

Dr. COMANOR. That is true, but high concentration and entry barriers are related to one another. The primary reason for high concentration in relevant therapeutic markets is precisely because of the entry barriers created by product differentiation. So it is difficult to distinguish the competitive effects of one from the other.

Mr. GORDON. Now, given the type of research conducted by the industry, and I want to highlight this point which you have already brought up, would it be fair to say that the industry is heavily dependent on new scientific knowledge developed outside the industry?

Dr. COMANOR. I think it is clear that much of a research effort in the industry makes use of new scientific advancements which come about in nonindustry laboratories. At the same time creating new drugs out of new scientific knowledge is precisely what might be considered the major research responsibility for the industry.

So I certainly would not be critical of this fact.

It seems to me this is precisely what society should expect and demand from the industry, that it will utilize the research efforts from outside, where the majority of medical research is in fact undertaken, and translate important discoveries into marketable products.

So while much of the industry research effort is devoted to this type of work, I feel that this is precisely what is desirable or useful from the point of view of society.

At the same time, this type of work would probably be carried on even under a regime of compulsory licensing after 3 years, and therefore, I think we have much to be gained from adopting this policy.

Senator NELSON. Thank you very much, Dr. Comanor. Your testimony was a very useful and valuable contribution to the record. We appreciate your taking the time to come here and testify today.

Dr. COMANOR. Thank you very much.

(The supplemental information submitted by Dr. Comanor follows:)

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RESEARCH AND COMPETITIVE PRODUCT DIFFERENTIATION IN THE PHARMACEUTICAL INDUSTRY IN THE UNITED STATES¹

(By William S. Comanor)

During the past two decades expenditures in the United States on research and development have expanded greatly. From outlays of the order of a half-billion dollars at the start of the Second World War, they have grown to well over \$10 billion. The rapid growth of an "industry of discovery"² has given rise to a large number of questions concerned with the rôle and function of industrial research. Why do firms spend large amounts on research and development? What is the relationship between research and market structure? What has been the impact of public policy, in the form of the patent system, on these expenditures?

In dealing with questions of this sort it is necessary to stress the pattern of relationships among firms within which research and development is undertaken. In an activity characterized by high degrees of uncertainty, we should not expect

¹ This article is based on the author's unpublished Ph.D. dissertation, *The Economics of Research and Development in the Pharmaceutical Industry*, Department of Economics, Harvard University, June 1963. I would like to acknowledge the assistance of J. W. Markham and R. B. Hefebower, who acted as supervisors of the original study, and also of E. T. Penrose for a number of helpful suggestions in the writing of this article. The study was undertaken with the aid of a research grant from the Science and Public Policy Programme at Harvard, and I am indebted to the Programme for this support.

² John T. Dunlop, "Introduction: Problems and Potentials", in John T. Dunlop, ed., *Automation and Technological Change*, p. 2.