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THE RELATIONSHIP OF ANTITRUST POLICY AND TECHNOLOGICAL PROGRESS*

JAMES T. HALVERSON**

The philosophy behind our antitrust laws is that the national economy will be invigorated by free and open competition. The premise is that unrestrained interaction of competitive forces will yield the best allocation of our economic resources, the lowest prices, the highest quality and the greatest material progress, while at the same time providing an environment conducive to the preservation of our democratic political and social institutions.¹

The objective of antitrust law is to ensure that the natural forces of competition are permitted to work, free of artificial restraints and the exercise of excessive monopoly power.

One tenet of competition policy that has received somewhat less antitrust attention than others is that competition promotes efficiency by rewarding cost-cutting innovation and encouraging technological development. It is the purpose of this Commentary to explore, in a preliminary fashion, the relationship of antitrust policy and technological innovation and to suggest circumstances under which the antitrust laws may lend themselves to the enhancement of opportunities for technological change and progress.

Certainly, in this country, we can look back on nearly a century of outstanding technological development since the advent of our antitrust system in the late nineteenth century. In addition to making new and better products available for consumer selection, technological progress is such an important factor in our society that it can be viewed as a basic indicator of the country's economic performance.²

Despite the obvious fact that competition and technological develop-

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ment are both important aspects of our economic system, the proper relationship between antitrust law and policies designed to promote technological development is not so obvious. The possibility of conflict is nowhere more vividly illustrated than in the parallel development of our patent and antitrust laws. On the one hand, we reward the inventor by granting him a limited and temporary monopoly on a patentable invention; on the other, we vigorously enforce our antitrust laws in order to confine the economic effects of that monopoly to a specific market and to a limited period of time. The uncertainty that still remains in defining the patent-antitrust relationship, while not the subject of this paper, attests to the difficulties involved in attempting to balance these sometimes conflicting patent and antitrust policies.3

The heart of the antitrust-technology problem lies not, however, in a conflict between two bodies of substantive law, but in the related economic questions concerning the effect of market structure on innovation and the effect of innovation on competition. This Commentary will address the problem, first, by summarizing the existing theories of the relationship between market structure and technological progress, and second, by examining how innovation can affect competition.

I. THE EFFECT OF CONCENTRATION AND FIRM SIZE4 ON THE RATE OF PRODUCT INNOVATION AND INTRODUCTION

A. A PRIORI THEORIES

The traditional antitrust viewpoint has been that material progress and product innovation are not only consistent with a competitive market structure but also reliant upon it. This attitude is well expressed by Judge Wyzanski in United States v. United Shoe Machinery Corp.:5

What appears to the outsider to be a sensible, prudent, nay even a progressive policy of the monopolist, may in fact reflect a lower scale of adventurousness and less intelligent risk-taking than would be the case if the enterprise were forced to respond to a stronger industrial chal-

3. See generally ATTORNEY GENERAL'S NATIONAL COMMITTEE TO STUDY THE ANTITRUST LAWS, REPORT 223-60 (1955).
4. It is important here to distinguish between firm size and market power. A firm's size is determined by the gross level of its business activities, often measured by its sales and assets. Market power is best reflected in a firm's ability to control market prices. While bigness and market power may coincide, bigness alone is no guarantee that a firm can exercise market power. For example, a widely diversified firm may be large, but not be active enough in any single market to hold much market power.
Although the judge was discussing innovation in the framework of a monopolization case, his opinion typifies a common suspicion that large amounts of market power can be a disincentive to development of new products and processes. Whether this suspicion is well-founded is essentially an economic question. If economic theory or empirical proof were to show a positive correlation between innovation and market concentration or firm size, some aspects of antitrust policy might require rethinking—keeping in mind, however, that innovation is but one goal of competition policy.

The relationship between innovation and firm size or concentration has been the subject of considerable economic study. While it would be impossible here to give comprehensive treatment to the numerous theories and studies that have been done, a brief discussion of the literature is in order. Traditional economic theory is reflected in the comment of John Stuart Mill that "to be protected against competition is to be protected in idleness, in mental dullness." The traditional view is not without its dissenters, however. For example, Professor Joseph A. Schumpeter theorized that the large and prosperous monopolist, rather than the lean, competition-hardened firm, is typically the most effective vehicle for progress. He believed that a firm which can draw on the surpluses accumulated through higher than competitive returns and which can expect a monopolist's return on its investment in research and development is more likely to incur the risk and expense of invention than the business which realizes only competitive profits.

6. Id. at 347.
8. J. MILL, PRINCIPLES OF POLITICAL ECONOMY 299 (rev. ed. 1900); see J. CLARK, ESSENTIALS OF ECONOMIC THEORY 374 (1907).
10. Professor Schumpeter's theory finds some support in Professor John Kenneth
B. Empirical Theories

Unable to agree on a priori theories of the relationship between firm size or concentration and innovation, economists have turned to empirical methods. The resulting studies fall generally into two categories: (1) those testing correlations between firm size and innovation and (2) those examining the relationship between market concentration and technological development.

1. Firm Size and Innovation

Professor Frederic Scherer has observed that there is no ideal firm size for innovation. Very small firms have contributed heavily to the initial, inexpensive stages of the innovative process. On the other hand, the development and application of new ideas can be very expensive and, in some instances, can be accomplished only by a firm with substantial financial resources. Reviewing the empirical evidence, Scherer concludes that increases in firm size can, up to a certain point (roughly $75 million to $200 million in annual sales), enhance progressiveness, but further increases beyond that size tend to retard Galbraith's belief that all the inexpensive innovations have been made and that the financial resources of the big firm are required for further progress. J. Galbraith, American Capitalism 86-87 (1956). It should be noted, however, that even if one accepts this thesis about firm size, one does not necessarily reject competition as a stimulus to innovation.

11. See, e.g., Comanor, Market Structure, Product Differentiation and Industrial Research, 81 Q.J. Econ. 639 (1967); Grabowski, The Determinants of Industrial Research and Development: A Study of the Chemical Drug and Petroleum Industries, 76 J. Pol. Econ. 292, 297-306 (1968); Horowitz, Firm Size and Research Activity, 29 S. Econ. J. 298, 298-301 (1962); Mansfield, supra note 7; Scherer, supra note 7. For an excellent summary of the research in this field, see Markham, Market Concentration and Innovation, supra note 7.

12. It is important to recognize that there is no perfectly satisfactory measurement of progressiveness. See generally F. Scherer, Industrial Market Structure and Economic Performance 357 (1971) [hereinafter cited as Industrial Market Structure]. Economists have typically looked either to investment in research and development or the number of patents acquired as rough indicia of progressiveness. One shortcoming of such methods is that they look only to the initial stages of the innovative process. The invention and patenting of new products and processes are several steps removed from actual introduction or implementation. Economic policy must be concerned not only with the market factors that promote inventiveness, but also with the factors that are conducive to the commercial application of new technology.


14. Scherer's estimations were made in terms of 1955 dollars and therefore would require adjustment for practical application today.
ANTITRUST POLICY

This approach assumes that economic progressiveness is sufficiently homogeneous to be measured on an aggregate basis. Such an aggregate approach, however, does not reflect the substantially different kinds of technological progress contributed by firms of greatly varying sizes. For example, development of new energy technologies and the successful completion of the construction of new types of energy enrichment or production facilities, such as nuclear enrichment and reactor facilities, will require enormous resources for technological development.

2. Market Power and Innovation

A number of studies have attempted to test Schumpeter's thesis that concentration provides a better environment for technological progress than does competition. Although there is considerable diversity in the methods used, those studies generally support the conclusion that there is at least a weak, positive correlation between concentration and innovation.

Before market power is heralded as the “mother of invention,” consideration should be given to the possibility that technological progress produces concentration rather than itself being the result of oligopoly. A subsequent section of this Commentary will touch upon the ways in which technological innovations allegedly have been abused with the purpose and effect of reducing or preventing competition in various industries. From a broader perspective, rapid progress may inevitably provide a favorable climate for concentration because it is the large firm, with its substantial resources, that is often best able to acquire,

15. INDUSTRIAL MARKET STRUCTURE 357-62.


17. See, e.g., Hamberg, supra note 7; Horowitz, supra note 11. Based upon his research in the field, however, Professor Scherer has concluded:

Technological vigor appears to increase with concentration mainly at the relatively low levels of concentration. Where the four-firm concentration ratio exceeds 50%-55%, additional market power is probably not conducive to more vigorous technological efforts and may be downright stuflifying.

Scherer, Market Structure and the Employment of Scientists and Engineers, AM. ECON. REV. 530 (1967). Scherer has also concluded that the effect of concentration on technological progressiveness is less important in “high opportunity” industries (i.e. those experiencing rapid technological change) than in “low opportunity” fields. INDUSTRIAL MARKET STRUCTURE 375.

employ, and market new technology, even though the large firm may not be innovative in its own right. The smaller firm simply may be unable to afford to implement the new processes or products.

C. Retention of Present Antitrust Policy

These economic observations of the different kinds of technological progress do not argue for any dramatic alteration of traditional antitrust policy. The conclusion is inescapable that technological progressiveness depends more on the characteristics of individual firms and markets than on firm size or concentration per se. Thus the most effective approach would seem to be to continue treating each industry as an individual entity and to make policy judgments concerning antitrust enforcement on a case-by-case basis.19

Because even the most dramatic antitrust remedies do not propose the re-creation of atomistic market structures, it seems highly unlikely that current antitrust enforcement remedies have significantly impeded innovation in any industry. Furthermore, it is important to remember and consider that present antitrust policy has as its basis a number of goals in addition to the encouragement of technological development.20 In the absence of convincing evidence that current policy has a strong detrimental effect on technological progressiveness, policy changes that sacrifice other important goals would seem unwarranted.

II. The Effect of Technological Development on Market Structure

Obviously, product and process innovation can be dramatically pro-competitive. The Polaroid Corporation is only one example of a firm that became a successful new entrant largely by introducing a new product. Technological developments permitting competition between products that formerly were not interchangeable and new processes bring-

19. "After all Schumpeter only argued that any indiscriminate assault on bigness and market power taken out of their evolutionary context, would deprive the capitalistic process of its source of progress." Markham, Market Concentration and Innovation, supra note 7, at 39 (emphasis added).

20. Among the other goals of antitrust policy are the following:
   a) efficiency in the use of resources;
   b) maintenance of competition as a market control mechanism; and
   c) establishment of a standard of business conduct.

ing cost savings to manufacturers can also stimulate pro-competitive effects. 21

A. New Products and Processes as Barriers to Entry

Less obvious, perhaps, are the barriers to entry that may be erected as new technology is developed and accumulated by the existing firms in an industry. 22 New products and processes, based in whole or in part on secret know-how, 23 can present formidable barriers to others. If a new or improved product of an established firm is of superior quality or versatility, sizeable segments of the buying public may be unwilling to consider older products as reasonable substitutes. If substantial expertise or know-how is necessary to develop and manufacture the novel superior product at a low cost and on a production-line basis, other firms desiring to make the product may be forced to undertake, at considerable expense, extensive research and development in an attempt to discover their own methods of production. This process is the essence of the concept of technological progressiveness and is consistent with competition goals if the situation is not abused by industry leaders. 24

A new process may enable an established firm to produce existing products more efficiently and, therefore, at a lower cost. In these circumstances, a new firm may be deprived of one of the most effective


22. When the term “barriers to entry” is used in this Commentary, it should be understood as embracing more than just those factors discouraging de novo entry. It also refers to those obstacles preventing firms already in the market from becoming effective competitors. The extent of such barriers partially determines how far the dominant firms in a market may deviate from competitive performance standards without risking competitive retaliation by either new entrants or smaller existing firms.

23. “Know-how” has been defined as “any information of peculiar value to its owner, not protected by patent, and not generally known or accessible to everyone.” 2 R. Callman, Unfair Competition, Trademarks and Monopolies § 52.1, at 379 (1968).

In the renegotiated consent order in Xerox Corporation, No. 8909 (F.T.C., complaint issued Jan. 16, 1973) “know-how” was defined as

all written materials used by Xerox Corporation in manufacturing, refurbishing, recondition retrofitting and servicing its office copier products . . . including but not limited to blueprints, drawings, formulae, manuals, process descriptions, production methods, specifications, quality control and test standards and computer programs.

BNA Antitrust Trade Rep. No. 710, at E-1, E-2 (April 22, 1975), order finalized,


means of increasing its market share—that is, price competition. Facing a cost disadvantage, the newcomer who undersells does so only at the pleasure of the industry leader, which retains the power to assert its competitive advantage whenever it perceives that its leadership is imperiled. Even if the established firm does not meet or beat the price of the new entrant, it may, nevertheless, reap a larger than competitive profit for an indefinite period. The newcomer, as in the case of product innovations, will probably be forced to expend the funds necessary to emulate the new process.

Even if the new product or processes can be imitated, however, the imitation may only be achieved at a higher cost. If this is the situation, a barrier to effective competition is present. Again, this may simply be the natural concomitant of effective innovation by the industry leader.

The smaller, less powerful firm still faces substantial problems, even assuming that it is prepared to spend the extra amounts of money for technology. The primary difficulty is that the firm is playing catch-up with the industry leaders. Starting at a disadvantage, the smaller firm cannot challenge the industry leaders merely by equaling the larger firms' expenditures and inventiveness. If it simply builds on its knowledge of the pertinent art, the smaller firm may find itself forever trailing behind the leaders at the same distance. In summary, the distance between the newcomer and the established firm is one manifestation of the competition barrier that the older firm may erect by accumulating its know-how. Although the new firm may eventually develop the expertise for manufacturing today's products at reasonable costs, it may very well find that these products mean little in the marketplace of tomorrow.

The evidence is unequivocal; technological change inherently makes market entry more difficult except where the new technology is freely available. To the extent that an innovative firm inevitably enjoys a competitive advantage, the concomitant barriers to effective competition should present no antitrust problems. Present antitrust policy does

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25. Id. at 219-24.
26. The small or new firm may also face substantial cost disadvantages. In many instances, the total cost of new technology may be as great, or nearly as great, for a small firm as for a large one. Because the small firm has fewer units of output over which to spread fixed costs, its unit costs will often be higher than those of the big firm. See Honeywell Inc. v. Sperry Rand Corp., 1974 Trade Cas. 95,875 (D. Minn. 1973).
27. See generally INDUSTRIAL MARKET STRUCTURE 368.
not deny a progressive firm the fruits of its efforts. Antitrust problems do arise, however, when a firm abuses technological advantages with the purpose or effect of injuring competitors and discouraging new entry.

The electronic data processing (EDP) industry provides a clear example of the barriers that know-how can pose to a new entrant. In 1956, Sperry Rand and IBM, who held between them approximately ninety-five percent of the EDP market, reached an agreement on the cross-licensing of existing and future patents and on the sharing of all EDP know-how in their possession. Honeywell later filed a suit against Sperry Rand for violations of sections 1 and 2 of the Sherman Antitrust Act, based, in part, on the agreement executed with IBM. Plaintiff argued that the agreement was, in effect, a technological merger between the two dominant firms in the EDP market. Finding that the agreement was a restraint of trade in violation of section 1, the district court noted that IBM and Sperry Rand had exchanged information that no other EDP firm had seen in an industry in which technology was crucial and at a time when the two exchanging parties heavily dominated the industry.

28. Of course, the very purpose behind the patent laws is to promote innovation by allowing the invention a period of exclusive exploitation. Nevertheless, industry-wide sharing of innovations can occur in a number of situations. For example, if the innovation is accomplished in a government laboratory or under a government research grant, information may be available to all applicants. Typical is the HEW regulation that empowers and, under certain circumstances, requires the Assistant Secretary to assure that inventions arising under a Department research grant are made publicly available on reasonable terms. 45 C.F.R. § 8 (1974). Another comparable situation occurs when the inventing firm, as part of the remedy in an antitrust case or consent settlement, is ordered to share technology. See, e.g., United States v. National Lead Co., 332 U.S. 319 (1947); Bell & Howell Co. v. Eastman Kodak Co., Civil No. 73-35 (N.D. Ill., July 8, 1974) (consent settlement), described in BNA ANTITRUST TRADE REP. No. 674, at A-9 (July 30, 1974); Xerox Corp., No. 8909 (F.T.C., July 30, 1975) (consent order), described in BNA ANTITRUST TRADE REP. No. 725, at A-5 (Aug. 5, 1975).


[The defendant may escape statutory liability if it bears the burden of proving that it owes its monopoly solely to superior skill, superior products, natural advantages, (including accessibility to raw materials or markets), economic or technological efficiency, (including scientific research), low margins of profit maintained permanently and without discrimination, or licenses conferred by, and used within, the limits of law, (including patents on one's own inventions, or franchises granted directly to the enterprise by a public authority).]

Id. at 342 (emphasis added).


The court also found that the agreement permitted each company to consider incorporating the techniques of the other into its own equipment. By reviewing and studying the technical information gained under the 1956 agreement, Sperry Rand and IBM were better able to evaluate the options available to each of them and to decide what equipment to build and what method to use in building it. Such opportunities involved time and cost-saving shortcuts in the evaluation and selection of alternate routes. Existing EDP firms and potential entrants were then forced to compete against the combined technical portfolio of the two giants in the industry. Sperry Rand had assured itself that others would confront the technological disadvantage of not having access to the exclusively traded know-how and would, therefore, have to sustain high research and development costs to duplicate efforts of the two parties.

The district court found that the agreement had permitted Sperry Rand and IBM to maintain a comfortable technological lead over the small companies who had not participated in the bilateral exchange. And indeed, the small firms had lost valuable time reinventing the innovations of the two industry leaders. As a result of the IBM-Sperry Rand agreement, a barrier was erected in the face of existing competitors and new entrants. Sperry Rand and IBM were able to concentrate on more advanced products and to keep them in reserve until competition was about to, or did, introduce similar ideas to the market. Thus, the case presented a classic example of the "catch-up" problem.

That control of technology can sometimes be used to achieve market power has been highlighted by the recently settled Federal Trade Commission action against Xerox Corporation. In essence, the complaint alleged that Xerox monopolized the office copier industry primarily by accumulating a patent portfolio that stood as an imposing barrier to entry. Xerox was also charged with maintaining and exploiting a patent portfolio and licensing posture in order to channel competitors into manufacturing and selling low-speed and coated-paper

32. Xerox Corp., No. 8909 (F.T.C., filed Jan. 16, 1973). The original provisional consent order was rejected in February 1975 by the Federal Trade Commission following widespread criticism by Xerox' competitors that the order did not go far enough. The renegotiated settlement, which gives competitors freer access to Xerox' portfolio of office copier patents and Xerox' know-how than the original settlement, will require Xerox to share much of its office copier technology. BNA ANTITRUST TRADE REP. No. 725, at A-5 (Aug. 5, 1975).
copiers while reserving the competitively more important high-speed and plain-paper copier market for itself.

B. Product Changes and Proliferation as Barriers to Trade

A different problem may be presented by the introduction of relatively minor product changes. Antitrust policy must be concerned with the possibility that certain insubstantial product modifications do not represent true progress, but may nevertheless seriously threaten competition. Trivial modifications may, when aided by intensive advertising, convince the consumer that a significant, desirable innovation has been introduced. Some authorities have argued that by a series of minor variations or style changes, a manufacturer (or a group of manufacturers) can thus make the products of competitors obsolete or can compel competitors to incur the expense of frequent product modifications. On the other hand, this phenomenon may be a competitive response to the rapidly changing tastes and preferences of American consumers.

In its monopolization case against IBM, Control Data Corporation touched upon the relationship between product changes and exclusion of competition. Control Data alleged that IBM had frequently and unnecessarily introduced new models and model numbers and had exploited the customers' fear of computer obsolescence, thus injuring the competitors of IBM. The premise of the charges was that, because of IBM's market power, customers' expectations were largely based on IBM's practices, and competitors had no choice but to meet those expectations.

Two recent suits against Kodak raise issues that are closely related to style-change problems. Although the two actions concern different product markets, the focus of the complaint is the same in each case. Basically, the plaintiffs allege that, because Kodak is the major

33. A number of articles have argued that the high barriers to entry into the automobile industry have resulted from the major manufacturers' practice of frequently changing body styles. See, e.g., J. BAIN, BARRIERS TO NEW COMPETITION 298-99 (1956); Note, Annual Style Change in the Automobile Industry as an Unfair Method of Competition, 80 YALE L.J. 567, 586-92 (1971).


producer of photographic equipment and supplies, competing manu-
facters must design their equipment and supplies to be compatible
with Kodak products. Allegedly, each time that Kodak modifies its
products, or its chemical formulae, its competitors' products become
obsolete. Thus, the other manufacturers' research and development bud-
gets are consumed, in large part, by efforts to adapt to Kodak technol-
ogy. The complaints allege, in effect, that Kodak aggravated the "catch-
up" dilemma of smaller firms by introducing product changes and timing
the changes in a way to injure competitors. The question raised by these
allegations is whether a company with a dominant market position en-
gaged in product changes for reasons motivated by the desire to satisfy
consumer tastes or improve the product technologically, or whether the
company made the changes simply because a smaller competitor was
about to "catch-up" technologically and the change would make it more
difficult for the competitor to increase its market position.

C. Adequacy of Present Antitrust Policy

The foregoing discussion has focused on the anticompetitive poten-
tial of technological abuses rather than concentrating on how antitrust
policy should be altered to deal with those abuses. This approach was
taken because the problem is considered to be a matter primarily for
the practitioner rather than the policymaker. Present antitrust policy
seems adequate to achieve the proper progress-competition trade-off.36
The challenge lies in examining each industry to distinguish the legit-
imate rewards of true progress and innovation from the fruits of anti-
competitive conduct.

(1965); Hartford-Empire Co. v. United States, 323 U.S. 386 (1945); United States v.