

ward movements of nearly vertical demand curves. The absence of price-consciousness on the part of the physician, the inability of the patient to purchase any but the specified drug, and the marked inelasticity of the individual patient's demand curve, all are conducive to the possibility of charging a price which is extremely high relative to marginal cost.

The cost structure of the industry is such that there seem to be few, if any, notable economies of scale in the production process. In this regard, a sharp distinction must be drawn between the production of "heavy" or "bulk" chemicals which are commonly produced in enormous quantities by continuous-flow processes (sulfuric acid would be a good example) and the production of "fine" chemicals, such as pharmaceuticals. Batch methods, which allow far less scope for economies of scale, are the rule, especially where fermentation is the key phase in the production process, as is the case in the production of antibiotics (except chloramphenicol) and synthetic corticosteroid hormones.⁵ These two categories of ethical drugs are the largest in terms of total sales volume. Fermentation vessels are "amazingly standard."⁶ Large antibiotics makers usually employ 10 to 15 such vessels.⁷ Changes in output levels for such products may be accomplished by the employment of a differing number of individually identical fermentation vats, a circumstance conducive to constant returns to scale. A second reason for the absence of important economies of large-scale production is the frequent absence of truly large-scale production. The physical volume of output of the active ingredients in drugs is typically very small, total national output being perhaps in the neighborhood of a ton per year.⁸ Actual cost data are kept secret by the drug firms. The inconclusiveness of some of the economic aspects of the 1959-1960 Senate hearings on the ethical drugs industry is due to the "trade secret" status afforded certain crucial cost data and the consequent failure to insist upon the publication of actual production costs for at least some of the higher-priced patented drugs. To the economist, this is a most unfortunate omission, for such data are otherwise entirely unobtainable. On the basis of the costs submitted to the Senate Subcommittee (but not published in the record), the *Report* comments upon the absence of economies of scale and the resulting "extremely small size of plant required for economical production."⁹ It is certainly true that very small firms can purchase the active ingredient for a given drug in bulk (the so-called "bulk powder") from the large firms and tablet and sell it at prices greatly below those which the large firms see fit to charge; there is also considerable evidence that very small firms can actually manufacture their own fine chemicals as bulk powder and sell them to small firms in bulk at prices equal to or lower than those charged by the major firms.¹⁰ Similarly, on the basis of antibiotics production costs revealed to the Senate Subcommittee, but not published in the record, Senator Kefauver said at one point in response to Eli Lilly & Company's request for confidentiality as to its production costs, "I will tell you frankly you all have about the same cost figures. . . . For a difference of one or two cents . . . I do not see any sense in all the secrecy. . . . Your costs, Bristol's costs, Upjohn's costs, are all within a very, very narrow range."¹¹ This tends to support the contention that there are no important economies of scale in production, inasmuch as the level of output of Bristol's product was almost twice as great as Lilly's. Granted that the ethical drug firms can purchase bulk chemicals from heavy chemicals firms which do themselves produce under conditions of economies of scale, within ethical drugs proper, there seems to be no evidence of anything but roughly constant returns to scale in the production process. The most important economies of large size seem to lie in the area of large-scale selling and advertising, to be discussed below. In the absence of important economies

⁵ Cortisone Quest; The Right Process Bug. Chem. Week, Aug. 25, 1952, as quoted in Hearings on Administered Prices, pt. 14, at 8291.

⁶ Gaden, Fermentation, Chem. Engr., April 1956, p. 159.

⁷ FTC, Economic Report on Antibiotics Manufacture 118 (1958).

⁸ Production in 1958 of the most important synthetic corticosteroid hormones (the second largest category of ethical drugs by sales volume) was, according to the U.S. Tariff Commission, as follows: cortisone, 2.15 tons; hydrocortisone, 3.21 tons; prednisone, .63 tons; prednisolone, 1.4 tons; methylprednisolone, .5 tons. Hearings on Administered Prices, pt. 14, at 8285-86.

⁹ Subcomm. Report 4.

¹⁰ According to Dr. Phillip Berke, president, Formet Laboratories, a small producer of drug bulk powder, with estimated sales of about \$500,000 for all products, could in 1959 sell bulk prednisone at prices competitive with those charged by Merck and Pfizer, firms with over \$200,000,000 in sales of all products. Hearings on Administered Prices, pt. 14, at 8056.

¹¹ *Id.*, pt. 24, at 14125-26.