹³⁴ IBM Transcript, *supra* note 100, at 3741-42 (testimony of R.E. McDonald).

¹³⁵ *Id.*

would need in excess of 10% of total installed base to have system support comparable to IBM's.¹³⁶ Richard M. Bloch, who headed Advanced Product Lines for General Electric before it left the industry, testified that General Electric's goal was 10% of the market, which he estimated to be enough for "long-term viability."¹³⁷ Arthur Beard, former vice president and chief engineer of RCA's Computer Systems Division, testified that RCA's goal was to have 10% of the market within 5 to 10 years.¹³⁸ However, Joseph Rooney, former vice president of marketing for RCA, although confirming that RCA's goal was a 10% market share,¹³⁹ maintained that 10% was not necessary for profitability.¹⁴⁰

The upshot of this evidence is that as of the late 1960's or early 1970's, a number of firms in the general purpose computer-systems market had concluded that about 10% of the market was needed for stability, viability, or profitability. Only the economist Pratten described that level as "minimum efficient scale," a term that may not be in businessmen's speaking vocabularies. Moreover, their common conclusion that 10% of the market was needed for stability, viability, or profitability may well have rested on the assumption that IBM would continue to charge monopoly prices. If so, minimum efficient scale may actually be larger than 10% of the market.

A 10% or greater scale requirement constitutes a high-scale barrier by Bain's standards.¹⁴¹ Bain found this range of MES in the automobile, typewriter, tractor, and copper markets, in which the scale requirement was highest among the twenty industries he studied.¹⁴²

The absolute cost barriers do not seem to be serious barriers to entry in the general purpose computer market. Special access to natural resources is clearly not a factor, and, suprisingly, patents have not restricted entry either. Highly talented personnel have apparently been readily available to small firms, many of them former employees of IBM or other general purpose systems producers.

The capital requirements for an established general purpose producer are large, however. Ten percent of the total installed base

¹³⁶ *Id.* 6366, 6368 (testimony of J.J. Hangen).

¹³⁷ *Id.* 7636, 7637, 7640-41 (testimony of R.M. Bloch).

¹³⁸ *Id.* 8500 (testimony of A.D. Beard).

¹³⁹ *Id.* 11803 (testimony of J.W. Rooney).

¹⁴⁰ *Id.* 12383 (testimony of J.W. Rooney).

¹⁴¹ BAIN, BARRIERS, *supra* note 50, at 86.

¹⁴² *Id.* 81-84.

today would be \$4.4 billion.¹⁴³ Some of this would be purchased rather than leased, so the capital requirement would be less than \$4.4 billion, but a figure of over a billion dollars is almost certain. Bain characterized the steel, automobile, petroleum refining, tractor, and cigarette markets as having very high capital requirements—over \$100 million in the early 1950s.¹⁴⁴ A steel mill considered for construction in 1976 was expected to have an investment requirement of \$3.25 billion to achieve a four-million ton capacity.¹⁴⁵ In the early 1970's, MES in petroleum refining was about 150-200 thousand barrels per day, a scale that required an investment of as much as \$300-\$350 million.¹⁴⁶ Vertical integration into production, pipelines, and distribution could double or triple this figure. L. J. White estimated that in the late 1960's efficient automobile production required a billion-dollar investment.¹⁴⁷ Inflation has probably doubled that figure. The capital requirements for an efficient new entrant in the general purpose computer-systems market are comparable to those of the steel and automobile industries and probably higher than in petroleum refining. This means that the capital requirements are as great as those in any major industry outside of the regulated sector.

Finally, product differentiation is very important in this industry. This barrier to entry is partially attributable to services offered by computer firms, an area in which a very large firm is at an advantage because it can provide prompt and complete service at points scattered widely throughout the country more easily than can a firm with a much thinner population of users. In addition, users might reasonably be concerned about the prospect of being left orphans by one of the smaller firms in the industry or by a new entrant. Most important, however, is software lock-in. Users have accumulated large stocks of software, which is highly dependent on the system for which it is written. Because switching to another supplier is likely to result in the obsolescence of a large part of that software, only sharp discounts can overcome the users' very strong loyalty to the current systems supplier.

¹⁴³ This figure is based on an IDC estimate of total United States installed base at the close of 1977. Patrick McGovern of IDC supplied the author with this information in a telephone conversation.

¹⁴⁴ BAIN, BARRIERS, *supra* note 50, at 158-59.

¹⁴⁵ COUNCIL ON WAGE AND PRICE STABILITY, REPORT TO THE PRESIDENT ON PRICES AND COSTS IN THE U.S. STEEL INDUSTRY 79 (1977).

¹⁴⁶ T.D. DUCHESNEAU, COMPETITION IN THE U.S. ENERGY INDUSTRY 102-03 (1975).

¹⁴⁷ L.J. WHITE, THE AUTOMOBILE INDUSTRY SINCE 1945, at 54-65 (1971).

The strong product differentiation advantage of IBM over the smaller systems manufacturers is well borne out in the record of the Justice Department case. Most officers of the smaller systems manufacturers and former systems manufacturers testified that they priced considerably below IBM for comparable performance. This was true of Sperry Rand (10% less),¹⁴⁸ SDS (10-15% less when in direct competition with IBM),¹⁴⁹ Control Data Corporation (less 5-10% on systems and 10-15% on peripherals),¹⁵⁰ NCR (5-10% less),¹⁵¹ General Electric (20-40% price performance advantage over IBM),¹⁵² RCA (needed a 15-20% price/performance advantage to compete and 20% less to displace IBM sales),¹⁵³ XDS (2-10% less),¹⁵⁴ and Amdahl (2½ times the performance of the IBM 370/168 system and same price).¹⁵⁵ An IBM internal memorandum from O. M. Scott to F. T. Cary (both IBM officers), dated April 14, 1969, acknowledged that IBM had been successful in selling its products at prices 10-15% higher than their competition.¹⁵⁶ This testimony provides an indication of very strong brand loyalty on the part of IBM's customers and implies an extremely high product-differentiation barrier for potential new competitors.¹⁵⁷

Stigler denies the existence of a product-differentiation barrier if existing firms had to make a comparable investment in product

¹⁴⁸ IBM Transcript, *supra* note 100, at 2883-87, 4150-51 (testimony of R.E. McDonald).

¹⁴⁹ *Id.* 3149-50, 3176 (testimony of M. Palevsky).

¹⁵⁰ *Id.* 6573-74 (testimony of J.W.C. Lacey); *see id.* 6042-43 (testimony of W.C. Morris); *id.* 5573-74 (testimony of C.W. Spangle).

¹⁵¹ *Id.* 6350-51 (testimony of J.J. Hangen).

¹⁵² *Id.* 7716 (testimony of R.M. Bloch).

¹⁵³ *Id.* 8491-95, 10080-81 (testimony of A.D. Beard); 11826 (testimony of J.W. Rooney).

¹⁵⁴ *Id.* 13182-84 (testimony of V.O. Wright).

¹⁵⁵ *Id.* 13278-80 (testimony of V.O. Wright).

¹⁵⁶ Government Exhibit 2423, *United States v. IBM*, No. 69 Civ. 200 (S.D. N.Y., filed Jan. 17, 1969).

¹⁵⁷ The product differentiation barrier is much lower in the market for peripherals because there is no software lock-in problem. In addition, Amdahl and a few other firms that have followed its lead have taken steps in recent years that could materially ease the software lock-in barrier. Amdahl has succeeded in marketing "plug compatible CPUs" which are perfect substitutes for IBM CPUs in that all software that would run on comparable IBM systems would run on the Amdahl system. Entire systems can now be built around Amdahl CPUs because, although Amdahl does not market peripherals, they are available from IBM or independent suppliers. Amdahl and similar CPUs are still a very small part of the systems installed—only 1.6% of the 1977 shipments, and almost certainly a smaller part of the 1977 installed base. EDP INDUSTRY REPORT, May 19, 1978, at 2. The effect of this development is not clear because IBM's full response has not yet been seen. A natural tactic would be to make all new IBM software proprietary so that buyers of Amdahl CPUs would not have access to software enhancements hereafter.

differentiation when they entered. But IBM clearly did not. When it entered and established its large market share, IBM did not have to overcome much software lock-in because most of its customers had not previously owned computers.

Altogether, new entrants and small firms seeking to expand in the general purpose systems market face scale requirements as great as those in typewriters, automobiles, tractors, or copper; capital requirements comparable to those in steel and automobiles; and a product-differentiation barrier as high as or higher than the industries Bain counted as having "great" product-differentiation barriers—automobiles, typewriters, tractors, liquor, and cigarettes.¹⁵⁸ It is not obvious how you add up these barriers, but I would expect that Bain would have concluded that the aggregate barriers were "very high," as he did for automobiles, cigarettes, liquor, tractors, and typewriters.¹⁵⁹

Having concluded that IBM has a sufficiently large market share to be a dominant firm and is therefore able to control price, and that it is protected from new entry and from expansion by small rivals by very high barriers to entry, I would conclude that IBM clearly had strong monopoly power.

C. Market Performance—IBM's Profit Level

Given that market structure, the model predicts that IBM would earn exceptional profits. In fact it does. Table 4 shows several alternative rates of return earned by IBM and by 47 of the other 50 leading industrials included in the May 1976 *Fortune* 500 list.¹⁶⁰

Columns 1 and 2 show rates of return on equity for IBM and for the forty-seven other large manufacturers. IBM consistently earned much more than the mean return on equity of the others. Over the 1962-1975 period, IBM averaged a 17.62% return on equity—44.7% higher than the forty-seven other manufacturers.

¹⁵⁸ BAIN, BARRIERS, *supra* note 50, at 140-41.

¹⁵⁹ *Id.* 170.

¹⁶⁰ FORTUNE, May 1976, at 316-41. The rate of return figures are my own calculations, based on data for 1976 obtained from the COMPUSTAT Primary File, a computer service of Standard and Poors. Two firms, Western Electric and Occidental Petroleum, are excluded from the table because the COMPUSTAT Primary File does not provide data on them. All other information included in the table and the single-firm data given in the text were derived from the COMPUSTAT Primary File except for IBM's interest income (noted in columns 3 and 7), which was derived from IBM's annual reports in an entry defined as "other income, primarily interest."

TABLE 4

RATES OF RETURN OF IBM AND OTHER LARGE INDUSTRIAL FIRMS

Year	Net Earnings ÷ Stockholders' Equity a			Adjusted Net Earnings ÷ Adjusted Stockholders' Equity b			Cash Flow ÷ Stockholders' Equity c			Adjusted Cash Flow ÷ Adjusted Stockholders' Equity d		
	(1) IBM	(2) 47 Others	(3) IBM	(4) 23 Others	(5) IBM	(6) 47 Others	(7) IBM	(8) 23 Others	(9) IBM	(10) 47 Others	(11) IBM	(12) 47 Others
1962	17.48	12.13			37.62	22.36			47.96	23.43		
1963	18.25	12.32			36.02	21.70			42.80	20.02		
1964	19.13	13.54			40.35	23.00			44.42	20.37		
1965	18.50	14.33			38.91	23.94			48.29	23.59		
1966	15.83	14.06			35.21	23.67			50.93	27.48		
1967	17.00	12.60			41.95	22.41			50.03	24.19		
1968	19.07	12.30			42.02	22.80			51.13	22.90		
1969	17.70	10.29	21.01	12.56	38.31	20.94			47.94	23.14		
1970	17.11	7.79	18.06	7.40	36.77	18.94						
1971	16.24	8.55	19.05	8.20	35.11	19.52						
1972	16.91	11.03	21.15	13.12	35.66	21.92						
1973	17.88	13.39	23.14	15.80	35.91	24.04						
1974	18.18	15.49	23.46	13.15	35.07	29.39						
1975	17.43	12.72	24.21	10.41	33.39	24.50						
Average	17.62	12.18	21.44	11.52	37.31	22.80						

a. This measure represents net income after tax, minus extraordinary items and discontinued operations, all divided by preferred stock plus common equity. In terms of COMPUSTAT variables, the equation is $(18 - 48)/(130 + 60)$.

b. This measure represents a complex fraction, the numerator of which is net income after tax, minus extraordinary items and discontinued operations, minus interest income times equity, all divided by total capitalization. The denominator is common and preferred equity, minus cash and marketable securities times cash times equity, all divided by total capitalization. Many firms were left out of column 4 because they did not report interest income. Nine of the 23 firms in column 4 were not included for some of the years 1962-1975. Because interest income was not reported by COMPUSTAT before 1969, earlier years are left blank in columns 3 and 4. In terms of COMPUSTAT variables, the figures in columns 3 and 4 are $(18 - 62(130 + 60)/(130 + 60 + 9) - 48) \div (130 + 60 + 1(130 + 60)/(130 + 60 + 9))$.

c. This measure represents net income after tax, plus depreciation, minus extraordinary items and discontinued operations, all divided by preferred stock plus common equity. In terms of COMPUSTAT variables, the equation is $(18 + 14 - 48)/(130 + 60)$.

d. This measure is a complex fraction, the numerator of which is net income after tax, plus depreciation, minus interest income times total equity, all divided by total capitalization minus extraordinary items and discontinued operations. The denominator is preferred stock plus common equity, minus cash and marketable securities times total equity, all divided by total capitalization. In terms of COMPUSTAT variables, the equation is $(18 + 14 - 62(130 + 60)/(130 + 60 + 9) - 48) \div (130 + 60 - 1(130 + 60)/(130 + 60 + 9))$. Many firms are excluded in computing column 8 because they did not report interest income. Because interest income was not reported by COMPUSTAT until 1969, previous years are left blank in columns 7 and 8. IBM interest income is taken from the "other income, primarily interest" entry in the IBM annual reports.

Only four firms exceeded its average rate of return: Caterpillar Tractors (17.77%), Kodak (20.05%), Xerox (22.07%), and Lockheed (18.02%). The Lockheed figure reflects low equity, rather than exceptional profitability. Because heavy losses had exhausted much of Lockheed's equity, the 1974 and 1975 profits, when divided by the remaining equity, resulted in rates of return of 87.55% and 60.16%, respectively. Xerox and Kodak were also dominant firms in the period covered. I am uncertain about the status of Caterpillar Tractors. Other firms with average rates of return close to IBM's were General Motors (17.48% average) and R. J. Reynolds (17.22%). Neither was a dominant firm in its primary market because each had close rivals, but each was the leading firm in a market that Bain judged to have very high barriers to entry.¹⁶¹

IBM's high profits were not due to exceptional risk. The standard deviation of IBM's rate of return was only 0.97. Based on the data in Table 4, the average standard deviation for the other forty-seven firms was 4.02. Only R. J. Reynolds among the other forty-seven firms had a lower standard deviation (0.76). In short, IBM had an exceptionally high and stable rate of return.

The rate of return on equity understates IBM's rate of return relative to other large firms for several reasons. First, IBM holds a very large amount of cash and marketable securities on which it earns only market rates of return. In 1975, such holdings came to \$4.8 billion or 30.7% of its assets.¹⁶² Columns 3 and 4 show rates of return on adjusted equity when interest income times equity over total capitalization is subtracted from the numerator, and cash and marketable securities times equity over total capitalization is subtracted from the denominator. Interest income and cash and marketable securities were multiplied by equity over total capitalization in order to allow an appropriate share of interest income and cash and marketable securities to be financed by debt rather than equity. The figures in columns 3 and 4 represent rates of return on operating equity. Of course some cash is essential for business operations, but COMPUSTAT does not permit us to subtract out marketable securities separately. IBM's rate of return on its operating equity was 21.44%, or 84% more than the average for twenty-three other large firms. Of the firms for which this calculation was possible, only Kodak (23.02%), another dominant firm, earned more on this basis than IBM.

¹⁶¹ BAIN, *BARRIERS*, *supra* note 50, at 140-41.

¹⁶² These calculations are also based on COMPUSTAT Primary File data.

Another way in which IBM tends to understate its profit rate is in its method of accounting for depreciation. IBM uses the sum-of-the-years' digits method, whereas many of the other computer manufacturers charge depreciation on a straight-line basis.¹⁶³ Its capital-revenue ratio is very high (107.6% in 1975), and its assets are growing very rapidly.¹⁶⁴ As a result, it is probably greatly understating its profits relative to other firms with straight-line depreciation, with less capital per dollar of sales and/or with slower growth. In an attempt to deal with this, columns 5 and 6 compare IBM's and the other forty-seven large firms' cash flow divided by stockholders equity. On this cash-flow basis, IBM had an average return of 37.31%, which was 64% higher than the 22.80% average for the other forty-seven large firms. Only Xerox (52.01%) and Lockheed (44.18%) had higher returns on a cash-flow basis than IBM. Lockheed is a statistical artifact and Xerox, like IBM, was a dominant firm with a rapidly growing lease base.

Finally, columns 7 and 8 make both adjustments at once. That is, cash flow rather than net income is in the numerator, and appropriate fractions of interest income and of cash and marketable securities are subtracted from the numerator and from the denominator, respectively. On this basis, IBM averaged a return of 47.94%, against 23.14% for other firms. IBM's cash-flow return on operating equity was 107% higher than that of the twenty-three other firms. No other firm in the study achieved such a rate of return—Xerox (46.66%), Dow Chemical (36.64%), and Kodak (32.33%) had the next highest rates of return.

Obviously some cash is an essential asset for any business and depreciation must be accounted for in some way in order accurately to reflect the firm's equity and earnings. The upshot of Table 4 is not that IBM earns 48% on equity but that it may well be the most profitable large industrial firm in the country once its cash hoard and depreciation position are taken into account.

It is difficult to make numerical adjustments for other accounting distortions, but they all point to IBM understating its profits relative to other large firms. For instance: (a) The accounting practice of listing assets at original cost in the presence of inflation results in the overstatement of all corporate rates of return, but the overstatement is least for a rapidly growing firm most of whose

¹⁶³ Control Data Corporation, Honeywell, Burroughs, and NCR utilize the straight line method. This information is derived from MOODIES' INDUSTRIAL MANUAL, 1978.

¹⁶⁴ COMPUSTAT Primary File.

assets are relatively new. As a result of its rapid growth, IBM understates its profits relative to other, more slowly growing firms.

(b) The expensing of intangibles (R&D and selling expenses) results in the understatement of both profits and equity. It results in the overstatement of the rate of return if the rate of growth in expenditures on intangibles is less than the reported rate of return, as is the case for most firms. There is no such overstatement in the rate of return if intangible growth is equal to the rate of return.¹⁶⁵ I don't know how fast IBM's R&D and selling expenses are growing, but the rate of growth of its revenues is about 14.4% per year, not far from its 17.62% rate of return on equity, so again most firms overstate their rates of return and IBM probably doesn't by much. Both of these considerations imply that IBM understates its profit rate relative to other firms and reinforce the earlier conclusion that IBM is probably the most profitable large corporation in the United States.

The finding that IBM is especially profitable does not necessarily imply that it has a great deal of monopoly power. High profits can arise from unanticipated increases in demand or decreases in costs. Demand has increased rapidly and costs have fallen rapidly in the computer industry. IBM does have a much higher rate of return than other firms in the computer industry, but this could be a matter of economies of scale or superior skill, foresight, or industry, all of which are permissible defenses to a monopolization charge. I cannot rule out such explanations. However, its high and stable rate of return gives me greater confidence in my conclusion that IBM is a dominant firm protected by very high barriers to entry.

D. *The Conduct Requirement of Monopolization Cases*

At this point, the affirmative case of the Justice Department should have ended. IBM could then have presented its own evidence concerning monopoly power or it could have attempted to show that monopoly was thrust upon it by economies of scale or by a valid patent or patents.

In rebuttal or in a subsequent relief hearing, the government should have subpoenaed Sperry Rand's study that yielded the \$400-500 million per year scale requirement, and any studies made by General Electric and RCA which underlay their goals of 10% of the market. Such studies may not have asked exactly the questions

¹⁶⁵ See Weiss, *Advertising, Profits, and Corporate Taxes*, 51 REV. ECON. & STATISTICS 423 (1969).

that a scholar trying to evaluate economies of scale would ask, but they would have taken the questions that were asked very seriously since the companies were using these studies to make decisions about investments in the hundreds of millions of dollars or, alternatively, decisions whether to leave the industry. Furthermore, they were not the work of IBM, which seems likely to be self-serving.

Virtually all the evidence for the findings of monopoly power was in the record or could have been in the record in the first year of the case in spite of the stately pace it has taken. The subsequent two years of the affirmative case were largely devoted to alleged improper business practices of IBM. In regard to some of these, such as the bundling of operating software and maintenance, this concern about IBM's practices might be useful, because it might lead to desirable injunctive relief. But surely the huge IBM case has as its purpose something more than a prohibition of bundling. The main reason for the emphasis on conduct was the apparent rule that monopoly is not itself an offense, but that monopoly power, together with conduct that goes beyond normal business practices in getting or retaining that power, is. I view this part of the case as often beside the point.

A large part of the case has had to do with allegations of predation on systems markets or peripherals markets. I do not mean to say that cases aimed at predation are useless or that the allegations in this case were wrong, but merely that they were time-consuming and should not be necessary for a monopolization case.

E. *A Dominant Firm Act*

There have been a number of proposals for a Concentrated Industries Act,¹⁶⁶ or an Industrial Reorganization Act,¹⁶⁷ that would provide for dissolution of leading firms upon a showing of persistently high levels of concentration, without any requirement of anti-competitive conduct. These proposals have gone far beyond the case law, calling for dissolution where the four-firm concentration ratio exceeds 70 in the Neal Task Force's Concentrated Industry Act or 50, with special provisions for certain other industries, in the Industrial Reorganization Act. They would have taken us much farther down the dissolution path than we have ever gone before and would have involved dissolutions in many industries and pos-

¹⁶⁶ WHITE HOUSE TASK FORCE ON ANTITRUST POLICY, REPORT (1969), *reprinted* in 2 ANTITRUST L. & ECON. REV. 11-76 (1969).

¹⁶⁷ S. 1167, 93d Cong., 1st Sess. § 101, 119 CONG. REC. 7320-21 (1973).

sibly hundreds of firms. Such drastic reorganization policy seems to be well beyond what Congress or the public will accept.

My proposal is that dissolution proceedings continue to require a market share of a relevant market sufficiently high and persistent that the firm can reasonably be considered dominant—perhaps a share of 50% or more of a market with no close rival—but that the apparent requirement of anti-competitive conduct be eliminated. A dominant firm could offer as a defense evidence that its large market share was due to economies of scale or valid patents. Such a policy would have a clear and uncontested basis in economic theory. The dominant-firm analysis seems to be accepted by everyone. Barriers to entry in the Bain sense are not, but the practical difference between a Bain-type barrier and some factor that makes the period of entry long does not strike me as serious. The law would apply only to a limited part of the economy where persistent market dominance exists. Litigation would still be substantial on such issues as market definition and economies of scale, but much of the content of a current monopolization case would be eliminated. The adoption of such a standard by the courts or by Congress seems to be a highly desirable reform of monopolization law.