

duce new products may find its demand and profits lower than its rivals', even if it should succeed in reducing the costs of producing its older products. This will be the case especially if the price elasticities of demand for its products are relatively low.

This explanation involves the question of profit maximization under conditions of oligopoly. Where profit rates are minimal, the pressures to reduce costs are associated with staying in business. Where profit rates are higher, however, the pressures to reduce costs via the introduction of new techniques are likely to be substantially less. But the pressures associated with the introduction of new products may be similar to those existing in the competitive model. Here the introduction of competitive new products by a firm's rivals may result in a large, and in some cases fatal, decline in the demand for the firm's output. While the conventional theory of profit maximization requires that the "carrot" be as effective as the "stick" in eliciting certain kinds of behaviour, it appears likely that the prevention of declines of profit is more important than the making of gains, that the maintenance of existing market shares through the introduction of new products is more important than the reduction of cost, and that a firm will work harder for the former purpose than for the latter. This means, merely, that in an uncertain world firms operate under some kind of minimax strategy. On this basis, firms will emphasize new products rather than new processes in their research efforts.

THE ROLE OF THE PATENT SYSTEM

United States law provides that patents on pharmaceuticals may be granted for new products as well as for new processes. Process patents, however, are a considerably weaker form of protection. As in most chemical industries, it is comparatively easy to modify a process somewhat and thereby evade the patent. Product patents, on the other hand, are a relatively strong vehicle of protection from competitive suppliers. Once a product patent has been granted, a rival firm cannot supply the identical compound without fear of legal proceedings. As a result, nearly 80 per cent of medical patents are issued for new products rather than for new processes.²³ Patent protection in this industry is, moreover, especially significant since a large proportion of individual products are covered. A survey of the industry estimated that over two-thirds of all prescription sales are for patented drugs.²⁴

Although patent protection in the pharmaceutical industry takes the form primarily of product patents, it does tend to be limited to specific chemical substances. In most cases patents cover only a single compound or a small number of compounds. Especially when the advancement in knowledge is small, the scope of the patent may be rather limited. In addition, there is the question of patent specifications and the problem of anticipating all possible variants of the product.²⁵ With regard to pharmaceuticals, it is frequently possible to invent around existing patents; to find a variant which has not been specified, obtain a patent for it, and introduce it as a competing product.

Since a large proportion of pharmaceuticals have some degree of patent protection, entry into a specific therapeutic market requires, in most cases, some form of scientific or chemical product differentiation. In a world of competing monopolists, rivalry requires the ability to acquire a monopoly position. The importance of pharmaceutical patents, however, can easily be overstated. While monopoly positions are conferred, patent protection does not normally confer the power to monopolize any of the therapeutic markets. This is borne out by the high turnover among leading firms and the vigorous product competition within these markets. The impact of the patent system has not been to create monopoly positions which remain active throughout the seventeen-year life of the patent, but rather it has been to foreclose to a great extent rivalry between identical chemi-

²³ In 1957 the industry's rate of return on investment after taxes equalled 21.4 per cent, which placed it second on the F.T.C. list of thirty-nine industries. The comparable rate reported for All Manufacturing was 11.0 per cent. See Federal Trade Commission, *Report on Rates of Return for Identical Companies in Selected Manufacturing Industries, 1940, 1947-1957*, pp. 34-49, and Senate Report, *op. cit.*, pp. 53-55.

²⁴ In a sample of the twenty-two major pharmaceutical firms, for 1958 drug operations only, selling expenditures reached nearly 25 per cent of total sales. Research expenditures, on the other hand, equalled only slightly more than 6 per cent. Senate Report, *op. cit.*, p. 31.

²⁵ Arthur D. Little, Inc., *op. cit.*, pp. 11-30. While these ratios are probably over-stated, the extent of the over-statement is not likely to be by much more than one-fifth.