

Dr. COMANOR. That is right. I carried out a study of a large number of pharmaceutical firms and I measured the relationship between research input and output. I measured the output of a research establishment by the number of new products introduced by the firm since research in the pharmaceutical industry is directed largely toward new products rather than new processes. The number of new products was multiplied by its sales during the first 2 years following introduction. To make these computations, I obtained access to the Gosselin data which provides sales by product for all products sold in the country. Research input was measured by the number of research personnel employed by the individual pharmaceutical firm, and the relationship between input and output was then estimated.

Senator NELSON. You did not make, I take it, any distinction between the efficiency of the research of one company in developing a new drug versus another company in producing a new drug? You did not make a distinction between that and the research which produced a product differentiation, did you?

Dr. COMANOR. No, I did not.

Senator NELSON. So whatever they produced, either as a product differentiation or a new drug, is included in the statistics?

Dr. COMANOR. I used two measures of new products, but the most important included only new single chemical entities. I was, therefore, dealing with products which were new in the sense that they were different chemical compounds which had previously been introduced in the U.S. market.

While it is true, of course, that some of these embodied a greater therapeutic advance than others, and it may be the case that some embodied no or very little therapeutic advance, I did not feel capable of deciding this question. I simply took all new single chemical entities, multiplied by their sales in the first 2 years following introduction, to measure the output of research.

When I carried out the statistical analysis between research input and research output, which is reported in one of the papers that I have published on the industry, there were a number of findings:

First, there was a fairly sustained and direct association between input and output. In other words, research is not undertaken in this industry simply in the hope of some payoff in the future, but rather there is this fairly sustained and systematic relationship between the amount of research undertaken and the number of new products introduced by the individual firm.

Senator NELSON. When you say you are comparing the relatively small firms versus their larger rivals, what standard did you use to distinguish a relatively small firm and a large firm?

Dr. COMANOR. I measured the size of firm by the level of pharmaceutical sales.

Senator NELSON. Yes; what was the cutoff point?

Dr. COMANOR. There was no cutoff. It was undertaken not on a discrete but on a continuous basis. I examined the entire relationship between small firms and large firms without any arbitrary cutoff point to distinguish large from small.

Senator NELSON. So some of of them were relatively small?

Dr. COMANOR. Yes, and I had firms of all sizes in my sample.