Bureau of Business Research
Graduate School of Business Administration
University of Michigan

September, 1970

PROFITABILITY AND INDUSTRY CONCENTRATION

Working Paper No. 7

by

Daryl Winn
Research Fellow
University of Michigan

BACKGROUND OF THIS PAPER

This is a proposal for research to be conducted in conjunction with the Auto Study currently being undertaken by the Bureau of Business Research at the Graduate School of Business Administration, University of Michigan. The research discussed in this proposal has been sponsored by the Bureau of Business Research. This study will serve as the Ph.D. dissertation for the author.

PREFACE

Many studies have been conducted toward establishing a relation between industry concentration and industry profitability. These studies generally show positive correlation between concentration ratios and rates of return. The importance of these studies is that they confirm the body of theory on industrial organization and behavior, and public policy toward industrial market structure is in turn heavily predicated on this assumed relationship.

The Introduction to this proposal gives the background for this study along with a discussion of the importance of its findings to the development of antitrust policy in the United States. It becomes clear in this section that government must and will take the necessary steps to ensure that our economic system will continue to fulfill the needs of its public. But most important it becomes clear that government policy makers attach cause and effect to the structure and performance relationship.

The author believes that further research on this relation is needed. Reviews of the literature indicate several possible explanations for the correlation between concentration and profitability other than cause and effect. Therefore, the author asks the question, "Is the observed

relationship between concentration and profitability a direct one of cause and effect or can it be explained by the multicollinearity among several phenomena ?"

Concentration ratios are used primarily to indicate monopoly power in effecting price-output strategy to maximize profits. Thus the "direct cause and effect" is seen as the relation between this power or capability and the achievement of high profits. It is upon this relationship that public policy is based. However, concentration ratios may be correlated with other phenomena which themselves may be causally related to profits. Therefore, the author has considered all reasonable factors that may lead to high profit measures which are independent of, yet possibly correlated with, monopoly power (measured by concentration ratios). Essentially then, this study is an analysis of profitability, with the specific purpose of assessing the independent influence of concentration as only one of several factors explaining industry profit differentials. Because studies have indicated that size of firm is correlated with profit and with capital-output ratios, these two factors become prime candidates for correlation with concentration ratios.

The nature of profit measures themselves and the methodology employed in many studies lead one to believe that the relation between concentration ratios and profitability measures may not accurately depict

the relation between monopoly power and profitability. It is noted that profit measures should be adjusted for price-level changes and risk premiums.

These shortcomings and the possible multicollinearity among factors are briefly summarized as general hypotheses.

In the section entitled "Establishing a Methodology" an attempt has been made to outline a general approach that will allow analysis explicitly to recognize the influence of size and capital-output ratios on the observed relationship between concentration and profitability. The general framework of analysis will be through the specification of the rate of return as a composite ratio. The rate of return (on assets) equals the ratio of profits to sales times the ratio of sales to assets. By taking firms in industries as the primary unit of observation, it is believed that through the analysis of the composite ratios for these firms explanations for differences in industry profitability other than sheer oligopolistic behavior will be suggested.

In the next section risk and measures of profitability are shown to be a critical part of the overall study. All previous studies of concentration and profitability take observed profits without adjusting for the different influences of risk. A methodology is suggested whereby observed rates of return can be adjusted for differences in the risk of various asset employments. These risk-adjusted profit measures are then believed to be a better measure to incorporate into the study if the independent influence of concentration on profitability is to be determined.

Finally, the author believes that the definitions and sources of data are particularly critical in a study of concentration and profitability. Few studies, in the opinion of the author, have defined the profit measures adequately for the purpose of studying this relationship.

CONTENTS

I

INTRODUCTION

At the time this nation was founded, Adam Smith wrote, "It is the great multiplication of the productions of all the different arts, in consequence of the division of labor, which occasions in a well-governed society, that universal opulence which extends itself to the lowest ranks of the people." [1/] Through the years the essence of this argument continues to be widely embraced and can be found behind many of the principles of economic theory. Naturally the language of economists has undergone considerable change since Smith wrote. However, to speak in terms of competition and monopoly should not be construed as simply extending Adam Smith's argument. Too often it is. Indeed, these terms--competition and monopoly--are frequently used in a confusing fashion. Whether the writer is conveying a behavioral or a physical concept is left to the interpretation of the reader. Smith clearly was thinking in terms of physical properties or principles of economic organization. The relationship of this concept, however, to the behavior of economic organization is most complex.

1/ Adam Smith, The Wealth of Nations (Modern Library ed.; New York: Random House, Inc., n.d.), p. 11.

Today it is the stated policy of the government of the United States to maintain competition and prevent monopoly whenever such action best serves the public interests. Furthermore, the antitrust laws of the government embody and reflect the commitment to the belief that the best use of economic resources obtains from competition and capitalism. This belief, of course, presupposes economic freedom. In writing on freedom in general, Milton Friedman asserts "that the great threat to freedom is the concentration of power." 2/ This statement applies to economic freedom and power as well. Though individual freedom was considered most important by Smith, its relationship to economic organization has not been adequately treated. The result is an apparent, and often recognized, contradiction or paradox in antitrust policy, which evolves from attempts to synthesize behavioral and physical concepts. Indeed, concentration of economic power involves the physical notion of size or number, while the impact of such concentration is judged in terms of effects on behavior (performance).

In the inability to reconcile these concepts we find what appears to be a corollary of economic freedom: competition connotes numbers of competitors. Furthermore, a large number and wide dispersion of producing entities ensures experimentation, the development of new

---

2/ Milton Friedman, Capitalism and Freedom (Phoenix Books; Chicago: University of Chicago Press, 1962), p.2.

technology, and the innovation which is so necessary to a viable and dynamic economic system. Thus a common view seems to be that, to the extent that economic freedom is unobstructed, competition will prevail and with it "the great multiplication of the productions."

However, the record shows that the 500 largest firms (indeed a very small fraction of the total producing entities) control over one half of our economy's nonfirm assets, and four largest firms of many industries account for more than 70 per cent of a particular industry's output. 3/ The question then is this: what is the nature of the forces leading to this condition if public policy and the basic premises upon which our economic systems are predicated oppose this result?

Smith articulated two separate concepts in his discussion of the pin factory and the invisible hand. Both concepts, with some modification, are applicable to economic theory of today. The advantages in the principle of the division of labor have been extended to the principle of scale economies, both internal and external. In the workings of the invisible hand we have seen the greatest modifications since the departure from the days of atomistic competition. The former led to the latter, and concepts such as "workable competition" developed. For many years now the trend toward fewer and larger producing entities has been defended as serving the public interest. That is, on net, the

---

3/ Edwin Mansfield, ed., Monopoly Power and Economic Performance (New York: W.W. Norton & Company, Inc., 1964), p.vii.

public has benefited from the advantages of the physical properties of economic organization more than it has lost in moving away from atomistic competition and the attendant favorable behavioral implications. The two principles are at odds.

In using, then, the terms competition or monopoly we must not look upon them as ends. Originally (supposedly) attaining competition--which meant atomistic (competitive) market structures--was tantamount to best serving the public welfare. How the firm was expected to behave under such "ideal" structural conditions also fell under the label of competition. Thus it could be said that in Adam Smith's time structure defined a behavioral mode or norm. Today, competition can no longer be viewed in this way. Rather business must be judged, not in terms of competition, but in terms of its performance in serving the economic interests of its public either through competition or some other means. This is not, however, the view expressed in the Neal Report, a report of the White House Task Force on Antitrust Policy which was appointed by President Johnson to study and make recommendations on the nation's antitrust policy.

> Effective antitrust laws must bring about both competitive behavior and competitive industry structure. In the long run, competitive structure is the more important since it creates conditions conducive to competitive behavior. 4/

The concept of competition presupposes certain characteristics of economic systems. In particular, it requires a certain relationship between markets and the number of firms serving those markets. Often the requirements of this relation are not met. However, if competition per se should not be viewed as the end of economic activity, but instead as the means of assuring an end--best use and distribution of economic value--then competition should not be used as a yardstick in assessing the performance of economic activity. 5/

Therefore, in analyzing economic performance we should be concerned with the extent to which economic entities (firms) serve economic ends. And, furthermore, the core of antitrust policy should be to establish public welfare, not competition, as the goal.

4/ U.S., Congress, Senate, Phil C. Neal, Chairman, White House Task Force on Antitrust Policy, "Task House Report on Antitrust Policy," Congressional Record, May 27, 1969, p. S5642. Hereafter referred to as the Neal Report.

5/ As an example of what this leads to, we can trace the development of micro-theory and note the emphasis on industry behavior as if the industry itself were the basic economic entity. Indeed, industries do not produce; firms produce. The concept of industry is a theoretical construct to which behavioral characteristics are often attributed on the basis of notions such as competition, monopoly, oligopoly, imperfect competition, etc.

In large part this goal seems to be recognized in the Neal Report:

> While consumer welfare is thus in the forefront of antitrust policy, important corollary values support the policy. Not only consumers, but those who control the factors of production--labor, capital and entrepreneurial ability--benefit when resources are permitted to move into the fields of greatest economic return; competition induces such movement and monopoly inhibits it. 6/

While this goal of antitrust policy--public welfare--is not debated, the methods used to pursue this goal can be, should be, and are, hotly debated. It is one thing to affirm a noble goal; it is another to successfully effect policy to attain that goal. In a capsule, the problem is illustrated by another quotation from the Neal Report:

> The function of the antitrust laws in the pursuit of these goals /economic freedom, consumer welfare, free flow of resources, etc./ is two fold: they are concerned both with preventing anticompetitive behavior and with preserving and promoting competitive market structures. 7/

The content of this statement is almost incomprehensible to even the academic economist. The underlined words contain the issue in antitrust policy today, for these few words show an inextricable web of a priori economic theory, empirical observation, ideology, and

---

6/ Neal Report, p.S5643.

7/ Ibid. (emphasis supplied).

philosophy. There is no question that business behavior must be judged on the basis of its impact on economic freedom and consumer-public welfare. But it is a far more complex task to adduce market structure as a force in the determination of this behavior. This study will address itself to this issue. Couched in familiar terms, this study will seek empirical evidence of the relationship between market structure and market performance. Here performance refers to the end result of business activity or conduct in serving the economic interests of the public. Performance is often judged by criteria such as output, prices, product design, and quality. In other words, it encompasses the complex of adjustments to changes in conditions of demand and supply in the related markets.

Bain suggests two determinants of business performance:

> First, the organization or structure of an industry (or group of competing enterprises) exercises a strong influence on the performance of the industry. That is market structure constrains and canalizes enterprise activities and their results; and variations in structure may lead to associated variations in performance. Second, the market conduct of enterprise--...policies, practices, and devices they employ in arriving at adjustments to the markets in which they participate--also influences performance. 8/

8/ Joe S. Bain, Industrial Organization (2d ed.; New York: John Wiley & Sons, Inc., 1968), p.3.

Too often, there is a failure to recognize and appreciate the intervening variable--conduct--that may alter "predictable" relationships between performance and market structure. The task then of studying performance and structure must include the recognition of various structure and conduct variables relevant to an analysis of performance. The next task is to establish a relationship between structure and conduct on one hand, and structure and performance on the other. To do this it is first necessary to find cause and effect relationships among the structure, conduct, and performance variables. Generally, this broad framework of analysis allows one to draw informed conclusions in terms of the aforementioned goals of antitrust about various structures and conducts that are conducive to performance.

It has long been recognized that pure and perfect competition does not exist in the United States. Theory has thus evolved which attempts to replace the classical models of competition and monopoly and their assumptions about the structures of markets. 9/ Just as theory adjusts to changes in atomistic market structures, so has theory adjusted to changes in ideas about market conduct. Profit maximization no longer is the fundamental premise of business conduct. Instead, it is being

---

9/ The two most notable examples are Edward Chamberlain, The Theory of Monopolistic Competition (7th ed.; Cambridge, Mass.: Harvard University Press, 1956), and Joan Robinson, The Economics of Imperfect Competition (London: Macmillan and Co., Ltd., 1934).

replaced or modified by theories of revenue maximization, and, more generally, a "behavioral" theory of the firm. [10/] While these refinements in theory advance our knowledge and perspective of the subject at hand, they also complicate the task tremendously and render empirical analysis of the structure-performance relationship too involved to be undertaken as a single study. Thus, in this study, we will not be directly or immediately concerned with such refinements. Instead, as is common in many other empirical studies, we will to certain extent ignore or assume away differences in motivation and its matrix of possible impacts on a structure-performance relationship. It must be said, however, that to do so does not imply that conduct is unimportant. In fact, it will be argued throughout this study that conduct not only becomes an initial intervening variable which may explain or be the reason for failure to find universal structure-performance relationships, but that conduct--generally, the host of possible intervening variables--will also aid in assessing the direction of causation.

Specifically, this study will focus on only a few of many structure and performance variables. The three which will receive primary

---

10/

William J. Baumol, Business Behavior, Value, and Growth (New York: Macmillan and Co., Ltd., 1959); Oliver Williamson, The Economics of Discretionary Behavior: Managerial Objectives in a Theory of the Firm (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1964); R.M. Cyert and J.G. March, A Behavioral Theory of the Firm (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963). For a good summary of many of these revisions see Williamson, The Economics of Discretionary Behavior, chap. 2.

emphasis are concentration ratios (an index of market power), firm size (an index of general economic power), and measures of profitability (an index of performance).

A quotation from the Neal Report summarizes the importance of market structure on conduct, performance, and, more generally, the attainment of the economic goals of our society:

> Market structure is an important concern of anti-trust laws for two reasons. First, the more competitive a market structure (the larger the number of competitors and the smaller their market shares) the greater the difficulty of maintaining collusive behavior and the more easily such behavior can be detected. Second, in markets with a very few firms effects equilavent to those of collusion may occur even in the absence of collusion. In a market with numerous firms, each having a small share, no single firm by its action alone can exert a significant influence over price, and thus output will be carried to the point where each seller's marginal cost equals the market price. This level of output is optimal from the point of view of the economy as a whole.
>
> Under conditions of monopoly--with only a single seller in a market--the monopolist can increase his profits by restricting output and thus raising his price; accordingly, prices will tend to be above, and output correspondingly below, the optimum point. In an oligopoly market--one in which there is a small number of dominant sellers, each with a large market share--each must consider the effect of his output on the total market and probably reactions of the other sellers to his decisions; the results of their combined decisions may approximate the profit-maximizing decisions of a monopolist. Not only does the small number of sellers facilitate agreement, but agreement in the ordinary sense may be unnecessary. Thus, phrases such as "price leadership" or "administered pricing" often do no more than describe behavior which is the inevitable result of structure. 11/

11/ Neal Report, p. S5643.

The key concepts or assertions here, of course, are that structure affects performance via behavior that seemingly emanates from the existence of a few decision-making units. The Neal Report continues:

> The alternatives, other than accepting the undesirable economic consequences, are either regulation of price (and other decisions) or improving the competitive structure of the market.
>
> We believe that the goals of antitrust policy require a choice wherever possible in favor of attempting to perfect the self-regulating mechanism of the market before turning to public control. It is for this reason that we favor steps that will increase the effectiveness of the antitrust laws in promoting competitive market structure. Such steps are desirable, not only because the problem of concentrated industries is significant in economic terms, but because the existence of such concentration is a continuing (and perhaps increasing) temptation for political intervention. 12/

This long quotation has been presented for several reasons. First, it summarizes well the basic arguments of the influences structure has on conduct and performance. Second, it enunciates the premises of the governmental task force to make specific recommendations to the President concerning legislation to effect antitrust policy. Third, it embodies many of the complex and various assumptions and relationships regarding structure and performance (which have been subjected to numerous empirical studies). Fourth, and not of least importance, it serves as the motivating force behind this study.

12/ Ibid.

At this point, it may serve well to point out again the critical aspects of the assumption or hypothesis contained in the above quotation:

1. The popular misconception of the condition of optimality is found in the statement (in the first paragraph) on the results obtained in a "market with numerous firms." The statement that the "output will be carried to the point where each seller's marginal cost equals market price... is optimal from the point of view of the economy as a whole..." is only true for the given market structure. The condition of unqualified optimality where marginal costs equal marginal revenue rests on the assumption that at all output levels marginal costs are identical for alternative forms of market structure. 13/ This assumption is tantamount to assuming the absence of scale economies or the host of other factors which could affect costs with a change in firm size. Instead of focusing on normative models of output, price, and profit, perhaps we should focus on normative models of market structure. Yet this is highly unfeasible because there can be no normative models for structure, i.e., numbers of firms producing a given product. No two products

---

13/ The assumption that marginal revenues are equal for all levels of industry output is not too tenuous, and can be easily made.

have identical, and very few have even similar, physical and technical production processes. The optimal market structure depends on the product and, in turn, on the technical requirements for the creation of that product. For example, no one would argue that the same number of firms (large enough to be considered optimal for competitive behavior) could produce diesel locomotives and bread at their respective lowest possible unit costs.

2. The traditional extension of this to the analysis of monopoly output-price decisions (in the second paragraph) is likewise improper in its use of the optimum concept for the same reasoning. The result of this extension is the reliance on profitability (since this is the motivation determining the output-price decisions) as the measure of the divergence from price-output optimality. Indeed, profit is a function of the price-cost relationship. However, if profits and costs are different under different market structures, price-output optimal conditions may be very difficult to pin down. The greatest shortcoming of using profits, then, as a measure of "suboptimality" is the possibility of a change in cost structures from changes in market structures. Optimality cannot be simply the equality of market price and marginal cost for either the firm or the industry.

3. To refute the last sentence of the second paragraph, the intervening variable, conduct--which is influenced by perception, uncertainty, and imperfect knowledge--does not make "behavior...the inevitable result of structure."

It is this assumed association between market structure and performance that must be carefully determined. Otherwise, should policy be based on erroneous analysis and conclusions, the warning about the "temptation for political intervention" may result in poetic justice and nothing more.

Theory which relates structure and profitability is replete in economic literature and has been for many years. Perhaps partly because it is the most easily observable index, profitability seems to be the point of departure in many of the empirical studies of industry performance. And thus it will be in this study. However, it will be argued that profitability as a simple index most meaningfully summarizes the results of the interaction of many, if not all, performance criteria. Furthermore, it should be noted that profitability is not only a criterion of performance that can be used in analyzing the workings of markets, but it is the most important decision variable in those markets. As George Stigler asserts, "There is no more important proposition in economic theory than that, under competition, the rate of return on investment tends toward equality in all industries." [14/] In this proposition

---

14/ George J. Stigler, Capital and Rates of Return in Manufacturing Industries (Princeton, N.J.: Princeton University Press, 1963), p.54.

profitability is not only an index which tests the nature of the competition in the economy, but it is the very decision variable that makes such a proposition operational. Discrepancies in the rates of return show themselves first, before the movement of capital (economic resources) can exert its debilitating effect on them and result in the equilibrium condition, i.e., equality of rates of return.

It is this proposition that provides the general framework of analysis. That rates of returns, under competition, tend toward equality "has been taken by some economists as a definition of competition; persistently high profits in an industry would be proof that the industry is not competitive." 15/ The authors of the Neal Report incorporate this type of analysis in their thinking by concluding that

> Above-average profits in a particular industry signal the need and provide the incentive for additional resources and expanded output in the industry, which in due time should return profits to a normal level. It is the persistence of high profits over extended time periods and over whole industries rather than in individual firms that suggests artificial restraints of output and the absence of fully effective competition. The correlation of evidence of this kind with the existence of very high levels of concentration appears to be significant. 16/

15/ Ibid., p.55.

16/ Neal Report, p. S5643 (emphasis supplied).

The place which measures of profitability hold in economic theory is clear. Profitability is central to economic theory upon which is based the essence of antitrust laws and behind which rest theories of industrial organization. Under the assumption of profit maximization the relationship between structure and profitability follows easily from the theory of perfect competition and a single-seller monopoly. But since neither of these forms is observed in the "real world," the relationship can only be found from empirical analysis. The difficulties of forming deterministic models which are of any practical significance are well known in the theory of oligopoly. However, on the basis of empirical analysis, as indicated above, powerful conclusions have been drawn and incorporated into economic policy. The purpose and objectives of this study will be to test this hypothesis that a positive association exists between industrial structure and performance, where structure is represented by numbers of firms and their sizes, and performance is measured by profitability. The significance of this hypothesis is attested to by the above quotation in which,on the basis of the "correlation of evidence," public policy takes this relationship as given and in turn is predicated on it.

II

NEED FOR FURTHER RESEARCH

Since William L. Crum's study in 1929, [1] many economists have tested the hypothesis that profitability is positively correlated with the size of the firm's assets. Though the hypothesis is generally validated for corporations over broad size classes (in which assets range from $50,000 to $250,000), there remain several flaws in the methodology and data. These flaws are marked when one tries to test the relation within specific industries or within a specific framework such as the relation among market concentration (which must be at a narrowly defined industry level), profitability, and size. [2]

It may be true that profitability is correlated with size, but the importance of the relation rests with the probable causes. For example,

---

1/ William L. Crum, Corporate Earning Power (Stanford, Calif: Stanford University Press, 1929).

2/ C.E. Ferguson conducted one of the few studies questioning this hypothesis by examining it in relation to firms within industries. He concluded that "there is apparently no systematic relationship between business size and profit" (p.57). C.E. Ferguson, "The Relationship of Business Size to Stability: An Empirical Approach," Journal of Industrial Economics, IX (Nov., 1960), 43-62.

Baumol advances the hypothesis that "increased money capital will not only increase the total profits of the firm, but because it puts the firm in a higher echelon of imperfectly competing capital groups, it may very well also increase its earnings per dollar of investment." [3/] The hypothesis simply states that while larger firms have the same options as any smaller firms have with regard to opportunities for investment, the larger firms also have opportunities which are unavailable to smaller firms because of the size of the required investment. That is, large firms simply have more options to choose from. If this hypothesis is correct, we should expect to find higher long-run rates of return for large firms, even in the absence of barriers to entry other than those of absolute capital requirements.

Although there are many other likely hypotheses, it is not necessary to offer them at this time. All that is needed is to suggest that many studies do show a positive correlation between rates of return and size.

Another relationship that has received a great deal of attention in recent decades has been that between profitability and monopoly power. After Joe S. Bain's study in 1951, [4/] empirical evidence began to be accumulated on the positive relation between concentration ratios--a measure of monopoly power--and profitability. Bain's results are well

---

3/ W.J. Baumol, Business Behavior, Value, and Growth (New York: Macmillan Co., 1959), p.33.

4/ Joe S. Bain, "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940," Quarterly Journal of Economics, LXV (Aug., 1951), 293-324.

known: " 1936-40 profit rates were on the average significantly higher if the firm was a member of an industry where eight firms controlled 70 per cent or more of value product...." [5/] With this finding came confirmation of his hypothesis "that the average profit rate of firms in oligopolistic industries of a high concentration will tend to be significantly larger than that of firms in less concentrated oligopolies or in industries of atomistic structure." [6/] Although Bain failed to find a significant continuous linear relationship, [7/] this famous dichotomy has been supported by more recent studies.

Bain also hypothesized that "monopoly or effectively collusive oligopoly will also bring forth a higher excess profit rate on sales." This hypothesis, of course, results directly from the expected output-price decisions of monopolies. As mentioned earlier, "optimality" is commonly seen to be the condition in which price equals marginal cost and which, in the long run, results in no excess profits. Needless to say, this hypothesis is far more complex and involved than Bain's

---

5/ Ibid., p.321.

6/ Ibid., p. 294.

7/ Bain posits an association between the probability of effective collusion and the degree of seller concentration within an industry (pp.295-96). It could then be argued that 70 per cent is the threshold for such a relationship. Bain's argument here is similar to that used in the Neal Report which focuses on policy on the basis of the 70 per cent figure.

first hypothesis. As Bain notes, his hypothesis should be true "so far as on the average the relation of industry demand to cost and the conditions of entry are about the same." [8] In a cross-section analysis among various industries one would not a priori expect to find such equal average relationships of demand and costs. Differences in cost structures could arise from a variety of causes. To mention just two: some products are more capital intensive than others, and differences in vertical integration vary from firm to firm and industry to industry. On the demand side, one also would not expect similar conditions of demand. Despite these limitations on the use of profit-to-sales ratios in interindustry analysis, a few people have attempted to test Bain's hypothesis by empirical work.

Norman Collins and Lee Preston conducted a comprehensive study of profit margins using Bureau of Census data for 1958. [9] The results of their study show a positive, though weak, correlation between price-cost [10] margins and industry concentration ratios.

8/ Bain, "Relation of Profit Rate to Industry Concentration," p.295.

9/ Norman R. Collins and Lee Preston, Concentration and Price-Cost Margins in Manufacturing Industries (Berkeley, Calif.: University of California Press, 1968).

10/ This index is essentially the difference between gross revenues and direct costs expressed as a percentage of the revenues. The figure for the difference was obtained by subtracting payroll and other direct costs from the census value-added figure for each four-digit industry.

Furthermore, a continuous rather than dichotomous relation was observed. "Concentration alone...never explained as much as a half, and rarely as much as a fourth, of the variation in margins among four-digit industries." 11/

Because profit data are generally not available on a four-digit basis, 12/ the means by which Collins and Preston attempt to associate a profit measure and the concentration measure are unique. The significant aspect of their study, however, is their regressions within major industry groups (two-digit) among four-digit industries.

> The strength of our findings varies substantially depending upon the profit indicator considered, the classification level of data, and the subsample under analysis... A perplexing feature of our statistical results is their diversity, particularly the absence of significant concentration-margin relationships among the four-digit industries in four of our ten major industry group subsamples. 13/

This is interesting because it would seem that the more narrowly the industry is defined, the clearer the impact of concentration should be. That is, Collins and Preston did not find greater similarity in price-cost margins among four-digit industries within the appropriate two-digit industry group. Their study covered ten major industry

---

11/ Collins and Preston, Concentration and Price-Cost Margins, p.108.

12/ Ibid., pp.51-62.

13/ Ibid., pp.107and 109.

groups, but only six of the groups showed a statistically significant and positive association between margins and concentration. The two following equations were fitted to the data:

$$(1) \quad Y_1 = a + bX_1$$

$$(2) \quad Y_1 = a + bX_1 + cX_2 + dX_3$$

where Y_1 = price-cost margin

X_1 = four-firm concentration ratio

X_2 = index of geographic dispersion

X_3 = capital-output ratio

The capital-output ratio, defined as the ratio of gross book value of assets to the value of shipments, "proved to be a significant explanatory variable in only three cases, and in two of these the sign was the reverse of that expected." [14/] They had hypothesized a positive relation between price-cost margins and capital-output ratios. The results are surprising because it would seem a priori that price-cost margins, which in this study are defined as essentially profit plus depreciation divided by sales, could serve as a proxy for capital-output (capital-sales) ratios. The denominator in each case is sales, while the numerator in price-cost margins are flows (profits and depreciation) which one would expect to be highly dependent on the capital stock, the numerator in the other ratio.

14/ Ibid., p.95.

Therefore, since this introduction of profit margins as a profitability measure creates some unanswered questions about the relation between capital-output ratios and concentration, a new framework of analysis is suggested for the larger study of profitability, concentration, and size. It should be noted at this point that when equation (2) was fitted instead of equation (1), the t ratios for the concentration coefficient fell in three of the six major industries, remained unchanged in one, and increased in two. The independent effect of the capital-output ratio is unclear, however.

Since many studies posit an association between rate of return and concentration, and because Collins and Preston show quite diverse results among four-digit industries by using price-cost margins as the profitability index to correlate with concentration and capital-output ratios, a new framework of analysis may yield some interesting insight into these questions. It should be noted particularly that a rate-of-return measure of profits is a composite index.

If we wish to take profitability as a rate of return we must determine the appropriate investment base. For reasons not discussed in full here, the appropriate base for problems of monopoly must clearly be economic resources, e.g., assets. Efficiency in economic activity must ultimately rest with the use of these economic resources. Using stockholders' equity as the denominator in rates of return yields only a partial and hence unsatisfactory measure of the efficiency of the utilization of these resources. Because we are concerned with the

economic question of resource allocation in imperfect markets, measuring the efficiency of a particular method of financing these assets seems slightly irrelevant and inappropriate. Accepting, then, that the appropriate base for a rate-of-return measure is assets, we can break down the composite ratio in the following way.

The rate of return on assets, computed as total profits divided by total assets, is composed of the product of two ratios: the profit margin and the asset-turnover ratio. [15] That is, rate of return is defined as

$$\frac{\text{profits}}{\text{assets}} = \frac{\text{profits}}{\text{sales}} \times \frac{\text{sales}}{\text{assets}}$$

It is observed that $\frac{\text{profits}}{\text{sales}}$ is simply the profit per dollars of sales, i.e., essentially the variable on which Collins and Preston ran their regressions. It was this variable that they hypothesized would be higher for concentrated industries. The second ratio is simply the inverse of the capital-output ratio they employed--but with confusing results--in their regressions.

---

15 / If stockholders' equity were deemed the appropriate base, the equations could be changed as follows:

$$\frac{\text{profits}}{\text{stockholders' equity}} = \frac{\text{profits}}{\text{sales}} \times \frac{\text{sales}}{\text{assets}} \times \frac{\text{assets}}{\text{stockholders' equity}}$$

The additional ratio is the inverse of the complement of the conventional financial ratio, the debt-equity ratio. In this form, we see clearly one of the major arguments for not using stockholders' equity as the investment base in rate-of-return calculations. This rate-of-return measure is directly influenced by the capitalization policy of particular firms and industries.

Within this framework of analysis, it is clearly evident that inferring structural-performance relationships from a rate-of-return measurement for a firm or industry is hazardous. One can easily imagine the possibilities of high rates of return and low margins, or vice versa. For example, Bain notes that "if we are comparing two firms or industries in terms of the differences between the ratios of their profits to their equities, the comparison is a good indicator of the corresponding differences between the ratios of their excess profits to sales (or of their prices to full average costs) only if $V_1 / R_1 = V_2 / R_2$." [16] (V is the measure of equity, and R is the measure of revenue.) That is, the relation between rates of returns and profit margins is only explained by the inverse of capital-output ratios. Because most analyses gloss over it, conclusions must be accepted with some reservation.

To put this point in perspective, a little commentary should be added. In perfectly competitive industries traditional economic analysis leads us to conclude that discrepancies between price (average) and marginal cost (or average costs, if we assume them to be constant in the long run) should be small, or zero, in long-run equilibrium. We should realize that this relationship merely results from a static theoretical construct and that it is very unlikely to become a reality in

---

16/ Joe S. Bain, Industrial Organization (2d ed.; New York: John Wiley & Sons, Inc., 1968), pp. 392-93.

view of the dynamics of our economy which continually jar industries and firms from conditions of equilibrium. It therefore could be possible (if we took a relatively short period) for concentrated industries to show a smaller discrepancy between average prices and average costs and yet, at the same time, show a higher rate of return on assets.

However, there are far more important reasons which may alter the expected relationships between monopoly power and profit margins. For example, should capital-output ratios be found to rise with levels of concentration (asset-turnover decreasing), assuming equal rates of return on assets, profit margins would be higher in concentrated than in unconcentrated industries. Stated another way, concentrated industries with high capital-output ratios will have lower rates of return unless their profit margins are higher. Though the author is not aware of any comprehensive studies on the relation of capital-output ratios to concentration, studies have been made on capital-output ratios and size. 17/ Generally, these studies show capital-output ratios rising with size of business (measured in assets). If, then, there is a positive relation between size of firm and concentration, one would expect to find higher profit margins in concentrated industries. Should this line of reasoning

---

17/ Hiram S. Davis, "Relation of Capital-Output Ratio to Firm Size in American Manufacturing: Some Additional Evidence," Review of Economics and Statistics, XXXVII (Aug., 1956), 286-93; John R. Moroney and Jan W. Duggar, "Vertical Integration and Capital-Output Ratios in U.S. Manufacturing Industry," Quarterly Review of Business and Economics, VII (Summer, 1967), 23-27.

be valid, then the failure of Collins and Preston to find more significant results is perplexing. However, one may wish to argue a **priori** that the direct relation is between concentration and capital-output ratios. If concentrated industries, acting as monopolies, restrict output and raise price, the high capital-output ratios are a behavioral phenomenon. Therefore, a new monopoly index can be found in the asset-turnover ratio. From this reasoning one would conclude that the positive correlation between size and capital-output ratios results from the fact that size is a proxy for concentration.

This argument is employed in much the same fashion by Stanley S. Schor. He hypothesized that the differences in capital-output ratios were due to varying differences in competitive pressures. 18/ In discussing this hypothesis, Davis said of Schor,

> He thought that larger firms would tend to be under less competitive pressure to economize on the use of capital than smaller firms, especially in an oligopolistic situation. He assumed that the small firms would tend to be relatively new and that they would have to get as much out of capital as possible to survive. 19/

Davis concludes his empirical investigation, however, on this note:

18/ Stanley S. Schor, "The Capital-Product Ratio and Size of Establishment for Manufacturing Industries" (unpublished Ph.D. dissertation, University of Pennsylvania, 1952), as referred to in Davis, "Relation of Capital-Output Ratio to Firm Size," p.287.

19/ Davis, "Relation of Capital-Output Ratio to Firm Size," p. 287.

> It would appear, however, that the relationship between size of firm and market position on the one hand, and rate of capital use on the other is much more complex. For example, among the seven industries analyzed [by Davis] in which large firms had substantially higher ratios than small (agricultural machinery, men's shoes, and men's shirts), the large firms carried on activities requiring more capital per dollar sales than those conducted by the small enterprises--such as manufacturing complex products, performing two or more vertically related processes or activities, or engaging in nation-wide promotion of product to consumers. Thus if the market advantages possessed by the larger firms in these industries played any part in their greater use of capital, it was in enabling them to undertake activities requiring more capital than those commonly undertaken by the small operators. 20/

The reader should note the similarity of this argument to that of Baumol cited at the beginning of this section. Additionally, we have established a relationship among concentration (market power), size, and capital-output ratios; and it is a relationship which Davis suggests is highly complex--so much so, in fact, that he continues: "Moreover, market advantages may be associated with larger firms having lower asset ratios than small firms." 21/

In reviewing briefly, if we can assume a relation between size and concentration and can then find an association between size and capital-output ratios, we ought to be fully aware of the difficulties of accepting

---

20/ Ibid., p.293.

21/ Ibid. (emphasis supplied).

observations on profit margins and concentration. That is, the multicollinearity of the variables explicitly included in regression equations, or the misspecification resulting from leaving out variables may make the analysis overwhelmingly complex.

The hypothesis being suggested is that the relationship between concentration ratios and profitability should be studied within the framework of specifying the rate of return as a composite ratio. Furthermore, within this composite ratio an asset-turnover (the inverse of capital-output) ratio is influenced by economies of scale, capital requirements, vertical integration, and a host of other variables which are often cited as reasons for big business or concentration in industries quite apart from motivations of businesses to increase market power and exploit the consumer. That is, measures of observed profitability (profit margins or rates of return) may be a function of variables other than those inherent in the competitive structure.

The generally observed relation between size of firms and capital-output ratios leads to another possible instance of multicollinearity in relationships. Ceteris paribus, the more capital intensive a production function is the more variable the profit rates will be. That is, for two industries of different capital-output ratios, a given percentage shift in demand will cause unequal changes in observed profits. The industry with the highest capital-output ratio will correspondingly tend to have a higher fixed cost/average cost ratio; and, if demand falls, the fall of profits will be greater than for a firm with a low

capital-output ratio. Thus if large firms are in fact more capital intensive, one would expect them, as a general rule, to show greater variability in profit rates. This, however, is not uniformly confirmed by empirical evidence. 22/

Sidney Alexander studied profit variability in 1949 and found "that small corporations have greater variability of profits than do large in two different senses. For any given year the dispersion of profit rate is much greater among small corporations than among large. From bad times to good the profit rates of small and medium sized corporations fluctuate more than do those of large ones." 23/

Few studies have been made, however, of the relation of size to profit variability within industries, and particularly within narrowly defined (four-digit industries) using firms as the unit of observation. C.E. Ferguson confirms the hypothesis for what appears to be fifteen two- and three-digit industries. 24/ Because he was not interested in

---

22/ See, for example, Sidney S. Alexander, "The Effect of Size of Manufacturing Corporation on the Distribution of the Rate of Return," Review of Economics and Statistics, XXXI (Aug., 1949), 229-35. Stephen Hymer and Peter Pashigan, "Firm Size and Rate of Growth," Journal of Political Economy, LXX (Dec., 1962), 556-69.

23/ Alexander, "The Effect of Size of Manufacturing Corporation on... Rate of Return," p.229.

24/ Ferguson, "The Relation of Business Size to Stability."

concentration ratios, the fifteen industries were not chosen to provide an analysis of concentrated and unconcentrated industries or, for that matter, industries for which concentration ratios are appropriate. In each of these fifteen industries, twelve firms were analyzed. Using rank correlation Ferguson found that all the industries had negative coefficients of correlation, a finding which supported the hypothesis that the variability of profits decreases with size.

Nevertheless, it would be very enlightening to focus on industries used in concentration studies and extend the number of observations within each industry wherever possible. Profit variability is not simply interesting. Indeed, profit variability is perhaps the critical factor in risk theory for investment decisions. Furthermore, in studying dispersions of profits, the moments other than the mean seem appropriate.

Although economists have written a great deal on risk and profit theory over the years, there have been only a few studies attempting to measure the relationship. Fisher and Hall in 1969 established an empirically testable model based on the theory as developed in literature. Fred Arditti also did this. George J. Stigler, too, explicitly recognized the importance of risk in the study of rates of return. 25/

25/ I.N. Fisher and G.R. Hall, "Risk and Corporate Rates of Return," Quarterly Journal of Economics, LXXXIII (Feb., 1969), 79-92; Fred C. Arditti "Risk and the Required Rate of Return on Equity," Journal of Finance, XXII (Mar., 1967), 19-36; George J. Stigler, Capital and Rates of Return in Manufacturing Industries (Princeton, N.J.: Princeton University Press, 1963), pp. 62-71.

Without going into the details of a model, we can enumerate some of the fundamental concepts of risk theory and their relation to rates of return. First, it is hypothesized that the greater the variance in the distribution of earnings, the greater the risk. Second, skewness of the earnings distribution affects risk. Positive skewness leads to smaller risk exposure, and negative skewness leads to larger risk exposure. 26/ Finally, the importance of risk exposure is in its effect on the risk-premium required above a "risk-free" or "risk-adjusted" rate of return. Because observed rates of return include any risk-premium, the appropriate rate of return for use in concentration-profitability relations must take this into account before any meaningful interpretation can be made.

Fisher and Hall estimated the risk-premium and risk-adjusted rates of return for eleven broadly defined industries, using a sample of eighty-eight firms. They observe that "average risk premiums vary substantially, suggesting important differences in risk exposure among industries." 27/ The results for the drug and automotive industries will be given as examples of the effect of risk on observed rates of return. For firms in the drug industry, the observed rate of return

---

26/ Fisher and Hall, "Risk and Corporate Rates of Returns," p.82.

27/ Ibid., p.87.

(on stockholders' equity) was 18.32 per cent while the risk-adjusted rate of return became 16.64 per cent. The results imply, obviously, that the drug industry has very little risk exposure. At the other extreme, the automotive industry had an observed rate of return of 14.77 per cent but when corrected for risk-exposure, the rate of return was only 7.54 per cent.[28] Of the eleven major industries studied, the automotive industry showed the largest risk-exposure and, hence, required the largest risk-premium.

It is hypothesized, then, that where rates of return or profit margins are used as performance variables in studies of structure-performance relations, adjustments to compensate or deflate rates of return for different risk exposures are required. Furthermore, risk exposure may be independent of market power or affected by capital-output ratios and therefore by cost structures and operating rates.[29]

---

[28] Ibid.

[29] Reed Moyer in "The Relation of Profit Rates to Operating Rates," Journal of Industrial Economics, XVI (July, 1968), 178-85, concludes, "There is no correlation between the degree of capacity utilization and profit rates among industries, though, as the regressions show, there is within each industry group" (p.183). He goes on to suggest that further study is needed on a less aggregated basis (than he undertook) at the four-digit industry level, as there have been no studies done at this level except for a few specific industries (p.185).

In addition to adjusting observed profit measures of risk, profits should also be adjusted for price-level changes. Though the problem of adjusting rates of returns according to the price level is recognized as a crucial step in the analysis of profitability, few such attempts have been made in the United States. 30/ George J. Stigler states, "Inflation makes historical costs, and depreciation based upon historical costs, obsolete. The returns in industries which have relatively durable assets, and in industries with relatively old assets, will be overstated relative to industries with the opposite characteristics." 31/ Though this is a rather simple observation, the importance of its implications is overlooked or excluded in almost all studies of profitability. In Great Britain, on the other hand, the Monopolies Commission and critics of its activities have dealt squarely with the issue. 32/ If adjusting observed rates of return for price-level changes would leave the relative performances of industries unchanged, there would be no point in pursuing this problem any further. However, it can be hypothesized with regard to the incidence of price-level adjustments on observed rates of return among various industries that in "growth industries," where the ratio

---

30/ George J. Stigler, Capital and Rates of Return, pp.49-52, is one such attempt.

31/ George J. Stigler, Organization of Industry (Homewood, Ill.: Richard D. Irwin, Inc., 1968), p.143.

32/ C.K. Rowley, "The Monopolies Commission and Rate of Return on Capital," Economic Journal, LXXIX (Mar., 1969), 42-65; I.P. Andren, "Monopoly Investigation and Methods for Calculating the Rate of Return on Capital Employed," Journal of Industrial Economics, IV (Oct., 1955), 1-15.

of recently acquired assets to older assets is higher than in declining industries, the adjustments to "real rates of return" would involve a smaller discrepancy between the observed rate and the real rate. This only becomes operationally important if, as is hypothesized, growth is related to concentration ratios. This relationship (negative correlation) has, in fact, been hypothesized and empirically validated by several studies. 33/ Furthermore, as we have already noted, should capital intensity increase with the size of the firm or concentration measure, one would expect the effect of price-level adjustments to be greater for larger firms. The reason, of course, basically rests with the nature of the price-level adjusting process which impinges primarily on fixed-asset valuations. Therefore, in addition to correcting observed profits for differences in risk, price-level adjustments seem necessary.

33/ For example, see Ralph L. Nelson, Concentration in the Manufacturing Industries in the United States, Economic Census Studies No. 2, (New Haven, Conn.: Yale University Press, 1963), pp.48-58.

III

GENERAL HYPOTHESES

In the first section it was shown that public policy is apparently heavily predicated on the accumulated economic theory and empirical evidence which reveal the importance of the relation between industrial structure and performance. In the second section, a brief review of the empirical work related to structure and performance suggested several new approaches. Before continuing with the development of these, the general hypotheses developed so far should be stated.

The fundamental proposition is that the structure of industrial markets affects performance in a predictable manner. Specifically, firms in concentrated industries, on the average, restrict output by charging higher prices than would firms in unconcentrated industries. Because it is difficult to determine the extent to which output is restricted by high prices, analysis rests with the corollary that is based on resource allocation. In competitive equilibrium, rates of return should approach equality. If rates of return are high in one industry, then capital is underallocated. Insufficient capital means output is not up to its optimal level. Finally, prices must therefore be higher than optimal from the point of view of the economy as a whole.

1. In accordance with such reasoning, profitability measures will be used to summarize an industry's performance. The two measures are rates of return (profits to assets) and profit margins (profits to sales). It is hypothesized that above-average industry rates of return will be found (over long periods of time) in concentrated industries. It is also hypothesized that high profit margins will be found in concentrated industries. The profit margin hypothesis, it should be noted, is a more direct result of the fundamental proposition. Both of these hypotheses lead to conclusions regarding the competitiveness of market structures.

2. Should the foregoing hypotheses be supported by the analysis, it is next hypothesized that factors other than concentration--where concentration implies the exercise of monopoly power in price-output decisions--partially explain the observed relationship. It is suggested that the statistical methodology used in many studies distorts observed relationships between profitability and concentration. It is hypothesized that the use of average profitability measures for the industry (weighted or unweighted) is influenced by factors independent of the exercise of monopoly power but correlated with concentration ratios. These factors are:

a. Firm size

b. Economies of scale

c. Capital-output ratios

Therefore, analysis of concentration and profitability must be designed to take account of the potential multicollinearity among these variables.

3. On the basis of the hypotheses in 2, it is further hypothesized that the measures of profitability are distorted if used in studies of concentration and profitability.

   a. If concentrated industries have higher than average capital-output ratios, then it follows that the temporal variability of profits (which is due to a high fixed-average cost ratio) increases the risk of asset employment in these industries. Therefore, on the basis of the theory of risk, observed profits should reflect these differences in risk exposure. It is hypothesized that concentrated industries, on the average, are subject to higher risk than unconcentrated industries. Should this hypothesis be rejected, it remains critical to the study that observed profit measures be deflated by risk-premiums included in the profitability measures of each firm and industry.

   b. If concentrated industries, among the older industries, grow relatively slowly and are more capital intensive, then the inadequacy of historical cost accounting impinges

more heavily on the profit measures for concentrated than for unconcentrated industries. Therefore, it is hypothesized that adjusting profitability measures for price-level changes will lower observed profit measures more for concentrated than for unconcentrated industries.

IV

ESTABLISHING A METHODOLOGY

Bain, in his chapter on "Market Performance in American Industries," [1] outlines several relationships among market, structure, and conduct. He reviews the major alternatives open to sellers in imperfect markets with respect to two main aspects of market conduct--interseller coordination and price calculation. He then puts together these two aspects of market conduct to get a variety of total patterns of conduct. Next, he assesses the implications of these total patterns and how they may lead to different consequences of market performance.

Throughout his discussion Bain continually falls back on the two-fold, theoretical classification of monopoly and pure (atomistic) competition as polar extremes against which one can seemingly judge how competitive or monopolistic any imperfect industry is. For example, he combines complete collusion and joint profit maximization (two of several categories of interseller coordination and price aims respectively) and makes this observation: "Complete collusion is

---

[1] Joe S. Bain, Industrial Organization (2d ed.; New York: John Wiley & Sons, Inc., 1968).

'evidently' entered into in order to facilitate joint profit maximization, and this aim is generally pursued where collusion is complete. Therefore, complete collusion tends to lead to a maximum of monopolistic output restriction and price raising." [2]

Bain notes that this is an oversimplification which needs qualification. After discussing these qualifications, he states,

> ... any completely collusive conduct pattern which becomes incomplete in one of the ways noted [he notes several possible qualifications] should have a general tendency to generate a "less monopolistic" performance--toward some lowering of price and extension of industry output as compared with the putative performance of complete collusion in the same setting. Incomplete collusion should thus probably lead on the average to a less monopolistic performance than complete collusion. [3]

The purposes of this immediate discussion can now be made clear. The study of the relation between market structure and market performance is indeed very complex, primarily because of the existence of the intervening variable--conduct--that Bain so well analyzes. He concludes "that a classification of different patterns of market conduct of the sort that can be developed from available evidence provides a poor basis for predicting market performance. That is, it is not possible to link a distinct class of performance with each objectively distinguishable broad class of market conduct." [4]

---

[2] Ibid., pp. 322-23.

[3] Ibid., p. 324.

[4] Ibid., p. 329.

Though this may be true, empirical observation usually connects structure and performance causally. One of the primary methodologies is to relate concentration and profitability. Bain emphasizes throughout this discussion of structure, conduct, and performance that the appropriate generalization--pervasively made and embraced in theory and in empirical work--is that combinations of structure and conduct which make market power or monopolistic action prevalent are translatable into a performance characteristic consisting of output restriction along with higher prices than would otherwise obtain in a more competitive structure-conduct pattern.

Yet this basic hypothesis cannot be, and has not been, subjected to any direct empirical analysis. The reasons are obvious. Empirical work is not designed to handle "ifs" or what-might-have-beens. Because there has, as yet, been no direct empirical methodology to test the validity of this hypothesis, researchers make use of a convenient transitional hypothesis which states that if output is restricted and prices are thus higher (assuming profit maximization), then it follows that rates of return in these industries will be higher than would obtain under more competitive structure-conduct conditions. The methodological framework to be developed below will in part test the validity of this transitional assumption and, it is hoped, will shed some light on conduct and structure as well as on expected or predicted performance. It is hoped that within the framework of the following methodology it will be possible both to test the relationship between structure and performance

and to infer conduct and determine how it does or does not affect this relation.

As has been noted, studies show correlation between the following pairs of variables:

1. Rates of return are positively correlated with concentration ratios.
2. Rates of return are positively correlated with size of firm.
3. Profit margins are positively correlated with concentration ratios.
4. Capital-output ratios are positively correlated with size of firm.

On the basis of the observed correlation among the above variables, it is hypothesized that multicollinearity exists among size, capital-output ratios, concentration ratios, and profitability measures. Therefore, studies which do not recognize this multicollinearity by excluding one or more variables result in a misspecification of observed relations. It is thus necessary to develop a methodology in which all these relationships can be accounted for. Doing so, it is believed, will result in a more valid structure-conduct-performance relationship. The method by which this will be accomplished is by specifying the rate of return as a composite ratio of the form

$$\underset{\text{I}}{\frac{\text{profits}}{\text{assets}}} = \underset{\text{II}}{\frac{\text{profits}}{\text{sales}}} \times \underset{\text{III}}{\frac{\text{sales}}{\text{assets}}}$$

Obviously, the above equation is a simple identity where ratios I, II, and III are the rate of return, profit margin, and asset-turnover ratios respectively. At first glance, the equation appears to be nothing

more than definitional. However, if viewed in terms of its individual components, this equation contains two performance variables (I and II) which are linked by a third term. This third ratio is the inverse of the capital-output ratio, if capital is broadly defined to include all assets.

Difficulties of Industry Profit Studies and Firm Concentration

Traditionally, this analysis of concentration and profitability is conducted at the industry level and not extended to individual firms within industries. As a result, those conducting the research have no choice but to attribute differences in profitability measures to differences in concentration. The correlation between high profits and concentration is cited, then, as evidence for the influence of market structure--numbers of firms--on market conduct, which manifests itself through this performance measure. However, this does not imply causality or its direction should it exist. Indeed, it is argued that the correlation between concentration and profitability is expected, but not necessarily because of the exercise of monopoly power. Furthermore, the instances of correlation between profitability and concentration support the hypothesis of multicollinearity among the above variables.

The fundamental proposition that "the persistence of high profits over extended time periods and over whole industries rather than in

individual firms...suggests artificial restraints of output and the absence of fully effective competition" [5/] must be tested carefully. For example, this proposition implies that all firms in an uncompetitive industry will have artificially high rates of return, i.e., excess profits. However, in studies of concentration and profitability usually only the industry mean is used. As a result, this proposition is not being tested, because the mean indicates very little about return distributions among firms within the industries. Also, in the process of simplifying concentration-profitability studies by using the mean as an industry summary measure for the performance of an industry, other influences on profits are not taken into consideration. Within an industry, profit differences among firms can be attributed to many causes. In particular, profit measures may differ because of (1) size, (2) economies of scale, (3) efficiency, (4) risk, (5) capital-output ratios, (6) accounting techniques, e.g., historical cost accounting.

Profits can vary among firms because of these differences as well as differences in monopolistic or competitive conduct. But through the use of industry means in concentration studies, the influences of these factors on profitability measures are ignored. The point is that each one of these factors can affect the mean quite independently of monopoly conduct, and therefore the mean distorts the relationship between profitability and concentration.

5/ Neal Report, p.S5643.

The composite ratio will be the basic framework for analyzing each firm in each industry. The collection of data for this ratio by firms opens up many possibilities for analysis of firms within industries of different classifications. First, firms and their ratios can be ranked according to size to determine a relation between size, profit measures, and capital-output ratios. Furthermore, this relation can then be tested across concentrated and unconcentrated industries. Second, these ratios and their interaction can be observed over time by taking yearly observations. Thus, the variability of rates of return can be explained by changes in profit margins and asset turnover. For example, the hypothesis that concentrated industries administer prices can be tested by observing the interaction of the three terms. Should profit margins show less flexibility in concentrated than in unconcentrated industries over a business cycle, then administered prices could be indicated. Testing this hypothesis, however, is not the major purpose of this study. Other, less obvious relationships may be accounted for by analyzing data on firms. It is hypothesized that economies of scale and productive efficiency lead to profit differentials among firms and thus distort industry profitability measures (means). However, the analysis of this distortion is quite complicated.

It seems implicitly assumed, for example, that where economies of scale exist, commensurately lower prices will obtain under competitive conditions. In other words, economies of scale should have no independent influence on profitability measures. Instead, it

is hypothesized in this study that economies of scale, efficiency, and size of firms within an industry affect profitability measures quite apart from the exercise of monopoly power. Much of the remainder of this section develops this point.

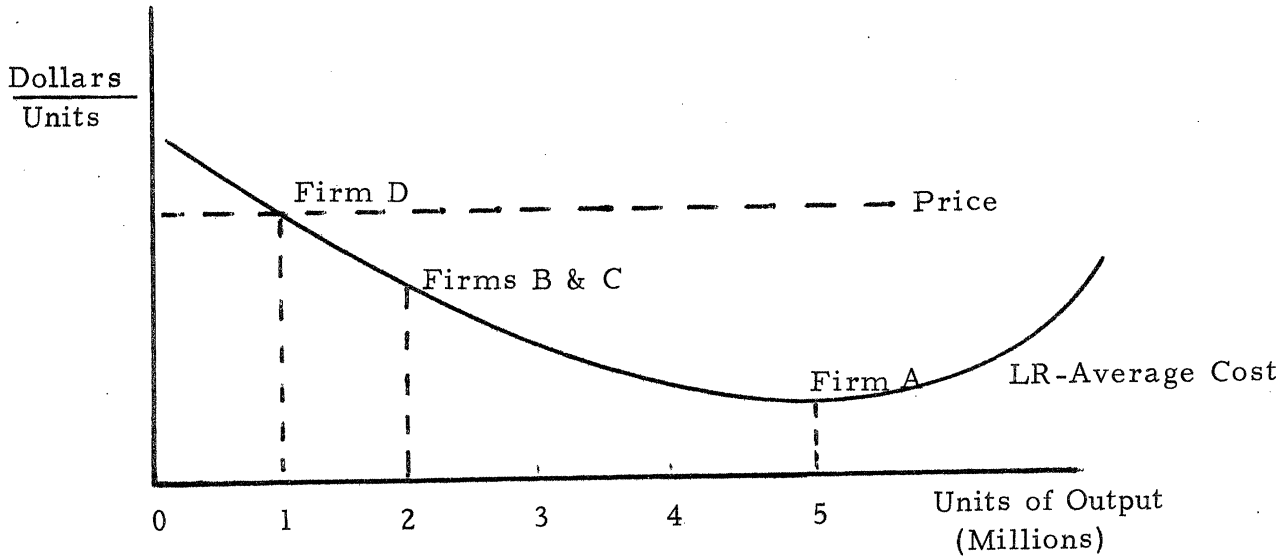
Let's start with an extreme example. Assume that the manufacture and production of automobiles is a natural monopoly. A firm is said to be a natural monopoly if its long-run average cost curve falls throughout; that is, if successive increases in scale reduce the successive low points on the short-run average cost curves. A natural monopoly situation may also exist even though the long-run average cost curve is U-shaped, provided it is falling throughout all relevant ranges of market demand. Thus, if either condition exists, the lowest costs of production are obtained by a single firm.

Next assume that there is more than one firm producing in this industry. Assume that all these firms, regardless of their number, operate along this same long-run average cost curve. This will be denoted as the equal efficiency assumption, where efficiency refers to least-cost combinations of factors given the scale of operation. For example, it may be possible that two firms produce at different unit costs at the same scale. The firm with the lower costs per unit is the most "efficient" firm. Thus efficiency as defined here is always relative to scale and hence not directly measurable by comparing unit costs of firms of different scales.

To continue with the example, assume that industry demand is ten million units of output and four firms share the market in the following manner (see Figure 1):

Firm A: 50 per cent or 5 million units
Firm B: 20 per cent or 2 million units
Firm C: 20 per cent or 2 million units
Firm D: 10 per cent or 1 million units

Figure 1



Clearly, the various possible combinations of firm numbers and size for different cost combinations are numerous. With four as an apparently arbitrary number, we can then hypothesize behavior or conduct under various constraints. The constraint that is of particular interest here is relevance of concentration ratios as used in formulating public policy such as that set forth in the Neal Report.

Again, we remind the reader that the one general criticism of monopolistic conduct is that it restricts output by raising prices beyond what they would otherwise be under more competitive structures. In this example, the four-firm concentration ratio, of course, is assumed

to be 100 per cent for every combination of firm sizes. We would expect, however, industry profitability measures to vary with the different combinations although not as much as they vary among firms. To make this last point clear, under most reasonable a priori pricing behavior we would expect these four firms to sell at or about the same price regardless of how those prices are determined. Hence, simply because of the cost differences, profits per unit of output will vary inversely with costs per unit. With the assumption that decreasing costs per unit of output accompany constant returns to scale, it is easy to translate per unit profit figures into rates of return on assets. Here, constant returns--a physical concept--means that output increases proportionately to increases in the capital or asset base. 6/ Temporarily at least, we can assume this oversimplification. The multidimensional nature of these relationships should be noted, however.

With these four firms accounting for the total market demand of ten million units, we have arbitrarily selected a price per unit of output such that the smallest firm breaks even. Since both B and C are assumed to be equally efficient in producing two million units, the profits

---

6/ The term economies of scale is ambiguous because it embodies both a physical and a pecuniary concept. Typically, economies of scale implies decreasing costs per unit of output as scale increases regardless of the reason. For example, decreasing costs could result from cost economies at higher scales through decreases in the cost of factors, or from factor costs' remaining constant while physical output increases more than scale increases.

per unit of output are identical and less than the largest firm's (A).

At this point, we can again note the work conducted by Collins and Preston in which attempts were made to correlate profit margins (essentially profit per dollar of sales) with industrial concentration. In this hypothetical industry, the average profit margin for the industry is high, partly because this industry has a steep U-shaped (cup-shaped) long-run average cost curve. A flatter, saucer-shaped curve might produce lower average profit margins under the same assumptions. The difficulties in using an industry profit margin will be discussed again later. At this time, it is sufficient to note that margins may vary depending on the nature of the cost curves within an industry.

Given this hypothetical situation the question of industry behavior or conduct arises. Simple economic analysis suggests that the ideal industry structure--if lowest costs per unit are to be attained--is two firms each having 50 per cent of the market. However, returning to the point at hand, antitrust policy is concerned with numbers of competitors and is seemingly predicated on the notion that more firms are better than fewer. The presumption that prices to consumers would be higher if there were fewer firms is questionable in this case. It might very well be that with two firms total industry profits could be higher and prices paid by consumers lower. Thus, again we have found fault with the use of industry profits as a measure of the degree to which consumer welfare is attained.

The following quotation is given to illustrate the trap which people commonly fall into in regarding this point:

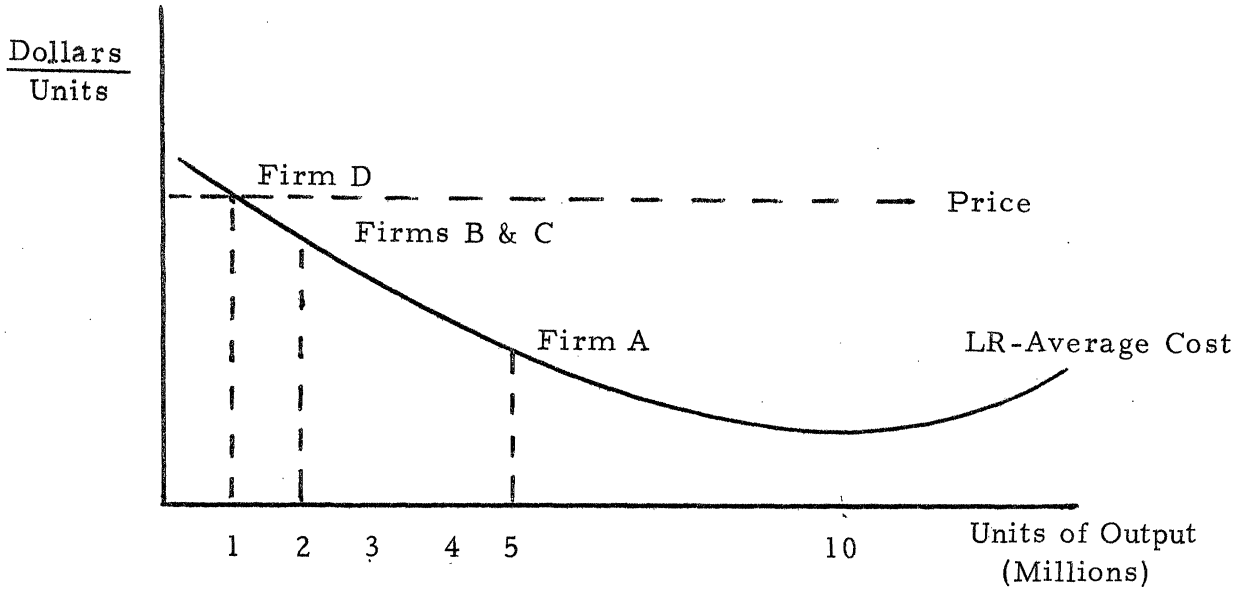
> Markets with more rather than fewer firms, particularly if parallel reductions in market shares are implied, will tend to reduce the exercise of market power, i.e., the extent to which prices can be advantageously elevated relative to costs. For example, if a dozen automobile firms of similar size were to supersede the present structure, there is good reason to believe that the average ratio of price to cost would be substantially reduced. 7/

On the basis of the hypothetical situation depicted here, this statement and its prediction are valid. However, that prices would be lower to consumers does not follow from the proposition that the "average ratio of prices to costs would be substantially reduced." Antitrust policy should be concerned with prices to consumers rather than with profits to producers.

To look at the possible modes of conduct and reasons for them we could change the scale of Figure 1 slightly to obtain Figure 2. Again we make the same assumptions regarding equal efficiency and total industry demand of ten million units. In this figure we clearly have the condition for a natural monopoly, although initially we are assuming the same market shares as before (50-20-20-10).

7/ U.S., Congress, Senate, Select Committee on Small Business, Planning, Regulation, and Competition: Automobile Industry--1968, Hearings, before Subcommittee of the Select Committee on Small Business, 90th Cong., 2d sess., 1968 (Washington, D.C.: Government Printing Office, 1968), p.915.

Figure 2



Again, to start with, it is assumed that the prices for each firm's output are given at the level just sufficient to allow the smallest firm no profits. Clearly, in this situation the industry will show large average profits and will be subject to the accusations that prices are too high and output is restricted--in short, that it is a monopoly. Here, however, the apparent lack of competition obviously will not be ameliorated by increasing the number of firms. Indeed, the competitive constraint upon this industry could be the unwillingness of the largest firm to increase its market share. Certainly 50 per cent of the market would be considered excessive by many public officials. In other words, firm A's initiation of price decreases in order to expand its output and in order to realize economies of scale more fully might force the smallest firm out of the industry. That is, it may be true that a price umbrella exists in this concentrated industry which protects the smaller high-cost firms.

Should this hypothetical situation ever be approximated by any industry, one solution would be to relax the constraint of antitrust policy on numbers of competitors and market shares. If the goal of antitrust is consumer welfare, it would not be too improbable to expect, in this instance, that a single firm could produce ten million units at a lower price to consumers. This is more likely to occur even if the firm behaved like a classical monopoly with higher absolute profits than if it maintained its original structure.

Again, the point is made that large profits in an industry do not necessarily imply the existence of too few firms or any abuse of market power. With the stress on concentration ratios as structure criteria--as in the Neal Report--we would expect firms to be constrained by the desire not to increase any already high ratios. Paradoxically, the complaint of restricted output and excessive prices in concentrated industries may, in part at least, be a result of the use of the measure (concentration ratios).

To the extent that firms or industries wish to avoid being called concentrated, they should restrict output, simply because concentration ratios would then be lower, at least for the top four firms. The relevance of this point would be clearer if, in the above figure, we divided each firm in half to make eight firms instead of four. While the eight-firm concentration ratio is 100 per cent, the four-firm ratio falls to 70 per cent. Any competitive behavior--lowering prices to expand output--would most likely increase the four-firm ratio, and the willingness of any of the top four firms to do so depends on the perceived importance

of raising the ratio above 70 per cent. If 70 per cent is used as a threshold level, as it is in the Neal Report, these firms, including the less "efficient" firms, may preserve themselves by maintaining the status quo.

Although this hypothetical situation may not be applicable to any real industrial structure, it does point out that high profits in an industry may not result from the classical notion of monopolistic conduct. The analysis of profits by industry aggregations and averages fails to disclose possible explanations for high profits. Rather it is assumed that too few firms lead to high profits. The only analysis that is relevant then is a firm-by-firm analysis. Although the example chosen is an extreme case, the implications for economies of scale and their potential effect on profit measures apply to industries where no natural monopoly conditions exist. For example, an industry may be a "natural" eight-, six-, or four-firm industry and the cost curve may be very steep or only slightly so.

In summary then, we have suggested several difficulties in using industry averages as performance measures against which to judge behavior of individual firms. Basically, performance for an industry is an inappropriate or at least elusive concept. The concept of performance is based on individual firms, as is the concept of conduct. In the aggregation of performance measures we lose the information necessary for explanations. As we have noted, many hypotheses have been advanced for high profits. In studies of concentration these other hypotheses are

stripped of explanatory power through the aggregation process. For example, if size is an explanation for high profitability quite independent of the exercise of monopoly power in the product markets, and if we expect large firms to be found in concentrated industries, then we would expect a correlation between profit and concentration. Furthermore, if economies of scale are explanations of high profitability for large firms in concentrated industries, industry averages will show higher profits for these concentrated industries in which economies of scale account for profit differentials among firms than for concentrated industries in which economies of scale are not found.

A Numerical Example of Interindustry Analysis

Perhaps a simple case would aid in the development of the methodology suggested here. Below are computed the three ratios for three different firms.

	I	=	II	x	III
Firm	Rate of Return (Percentage)	=	Profit Margin (Percentage)	x	Asset Turnove
C	8	=	4.2	x	1.9
A	7	=	4.7	x	1.5
U	5	=	8.3	x	.6

Although these ratios have been computed for only one year, for purposes of illustration let's assume they were average relationships for several years--say ten. First, analyze the rate-of-return column (I). If firm C were known to belong to a concentrated industry, the

empirical evidence here confirms the expected performance when compared to the two other firms which belong to an ambiguous category (A) and an unconcentrated category (U), respectively.

Now, one may wish to confirm this prediction by analyzing profit margins. The expected positive relationship is not apparent. Instead, the order of expected relationships is reversed. From a glance at column III the explanation is clear. Or is it? Based on theory and empirical evidence, the oligopolistic firm is expected to have excess profits which can be observed in both profitability measures. That is, an oligopolist or monopolist maximizes profits (revealed in rates of return) by charging higher prices and restricting output (reflected in profit margins). Yet, these expected patterns of conduct are not suggested by the data. If C is a member of a concentrated industry, it appears that C's high rate of return results from lower prices and higher output levels vis-á-vis the other two firms. That is, the data may suggest that low prices of firm C have led to greater increases in output and hence are reflected in the rate of return. 8/ The point needing to be emphasized is simply that for either one of the profit measures to become meaningful, they must

---

8/ Obviously, this analysis is static and very simplified. But at this point it can be noted that for this to occur in dynamic analysis requires elasticity of demand greater than conditions of unity and favorable cost.

be studied in the light of their interaction with the third term.

With this brief and very simple example, it is perhaps clear that the analysis of profitability measures may be quite complex. The overwhelming limitation of this methodology lies in the relations on the right side of the equation (terms II and III). We would expect profit margins and asset-turnover ratios to vary rather widely among firms in different industries. In this example the three firms are from three different industries where differences in the nature of production functions would appear in term III. Therefore, to the extent that these differences lead to requirements of high profit margins to maintain an adequate rate of return, the comparison of profit margins does not seem to be an appropriate interindustry methodology in the study of concentration. It is believed, as was already mentioned, that the relation between profit margins and concentration found by Collins and Preston may be due to multicollinearity. This would seem more apparent if size and concentration were positively correlated. That is, if concentration and capital-output ratios were positively correlated, one would expect higher profit margins or concentrated industries even if excess profits were not found in rate-of-return profitability measures.

A Numerical Example of Intraindustry Analysis

Though the use of profit margins and asset-turnover ratios as indices of monopoly pricing and output restrictions is seriously impaired because of interindustry differences in production functions and demand conditions, these terms may possibly be used in intraindustry analysis.

If it is found that the largest firms in oligopolistic industries generally show higher asset-turnover ratios and higher profit margins (and thus higher rates of return) than smaller firms, economies of scale may be indicated. Within industries, the production functions and demand conditions could be very similar. If identical or very similar products are produced, one can assume prices to be very near the same for all firms. Thus, revenues are a direct measure of physical output, and the asset-turnover ratio may become a proxy for returns to scale. For example, increasing returns to scale means that for a given percentage of increase in scale (assets as a proxy), a greater percentage of increase in physical output results. Furthermore, because prices are the same, cost differences are reflected in profit margins. Thus profit margins become an index of either efficiency or economies of scale.

One would expect, then, if economies of scale exist in industries beyond the scale of the smallest firms observed in that industry, larger firms should have higher asset-turnover ratios and higher profit margins. Obviously, all of this analysis rests on the ranking of firms within industries according to size.

In concluding this section, we introduce the automobile industry as an illustration of intraindustry analysis. In doing so, we attempt to show the potential of intraindustry analysis in explaining or suggesting reasons for the high average profitability measures of the industry. Specifically, we are seeking reasons beyond the "monopoly power" and price-output

decisions of oligopolies. The ratios, roughly computed, are simple averages for the period 1961-68.

	I		II		III
Firm	Rate of Return (Percentage)	=	Profit Margin (Percentage)	x	Asset Turnover
General Motors	14.73	=	9.24	x	1.65
Ford	7.12	=	4.74	x	1.48
Chrysler	6.64	=	3.89	x	1.70
American Motors	0.49	=	(.08)	x	2.30

Again, in many studies of concentration the only data analyzed are the industry aggregates. For example, when the two profit measures are weighted by assets, the automobile industry shows an average rate of return of 10.8 per cent and an average profit on sales of 6.8 per cent. Using then either or both of these industry figures along with similarly calculated figures for other industries, studies find correlation between concentration and profitability. The point to be made is thus twofold. First, the single indicator of industry performance--average rates of return or average profit margins--may not be representative for the industry. In this case, a 10.8 per cent rate of return on assets is not close to any one firm's rate of return. It is influenced very heavily by the weighting process. In other words, if one is hypothesizing that a concentrated industry enables all firms in that industry to enjoy special advantages, this is not indicated by the average rate of return. For a concentrated industry to have a single though very large firm with unusually high

profitability should not necessarily lead to the conclusion that high concentration and profitability are causally related.

The second criticism of many previous studies is simply that they lose information by employing only one of the two profitability measures or by failing to link them by the asset-turnover ratio. This point was suggested early in this section by a few hypothetical situations. In a firm-by-firm analysis which extends over an appropriate time period--say ten years--it becomes possible to incorporate into the analysis explicit recognition of other hypotheses explaining high profitability. Multiple collinearity, which was one of the difficulties in previous analysis, can then be attacked in a new light. For example, let's continue with the automotive industry data.

First, we know that General Motors is the largest firm in the automotive industry, followed at a distance by Ford and Chrysler and then by American Motors. Thus analysis of this industry can explicitly take cognizance of the hypothesis that size is independently correlated with profitability. Note also that in the automobile industry there is a perfect rank correlation.

Second, it has been noted that size is positively correlated with capital-output ratios. The third term in this composite ratio is, of course, a proxy for the inverse of this ratio. Therefore, if data on the automotive industry were to support this hypothesis, we would expect the asset-turnover ratio to increase as one goes from the largest to the smallest firm. The explanations for this finding and hypothesis are

numerous and space does not permit a full discussion of them. Instead, only three reasons will be cited at this time. [9/] The findings of correlation between size and capital-output ratios are said to result from

1. Product mix differences between large and small firms, i.e., large firms produce more capital intensive products.

2. Differences in degrees of vertical integration, i.e., large firms are generally more vertically integrated than small firms.

3. Greater efficiency in the utilization of assets by smaller firms, i.e., large firms, because of their size, have ready access to capital markets and therefore need not be careful in the acquisition and employment of capital assets.

In the automotive industry we can observe that the ratios also seem to conform to expectations. However, it is commonly known that GM is highly vertically integrated; furthermore it has a higher cost per car because it produces relatively more high-cost, low-volume cars, i.e., it produces more capital intensive products. Thus, it may be possible to quantify these differences and alter the ratios correspondingly. If this could be done with reasonable accuracy then these new ratios could be used to infer conduct for the firms in the industry. That is, inferences could be made about pricing and intentions to restrict output.

9/ See, for example, Matityahu Marcus, "Size of Establishment and the Capital-Output Ratio: An Empirical Investigation," Southern Economic Journal (July, 1965), 53-62, and Hiram S. Davis, "Relation of Capital-Output Ratio to Firm Size in American Manufacturing: Some Additional Evidence," Review of Economics and Statistics, XXXVI (Aug., 1956).

For example, vertical integration differences could be neutralized by replacing sales with value added, to obtain the following for the largest three firms: 10/

	I		II		III
Firm	Rate of Return	=	Profits / Value Added	x	Value Added / Assets
GM	14.73	=	17.52	x	.870
Ford	7.12	=	11.26	x	.623
Chrysler	6.64	=	9.95	x	.665

The analysis of these data which may lead to potentially useful hypotheses about the automotive industry's conduct and performance could be very lengthy and multidimensional. This is not our purpose here. Rather, we only want to indicate the potential of a firm-by-firm analysis of "industry" performance. For example, if we could assume that these firms produce essentially the same or identical products (after all, this is the economic definition of an industry), the explanation of a high (10.8 per cent) rate of return for the industry rests with the efficiency of one firm--the largest. Since firms within each industry would be

---

10/ American Motors was excluded because of the lack of readily available comparable data. It may not be possible to use value added in this study to neutralize vertical integration because data are not always available for all firms.

selling the same product, we could also assume that the prices received for these products are the same. [11] The analysis here has been complicated by the replacement of value added for sales. To avoid unnecessary complexity at this time, let's assume that these firms are equally vertically integrated. However, let's use the actual ratios for value added as if they were obtained with the use of sales figures.

If this were the case, then the high industry profit margin results from the largest firm's being a relatively low-cost producer, i.e., an efficient producer, or possessing significant economies of scale. Furthermore, the explanation of the high (10.8 per cent) rate of return becomes more meaningful than simple monopolistic pricing behavior. The high rate of return obtained by GM, the largest firm, results from two high ratios. The first, high profit margin, has been explained by low-cost production. Part of the reason behind this conclusion rests with the observation that the asset-turnover ratio is also highest for GM. It would be very tenuous to suggest that this industry was dominated by a large firm which restricted its output (and used capital inefficiently) by charging higher prices than the other, more competitive firms which were attempting to expand their market shares by undercutting the

---

[11] Of course one could allow for the possibility of small firms undercutting the larger firms or other possibilities in pricing policy among firms in each industry. (See Bain, Industrial Organization, chap. 9, for these possibilities.)

high prices. That is, the lower profit margins for the smaller two firms are not evidence for the hypothesis that their prices are lowered in an attempt to compensate by increased volume (shown in the asset-turnover ratio) to maintain their rates of return.

On the basis of the above table, one could not refute the hypothesis that the larger firm enjoys economies of scale or is more efficient, and that this is the explanation for its high rate of return. If GM's asset-turnover ratio were lower than the other firms', then the support for this hypothesis is ambiguous. On the other hand, since it is higher and we have assumed that identical products are sold at identical prices for all firms, we could conclude that the largest firm has more physical output for each dollar in assets, i.e., the industry may have significant and increasing returns to scale. This conclusion is not warranted, however, by a superficial analysis of data. For example, the assets required to produce a car are $1,845, $1,757, $1,578, and $992 for GM, Ford, Chrysler, and AMC respectively. Two reasons could be cited for this.

1. GM is, in fact, more vertically integrated and hence output in units becomes an elusive concept. In comparing the output of GM and AMC one cannot use cars, because part of GM's output is components.
2. The automobile firms do not produce identical or even comparable products. Product mix between high-priced luxury cars and the low-priced compact cars varies among firms. GM, for example, has a high percentage of its output in the high-priced luxury car class. Therefore,

the output, if measured in units of automobiles, is not directly comparable to a typical car produced by AMC.

Obviously, this analysis has been very brief and highly simplified by the assumptions employed. However, it is hoped that the potential for this methodology remains clear. It is contended that analysis of the industry is much more meaningful with the use of firm data than with summary measures of a single industry.

Summary of Intraindustry Analysis

To summarize the suggested methodology in using the composite ratio, several shortcomings of industry averages for rates of return or profit margins have been noted. It has been asserted that the industry average is not the appropriate variable to be used in regressions of profitability measures and concentration ratios. Briefly, the principal reason is that the dispersion of rates of return for firms within each industry affects the mean rate of return regardless of the exercise of monopoly power. Should all firms in a concentrated industry show about the same profitability measures, then the mean is the appropriate variable for profitability-concentration correlation. Thus, the dispersion around the industry mean should be incorporated into the analysis.

Also, because the analysis is begun on the basis of firms within industries, the nature of the dispersion of profitability measures can potentially suggest reasons other than the existence or absence of monopoly power for the observed relationship between concentration and

profitability. For example, an industry can show a high average profitability in any of the following instances:

1. All firms have about the same high profitability.
2. In an industry composed of an equal number of large firms and small firms, the large firms have high profitability and the small firms have low profitability.
3. A few large firms have low profitability, and many small- or medium-sized firms show high profitability.

Naturally, the situations can be extended at great length, and one could also include the various possible combinations of the three ratios. The point is that each situation suggests different reasons for high or low observed industry means. A single firm in an industry of only a few firms can greatly influence an average if it happens to be the largest and by far the most profitable. If size is correlated with profitability for reasons other than the exercise of monopoly power (one would expect, for instance, that a highly efficient and well-managed firm would grow relative to the less successful firms), then the statistical methodology of weighting profitability measures to obtain industry averages distorts the relation between concentration and profitability.

Although the directions in which one could approach a study of concentration and profitability are numerous, the following procedure seems most promising at this time, because the applicability of industry averages has been denied.

First, regress concentration ratios on the industry weighted average profitability measures (perhaps only the rate of return at this time), thereby determining a relationship. It would be expected that some concentrated industries would show high and others low-average industry profits.

Second, a firm-by-firm analysis within industries will suggest reasons for these high and low averages. At this point the validity of using weighted industry averages to represent the performance of an industry will be examined. Should simple averages appear to be a better measure of industry performance, then the procedure will be duplicated, and they will be used.

Third, because the dispersion of profitability measures of firms around the industry mean indicates the extent to which the industry average represents industry performance, the deviations from the industry averages for each firm will be summed. At this time it has not been decided whether the dispersion should be determined around the weighted or simple average industry means. If it is deemed appropriate, the initial regression using industry averages and concentration ratios will be supplemented by a third variable, the standard deviation. In a sense, the standard deviation becomes a proxy for the net influence of all other variables--economies of scale, size, efficiency--which may affect the industry average independently of monopoly power. The results of the addition of this variable on the correlation between concentration and profitability may indicate one of at least the two following possible relationships:

1. If the coefficient for the dispersion variable is significant and positive, the appropriateness of a firm-by-firm intraindustry analysis is implied. For example, if we took weighted dispersions around an unweighted industry mean, and if this variable proved to be significant, the importance of the size of firms in the statistical process is indicated. That is, industries show high- or low-average profits because of the weighting process.
2. Should it be found that concentration ratios are correlated with the dispersion index, the central proposition that high profits are found across all firms in oligopolistic industries loses credibility. The implication is that high profits in concentrated industries are not enjoyed by all firms, but only the largest. Thus there is the implication that large firms in these industries possess economies of scale, unique efficiency, or unique market power not enjoyed by all firms and these advantages manifest themselves by profit differentials among firms. 12/

12/ This point will be developed further in the next section on risk.

By collecting data for the three ratios by industries, we hope that the dispersions will take an observable pattern. And, as a result of analysis, additional relationships will be suggested--the most readily testable being the relation between concentration, profitability, size, and asset-turnover (capital-output) ratios. Recall that one of the hypotheses is multicollinearity between these variables. There are various methods by which this can be tested.

On the one hand, size and capital-output ratios can be correlated (nonparametrically) within industries. It can then be observed what, if any, impact the industrial classification has on the relationship. If it is found that size, capital-output ratios, and profitability have higher positive correlation in concentrated industries, we have supported the contention that the observed relation between profitability and concentration is partially, at least, attributable to multicollinearity.

On the other hand, analysis can proceed more generally by not observing size or capital-output ratios within industries, but instead by developing industry indices (averages) for firm size and firm capital-output ratios. These then can be introduced as summary variables for the industry along with industry profitability and concentration in a regression across industries. This analysis may show the possibility of multicollinearity using industry aggregate data employed in many profitability concentration studies.

At this time it would be futile to attempt to suggest all possible relations among the variables in an analysis among firms within industries or among industries. Only a general methodology has been

offered from which, it is believed, a better, more valid concentration-profitability relationship can be established. By use of the composite ratio in a firm-by-firm analysis, many key variables such as size, capital-output ratios, or differences in industry profit dispersions, can be separately accounted for with regard to their relation to profitability measures. Thus from these relationships may come explanations for the generally observed patterns of profitability among industries.

In the next section on risk, a methodology is developed whereby profitability measures can be adjusted for the independent influences of risk. The profit measures thus obtained become new variables to be incorporated into the general analysis above.

V

RISK AND MEASURES OF PROFITABILITY

Before evaluating the influence of a structural variable on profitability measures, observed profits must be adjusted for all other possible influences. Alternatively these other influences must be presumed to have either a negligible impact on the profit measure or a systematic relationship to structure which can be explicitly quantified in a model. Because, in this study, a relation between concentration and profitability is hypothesized, scientific inquiry calls for the elimination of all influences on profit other than the one control variable, concentration ratios. This requires the elimination of the influence of varying levels of risks among the industries or firms studied. As previously mentioned, one of the fundamental propositions of the theory of competition is that the equilibrium rate of return will be identical among all alternatives for the employment of capital. This occurs through the free flow of capital to activities with high returns from activities with low returns. Equilibrium occurs then when all rates of return are equal and the result is the optimum allocation of resources and goods.

When risk is considered, however, the adjustment process is far more complex. In the real world, the assumption of perfect knowledge is not appropriate. Indeed, uncertainty and the lack of information make the business man a businessman. Because risk varies with different activities, businessmen must weigh the risk against expected returns. Capital moves not only according to observed rates of return, but also according to the perceived risk associated with each activity. If equilibrium is reached, rates of return will remain unequal, reflecting the differences in risk exposure. In equilibrium these rates differ by the risk premiums, and risk-compensated rates of return are equal. Thus, if one accepts the hypothesis that risk varies among different employments, he must then accept that the observed rates of return will vary according to that risk. It is hypothesized that risk has a significant influence on observed profits. The question then is whether the influence of risk on observed rates of return is systematically related to concentration ratios. Two methods could be used to answer this question.

First, industries (and firms) could be carefully selected so that they are all subject to comparable risk influences. However, this would be clearly inappropriate for our purposes. The second method--which is the one we will use--is directly to establish a relationship between observed rates of return and risk, and, from this relationship, adjust observed rates of return for these differences in risk. To eliminate the independent influences of risk in this way allows industries to be selected on a basis other than risk comparability.

Before the methodology for accomplishing this task is developed, a critical hypothesis needs to be stated which will ideally justify the explicit recognition of risk as it is defined below. It is hypothesized that through the explicit recognition of a risk component in observed rates of return a more accurate relation between concentration, size, and profitability results. The possibility of multicollinearity among risk and other variables (size and capital-output ratios) in this study cannot be ruled out. It is the opinion of the writer that the simplest way to test this possibility of multicollinearity is to do so empirically, rather than on an a priori basis.

Risk, in this study, is defined as the condition where the outcome of future events cannot be predicted with certainty but where probabilistic expectations can be derived. With such a definition it is possible to establish a measure of risk by statistically analyzing firm and industry distributions of rates of return. 1/

Assume that the firm maximizes a utility function of the form U(I+A) where utility is a function of income, I (a random variable), and assets, A (assets being the measure of a firm's wealth). The expected value of this function is denoted by E (I+A). Next assume that the typical firm is adverse to risk, which is tantamount to saying the

---

1/ The methodology developed here follows that of I.N. Fisher and G.R. Hall, "Risk and Corporate Rates of Return," Quarterly Journal of Economics, LXXXIII (Feb., 1969), 79-92.

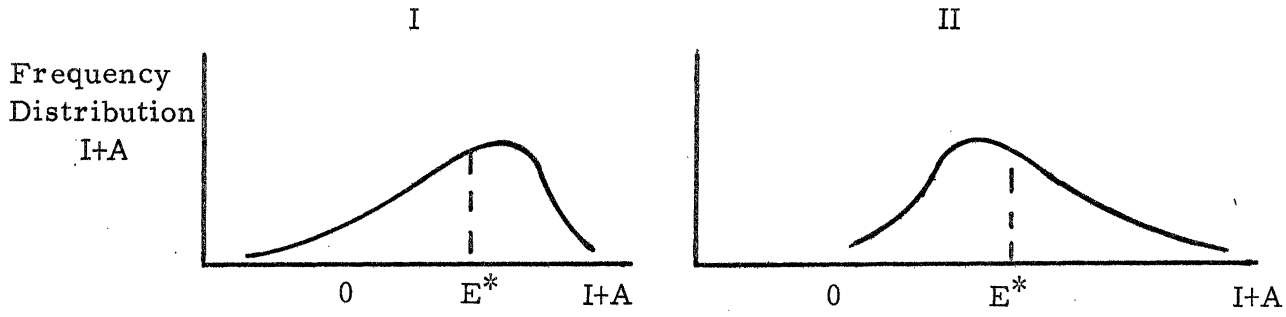
utility curve is concave from below (when utility is on the vertical axis). If firms typically have an aversion to risk, it follows that they will not be indifferent between equal sums of I+A when one is an expected value and the other is a certain value. Specifically, it follows that a risk premium will be required, denoted R(I,A), above the expected value E(I+A) to make the firm indifferent. Thus the risk premium is defined as the difference between the expected value of the income, E(I+A), and the certain value, E(I+A) - R(I,A).

It can be shown that, with the assumption of risk aversion, the greater the dispersion of possible outcomes (profits) around the mean, the greater the risk premium. 2/ That is, the greater the standard deviation in the distribution of profits, the greater the risk, and therefore, the greater the risk premium. Essentially, this follows from the definition of risk. In fact, some define risk simply in terms of the standard deviation or variance, implying that earnings should be higher for firms with high variations in earnings than for firms with low variations in earnings.

In addition to dispersion, it can be hypothesized that skewness of the distribution of (I+A) also affects the risk-premium. 3/ Perhaps a simple graphic example will show this point.

2/ Ibid., pp.81-83.

3/ Fred Arditti, "Risk and the Required Rate of Return on Equity," Journal of Finance, XXII (Mar., 1967), 19-36.



In both distributions the expected value E^* is the same. In I, the distribution is negatively skewed and shows a possibility of a large loss with no chance of a very large gain. In II, the distribution is positively skewed showing no chance, or very little, of a large loss, but a chance of a very high gain. For firms with risk aversion, distribution II is preferred to I although they both have the same expected value. Therefore, it is hypothesized that firms prefer positively skewed distributions because the chance of very low income is smaller. Thus positive skewness results in a smaller required risk premium for otherwise comparable distribution (same standard deviation and same expected value).

The two components of risk are thus identified. To measure the influence of risk on profits it is necessary to go back to the central proposition of equilibrium. Since risk-compensated rates of return should be equal in equilibrium, the observed rates of return will differ, on the average, by the risk premium. It is posited, then, that entrepreneurs and capital markets respond to risk as they respond to expected rates of return. To test this hypothesis and find a measure

of risk it is necessary to assume that, on the average, the manager's expectations of profits are correct. Thus observed rates of return (the means) serve as a proxy for expected values. Risk can then be measured by the movements of the distribution of observed rates of return.

The two risk variables are:

σ_i = the standard deviation of observed rates of return, for firm i

S_i = the skewness of observed rates of return, for firm i

However, simply to find the standard deviation of firm i's rates of return for a given number of years does not measure the risk variable as defined. Since risk is the inability to predict outcomes, the standard deviation must be computed about predicted or expected values. Unless the firm's distribution is adjusted for a trend--a growth or a decline in earnings--the variance around the average rate of return for these years will be too large. Therefore, both the standard deviation and skewness must be adjusted for any trend in the firm's return distribution. By assuming the trend to be linear, a simple linear regression gives predicted rates of return for each year. The standard deviation and skewness will be computed by the use of these predicted values rather than the mean rate of return. The risk variables will be calculated as follows:

$$\sigma_i = \left[\sum_{t=1}^{n} \frac{(r_{it} - \hat{r}_{it})^2}{n} \right]^{1/2}$$

$$S_i = \sum_{t=1}^{n} \frac{(r_{it} - \hat{r}_{it})^3}{n \sigma_i^3}$$

where r_{it} = observed rates of return for firm i in year t

r_{it} = predicted rate of return from trend for firm i in year t

σ_i = standard deviation of rates of return about trend for firm i over n years

S_i = skewness about trend for firm i

n = number of years in sample

The model can now be stated as

$$r^*_i = a + b_1 \sigma_i + b_2 S_i$$

where r^*_i = average observed rate of return on assets for firm i

a = intercept

b_1 = coefficient of the standard deviation of the return distribution

b_2 = coefficient of the skewness of the return distribution

It is hypothesized on the basis of the theory and empirical evidence [4/] that the signs of the coefficients will be:

$b_1 > 0$, indicating that the greater the dispersion of observed rates of return, the higher the average observed rate of return

$b_2 < 0$, indicating that for a positively skewed distribution of observed earnings, the less will be the observed rate of return

By using this model, it is possible to estimate risk elements of observed rates of return. It is hypothesized that the residual rate or risk-compensated rate is more appropriate in explaining structural-profitability relationships among various industries and firms within those industries.

4/ Ibid., pp. 20-23; Fisher and Hall, "Risk and Corporate Rates of Return," pp. 85-86.

The importance of this proposition is indicated by results obtained by George J. Stigler on the dispersion of rates of return for concentrated and unconcentrated industries. On the basis of the theory of competition, he offers that "the dispersion of average rates of return (over a substantial period) among competitive industries will be smaller than that of monopolistic industries." However, his data do not support this suggestion; he found a larger dispersion of rates of return for concentrated industries. Attempting an explanation, Stigler suggests that "concentration itself, quite aside from any monopoly power, is associated with characteristics (e.g., large cyclical fluctuations of output) which make for dispersion of profits." [5/] Thus factors other than--but correlated with--monopoly power may explain higher observed rates of return in concentrated industries. Specifically, such rates of return may not be due to the exercise of monopoly power in price-output decisions.

To isolate industry differences in risk, dummy variables can be introduced into the above equations. It will be assumed in this study that the relation between the rate of return and the risk variables is independent of industry membership; i.e., the coefficients of the risk variables are assumed to be constant across all industries. Therefore, in

---

5/ George J. Stigler, Capital and Rates of Return in Manufacturing Industries (Princeton, N.J.: Princeton University Press, 1963), pp.69-70.

regressing the following equation,

$$r^*_{ij} = C_j + b_1 \sigma_{ij} + b_2 S_{ij}$$

where C_j is the intercept for firms within industry j and all the other variables the same as defined before,

the new risk coefficients (b_1 and b_2) remain the same for all firms in all industries.

Fisher and Hall group the eighty-eight firms in their study into eleven broadly defined industries. Their estimates for b_1, b_2, and all the C_j's were significant at the .01, .05, and .05 levels respectively. While the R^2(.1560) was rather small for the regression without the industry dummy variables, it improved substantially to .4936 with the introduction of industry variables.[6/]

The interpretation and use of the intercept variable, C_j, is an important feature of this model. The C_j's are the various industries' average rates of return after each firm's rate of return (in that industry) is adjusted for the influence of risk. That is, C_j is the residual average rate of return for the industry after taking the risk element from the observed average. Therefore, one can determine the risk premium for each industry simply by finding the difference between the observed rate and this intercept variable.

6/ Fisher and Hall, "Risk and Corporate Rates of Return," pp. 86-87.

Fisher and Hall then label these as risk-comparable rates of return for the various industries. It is by this methodology that we propose to extract the risk premium from observed rates of return. This model should yield rates of return more comparable for establishing relationships between concentration, size, and profitability.

Fisher and Hall refer in their article to another methodology for measuring risk suggested by Cootner and Holland. [7] Their measure of risk is calculated as the standard deviation of firms' average rates of return on the industry-wide average. This is a much different approach to risk, and the interpretation is likewise unique. As quoted in Fisher and Hall, Cootner and Holland explain this approach in the following way:

> If we assume that an entrepreneur entering an industry is purchasing a proportionate share of the experience of every firm in the industry, then it would seem that the dispersion of company rates of return around the average rate of return for the industry in which they belong is an indication of the riskiness of an investment in that industry. Since the standard deviation of such rates of return indicates to an investor the likelihood that he would fare differently from the industry average, we would expect that if executives were risk-averters, large standard deviations would require high average rates of return to attract investment. [8]

7/ Paul H. Cootner and Daniel M. Holland, "Risk and Rate of Return," Massachusettes Institute of Technology, DSR, Project 9565, revised issue, Feb., 1964 (mimeographed).

8/ Fisher & Hall, "Risk and Corporate Rates of Return," p.88.

This is an interesting approach because it focuses on risk defined as a potential barrier to entry. Because other barriers to entry are often cited as reasons for oligopolistic market structure and hence for profitability and performance in general, this concept of risk is relevant to this study. Thus, it is introduced here as a method of providing additional explanation of concentration or oligopolistic market structures.

Their model (as stated by Fisher and Hall) is as follows:

$$\sigma_j = \left[\sum_{t=1}^{N} \sum_{i=1}^{M} \frac{(r_{it} - R_j)^2}{NM - 1} \right]^{1/2}$$

where σ_j = standard deviation of firm rates of return about the industry average for industry j

R_j = average rate of return on assets in industry j

r_{it} = rate of return for firm i during year t

N = number of years in the sample

M = number of firms in industry j

The relation between risk and rate of return then is:

$$R_j = R_o + b\sigma_j$$

where R_o = intercept

b = the marginal effect of intraindustry dispersion on average industry rates of return

The risk-adjusted rate for each industry denoted R_j^* is computed as [9/]

$$R_j^* = R_j - b\sigma_j$$

Before we discuss this methodology, let's compare the two concepts of risk. Essentially, Cootner and Holland's intraindustry risk measure is justified by the assumption "that an entrepreneur entering an industry is pruchasing a proportionate share of... every firm in the industry." Implicitly, this assumes that the potential entry cannot identify characteristics of successful firms, its products, etc., that lead to intraindustry return differentials among the firms. If an industry and its firms are homogeneous in all important respects, then this risk measure is quite appropriate. For the level of industry classification used by Fisher and Hall (two and three digit), this measure seems inappropriate because of the heterogeneity of member firms. That is, the assumption made by Cootner and Holland cannot be regarded as valid for broadly defined industries. However, in analysis of more narrowly defined industries the use of this measure may possibly be warranted.

9/ The results Fisher and Hall obtained by using their data in this model were

$$R_j = 6.979 + 1.084\sigma_j \quad R^2 = .734$$
$$(0.223)$$

The coefficient for σ_j was significant at the .01 level. For all but two of the industries the risk-adjusted rates under the two definitions turned out fairly close (within 2 to 3 percentage points).

It should be pointed out that with this definition of risk, risk will be indicated even though each firm can predict with certainty its rate of return in future years. The critical question is whether to define risk for existing firms as their inability to predict rates of return, or for entering firms as their inability to predict which of the existing firms it will most likely be similar to. For the central purpose of this study, we will use Fisher and Hall's concept of risk. Thus risk is defined as the inability of firms to predict returns from committed assets in various employments.

It should be pointed out that there seems to be an inconsistency between Cootner and Holland's definition of risk and their methodology or measurement. Their measure of risk, σ_j, is not a measure of the dispersion of firm average rates of return around the industry average. Instead, it appears to be a composite measure of both Fisher and Hall's and Cootner and Holland's definitions of risk. First, the computation of σ_j obviously includes a measure of the dispersion around the industry average. Second, it also includes a measure of temporal dispersion through the use of annual rates of return for each firm. If Cootner and Holland had no intention of including temporal variability of a firm's earnings streams, then the calculation of the risk variable should be:

$$\sigma_j = \left[\sum_{i=1}^{M} (r_i - R_j)^2 \right]^{1/2}$$

where r_i and R_j are respectively the N year averages for the firm and the industry.

Alternatively, if instead of using period averages they wanted to use

annual figures the computation should be

$$\sigma_j = \left[\sum_{t=1}^{N} \sum_{i=1}^{M} \frac{(r_{it} - R_{jt})^2}{NM - 1} \right]^{1/2}$$

where r_{it} and R_{jt} are respectively the annual averages for the firm and the industry.

The reader should note that both of these computations are similar to that which is suggested earlier in this proposal. Earlier it was suggested that the standard deviation of firm returns around the industry average would indicate the propriety of using the industry mean to summarize industry performance. Recall that it was argued earlier that this dispersion index becomes a proxy for the net influences of economies of scale, firm size, efficiency, and capital-output ratios on member firm's rates of returns within each industry. Recall, too, that it was argued that industry averages may be influenced by such phenomena. That is, average rates of return for concentrated industries may be affected by the relation between profit and firm size, profit and capital-output ratios, and profit and economies of scale, in addition to profit and the exercise of monopoly power in the product markets.

Therefore, to label this measure of dispersion as a measure of risk involves attaching a meaning to risk that does not seem appropriate. For example, if an industry's production function is such that significant economies of scale are achieved by the larger firms, then the resulting

profit differentials among firms (between large and small firms) increase the measure of risk. Consequently the "risk of entry" becomes the risk associated with the likelihood of an entering firm achieving the size necessary to benefit from economies of scale. Indeed, this situation may be a barrier to entry, but it is not a situation that leads to a risky investment in the usual sense. To maintain that it does seems to imply that risk decreases with the size of the investment.

In summary, the risk-compensated rates of return will be used as the variable for regression against concentration. Furthermore, once risk-compensated rates of return are obtained, it is easy to adjust profit margins accordingly. In the composite ratio, the adjustment of rates of return determines directly the corresponding profit margins, because the asset-turnover ratio is not changed.

VI

DEFINITIONS AND SOURCES OF DATA

In the preceding sections, the relationship between profit measures and concentration has been explored without discussing the nature of profit and concentration measures. Before sources for data can be selected, the data must be defined.

The Nature of the Data--Concentration and Profit

In a study such as this, one cannot overemphasize the importance of properly defining the data. There are many definitions of profit and concentration which are each appropriate depending on the purposes of their use. In this study, the definitions of profit and concentration must follow from, or be consistent with, the theory as discussed in the preceding sections.

Because concentration has been defined in terms of market power, the appropriate measure is individual product concentration ratios. Ideally, the profit measure (following from economic theory of markets) would allow analysis of discrepancies between marginal costs and prices in the short run, and average economic costs and prices in the long run for each product for which concentration ratios are known. Thus analysis of optimality for each product would be possible. Additionally, the ideal profit measure gives a rate of return on the

specific assets employed in producing each product. As economists are painfully aware, such measures are not to be found. Accountants and managers are not able to determine marginal costs as they are defined in theory. Partially, this results from the fact that firms produce more than a single product. Therefore, it is most times impossible to separate accurately the costs of each. The same plant, equipment, personnel, supplies, and so on, are used to produce many products of the firm. Factory overhead and general and administrative costs cannot be allocated to products as economic theory demands.

For empirical research, the concept of product concentration is meaningful, but the concept of product profit is not. This of course greatly complicates the study of these two variables. Concentration data are available by four- and five-digit SIC classes, while profitability figures are generally by two- and three-digit classes. Since paired observations are needed, one is forced to center the analysis and the definitions of profit around the firm. Though this may seem to be a major difficulty at first, it is the only logical choice if one emphasizes the behavioral aspects of the study. One can well argue that it is to the firm (management) that performance (behavior) is ascribable and most meaningful. The basic problem, then, is to match firms with concentration ratios. This will be discussed later in this section.

Definition of Profit

Tax versus stockholders' profits

While the source of data is to be discussed later as a separate topic, one must realize that the selection of the source in fact defines the data. The two basic sources of profit data are (1) tax returns, and (2) stockholders' financial reports. Profits are treated as cardinal measures. Though this is as it should be, it must be recognized that these measures result from some arbitrary definitions, procedures, and principles of financial and tax accounting. Recognizing this fact, many researchers have believed it more defensible to use Internal Revenue Service data (tax returns) because tax law is consistently applied across all firms. It is believed that profit measures as reported for tax purposes are the most comparable for interfirm and interindustry analysis. Others contend that it makes little difference which source is used because both measures will be about the same if a lengthy time period is used. However, it is the author's contention that neither of these arguments is valid.

First, the concept of profit is totally different primarily because of the IRS definitions of revenues and expenses in arriving at profits and because of management's desire to defer the payment of taxes. Second, it is not necessarily true that over a considerable time period the two definitions of profits will result in comparable measures, especially if profits are expressed as ratios in the form of rates of return.

A growing industry would tend to show lower profits than a declining one, simply because of the continual deferral of taxable income and taxes. Complicating this is the attendant impact on the base for rate-of-return measures. Obviously, the investment base--when considering accelerated depreciation and amortization of assets--is different under tax and financial reporting procedures. Because of the basic differences in the timing of revenues and expenses under tax and financial reporting, the temporal pattern of profitability is affected, and this is crucial to the analysis. The question, then, is what definition most nearly corresponds to a profit concept as developed and used in economic theory. Without supporting the assertion with a lengthy discussion here, the author contends that profit in financial reports to stockholders best conforms to economic profits, and that the measure of such profit is more appropriate for interindustry analysis and comparison.

For publicly held firms of the size that will be used in this study, conformity in the application of accounting principles will not be as serious a problem as it would be in a study of both small, privately held companies and large, publicly held corporations. One of the major goals of the Securities and Exchange Commission and the American Institute of Certified Public Accountants is to present financial information to investors from which they can accurately assess the past, present, and future performance of a firm. The standards, procedures, and principles applied by accountants under the guidance of the SEC and the AICPA result

in a better statement of profit as a measure of performance and a basis for decisions. If we return again to the fundamental propositions of this study by stating that it is behavior we are interested in, then the data used in decision making seem the most appropriate.

Financial reports are used by both of the two primary decision units around which this study and hypotheses are centered--the investor and the manager. Neither party will use tax return data as the primary information source. Equilibrium rates of return on alternative investment opportunities only result if these decision makers base their actions on predicted or expected profits. The best source for predicting profitability (performance) rests with the financial reports, not tax returns. One need only trace the underlying motives in designing the procedures and principles of financial reporting and tax law (and tax reporting) to see the overwhelming appropriateness of financial reports for measures of profitability as they are to be used in this study.

Although there has intentionally been no lengthy and detailed discussion of the propriety of using profits as determined (and defined) by financial reports, one item needs further amplification. Even if financial reports are accepted as the best source for the profit measures, the problem of tax accounting still remains. Unless it is decided to use profits before taxes, the tax figures reported to stockholders distort after-tax profits. Before 1966, it was not uncommon for corporations to carry the tax charges determined by IRS definitions of revenues and expenses directly

to the financial reports. As a result, reported profits after taxes is a hybrid figure resulting from tax and financial reporting techniques. After the accounting profession's recommendation in 1966 to use tax allocation, this difficulty was at least partially overcome in the statements of many firms. However, this study will probably concern a time around 1963 and will therefore require data from both periods.

For this and other reasons, it may be best to establish profits before taxes as the appropriate concept. In doing so, one could argue that taxes are simply an allocation of income to social overhead, i.e., government. Thus, profits before taxes may be viewed as a mix of social and private profits. Furthermore, one could argue that the tax policy of government is not primarily aimed at efficient allocation of resources through a policy of maintaining effective market structures. In this regard, tax law could be said to be neutral. Rather it is a means of generating public revenues and, in some cases, allocating resources to specific products or production independent of attempts to effect competitive markets. Though many studies have used both measures of profits and generally they conclude that the definition does not significantly alter the results,the question of whether before or after-tax profits are the best measure remains unanswered in this proposal. Perhaps the resolution will come from the use of both measures.

Investment base

Regardless of which concept of profits is finally deemed best, there remains the selection of the investment base for computing rates of return.

As previously mentioned, economic resources (total assets) are the appropriate base for studies related to the allocation of economic resources. Net assets or stockholders' equity are not. With total assets as the investment base, a more specific definition of profits becomes possible. We are interested in a profit concept that best measures the total earnings of these assets. Since we are not interested in earnings to any particular claimants of income, profits as reported to stockholders are only a part, though a large part, of the profit figure we need. All parties having claims on the firm's assets earn profit. Therefore, income is earned by those supplying capital--shown by the equity side of the position statement.

The appropriate definition of profit then includes the earnings to all sources. First, it includes income to stockholders or suppliers of risk capital. Second, it includes the earnings to the debtors of the firm. Income earned on long-term debt is usually fairly easily determined. It is simply the interest charges appearing on the income statement to stockholders. This interest charge should include the interest payments and the amortization of any debt premium or discount. While the earnings to stockholders and long-term creditors are explicitly recognized in financial reports, earnings to short-term creditors are not. For a complete and consistent concept of profits, earnings to these suppliers of capital must then be imputed. By assuming an appropriate interest rate series, earnings to these creditors can be approximated by averaging the amount of short-term capital supplied throughout each

year. It will not be determined here what the specific series will be, or what the average technique will entail. Rather, we only note that this sort of calculation must be made in arriving at the appropriate profit measure.

Profit defined

On the basis of the foregoing, a definition of profits can be made. Profits are defined to be total earnings to all suppliers of capital (short and long term). Its main components are:

1. Income to common stockholders
2. Dividends to preferred stockholders
3. Interest charges on explicit interest-bearing debt
4. Implicit interest charges on short-term, noninterest-bearing debt
5. Possibly tax charges

Sources of Data

The data source for concentration ratios will be the U.S. Census of Manufacturers published by the U.S. Bureau of the Census. Concentration ratios for 1963 are summarized well in Part I of Concentration Ratios in Manufacturing Industry, 1963, a report prepared by the Bureau of the Census for the Subcommittee on Antitrust and Monopoly. Concentration ratios are also available for later years in the annual surveys of the U.S. Bureau of the Census, Census of Manufacturers. Should it be necessary to embelish concentration ratios by using coverage ratios, specilization

ratios, or some index of geographic dispersion, this information is available in the sources named above.

The source for all financial data for firms and industries will be the Standard and Poor's Corporation Compustat annual industrial tapes recently acquired by the Graduate School of Business Administration at the University of Michigan. These tapes contain all the necessary financial information. In addition, all firms are coded to industries. For most firms, the four-digit industry level of coding is given. One of the problems will be assessing the validity of the industrial classification scheme of Standard and Poor's. However, it is believed that, from these tapes, financial data can be obtained for enough firms of enough concentrated and unconcentrated industries to give valid relationships at the four-digit industry level. Should it seem worthwhile to increase the numbers of firms in each industry by aggregating to the three-digit level, the corresponding concentration ratios can be readily obtained and analysis could proceed. As yet, no detailed attempt has been made to determine the numbers of firms in particular four-digit industries. This, however, would be quite easy, since the manual accompanying the Compustat Tapes lists the firms by industries. Naturally, picking the industries to be used will be one of the first steps in this study.

PREVIOUS PAPERS IN THE WORKING PAPER SERIES

Working Paper Number	Title and Author
1	"Reflections on Evolving Competitive Aspects in Major Industries," by Sidney C. Sufrin
2	"A Scoring System to Aid in Evaluating a Large Number of Proposed Public Works Projects by a Federal Agency," by M. Lynn Spruill
3	"The Delphi Method: A Systems Approach to the Utilization of Experts in Technological and Environmental Forecasting," by John D. Ludlow
4	"What Consumers of Fashion Want to Know," by Claude R. Martin, Jr.
5	"Performance Issues of the Automobile Industry," by Sidney C. Sufrin, H. Paul Root, Roger L. Wright, and Fred R. Kaen
6	"Management Experience with Applications of Multidimensional Scaling Methods," by James R. Taylor