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Chapter Author: John Perry Miller

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MEASURES OF MONOPOLY POWER AND CONCENTRATION: THEIR ECONOMIC SIGNIFICANCE

JOHN PERRY MILLER
YALE UNIVERSITY

THE purpose of this paper is to discuss the significance of various measures of monopoly power and concentration for both economic analysis and public policy. It is perhaps a sign of the immaturity of the science of economics that the notion should persist that the competitiveness of the economy or of a sector of the economy can ultimately be characterized by some single number or set of numbers. One might have supposed that theoretical and empirical developments in the last two decades would have brought home the essentially heterogeneous nature of our industrial structure and behavior.[1] But the illusion still persists in influential quarters that there is some simple key which will enable us to separate the monopolistic from the competitive. This paper is designed not to disparage progress to date but rather by underlining its limitations to suggest the magnitude of the task ahead.

1. *Aspects of Competition*

THE interests of economists in measures of monopoly and competition have been mixed. In part the interest has been in economic analysis, i.e. in distinguishing market situations according to such characteristics as the objective market conditions, the processes of decision making, or economic results. But much of the work in the field has been oriented quite understandably to issues of public policy, i.e. toward distinguishing desirable from undesirable market situations, workable from unworkable competition, etc. The policy approach may be at once both narrower and broader than the analytical. It is often narrower in that attention is focused on variables

[1] See, for example, Edward H. Chamberlin, "Monopolistic Competition Revisited," *Economica*, November 1951, pp. 343-362; Friedrich A. Hayek, *Individualism and Economic Order* (University of Chicago Press, 1948), Chap. 5; Joe S. Bain, "Price and Production Policies," in Howard S. Ellis, editor, *A Survey of Contemporary Economics* (Blakiston, 1948); John M. Clark, "Toward a Concept of Workable Competition," *American Economic Review*, June 1940, pp. 241-256; Arthur R. Burns, *The Decline of Competition* (McGraw-Hill, 1936); Clair Wilcox, *Competition and Monopoly in American Industry*, Temporary National Economic Committee, Monograph 21, 1940.

that are operationally measurable and upon identifying situations where it is feasible both politically and administratively to take action. Certain analytically significant factors may therefore be left out of consideration. But the policy approach may also be broader in some respects since it is concerned with such noneconomic aspects of market situations as the effects of market structures and practices upon political structures and the processes of political power, upon career opportunities and the processes of personnel selection, or upon the development of human personalities and the distribution of prestige. These noneconomic factors have bulked large in some of the discussions of antitrust policy, although little effort has been made to define with care the issues involved or to correlate kinds of market structures and practices with various political or social effects.[2]

Even when looking at the purely economic aspects of market situations, various economists have emphasized different aspects of the situations including:

1. *The objective characteristics of the market,* e.g. the number and size of the decision-making units, the ease of entry, the characteristics of the product, the characteristics of the buyers, and the rate of growth and age of the industry.[3]

2. *The power of the decision-making unit,* i.e. the kinds and extent of discretion available to the decision-making unit consistent with survival.

3. *The activities of decision-making units,* i.e. the exercise of discretion with respect to internal activities such as the use of resources, research and development, and investment policies and with respect to such external activities as the shaping of preferences, market development, pricing, procurement, and related trade practices.

4. *The economic effects of the activities of decision-making units,* i.e. the effects of economic activities in bringing about a mutual adaptation of wants and resources, including the rate of economic development, the allocation of resources and the efficiency with which they are used, and the allocation of income and wealth.

Differences in emphasis depend in part upon differences in the value orientation of various students. But more important are the differences in vision as to the nature of the competitive process, dif-

[2] It is clear from the legislative, administrative, and judicial history of our antitrust laws that noneconomic factors have played an important part in shaping policy in this area.

[3] See for example, Bain, *op. cit.*, pp. 160-161.

ferences that are likely to remain substantial until we develop a verified theory of market structures and behavior.[4] The limiting cases of markets characterized by perfect competition and perfect monopoly are reasonably well understood. But, although there has been a good deal of exploratory work in the areas between, these areas have proved relatively intractable to the traditional methods of economics.[5]

While the current body of theory provides a useful frame of reference for ordering empirical data and analyzing problems of policy, it is important to recognize certain limitations of this body of thought for the purpose at hand, limitations arising from the fact that the modern theory of the firm and market behavior is largely a by-product of efforts to refine the neo-classical theory of perfect competition. The essence of the perfectly competitive market is a condition in which the function of the firm is simply to adapt its input and output decisions in the light of market-determined prices. Significant deviations from the principle of profit maximization are incompatible with survival. Activities are confined, therefore, by the nature of the market structure to deciding the volume of inputs and outputs in light of the maximizing principle and to administering resources within the firm.

In an economy characterized by the Schumpeterian circular flow,

[4] In his summary comments on a symposium conducted on the effectiveness of the antitrust laws, Dexter M. Keezer remarks ". . . one fact seems to emerge with increasing clarity. This fact . . . is that the concepts of competition and of a 'broadly competitive system' are so diverse that they offer wide latitude for difference of opinion as to the effectiveness of the antitrust laws . . . until we expose the various and complicated strands of our concepts of competition, and then put them together in a clear-cut design which we all understand and accept, our chances of charting clearly how well we are doing in preserving and protecting competition will be seriously compromised." "The Antitrust Laws; A Symposium," *American Economic Review*, June 1949, pp. 722-723.

[5] "Disencumbered, however, of all the limitations and taboos implied in the classical assumptions, the way is now open for the building up of a different type of economics. Instead of drawing its substance from arbitrary assumptions, chosen for their simplicity and unduly extended to the whole field of economic activity, our theory may turn to more pedestrian, but more fruitful methods. It will recognize the richness and variety of all concrete cases, and tackle each problem with due respect for its individual aspects. . . .

"We are rightly dissatisfied with the distorted picture of economic life which classical theory has bequeathed us. Subconsciously, however, we keep hoping for some other grand formula that would unravel as simply and elegantly the infinite complexity of our modern world. For economics to progress, it must give up its youthful quest for a philosophers' stone." Robert Triffin, *Monopolistic Competition and General Equilibrium Theory* (Harvard University Press, 1940), p. 189. See also William Fellner, *Competition among the Few* (Knopf, 1949), especially pp. 3-15.

it is assumed that individual preference scales, the body of knowledge, production functions, and the volume and efficiency of resources are fixed. It is usually further assumed that these variables are independent both of one another and of economic activity. Under less restrictive assumptions of an economy subject to fluctuation and secular change these variables may be conceived as subject to change. But in the case of perfect competition, such change is assumed to be exogenous to the firm. Even in such a world of change, the function of the firm in the perfectly competitive market is viewed as simply the adaptation of inputs and outputs to changes in market prices that in turn reflect changes in preference scales, the body of knowledge, production functions, and the supply of resources. The continuation of a condition of perfect competition is viewed as incompatible with activities by the firm designed to change these basic parameters of the system.

In the development theories of monopolistic or imperfectly competitive markets it has often been assumed that preferences, resources, the body of knowledge, and production functions are fixed or at least independent of the activities of the firm. As a result, the function of the firm has been conceived as that of adapting inputs and outputs in the light of these parameters and of specified conditions of interdependence between firms. The principal exceptions to this have been the attempts, as yet not too successful, to introduce advertising into the body of economic theory[6] and the work of Schumpeter who insisted on the innovating functions of the entrepreneur.[7]

In considering the various measures of monopoly power, it is important to bear in mind the limitations of the analytical models from which they arose, especially their preoccupation with price and output decisions to the exclusion of other activities. But the essence of much business behavior is the conscious attempt to shape preferences; to develop new resources; to seek, adapt, and add to the body of knowledge; to protect and extend market positions, thereby reshaping market structures; to influence interdependence by learning about the reactions of others and by affecting the expectations upon which others act.

[6] See especially Edward H. Chamberlin, *Monopolistic Competition* (Harvard University Press, 1933). Also George J. Stigler, *The Theory of Price* (rev. ed., Macmillan, 1952), pp. 207-209; N. S. Buchanan, "Advertising Expenditures; A Suggested Treatment," *Journal of Political Economy*, August 1942, pp. 537-557.

[7] Joseph A. Schumpeter, *Business Cycles* (McGraw-Hill, 1939), I, 2-3; *Capitalism, Socialism, and Democracy* (Harper, 1942), Chap. 8.

This view of the function of the firm implies that the processes of competition are infinitely more complex than is often assumed, and that the links between objective conditions, economic power, activities, and results are more involved than is often represented. Over a wide area of modern industry the important factor is the existence of a range of discretion often used in ways that violate the static assumptions. Our real interest is less in the *state of monopoly* or *competition* than in the *process of competing* and *monopolizing*. ". . . the modern theory of competitive equilibrium *assumes* the situation to exist which a true explanation ought to account for as the effect of the competitive process."[8] We should aim at devising measures characterizing not the *state of monopoly* but rather the *nature of the competitive process* conceived as a process of innovation and adaptation proceeding through time.

2. *Theoretical Indexes of Monopoly and Competition*

SEVERAL attempts to define theoretical indexes of monopoly power approach the problem from the point of view of the individual firm, although they can be adapted to the situation of a group of firms acting in concert. These indexes arise in general from the static theory of the firm and have the limitations attached thereto. With the exception of the Lerner index, the operational usefulness of these indexes is not great since they assume some knowledge of the elasticity or cross-elasticity of demand, knowledge that is generally hard to come by.

LERNER INDEX

PERHAPS the most famous of the indexes of monopoly power is that of Lerner,[9] $m=$ (price—marginal cost)/price. This index, m, may be equal to, greater than, or less than zero according as the product is sold at, above, or below marginal cost.

The Lerner index is clearly not a good indicator of differences in objective conditions of the market. To be sure, in the limiting case of a profit maximizing firm in equilibrium, the Lerner index is the inverse of the elasticity of demand and may, therefore, be taken as a characterization of the demand for the product of the firm. But in the case of a nonmaximizing firm it is no guide to the nature of demand.

[8] Hayek, *op. cit.*, p. 94.

[9] A. P. Lerner, "The Concept of Monopoly and the Measurement of Monopoly Power," *Review of Economic Studies* (1933-1934), pp. 157-175.

It is essentially an index of the extent of divergence from marginal cost pricing. As such it is an indicator of one aspect of the economic results of business behavior, and its significance depends on the relevance of marginal cost pricing as a condition of the desirable allocation of resources.[10] But at best the Lerner index is a limited index of results. While it indicates the divergence between marginal cost and price, it tells nothing about the extent to which market pressures or administrative action keep the costs at a minimum in the light of the existing body of knowledge, or to what extent competitive pressures stimulate costly sales effort and firms of uneconomic size, or to what extent the potentialities of technological development are being exploited. Although the Lerner index is designed primarily to indicate the effects of economic activities upon the allocation of economic resources, it has all the limitations of the static model from which it is derived. For a sector of the economy approaching the state of the Schumpeterian circular flow it may be reasonably useful, but even here it may fail to distinguish between firms operating along minimum cost functions and those which are not. For a world of fluctuation and growth its use is limited. Any given value of the index for a sector of the economy may be consistent with various total conditions of the sector and with various rates of change. The index makes no allowance for differences in activities of the firm in shaping preferences and developing resources, for different degrees of initiative in seeking, adapting, and adding to the body of knowledge, for various rates of fluctuation in the use of resources, or for various distributions of income and wealth and of gains and losses incident to change. Clearly, it tells us nothing about the distribution of power, whether economic or political, or about the other social and political repercussions of economic activity.

CROSS-ELASTICITIES OF DEMAND

BRIEFER mention will be made of several suggestions for distinguishing markets primarily on the basis of the conditions of demand for the product of the individual firm. While these proposals differ in detail, they are all concerned primarily with the discretion available to the firm to affect price or output.

[10] For discussion of this issue, see in particular Kenneth E. Boulding, "Welfare Economics," in Bernard F. Haley, *A Survey of Contemporary Economics*, II (Irwin, 1952); I. M. D. Little, *A Critique of Welfare Economics* (Oxford University Press, 1950); Nancy Ruggles, "The Welfare Basis of the Marginal Cost Pricing Principle," and "Recent Developments in the Theory of Marginal Cost Pricing," *Review of Economic Studies* (1949-1950), pp. 29-46, 107-126.

A frequent approach to the problem of monopoly power has been via the concept of the cross elasticity of demand.[11] If there are no close substitutes for the product X of a firm—that is, no other products whose price changes may affect the demand for X—the cross elasticities of demand for X with respect to all products are zero. This is the limiting case of perfect monopoly. At the other extreme is the case of pure competition where present units of demand will shift from one supplier to another upon the slightest difference in price. In this case the cross elasticities of demand for X with respect to the products of some rivals approach infinity. The more usual case is that in which the cross elasticities of demand for X with respect to the products of many other firms are zero but with respect to one or more is greater than zero but less than infinity.

This index, or cluster of indexes, is designed to indicate something about the range of discretion with respect to price available to the individual firm. While it is unambiguous in the limiting cases of perfect competition and a profit-seeking monopolist in static conditions, it is of doubtful significance in the intermediate range of cases or under conditions of change. It does not really indicate the range of effective discretion since it rules out of consideration relevant non-price factors and does not distinguish between alternative anticipations of rivals' reactions that may be crucial in markets with few firms. Thus, in the case of two firms selling a homogeneous product, the cross elasticities may be infinite. Yet it is well known that the behavior of the rivals and the resulting price and production policies may take any of several forms.[12] Moreover, this approach indicates nothing about non-price types of discretion, the objective conditions of the market, the firms' activities, or the results of such activities. In a world of fluctuation and change, this approach has all the other limitations discussed in connection with the Lerner index.

ROTHSCHILD'S INDEX

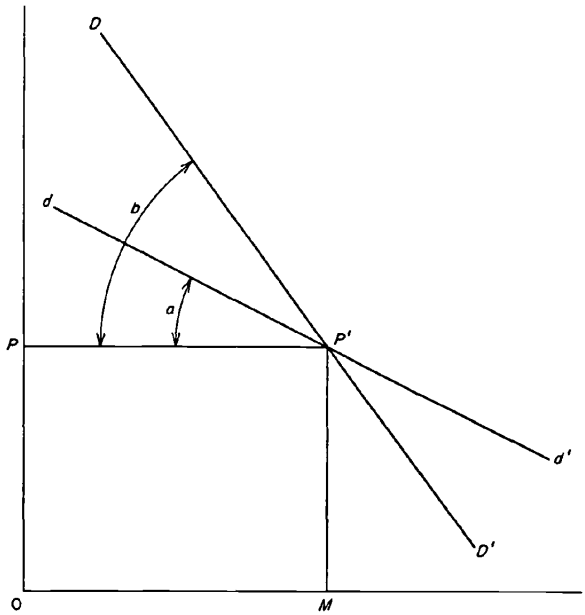
K. W. ROTHSCHILD has suggested an index of the degree of monopoly designed to show how far a particular firm controls the market for a commodity.[13] He defines his index as $m = (\tan a/\tan b)$ where

[11] Nicholas Kaldor, "Market Imperfection and Excess Capacity," *Economica*, February 1935, pp. 33-50; Stigler, *op. cit.*, pp. 205-207.

[12] Chamberlin, *op. cit.*, Chap. 3; Fellner, *op. cit.*

[13] K. W. Rothschild, "The Degree of Monopoly," *Economica*, February 1942, pp. 24-39. For discussion of this, see Joe S. Bain, "Measurements of the Degree

d d' is the demand curve for the individual firm on the assumption that "competing firms do not change their price (or output)" and *D D'* is the demand curve on the assumption that "other firms change their price (or output) in the same or some other predetermined way as the firm in question." This index presumes, then,



some knowledge or assumption concerning the reactions of other firms. It may be equal to or greater than zero and equal to or less than one. If the demand curve for the product of the individual firm is independent of the reactions of other firms, *d d'* and *D D'* coincide and the index is equal to one. If the firm is producing under purely competitive conditions so that its price is market-determined and completely independent of its own discretion, the index is equal to zero.

While this index has the advantage of making allowance for the reactions of rivals, it seems otherwise to have all the disadvantages and ambiguities incident to the approach through cross-elasticities.

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of Monopoly: A Note," *Economica*, February 1943, pp. 66-68; K. W. Rothschild, "A Further Note on the Degree of Monopoly," *Economica*, February 1943, pp. 69-70; Theodore Morgan, "A Measure of Monopoly in Selling," *Quarterly Journal of Economics*, May 1946, pp. 461-463.

PAPANDREOU'S INDEX

PAPANDREOU, emphasizing the efforts of rivals to invade one another's markets, has proposed to measure the competitive relations among firms by two coefficients, one of penetration and one of insulation.[14] His coefficient of penetration, which measures the capacity of a firm to penetrate its competitors' markets by a price cut, takes into account both its capacity to attract customers and to match with units of supply the demand that stands ready to shift upon a price change. His coefficient of insulation is designed to measure the degree of nonresponsiveness of the actual volume of sales of a firm to price cuts initiated by its competitors. This approach has the advantage of recognizing the limits that the availability of capacity places upon competitive strategies, a factor neglected by the simple cross-elasticity approach. But otherwise this approach seems to suffer from most of the remaining limitations of the cross-elasticity approach, a fact that Papandreou clearly concedes.[15]

BAIN'S INDEX OF PROFITABILITY

JOE S. BAIN has been the principal proponent of the profit rate as a measure of monopoly power or "of deviations from competitive equilibrium." In his article of 1941[16] he proposed that the profit rate be defined as "in any short period the ratio of the net earnings of that period (quasi-rents less depreciation computed as indicated) to the replacement cost of service value of those assets of the firm which it could economically hold at a minimum and produce its present output." A comparison of the rate of profit so defined with the rate of interest "is therefore an indicator of the deviation of the earnings behavior of the firm from a selected norm. A deviation for a year or two is obviously significant of nothing more than that the firm operates in a cyclical economy. A persistent deviation over a period of years, however, is an indication of a failure of the competitive mechanism to force an approximation to equilibrium, and therefore a probable indication of monopoly or monopsony power, or less probably of pure competition with persistent impediment to entry."[17]

[14] A. G. Papandreou, "Market Structure and Monopoly Power," *American Economic Review*, September 1949, pp. 883-897.

[15] *Ibid.*, p. 897.

[16] Joe S. Bain, "The Profit Rate as a Measure of Monopoly Power," *Quarterly Journal of Economics*, February 1941, pp. 271-293.

[17] *Ibid.*, pp. 287-288.

It is clear that the Bain index may reflect the cumulative effect of several factors. For an economy in the state of circular flow it would reflect (1) profits incident to limitations upon entry into a given industry, whether the industry is "monopolistic" or purely competitive, (2) monopsonistic profits, and (3) the wasteful costs incident to investment in excess of the minimum necessary to produce present output.[18] In a world of economic fluctuation and secular change, the rate of profit would include as well (4) the effects of fortuitous change, (5) temporary profits and losses incident to the adjustment of the economy to exogenous changes, and (6) profits and losses incident to innovation.

The profit rate so defined is primarily an index of the gross effects of economic activity. It should be noted that since the rate of profit as defined by Bain involves an allowance for unnecessary expenditures with reference to the competitive norm, this profit rate has no necessary relation to the profit rate as viewed by business in a private enterprise economy. Bain emphasizes the significance of his index because of the effect of the profit rate "directly on the functional distribution of income, and indirectly on the propensity to consume, the level of employment, etc."[19] But in view of the synthetic nature of the Bain index, including as it does elements of unnecessary investment expenditures as well as profit in the usual economic sense, this index would seem to be of limited significance in these respects. Two situations with the same rate of profit in Bain's sense are consistent with different rates of profit in the usual sense and, therefore, with different effects on the distribution of income, the propensity to consume, the level of employment, etc.

The Bain index seems to be oriented primarily at welfare considerations, i.e. at providing some index of the efficiency with which resources are allocated and used. For purposes of both analysis and policy it is useful to separate the two components of the Bain index: (1) profits in the traditional economic sense and (2) unnecessary investment expenditures. The first component reflects the willingness and ability of owners of resources to respond to profit differentials and as such indicates in a rough way the effectiveness of the profit

[18] It is not clear that Bain would remove from "costs" and add to the "profits" any *variable* expenditure which would be unnecessary in the "competitive norm," e.g. advertising, although this would seem to be consistent with his objective.

[19] Bain, "Measurements of the Degree of Monopoly: A Note," as cited, p. 66.

stimulus in allocating resources *to* various sectors of the economy. It is a reasonably objective index. The second component is indicative in part of the effectiveness with which resources are organized *within* any sector, the extent of "wasteful" or "unnecessary" investment. As such this second component depends upon some comparison of the actual organization of resources within a sector with some "ideal" organization.

A normal rate of profit as measured by the first component is indicative of a low range of discretion consistent with survival. A high rate of profit associated with the first component of the Bain index may be indicative of either fortuitous circumstances, the imperfect adaptation of resources because of the time necessary for such adaptation, innovation, or a monopolistic or monopsonistic position. Since the first two must be ruled out as typically unimportant for long periods, a persisting high rate of profit requires further analysis to determine whether it arises from a more or less permanently entrenched position or from a monopoly position which is continually renewed by successful innovative effort. But although this component may be suggestive of the *extent* of discretion open to the firm, it tells us little about the *types* of discretion available.

The second component of the Bain index indicates the extent to which assets are held by a given firm or industry in excess of the minimum necessary to produce its present output. Clearly this reflects the wastes of investment due to excess capacity or "competitive" strategies. But it does not indicate whether there is "excessive" multiplication of products, nor does it indicate whether firms have found the most efficient method of production, nor whether the market is stimulating or retarding the improvement of products and processes. A normal rate of profit may be consistent with enlightened, progressive management working under aggressively competitive conditions or with inefficient, lethargic, routine management functioning in a protected position.[20]

[20] It should be noted in passing that despite the note of optimism in Bain's article of 1941 concerning the feasibility of approaching such an estimate of profits, I know of no attempts to date to do so. Bain's own efforts in his study of the Pacific Coast petroleum industry (*Pacific Coast Petroleum Industry*, 3 parts, University of California Press, 1944-1947), and his general study of the relation of profit rates to industrial concentration ("Relation of Profit Rate to Industry Concentration, American Manufacturing, 1936-1940," *Quarterly Journal of Economics*, August 1951, pp. 293-324) consider profits on "actual" rather than "economically necessary" investment.

3. *Ratios of Concentration*

A LARGE body of literature has developed in the last two decades on industrial concentration and its significance.[21] The concentration ratio is a common-sense approach, treating sectors of the economy at the level of the industry rather than at the level of the firm. But the industry concept raises serious classificatory problems of both a theoretical and practical sort, problems of delineating the boundaries of the industry in terms of the range of products and firms, and the geographical area to be included. These problems of classification are discussed in other papers in this Conference. It is sufficient to note that if the industry is defined too broadly, the concentration index may tend to understate the monopolistic potentialities of a situation; if it is defined too narrowly, the monopolistic potentialities may be grossly exaggerated.

The concentration ratio is, of course, a useful index of one characteristic of market structures. But the crucial question is whether there is any close correlation between the degree of concentration and the character of the competitive forces at work in a sector of the economy. An influential body of opinion holds that there is at least a rough correlation. This view holds that a combination of high concentration of output in a market with large size, measured in terms of the value of assets or number of employees, will generally be associated with monopoly rather than competition.

But what does the concentration ratio tell us? A low concentration ratio indicates a number of points of initiative and the existence of numerous alternatives available to buyers. It suggests that the range of discretion open to any one firm consistent with survival will be narrow. If there is relatively free entry and the absence of restrictive agreements, it is probable that there will be considerable pressure upon the firm to be efficient in its production, procurement, and marketing. Moreover, one would expect a general tendency for resources to flow in response to profit differentials. The concentration ratio will not, however, distinguish the kinds of competition,

[21] See in addition to articles in this Conference, *The Structure of the American Economy*, National Resources Committee, 1939; Willard L. Thorp and Walter F. Crowder, *The Structure of Industry*, TNEC, Monograph 27, 1941; *The Concentration of Productive Facilities, 1947*, Federal Trade Commission, 1949; M. A. Adelman, "The Measurement of Industrial Concentration," *Review of Economics and Statistics*, November 1951, pp. 269-296; Corwin D. Edwards and others, "Four Comments on 'The Measurement of Industrial Concentration'; with a Rejoinder by Professor Adelman," *Review of Economics and Statistics*, May 1952, pp. 156-178.

i.e. between situations where competition takes the form of rivalry in price and those where it is deflected into sales effort or product differentiation. Moreover, it is in no way indicative of the opportunities and incentives to add to the body of knowledge or to develop resources. The most that can be assumed is that resources are responding to profit opportunities and that incentives to efficient use of resources within the firm are strong. Whether the environment promotes economic progress or whether it fosters "wasteful" non-price competition is open to question. How "workable" or "desirable" is the competition will depend upon further findings on these matters. But one can assume that output, efficiency, and innovation are not being restricted by the arbitrary decision of a few.

More serious difficulties arise in interpreting high concentration ratios. It is clear in such cases that the market has some monopolistic characteristics: it is not purely or perfectly competitive and there is some degree of mutual interdependence. But a typical view goes beyond this and assumes that the degree of discretion is substantial and that this discretion will be used for purposes detrimental to the best use of resources.

In a situation where the structure of the market, preference schedules, the supply of resources, and the body of knowledge can be taken as given or as subject primarily to exogenous change, it would be reasonable to assume that a high concentration ratio indicates monopolistic practices, i.e. practices restricting production or wasteful of resources. There are markets to which such a model may be applied without doing too great violence to the facts. The case of the cigarette industry, which has been well documented by two studies recently, is a case in point.[22] But even in a market approaching this state, it is not at all clear that there will be a high correlation between the degree of concentration and the degree of restrictiveness or waste. The degree of discretion, the activities of the firm, and the economic results will depend upon many factors. Among these will be the substitutability of products not included within the industry; the effectiveness of potential competition, which depends upon the availability of knowledge and resources and the costs of entry, and upon the character of patent control and the extent of equivalent inventions; the expectations concerning rivals'

[22] Richard B. Tennant, *The American Cigarette Industry* (Yale University Press, 1950) and William H. Nicholls, *Price Policies in the Cigarette Industry* (Vanderbilt University Press, 1951). In this case the principal exception to the circumstances envisaged by the typical static model is sales effort designed to shift preferences as between brands.

reactions and the competitive strategies resulting therefrom. Moreover, the extent and effect of economic power will depend not only upon the proportion of the market that a firm controls, but also upon the extent of integration of the firm and the point in the production and distribution process at which it is located. There is a substantial difference in the potential power of a firm or a few firms controlling the production of a basic raw material such as aluminum and the power of the large chains in the retail grocery field. The way this power is used in such cases and its economic effects likewise differ.

But in the modern economy in which the activities of the firm play an important part in economic change, the concentration ratio has further limitations. In such an economy the activities of the firm may be as important as the structure of the industry. It is crucial in considering highly concentrated industries to remember that the market itself is often an important variable in the competitive process. There is plenty of evidence in the last fifty years that the market positions of many dominant firms were insecure. A firm must be constantly alert to defend and enlarge its position. The question is how its position may be secured. For this reason, the concentration ratio must be regarded not only as one of the factors conditioning the current behavior of the market but also as one of the results of previous behavior. A high concentration ratio may be the result of aggressive, restrictive, and exclusive practices as in the case of many of the early "trusts," or it may be the result of control over strategic resources or patents. But it may also be the result of aggressive policies of innovation, market development, and cost reduction as in the aluminum industry.

The history of Alcoa is a significant case in point. It was virtually the sole domestic producer of virgin aluminum ingots from the beginning of the industry until World War II. Its discretion was limited only by rival products such as copper and steel, by imports of aluminum often limited by cartels and tariffs, and by the supply of secondary aluminum. There is no doubt that Alcoa had a wide range of discretion in many markets for a long period of time, although we are a long way from understanding the extent of this discretion.

But consider the other side of the picture. Alcoa was responsible for the development of a new basic material, and for continuous research into new uses for this material and new processes for its production. Any of the usual statistical measures of concentration in

industry during this period will show that this industry was from the beginning highly concentrated. Moreover, since the industry represented an increasing share of the economy, any overall index of industrial concentration would show *ceteris paribus* an increasing concentration. Yet the net impact of Alcoa was to increase competition by increasing the number of alternatives available to metal fabricators and consumers. Its effect was to increase the cross elasticities of demand for a wide variety of products, thereby narrowing the discretion available to producers of other materials for which it was a substitute.

These remarks are made without prejudice to the question of whether some other structure of the aluminum industry would have increased or reduced the competitive thrust of Alcoa or whether there are on balance good reasons of public policy to disapprove of the concentration of control of a basic material such as aluminum in the hands of a single firm, no matter how benevolent its intentions or beneficent its effects. I wish only to emphasize that sole reliance upon concentration ratios may lead to a distorted view of the competitive process. While the concentration ratio of an increasingly important industry remained virtually stationary at 100, the markets for metals were experiencing a dramatic increase in the competitive forces.

But the history of a firm developing a new product or a new method where there are no legal or other obstacles to entry need not be one leading to a high rate of concentration. A policy of short-run profit maximizing may lead instead to the multiplication of firms and a low rate of concentration, the innovator acting as an umbrella for the development of new competitors.[23] This contrasts with a policy of low prices and high volume that might result in high concentration. We would have to know a good deal more about these alternatives if we are to judge the relative merits in terms of economic or other effects. In the kind of world we live in behavior is not necessarily structurally determined by preference schedules, production functions, and the prices of the factors of production.

Skepticism about the significance of concentration as an index of monopoly behavior is reinforced by the limited studies of the effects of concentration that are available. Some of these are discussed in other papers. Mention may be made of a few. Alfred Neal in his study of price flexibility in the great depression concluded:

[23] Chamberlin, *op. cit.*, Chap. 5.

"First for the 1929-1933 period, there was a slight tendency, as has been claimed by proponents of the concentration thesis, for production to fall most where price fell least. (This relation does not obtain in the 1929-1931 period.) Neither price change nor production change, however, is to be explained by concentration. Rather, differential price changes are explicable by differential unit direct cost changes, and differential production changes are to be explained in terms of demand shifts which are a consequence of the nature of the demands concerned.

"Secondly, differential price behavior among industries for both comparisons (1929-1931 and 1929-1933) is to be explained for the most part by differential unit direct cost behavior rather than by concentration.

"Thirdly, concentration does not even explain the *difference* between actual price declines and those which could be expected on the basis of changes in direct cost. This conclusion is reasonable in view of the differences in cost structures among industries.

"In the fourth place, however, concentration did have a small but significant influence upon the decline in the difference between unit price and unit direct cost—the overhead-plus-profits margin. This margin tended to decline least where concentration was high; most where it was low."[24]

Similarly Ruggles in his paper in this Conference concludes with reference to the period 1929-1932 that "the major patterns of price behavior in the economy can be explained in terms of factors other than concentration."[25] Finally, although Bain found a correlation between concentration and the rate of profit for the period 1936-1940, his results are highly tentative.[26]

The crucial significance of the degree of concentration as a tool of economic analysis or as a guide to public policy has yet to be established. While it may be assumed that it is in the area of concentrated industries that the important cases of monopoly restrictions will appear, it has not been established that there is a unique correlation between the degree of concentration and either the degree of discretion available to the firm, the types of business practices pursued, or the character of the economic effects. This does not mean that further work may not show some relation between con-

[24] Alfred C. Neal, *Industrial Concentration and Price Inflexibility* (American Council on Public Affairs, 1942), pp. 165-166.

[25] See p. 488.

[26] Bain, "Relation of Profit Rate to Industry Concentration," as cited, pp. 293-324.

centration and important aspects of competition. Moreover, evidence on concentration may be administratively useful as a basis for preliminary screening of cases under review with an eye to possible antitrust proceedings or other policy action. But it appears both on a priori grounds and on the basis of such empirical evidence as we have that the extent of concentration is only one of several important variables to be examined, whether the interest is in economic analysis or public policy.

4. *Some Suggestions for Further Research*

ATTEMPTS to characterize various sectors of our economy in a meaningful way by simple indexes of concentration, profitability, and monopoly have not been very successful. There is a growing consensus that further progress in developing a meaningful theory of market structures and behavior lies in empirical work designed to test the significance of various hypotheses and to suggest new hypotheses of more relevance to the economic experience to which such a theory is addressed.

This field of economics, which has grown out of the very center of neoclassical economics, is at about the stage in which the field of business cycles stood in 1900, before the pioneering data collection and analysis of the National Bureau of Economic Research, the Harvard Committee on Economic Statistics, and other similar groups. But if we are to achieve an understanding of the competitive processes, we must develop a verified theory of market structure and behavior relevant to an economy in constant change. Such a theory should explain not only the processes by which wants and resources are mutually adapted, but also the constantly changing structure of markets and behavior by which this mutual adaptation is brought about. While intensive studies of individual firms, industries, and trade practices must play an important part in such a development, their usefulness would be immeasurably increased if they could be related to a broad, empirical analysis of the competitive process. At present the principal frame of reference is the vision of the static economy or the circular flow, in which change is treated as essentially exogenous to the system, and market structure and behavior are taken as structurally determined. This vision, the main contours of which date back to Adam Smith, represents a substantial contribution to economic thinking, which is still valuable for purposes of economic analysis. But while some are inclined to underestimate its usefulness, most will agree that this vision has serious shortcomings.

Whether we shall be able to devise a more fruitful vision of our economy remains to be seen.

An important step forward would be the development of an overall picture of the changing contours of business structure and behavior in major sectors and subsectors of the economy. It should be feasible to develop for major sectors and subsectors a series of indexes reflecting the competitive processes over substantial periods of time. These indexes might cover such factors as (1) strategic aspects of industrial structure, e.g. numbers, size, concentration, rate of growth, and change in rank order of firms; (2) important aspects of industrial behavior, e.g. price and cost flexibility, price and cost trends, sales efforts, and technological and managerial innovation; and (3) important aspects of results, e.g. changes in the rate of investment, rate of output, gross margins, and profit rates and the development of new product lines. Clearly, much remains to be done in defining and constructing adequate indexes. But there are many data at hand that have not been fully analyzed for these purposes.

I urge such a sector analysis of industrial structure and behavior because of a belief that the competitive processes operate in somewhat different ways in various sectors and subsectors of the economy. Consequently, an analysis of the similarities and differences between sectors and subsectors and within sectors and subsectors may suggest fruitful hypotheses. It is a plausible hypothesis that various structural and behavioral characteristics of markets will have different effects depending on the sector or subsector of the economy in which they appear. Thus I suspect that high concentration will be associated with more serious monopoly effects in the mining and metal industries than in retail distribution. I suspect it will also be associated with more serious monopoly effects in industries where technological change is slow and comes from sources external to the industry than where technological change is rapid and is initiated within the industry. Such a sector analysis, in addition to providing a frame of reference for more detailed studies of individual firms and industries and assisting in the development of further hypotheses, should also aid in bridging the gap between micro- and macroeconomic theory, a gap that has become increasingly serious.

It is beyond the scope of this paper to catalogue the variables that might prove significant in various sectors of the economy, but a few factors deserve more attention. In specifying the changing structure of an industry or sector of the economy, it may be useful to explore

not only the changing number, size, concentration, and degree of integration of firms but also changes, if any, in the rank order of the largest firms. Does the rank order of firms change more slowly in some sectors than in others? Are such differences related in any systematic way to other identifiable characteristics such as the importance of the control of raw materials or innovation and technological change? Are there any indications that frequent changes in rank order tend to stimulate the competitive factors?

Clearly, the effectiveness with which the competitive process is allocating resources should be a principal object of concern. In a freely competitive society one expects resources to be attracted to high-profit opportunities and to be repelled from low-profit opportunities. As an index of this tendency, one might explore the responsiveness of new investment to differences in the rate of profit. This suggests an index correlating the rate of new investment with the rate of profit on existing investment. Such an index would indicate the obstacles or resistances to freedom of entry and exit. Because new investment is more mobile than sunk investment, one might also expect to find a closer correlation in expanding industries than in unprofitable and contracting industries. One might explore the hypothesis that the degree of responsiveness of new investment to profit opportunities is inversely correlated with the degree of concentration, and also the hypothesis that the responsiveness is inversely correlated with the asset size of the individual firm. In any event, the extent to which the flow of new investment responds to profit differences should be a useful index of the allocative process in a market economy.

Further study of the short-run flexibility of prices, which is the subject of Ruggles' paper in this Conference, should be another aspect of the over-all description of the contours of market structure and behavior. Such a study might be supplemented with a study of fluctuations in gross margins, a measure that in some cases would serve as a first approximation to the Lerner index of monopoly power discussed above. Ruggles' paper suggests the usefulness of sector analysis for these problems and more particularly of the significance of fluctuations in costs as an explanation of differences in price flexibility. But how are we to explain differences in cost behavior? What part does concentration play in the differences between short-run fluctuation in prices of such different raw materials as minerals and metals on the one hand and natural fibers on the other? Are differences in the flexibility of wage rates due to differ-

ences in the organization of labor, to differences in the degree of concentration in the employing industry, or to both?

Clearly, some indexes of differences in the rate of technological change and innovation are called for. We need to develop some picture of the differences in the rate of technological change and innovation in various sectors of the economy and to test rival hypotheses concerning the effect of concentration and monopoly upon these processes.

The problem of technological change has, of course, many facets. What might we hope to measure? We would ideally like to know something about the rate of technological change and innovation in various sectors of the economy in comparison with the potential for such change. Such a study poses many serious problems. Expenditures on research and development suggest themselves immediately as one item on which data might be obtained. But before the significance of this would be clear we should need some studies of the economies of scale in research and development and of the advantages of integrating research and development with commercial exploitation and production. This suggests the need for case studies in the organization of research and development.

In some industries that have undergone considerable change of products it should be possible to acquire data on the extent to which the product mix has undergone change over a period of time, thereby indicating the extent to which the old products have been displaced by new. The rate of diffusion of new ideas might also be investigated. A study of the period elapsing between the state of an initial invention and the time at which it becomes commercially exploited and finally widely diffused would be useful. These and other variables seem worth exploring.

Two tentative hypotheses may be suggested that it might be possible to test from such data on technological change and innovation: (1) assuming that firms act independently in their technological and other decisions, the extent and speed of innovation will increase with the degree of concentration up to some critical point and will decline abruptly when the number of firms becomes very small, for example, one or two; and (2) in industries with high rates of innovation, the rank order of firms would change more frequently than where innovation is more gradual and less strategic.

A program of research along these lines would be a major undertaking. But a broad statistical picture of the anatomy of industry and the processes of competition in major sectors and subsectors of

the economy is badly needed. Such an undertaking might well be the outcome of this Conference and the National Bureau of Economic Research might well serve as its focus.

COMMENT

Joe S. Bain, University of California, Berkeley

Miller has discussed the deficiencies of several measures of concentration that have been advanced in the last twenty years (most of them ten or more years ago), and has offered some suggestions for further work directed toward classifying and typing the market situations in which business firms operate.

With Miller's general view of the problem of classifying and typing market situations I am in substantial agreement. That is, I agree that we should distinguish, for purposes of classification, types of market structure, types of internal and market conduct of firms, and types of market performance or results emergent from the conduct of firms. (I am willing to add, if measurement is feasible at all, types of situations with respect to the "power" of firms.) I agree further that each of these things—structure, conduct, and performance—is in essence multidimensional, and that classification on any level will be correspondingly complex. I agree finally that in establishing classifications at each level and in looking for associations between types at different levels—certainly the crucial task—we should not limit ourselves to the classificatory systems and explanatory hypotheses put forth by static price theory. I may add that it is my impression that this general range of views is now shared by a large number of economists interested in the field of price studies.

Having said so much, I can scarcely disagree with Miller's major criticism of each of his "theoretical indexes" of monopoly. Each deals with only one dimension either of market structure (as for example in the case of simple cross elasticities, the Rothschild measure, or the Papandreou measure) or of performance (as in the case of the Lerner measure or my own profit measure), and as such it is insufficient. No single simple measure on any level will serve adequately to distinguish situations that may differ in many ways; a large number of one-dimensional measures must be used simultaneously to deal with a population of cases that differ in many dimensions. Precisely the same may of course be said of the measure of industry concentration. This view seems sound if hardly novel.

It may be suggested that a more charitable view of many individual measures of structure, conduct, or performance might be entertained if no one of them were expected to provide a self-sufficient classification of market situations. Detailed information on cross elasticities of demand among firms, for example, would be very useful—*along with many other sorts of information*—in typing market structures. In saying that each of many individual measures has a limited usefulness, it seems to me that Miller too much emphasizes the limitations and too little the positive usefulness. This same observation might be made about any relatively grandiose scheme of assembling data such as Miller suggests, wherein an array of individual partial measures, each with its limitations, would be discovered.

Two final comments may be added. First, although our ultimate goal may be a system of classification and explanation of markets and market performance which simultaneously comprehends numerous dimensions of market structure and conduct and which is adequately dynamic in its reference, a good deal may be discovered first by seeking for the partial associations of, for example, one aspect of market structure to one aspect of performance—and in this pursuit the usefulness of even static price theory as a source of hypotheses is not to be overly discounted.

Second, the outlines of the project of assembling data for empirical research that Miller puts forth are vague about some pertinent details. As these details are filled in, it will be found that the structure of the empirical research project—as regards definitions, procedures, hypotheses to be tested, and so forth—either will be arbitrary or *ad hoc* in character, or will be dependent upon some familiar or newly elaborated theoretical structure. Miller apparently eschews dependence upon existing theoretical structures, but he provides no systematic or established substitute. If the research effort he contemplates is to transcend the level of strictly pragmatic experiment, an extensive and thoroughgoing theoretical analysis should first be made in order to justify as fully as possible on an a priori level the definitions to be adopted and applied, the sorts of data to be collected, and the hypotheses to be tested. In this connection, traditional price theory, with all its limitations, may be surprisingly useful.