A NOTE ON LONG RUN MARKET POWER
AND SUBSTITUTE COMPETITION

by

Victor P. Goldberg

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Department of Economics
University of California
Davis, California
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by Victor P. Goldberg *

The long run market power of a firm is constrained by producers and potential producers of the same product and by producers of substitutes. The rapid pace of technological change has led a number of observers to focus on this second element. Max Ways (8), for example, claims that "progress has done most of antitrust's work by sharply reducing the chance that 'market power' can arbitrarily raise prices." In this note we shall consider two aspects of this substitute competition. First, we will consider under what circumstances high profits will induce innovations from producers of substitute products. Second, we will distinguish between the effects of "progress" on the entire demand for a product and its effects on the demand within the many separate markets in which the product is sold.

I

In intra-product competition, if a firm achieves temporary monopoly profits, say by introducing a new cost-saving technology, other producers will take those profits as a signal to imitate him and bid away his monopoly profits. In inter-product competition it is less likely that profits would be taken as such a signal. The producers of substitutes (8) will make their decisions to invest in research and development primarily on the basis of their own

* Assistant Professor, University of California at Davis. He thanks Alan Olmstead and Ken Goldin for helpful comments.

1 Robertson (5) takes an equally enthusiastic view. Clark (1) and Scherer (6) also stress the importance of the substitute competition, but are much more reserved in their enthusiasm. The role of competition from new products is, of course, central to Schumpeter's (7) Creative Destruction.

2 Included in B are producers of existing substitutes and potential producers of new substitutes.
expected profits, and the magnitude of the monopolist's (A) profits will enter into the determination of B's expected profits only under certain conditions. In fact, as will be shown below, it is possible that the profit signal will have a perverse impact, i.e., high profits in A could be a signal for B not to innovate in a particular market.

Assume that A and B have completely independent costs. 3 Therefore, A's profits can only convey information on the potential demand for B. Assume further that A is sold in a number of markets and that it competes with a number of substitutes on different terms in each market. This is a most reasonable assumption which characterizes much inter-product competition. Aluminum's ranking in a number of markets--kitchen utensils, beer containers, automobile radiators, frozen food trays, and potato chip bags--relative to a number of different substitute products--steel, glass, copper, glassine, cellophane, and plastics--serves as an example. 4 Assume also that A cannot price discriminate; he will, therefore, receive the same profit in each of his markets. 5 Consider a potential innovation that will compete in only one of A's markets. A's profits will convey no information to the potential innovator in this case. Rather B would be concerned with the ratio between the switching price 6 in this market and the price of A. The lower this ratio, the greater B's incentive to innovate. If, however, a potential innovation will effect nearly all of A's markets, e.g., the development

3 The restrictiveness of this assumption will be seen below.

4 The competition between cellophane and other flexible packaging materials provides another example. For details on this competition, see Goldberg (2).

5 Profits will actually differ somewhat between markets because it is too expensive for a firm to set up a price system that will reflect precisely the difference in costs in selling to different markets.

6 The switching price in a particular market is that price at which most customers will switch to substitute products; see Goldberg (2, pp.21-23).
of synthetic rubber to compete with natural rubber, then A's high profits will serve to direct research and development expenditures towards substitute innovations.

If A can discriminate between markets, then high profits become a perverse signal. Suppose that A is sold in two markets at two different prices. Profits are higher in the high price market. Toward which market might B direct his innovative efforts? Since a more substantial improvement in the price or properties of B will be necessary to capture the high profit market, B would, cet. par., set its sights on the low profit market.

This conclusion would appear to directly contradict experience in the competition between railroads and trucks. Railroad rates were set on a value of service basis discriminating against products that have a high value per pound. Beginning in the 1920's trucks began invading rail markets; these high profit markets were the first to be attacked.\footnote{Peck (4, p. 249) says: "The truckers, naturally enough, concentrated their traffic-gathering activities on the high-profit traffic of the railroads... Here the motor carriers could successfully compete even though both their average and marginal costs were higher than the railroads."} This experience is consistent with the above argument, however, if two factors are taken into account. First, transportation prices are regulated and consequently the truckers did not have to fear retaliatory price cuts; for this reason they would be indifferent as to which markets they invaded. This only gets us halfway there, however; it tells why high profits did not have a perverse influence, but it does not tell why they had a positive influence. To show this we need to consider a second factor. Competition between these two transportation modes violated one of the assumptions made above: the costs of the two modes are not independent; both depend on distance covered, weight and volume. Therefore, goods that were highly profitable for railroads to carry were likely also to yield high profits to the truckers.
Thus, a monopolist exercising his power should be expected to call forth the appearance of substitutes only if one of two conditions hold. The producer of the prospective substitute must be able to anticipate competing for all or most of the monopolist's market, and/or the prospective substitute must have its costs dependent on some of the factors influencing the monopolist's costs.

This does not mean that A will have no influence on the direction of innovation in B; the mere fact of A's existence focuses the attention of producers of other products on its market; it assures them that a market is available; it shows them which properties are desired and which are to be avoided. In short, it serves as an economizer of information. But this has nothing to do with market power or profitability; it would be just as important if A were produced by a competitive industry.

II

In the long run, technological change will yield products that will be good substitutes for a given product in many of its markets. In this way "progress" is supposed to reduce a monopolist's long run market power. This, however, tells only half the story. For while technological change can create new substitutes for a given product, it at the same time might be creating new markets or improving the product's position in existing markets. Consider two examples: cellophane and oil.

Cellophane was first produced in the United States in 1924. Sales grew rapidly until around 1960 as new markets were continuously developed;

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8 The argument below does not depend on whether or not the technological change in substitute products was induced by the firm's exercise of market power.
in the past decade the development of new markets (or improvements of position within existing markets) has failed to offset declines in old markets and overall sales have decreased. When frozen foods were introduced commercially in the early 1930's, cellophane was used as part of the package. This market began to grow very rapidly after World War II, but cellophane producers failed to benefit from this growth as first improved waxed papers and later coated paperboard and polyethylene bags captured most of the market. Fresh meat was first packaged in the 1940's with cellophane meeting no competition from other packaging materials. By 1960 this market had grown to over ten percent of total cellophane sales (about fifty million pounds of cellophane); development of a new polyvinyl chloride film in the mid-1960's caused cellophane to lose virtually all of this market by 1970. A similar loss was felt in the bread wrapping market. About eighty million pounds of cellophane was used for this purpose in 1960. In the following decade virtually the entire market was lost to polyethylene bread bags and to a number of plastic wrappers. The most important offset to these losses came from the snack packaging market which grew from about five million pounds in 1948 to approximately 70 million pounds in 1970. The cigarette packaging market provides an example of a market that has been virtually untouched by changes in substitute products. From 1932 to 1970 virtually all cigarettes were overwrapped in cellophane—cigarette packaging accounted for about eighteen per cent of cellophane sales in 1970.9

9 For more detail on interproduct competition within these markets see Goldberg (2): frozen foods (pp. 186-194), fresh meat (pp. 167-177), bread (pp. 156-167), snack foods (pp. 194-204), and cigarettes (pp. 109-110,144-145). The packaging of luncheon meats—a much smaller market than those discussed in the text—is also illustrative of the process of competition within specific markets. The market was developed in the late 1940's and was initially shared by cellophane and saran. The inadequacy of both of these materials meant that most luncheon meats were not pre-packaged. A lamination of cellophane to polyethylene was the first film that could give acceptable performance in this market and following its introduction the market, and cellophane's sales to it, grew rapidly. By the 1960's a number of other structured films were developed, e.g., laminations of polyethylene to polyester or nylon film, and these new structured films have displaced cellophane from much of this market (pp. 148-153).
The rise and fall of markets for a product is also illustrated by the history of the demand for oil. Levitt describes the changes in oil's market this way (3, pp. 14-16):

First, crude oil was largely a patent medicine. But even before that fad ran out, demand was greatly expanded by the use of oil in kerosene lamps. . . .

In the days of the kerosene lamp, the oil companies competed with each other and against gaslight by trying to improve the illuminating characteristics of kerosene. Then suddenly the impossible happened. Edison invented a light which was totally nondependent on crude oil. Had it not been for the growing use of kerosene in space heaters, the incandescent lamp would have completely finished oil as a growth industry at that time. Oil would have been good for little else than axle grease.

Then disaster and reprieve struck again. Two great innovations occurred, neither originating in the oil industry. The successful development of coal-burning domestic central-heating systems made the space heater obsolescent. While the industry reeled, along came its most magnificent boost yet—the internal combustion engine, also invented by outsiders. Then when the prodigious expansion for gasoline finally began to level off in the 1920's, along came the miraculous escape of a central oil heater. Once again, the escape was provided by an outsider's invention and development. And when that market weakened, wartime demand for aviation fuel came to the rescue. After the war the expansion of civilian aviation, the dieselization of railroads, and the explosive demand for cars and trucks kept the industry's growth in high gear.

Meanwhile centralized oil heating—whose boom potential had only recently been proclaimed—ran into severe competition from natural gas. While the oil companies themselves owned the gas that now competed with their oil, the industry did not originate the natural gas revolution, nor has it to this day greatly profited from its gas ownership. The gas revolution was made by newly formed transmission companies that marketed the product with an aggressive ardor. They started a magnificent new industry, first against the advice and then against the resistance of the oil companies.

Oil has never been a continuously strong growth industry. It has grown by fits and starts, always miraculously saved by innovations and developments not of its own making. The reason it has not grown in a smooth progression is that each time it thought it had a superior product safe from the possibility of competitive substitutes, the product turned out to be inferior and notoriously subject to obsolescence.

For our purposes it does not matter whether the innovations were introduced
by industry members or whether they were primarily exogenous developments. The point is: the process of technological change will generally produce factors both decreasing and increasing a product's market. And in general there is little reason to expect one influence to outweigh the other. This line of reasoning suggests two propositions concerning long run market power and technological change. First, one should expect technological change to decrease long run market power within specific markets. Second, one should not expect technological change to decrease long run market power (and profits) for a product. In fact, on a priori grounds, it is just as reasonable to expect an increase.  

This distinction has an important implication for policy. If market power is opposed primarily because of its redistributive effects then concern should focus on the long run market power accruing to control of a product; the argument suggests that technical progress should not be expected to eliminate this power. If, however, policy is more oriented toward efficient resource allocation and the elimination of high price/marginal cost ratios within individual markets, then concern should focus more on competition within specific markets; in this case technical progress should be far more effective with price/cost ratios frequently falling in old markets as these markets are lost to substitutes.  

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10 In specific cases it will be possible to determine whether or not a product is likely to have its position improve or deteriorate vis a vis substitutes. For example, plastic products can be expected to improve their competitive position relative to non-plastic substitutes.

11 There is a definitional problem here. If A's price and cost remain unchanged and A loses a single market to an innovation by B (a monopolist), then it is possible that B's price/cost ratio is greater than A's was before the innovation. By defining the relevant price/cost ratios as the ratios of the market price of the good actually sold to the costs of A, the statement holds. This definition makes sense from a resource allocation point of view since after the innovation it is possible to get more output from the same amount of resources.
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