Productivity and Prices
The Consequences of Industrial Concentration

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Foreword

The declining rate of productivity growth experienced by the United
States and many other industrial countries in the past fifteen years has
had a significant impact on the recent economic performance of these
countries. It has affected their economic growth, inflation, and overall
economic competitiveness. Yet the origins and causes of this decline
are not particularly well known and remain a puzzle to many experts in
the field.

Given this gap in our knowledge, AEI decided two years ago to
embark on a multiyear project focusing on the causes and implications
of the decline in productivity growth. The objective was to analyze the
contributing factors to this decline and to assess the likely effects of
existing or proposed policies upon the functioning of certain sectors of
the economy and upon costs, prices, and employment.

In this spirit and as part of the ongoing program of AEI, Professor
Lustgarten in this volume analyzes recent trends in industrial con-
centration and their implications for prices and productivity. Lust-
garten attempts to explain the evolution of industrial hierarchies and
structures and its effect on current or possible antitrust regulation and
public-policy choice.

His analysis leads to the observation that economic development
and technological evolution have had a similar pattern in many indus-
trialized countries: Atomistic market structures (many small firms)
have been replaced by oligopolistic structures (a few large firms). The
change has occurred either through mergers and acquisitions, through
internal expansion of some of the more successful firms, or through
bankruptcy of the less successful firms.

Although the efficiencies of mass production techniques, econ-
omies of scale, are well recognized economically, government oppo-
sition to the growth of large-sized firms in the United States, evidenced
by the growth of antitrust policies, has been periodically observed.
Those who wish to break up large firms with significant market shares
in certain industries base their argument on what is called a monopoly
theory of concentration. This theory argues that strong oligopolistic
firms basically function like a monopoly and thus dampen economic

competition, pursue predatory pricing policies to drive competing firms out of the market, and resort to excessive advertising campaigns in order to create barriers to the entry of new firms. In contrast to this argument is the efficiency theory, which holds that concentration arises out of a competitive process in which the less efficient firms are replaced by cost-saving, resource-saving, efficient firms. If this latter argument is correct, then government policies designed to restructure concentrated industries will lead to inefficient production and higher prices for consumers.

Lustgarten's study analyzes changes in productivity and price levels in U.S. industries that have accompanied changes in seller concentration over the last quarter century. His findings show that concentration has not led to poor productivity performance or necessarily to higher prices. His data refute the monopoly theory in favor of the efficiency theory and suggest that legislation to retard concentration of major manufacturing industries could actually have unfavorable effects on consumer welfare.

The views expressed in the study are, of course, solely those of the author and should not be ascribed to the trustees, officers, or other associates of the American Enterprise Institute.

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WILLIAM J. BAROODY, JR.
President
American Enterprise Institute

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Contents

LIST OF FIGURES

1
Introduction

Changes in industry structure among industrialized countries have followed a similar pattern. Industries initially composed of many firms underwent a transformation whereby a few large companies came to account for the majority of sales. Mergers and acquisitions, internal expansions of the more successful firms, and voluntary liquidations or bankruptcies of the less successful firms produced this change.

The fact that the same industries have become concentrated in most modern national economies suggests that basic economic forces rather than chance occurrence are behind such changes.[1] Technological progress, for example, has decreased the cost of transportation, enabling efficient firms to market their output to an enlarged territory. The most frequently cited determinants of industrial structure, however, are the technological improvements that underlie economies of scale in production. The use of highly specialized labor and equipment on assembly lines, and of continuous refining and processing, and other methods of mass production are among the principal means of achieving efficiency. But to employ these means most efficiently, firms must typically achieve a large size and produce a very large volume of goods. In many industries, the volume required for a firm to use all these specialized factors and to substitute continuous production methods for batch processing means that only a few firms can exist.

Of course, movement from an atomistic to a concentrated industry structure is not the only pattern found. Some industries, such as aluminum, computers, electric lamps, and man-made fibers, that are now oligopolistic were highly concentrated from their inception. Other industries began concentrated and became atomistic.[2] The cotton textile industry in the United States, for example, had a four-firm concentration ratio of 90 percent in 1800, but the ratio had dropped to 8

TABLE 1

Manufacturing Value Added,
by Four-Firm Concentration, 1972

Four-Firm Concentration Ratio	Percentage Share of Value Added
0–0.09	5.29
0.10–0.19	17.67
0.20–0.29	18.69
0.30–0.39	14.87
0.40–0.49	13.10
0.50–0.59	7.49
0.60–0.69	9.88
0.70–0.79	4.10
0.80–0.89	1.44
0.90–1.00[a]	7.47
Total	100.00
Weighted average concentration	40.20

a. For the telephone and telegraph apparatus industry, the 1970 figure of 0.94 was used. The Census Bureau could not disclose the data for 1972.
Source: U.S. Department of Commerce, Bureau of the Census, Census of Manufacturers, 1972, *Concentration Ratios in Manufacturing*, MC76(SR)-2, table 5.

percent by 1840. The structure of the U.S. meat-packing industry was initially atomistic, became concentrated, then became deconcentrated. The ready-to-eat cereals industry started out concentrated, became deconcentrated, then became reconcentrated.

Most of the national output in the United States is produced in industries where the largest firms account for only a small fraction of the national market. In manufacturing, only 30 percent of the value added is produced in industries where the four largest sellers account for more than 50 percent of industry sales nationally (see table 1). In other sectors of the economy, such as agriculture, construction, mining, and retail trade, average concentration is even lower than that in manufacturing. Communications—network radio and television, telephone, and the postal service—subcategories of transportation such as bus and railroad passenger service, and government are the major exceptions. In this study the manufacturing sector of the United States will be analyzed in an attempt to determine whether consumers were made better off or worse off when industries became more concentrated.

Criticism of Concentration

Although the efficiencies of large-scale production are well recognized, opposition to the growth of large firms in the United States has appeared periodically in various forms. An early instance was the Pujo Committee investigation of 1913 which looked at the concentration of control over wealth by the financial community.[3] In 1938–1941, the Temporary National Economic Committee investigated the extent and the effects of high seller concentration in the industrial sector. It concluded that a reorganization of the economy was necessary.[4] More recently, in 1968, a Task Force on Antitrust Policy, appointed by President Lyndon Johnson, recommended a "Concentrated Industries Act" that would direct the attorney general to examine all concentrated or oligopolistic industries—there defined as those in which the four largest firms sell 70 percent or more of the domestic output of the industry—and bring legal proceedings against firms with a market share of 15 percent or more.[5] In 1972 and again in 1975, an industrial reorganization bill was introduced in the U.S. Senate. Its aim was to dissolve the largest firms in any industry in which the four largest sellers produced 50 percent or more of domestic output.[6] Under the bill, the reorganization of certain industrial sectors was to take priority. These included chemicals and drugs, electrical machinery, energy, iron and steel, motor vehicles, electronic computing, and nonferrous metals.

Those who wish to deconcentrate major industries base their arguments on what can be called the shared-monopoly, or collusion, theory of concentration. According to that theory, in any industry in which sellers are few, the sellers will recognize their interdependence and collude—either tacitly or overtly—to restrict output so as to achieve a monopoly price.[7] Existing levels of concentration are the result of mergers that were aimed at the achievement of monopoly power, predatory pricing policies that drove out competitive firms, and excessive advertising, which blocked other firms from entering the industry.[8] High prices persist in concentrated industries, according to this theory, because the threats of predatory pricing and advertising restrict entry.

These arguments contrast with what might be called an efficiency theory, which holds that concentration arises out of a competitive process in which more-efficient firms grow large and less-efficient firms withdraw or fail. Lack of entry into a concentrated industry, according to this theory, is due to the superior efficiency of large firms, which allows them to sell at prices unattractive to potential entrants. If this is correct, then government policies designed to restructure con-

3

centrated industries would lead to less-efficient production and higher prices for consumers.[9]

Concentration and Efficiency

Although much attention has been focused on the profitability of industries at different levels of concentration in order to confirm or refute the shared monopoly theory, little work has been done to measure relative efficiency at different levels of concentration. One exception is a study by Sam Peltzman, in which both the cost-reducing and the profit-raising potentials of industry concentration are considered.[10] He found that the cost-reducing effect of concentration more than offset any profit-raising effect, so the net result of high concentration was lower prices. He concluded that a policy of forced divestiture which reduced the share of the four leading firms in concentrated industries to 50 percent would increase industry costs by about 20 percent and prices by about 10 to 15 percent.[11]

A study by Betty Bock and Jack Farkas of the National Conference Board, which was also focused on the efficiency aspects of concentration, revealed that in most industries output per unit of labor input is higher for the biggest firms than for the rest of the firms in that industry. Their conclusion suggests that leading firms obtain and maintain their large market shares because they use labor resources efficiently. Thus, concentration is a byproduct of efficiency.

Some have argued that the measures used by Bock and Farkas—value added and value of shipments per employee and per production worker–hour—reflect monopoly power to set higher prices as well as efficiency and are, therefore, inappropriate. Bock and Farkas, however, found larger shipments and value added per employee and per production worker–hour in the largest firms in almost *all* industries, not just those industries in which large firms might have market power. Using data from the 1963 Census of Manufactures, they found that in 81 percent of the 345 industries they examined

> the *top-four* companies were at least 5 percent more productive than other companies in the same industry, while in only 5 percent of the industries were the top-four companies definitely less productive than others in the same industry. And again in approximately one-fourth of the industries, the top-four companies accounted for at least 55 percent more value added per production worker man–hour than the remaining companies in the same industry.[12]

The authors reached similar conclusions using value of shipments per employee and value added per production worker–hour. They were

4

not able, however, to examine output per unit of capital, which may be higher for the smallest firms. If so, the findings of Bock and Farkas may reflect a difference in factor proportions between large and small firms that is due to differences in factor costs. Large firms may be more capital-intensive because their cost of capital, compared to that of labor, is lower. Lower risks incurred by investors in large firms and economies of scale in raising capital are likely explanations of a lower relative cost of capital.

Leonard Weiss's study of suboptimal plant capacity adds evidence of greater production efficiency among concentrated industries.[13] He examined the extent to which the capacity of production facilities in various industries was smaller than that necessary to attain the lowest average production cost. He found that suboptimal or high-cost plant capacity was more frequent in unconcentrated than in concentrated industries. In fact, his computations indicate that for every increase of one percentage point in the concentration ratio, the percentage of industry shipments from suboptimal plants declines by 0.86 percent.

Summary of Findings

The study reported in the following pages analyzes *changes* in productivity and price levels in U.S. manufacturing industries that have accompanied *changes* in seller concentration during the last quarter century. Thus, the analysis presented here adds another dimension— that of time—to the work done by Bock and Farkas. In addition, it addresses the issue of the way changes in price are related to changes in concentration.

The evidence presented below refutes the monopoly theory and supports the efficiency theory. If the monopoly theory were correct, when seller concentration increased, productivity would not increase but prices would; but this study demonstrates that industries with rising concentration are marked by greater productivity and lower prices. It suggests that enactment of legislation whose aim is the deconcentration of major manufacturing industries will have harmful effects on both national output and consumer prices.

The first section of this study examines the arguments that concentration is harmful. The second discusses the way in which productivity and price changes were measured. The third reports how price and productivity behaved for different changes in concentration.

Notes

1. Concentration ratios vary among industries in different countries. The reasons include size of market, age of major firms, the technology that they use, and government antitrust policy. The basic patterns of concentration, however, are remarkably similar. For comparisons of concentration ratios among countries, see Joe S. Bain, *International Differences in Industrial Structure* (New Haven, Conn.: Yale University Press, 1966); and F. L. Pryor, "An International Comparison of Concentration Ratios," *Review of Economics and Statistics*, vol. 54 (May 1972), pp. 130–40.

2. F. Bateman and L. Weiss, "Market Structure before the Age of Big Business: Concentration and Profit in Early Southern Manufacturing," *Business History Review*, vol. 49 (Autumn 1975), pp. 312–36.

3. U.S. Congress, House, Committee on Banking and Currency, *Investigation of Financial and Monetary Conditions in the United States*, 62d Cong., 3d sess., 1913.

4. U.S. Congress, Senate, Temporary National Economic Committee, *Final Report and Recommendations*, 77th Cong., 1st sess., 1941, S. Doc. 35.

5. P. C. Neal et al., "Report of the White House Task Force on Antitrust Policy," *Antitrust Law and Economics Review*, vol. 2 (Winter 1968–69), pp. 1–64.

6. U.S. Congress, Senate, *Congressional Record*, 92d Cong., 2d sess., 1972, pp. S11494–99.

7. "Although there are many oligopoly theories, virtually all of them predict an increase in the effectiveness of collusion (a decrease in the cost of collusion) as concentration rises." A. D. Strickland and L. W. Weiss, "Advertising, Concentration, and Price-Cost Margins," *Journal of Political Economy*, vol. 84 (October 1976), p. 1113. See also E. H. Chamberlin, *The Theory of Monopolistic Competition* (Cambridge: Harvard University Press, 1933), p. 48, and William Fellner, *Competition among the Few* (New York: Alfred A. Knopf, 1949).

8. For one view of the importance of mergers in attaining monopoly, see George Stigler, "The Statistics of Monopoly and Merger," *Journal of Political Economy*, vol. 64 (February 1956), pp. 33–40, and his "Mergers and Preventive Antitrust Policy," *University of Pennsylvania Law Review*, vol. 104, no. 2 (November 1955), pp. 176–84. In the latter, Stigler states, "A preventive antitrust policy . . . should be directed at activities which on their face have a general and important tendency to reduce competition and only at such activities. Mergers of business rivals are unique in the degree to which they meet this requirement . . . . This is, indeed, their chief purpose: historically the other purposes of mergers (of large firms) have been incidental and unimportant" (p. 177).

9. John McGee, *In Defense of Industrial Concentration* (New York: Praeger Publishers, 1971).

10. Sam Peltzman, "The Gains and Losses from Industrial Concentration," *Journal of Law and Economics*, vol. 20 (October 1977), pp. 53–100. See also J.H. Landon, "The Relation of Market Concentration to Advertising Rate: The Newspaper Industry," *The Antitrust Bulletin*, vol. 16 (1971), pp. 53–100.

11. Peltzman, "Gains and Losses," p. 263.

12. Betty Bock and Jack Farkas, *Concentration and Productivity: Some Preliminary Problems and Findings* (New York: The Conference Board, 1969), p. 23. Emphasis in original. Similar findings, based on data for 1972, were reported by Edward Miller, "The Extent of Economies of Scale: The Effects of Firm Size on Labor Productivity and Wage Rates," *Southern Economic Journal*, vol. 44 (January 1978), pp. 470–87.

13. Leonard Weiss, "Optimal Plant Size and the Extent of Suboptimal Capacity," in *Essays on Industrial Organization in Honor of Joe S. Bain*, ed. Robert Masson and David Qualls (Cambridge, Mass.: Ballinger, 1976), pp. 123–41.

2

Arguments That Concentration Is Harmful

The postulated harm to consumers from high concentration sup-
posedly stems from the possibility that competition among a small
number of sellers will not force prices down to their resource cost.
Where a few firms account for the bulk of industry output, collusion
(tacit or overt) among them to raise prices becomes easier. Even in the
absence of economies of scale, therefore, firms may grow large
through mergers or internal expansion in order to facilitate collusion.
Some even argue that mergers have been the main road to large firm
size (relative to the size of the industry) and that the main purpose of
becoming large through mergers has been to attain monopoly or
shared monopoly.[1]

   This argument ignores the fact that when collusion succeeds in
raising industry profits to levels in excess of the cost of capital, new
entrants are attracted.[2] As entries occur and output expands, prices
decline. Alternatively, to maintain price levels, firms already in an
industry must restrict their output as new firms enter, thus earning
lower profits because of the costs of carrying excess capacity. Even if
the existing firms ultimately acquire the new entrants, other com-
panies will continue to be attracted as long as industry profits are
above normal or prices are above the minimum average cost in effi-
ciently scaled and operated businesses. Therefore, in the absence of
economies of scale, any increase in profits from mergers resulting in
industry concentration is likely to be short-lived.

   In 1921 Arthur Dewing studied the profit performance of thirty-
five consolidations that had taken place around 1900. Each had united
five or more firms that had been competitors. He found that earnings
in the ten years following each merger averaged 18 percent less than
the total earnings of the constituent firms before the merger.[3] Evi-
dently, entry and expansion by existing firms—including those that
had been consolidated—were adequate to keep prices at competitive
levels despite the high degree of concentration brought about by the
consolidations. The National Industrial Conference Board, in its 1929

7

study of mergers, found that from 1900 to 1913 prices dropped 13 percent in twenty-six industries in which there were major consolidations, while prices rose 10 percent in thirty-three industries in which only minor consolidations or none occurred.[4]

In response to the argument that new entries ultimately eliminate any profit from collusive agreements, advocates of the monopoly theory assert that barriers to entry allow colluding firms in concentrated industries to maintain high profits. The barriers most often cited are the large capital expenditures required to build plants or to carry out intensive advertising campaigns. Entry on a small scale would presumably be unsuccessful because, in concentrated industries, small firms are less efficient than large firms.[5] Thus, even the advocates of the monopoly theory implicitly concede that economies of scale are a factor underlying concentration. They maintain, however, that while economies of scale are partially responsible for high concentration, existing market shares of large firms are far in excess of what is necessary to realize all these cost savings.[6] Thus, industries could be less concentrated than they now are with no loss of efficiency.

The argument that concentrated industries, such as those producing primary aluminum and automobiles, are protected by capital barriers has intuitive appeal—especially when that situation is contrasted with the situation in industries in which firms are small, such as services or retail trade. After all, almost anyone can buy a restaurant, but only the extremely wealthy can buy steel mills. What this view fails to consider is that the corporate form, by pooling the investments of many people, allows the less wealthy to buy a share of a business they could not enter individually and thereby enables the corporation to assemble the capital required to enter a concentrated industry.

Also, if it is true that firms in concentrated industries generally set prices in a monopolistic fashion, then profits to sellers in most of these industries are higher than those available elsewhere (for the same risk) and are therefore higher than the cost of capital.[7] For that reason, firms in other industries that are large enough to raise capital economically have a great incentive to enter concentrated industries. Chemical companies, for example, could earn higher profits by entering the aluminum industry if it were profitable enough to provide earnings in excess of the cost of capital. Even if chemical companies were already earning excess profits on their investments, existing or potential stockholders would be willing to provide additional funds for their companies to manufacture aluminum if monopoly profits were to be had. The additional returns would provide even higher dividends and capital gains to the stockholders. Alternatively, or as part of their strategy, the chemical companies could borrow at the competitive

market rate in the bond market and make profits at a higher rate in the aluminum industry.

A company's incentive to enter an industry that prices its product above competitive levels is much greater when the company uses that industry's product in its production process or when that industry's product complements its own product. Thus, if aluminum companies were obtaining monopoly profits, it would pay automobile companies to enter the aluminum industry, since they could lower their own costs of production. Or, if the major oil companies were monopolistic, it would pay automobile companies to enter the oil industry, since the lower gasoline prices that competition would bring would increase the demand for automobiles. All of this follows if the major barrier to entry into concentrated industries is the inability of new firms to raise capital. And it highlights the weakness of the capital-barriers argument—that potential entrants are unable to raise capital even though investors know they could obtain profits by providing it.

It may be that capital is more difficult to raise in concentrated industries because the risks there are greater. Greater risk in a concentrated industry may be attributable to the fact that its assets are more specialized and more durable than those of other industries. Examples of specialized and durable resources used in concentrated industries are those secured through large expenditures for plant and equipment, advertising campaigns, or research and development (R&D) programs. The use of such resources creates barriers to exit as well as to entry, because specialization limits alternative uses and durability creates sunk costs that restrain exit when the rate of profit falls below expectations. For example, a highly trained and specialized labor force represents human capital; investments in advertising create brand identification; and investments in R&D create new products and technology. Each of these resources is difficult to transfer from one area of economic activity to another. Outlays in these areas become fixed costs, and when these constitute a large portion of total costs, operations often continue despite deficient profits or losses. Thus, resource specialization and durability, which keep potential entrants out of an industry when its profits are abnormally high because of the time it takes to build specialized plants and equipment, also keep existing firms from leaving an industry when its profits are abnormally low.

The inability of some concentrated industries to transfer assets out of particular activities means that investment in these industries is very risky. Investment in specialized plant and equipment or in training workers also has very small liquidation value if the intended use turns out to be unprofitable. Likewise, advertising expenditures rarely have

9

any liquidation value. And investment in R&D to develop a new product that ultimately fails often has no liquidation value. The greater risk involved in using specialized and durable assets means that higher rates of return are necessary to attract capital—that is, the cost of capital is higher in a risky industry. For that reason, the higher rate of profitability sometimes observed in concentrated industries may be a consequence of the greater risk inherent in the types of assets they must use. Entry will not, and should not, occur unless the expected return equals or exceeds the risk-adjusted (higher) cost of capital invested in risky assets.

If it is difficult to transfer resources out of concentrated industries, then firms are deterred from entering if the expected returns do not justify the costs—including the risk of failure—of acquiring and implementing complex technologies. There is no misallocation of resources in this case since, taking the cost of the risk into account, the potential entrants' resources are better used elsewhere.

The differences that exist in the average rate of profitability between concentrated and unconcentrated industries are perhaps explained by differences in risk.[8] But the more important question to be answered is whether concentration is related to the efficiency of an industry. Profits may be higher either because costs are lower or because prices are higher. When concentration increases, consumers can be better off even if profits are higher, if the greater profits are realized from reductions in cost that lead to reductions in selling prices.

In the balance of this study two questions are examined. First, are the prevailing levels of industry concentration explained by efficiency factors or could firms be smaller than they are now with no loss in efficiency? Second, are any of the gains from growth in productivity that are attributable to high concentration passed on to consumers through reduced selling prices? The first question will be addressed by tracing changes in productivity as industries moved to their current level of concentration. The second will be addressed by determining the extent to which prices fell as concentration changed.

Notes

1. George Stigler, "Mergers and Preventive Antitrust Policy," *University of Pennsylvania Law Review*, vol. 104, no. 2 (November 1955), p. 177.

2. For examples of industries in which this has been the case, see Fritz Voight, "German Experience with Cartels and Their Control during Pre-war and Post-war Periods," in *Competition, Cartels and Their Regulation*, ed. J. Miller (Amsterdam: North-Holland, 1962), pp. 169–213.

3. A. S. Dewing, "A Statistical Test of the Success of Consolidations," *Quarterly Journal of Economics*, vol. 36 (November 1921), pp. 81–101.