THE WELFARE EFFECTS OF AN ANTISUBSTITUTION LAW IN PHARMACY ON THE STATE OF OKLAHOMA

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PREFACE

This dissertation is an attempt to estimate how much, in dollar values, consumers have lost in well-being as a result of paying higher prescription drug prices for many drugs than was necessary. It further studies the impact of legislation known as an antisubstitution law on the prices of prescription drugs that consumers pay. The probable effect of the modification or removal of this law is investigated and specific policy recommendations are made.

The data for this calculation of the "welfare loss" were collected by mailed questionnaires to all the pharmacies of the State of Oklahoma. It was thus possible to undertake this study only if the cooperation of the pharmacists of Oklahoma was gained. The responses from most were good and their comments and suggestions were very helpful. My sincere appreciation is extended to those who cooperated.

I owe a substantial debt to the adviser of this thesis, Dr. Joseph Jadlow, whose patience, interest and assistance were continual. I also wish to thank the other members of my committee: Dr. Gerald Lage, who has always shown an attitude of helpfulness; Dr. Joseph Klos, whose assistance and encouragement have been ever present; Dr. Y. C. Lu for his time and effort.

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CHAPTER I

INTRODUCTION

The United States prescription drug industry has twice in the last decade been investigated in lengthy Congressional Hearings for an alleged lack of competition among drug producers.[1] It is the purpose of this study to investigate a specific piece of legislation known as an antisubstitution law and view its possible impact upon price competition in the prescription drug industry. Where less competition results in higher prices of products and smaller quantities purchased, there is a loss in economic well-being to consumers. The focus of this study is on the antisubstitution law of the State of Oklahoma. The law itself is investigated and an attempt is made to measure the possible loss in economic welfare to the consumers of Oklahoma.

Chapter II contains a discussion of the prescription or ethical drug industry. It includes an analysis of the structure of the industry and of the conduct of its constituent firms. This chapter also provides the perspective of the antisubstitution law and a discussion of the way in which the law may serve to impede competition among drug producers. Since data for the empirical portion of this study were collected at the

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[1]See U. S. Senate, Committee on the Judiciary, Subcommittee on Antitrust and Monopoly, Hearings, Administered Prices in the Drug Industry, 86th Cong., 2d sess., 1960, and U. S. Senate, Select Committee on Small Business, Subcommittee and Monopoly, Hearings, Competititve Problems in the Drug Industry, 90th Cong., 2d sess., 1967.

retail or pharmacy level, the relationship between manufacturers of the drugs and the pharmacists who dispense them is studied.

In Chapter III the technique of measuring welfare losses is developed. The theoretical foundations of the technique are established by presenting a chronological review of the literature. In addition, the chapter includes a discussion of previous studies attempting to empirically estimate welfare losses resulting from monopoly elements in the economy. The chapter lists criticisms which have been made of these studies and points out differences between the present study and earlier ones.

Chapter IV embodies the heart of the empirical portion of this study. The welfare loss estimates derived from the data gathered and the technique previously established are adapted to the specific case of the ethical drug industry and the results are presented. The data for this study were collected by mailed questionnaires to pharmacists in the State of Oklahoma. It was found that the value of the loss in well-being to the consumers of the State of Oklahoma on the small sample of non-patented drugs is considerable.

That the welfare loss discovered can be partially attributed to the presence of the antisubstitution law is established in Chapter V. Certain conditions which must be present for the antisubstitution law to stifle competition are shown to exist from representation of attitudinal information collected from pharmacists via questionnaire.

Chapter V also presents the probable impact of a professional fee system of pricing, a method currently being considered by pharmacists. This method is shown to be an impediment to price competition at the

retail level and can result in an increase in the welfare loss estimates already in existence.

The findings of this study generally indicate that elimination or modification of the existing state antisubstitution laws would likely lower prescription drug prices at the manufacturer and the retail or pharmacy level and would result in an increase in the economic well-being of the consumers of prescription drugs. It also concludes that the use of a professional fee system of retail pricing of drug products would lead to less price competition at the retail level and a concomitant increase in prescription drug prices.

CHAPTER II

MANUFACTURERS, RETAILERS, AND COMPETITION

In order to lay groundwork for analysis which is carried on later in this study, various elements of the structure and conduct of the ethical drug industry are considered in this chapter. Monopoly pressures on ethical drug prices may arise at the manufacturing and/or the retail level. Therefore, it is proper to study both levels and the relationships between them.

In addition to a review of market structure and behavior, this chapter describes the legal framework within which the drug market operates. Laws which may affect drug prices are cited and their possible effect on economic welfare in general is examined.

Structure of the Industry

The first task in viewing the structure of the ethical drug industry is to present the firms composing the industry by their number and relative size distribution. This is done on the bases of two criteria for which reliable data are available. The first division is based on sales of ethical pharmaceutical products. The second division is on the basis of the number of drugs that each firm produces which are included on the list of the largest selling 500 drugs in the United States according to an annual audit by R. A. Gosselin and Company. The purpose of this section is to see if the ethical drug industry is

dominated by large drug firms which produce and sell their products under trade names.

In 1969 there were 1,300 establishments producing and selling all types of drugs.[1] Approximately one-half of these firms were engaged in the production of proprietaries and the remaining 650 firms manufactured ethical drugs.[2] However, 136 firms and their subsidiaries accounted for ninety-five percent of the ethical drug sales.[3] These firms were the members of the Pharmaceutical Manufacturers Association, a group which includes most of the major trade-name producers. Individual sales of these 136 firms ranged from under $200,000 to over $100 million.[4] Furthermore, thirty of these firms accounted for seventy-one percent of the entire drug market.[5]

The description of the size distribution of drug firms on the basis of sales can be supplemented with data on prescriptions. According to the National Prescription Audit, twenty-four U. S. firms produced 314 of the 500 largest selling drugs in 1968.[6] Fifty of these 500 drugs were sold by generic names; although pharmacies buy some of these,

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[1]U. S. Department of Commerce, U. S. Industrial Outlook, 1970 (Washington, D. C., 1969), p. 178.

[2]Ibid.

[3]Pharmaceutical Manufacturers Association, Prescription Drug Industry Fact Book (Washington, D. C., 1968), p. 1.

[4]David Keifer, "The Drug Houses: Harried But Still Prosperous, Part II, The Challenge of Change in the Drug Industry," Chemical and Engineering News, XLII (August 17, 1964), p. 115.

[5]U. S. Department of Health, Education and Welfare, Task Force on Prescription Drugs: The Drug Makers and the Drug Distributors (Washington, D. C., 1969), p. 9.

[6]R. A. Gosselin & Company, Inc., National Prescription Audit: General Information Report (7th ed.; Dedham, Mass., 1968), pp. 43-47.

institutions (e.g.'s, hospitals, Military Medical Supply Agency, etc.) purchase the bulk of these outputs. The remaining 450 of the top 500 drugs were all trade-name products. Of these 450 trade-name drugs, 314 were sold by only twenty-four firms.

These twenty-four firms produced 129 of the largest selling 200 prescription drugs. Of these 200 drugs, sixteen were produced generically. So, 129 of the 184 trade-name drugs on the list were sold by only twenty-four firms.[7]

The twenty-four firms mentioned above are relatively large drug firms for which reliable ethical drug sales data are available for 1968. Sales data for some of the other large drug sellers are not available in usable form because they are divisions of large corporations and ethical drug sales are not separated from the other types of sales each firm has. Some of the firms also do not furnish the portion of their total drug sales which is derived from ethical drugs. An attempt has, therefore, been made to include only those firms which release their ethical drug sales data and firms which derive most of their revenues from the sales of ethical drugs.

It is clear that the majority of the largest selling drugs are trade-name drugs and that these trade-name drugs are sold by a relatively small number of firms. The twenty-four firms alluded to are listed in Table I. These twenty-four firms produce sixty-three percent of the largest selling 500 drugs and seventy percent of the trade-name drugs on the list. It should be noted that the addition of four firms

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[7]The 200 drugs on the list accounted for 67.8 percent of all new, non-compounded prescriptions in 1968. Gosselin, Explanatory Footnote, p. 43.

TABLE I

RELATIVE SIZE OF TWENTY-FOUR DRUG FIRMS

(1) Firm	(2)* Sales in 1968 (Millions of Dollars)	(3) Percent of Total Sales	(4)** Percent of Total Sales	(5) Assets (Millions of Dollars)
Chas. Pfizer	$725.816	12.8%	7%	$260.624
Warner-Lambert	717.750	12.7%		335.389
Merck, Sharpe & Dome	583.108	10.3%	7%	298.338
Eli Lilly & Company	479.618	8.5%	7%	260.624
Warren-Teed	423.361	7.5%		185.993
Am. Home Products	379.964	6.7%	7%	425.535
Sterling	366.632	6.5%		220.257
Abbot Labs.	350.955	6.2%	3%	167.879
Pittman-Moore	297.447	5.2%		775.856
Smith, Kline & French	282.986	5.0%	5%	134.007
Upjohn	249.930	4.4%		176.561
Parke-Davis	250.983	4.4%		244.608
Squibb	238.980	4.2%	4%	254.293
Schering	179.099	3.2%		106.469
Bristol-Myers	178.633	3.2%		307.143
G. D. Searle	147.724	2.6%	3%	97.479
Richardson-Merrel	123.114	2.2%		134.737
Baxter	122.153	2.2%		59.571
A. H. Robins	115.428	2.0%	3%	50.690
W. H. Rorer	114.010	2.0%		59.571
Carter-Wallace	84.944	1.5%		47.827
Syntex	73.752	1.3%		52.658
Massengill	19.870	.4%		7.574
Alcon	15.748	.3%		6.570

*Source: Moody's Industrial Manual (New York, 1960).
**Source: Personal Communication, Arthur D. Little, Inc., May 15, 1970.

for which reliable ethical drug sales is not available would boost the latter percentage to seventy-six percent.

Total sales of ethical drugs were $5.7 billion for 1968. Market shares as a percent of these total sales are listed in column three of Table I. For comparison, market shares calculated by Arthur D. Little, Inc., are placed in column four. From the table, it is clear that these twenty-four firms control a large share of the ethical drug business.

The Pharmaceutical Manufacturers Association (PMA) reports that, in 1968, the largest ethical drug firm captured seven percent of the market while the largest ten had fifty-one percent of ethical drug sales.[8] In terms of new, noncompounded prescriptions, a single firm had 8.2 percent of the market. The first five companies had 31.6 percent, the first ten had 51.9 percent.[9] These figures roughly approximate the data presented here on market shares by sales.

From the above findings it is evident that the large drug manufacturers hold a substantial share of the prescription drug market; in terms of both sales revenues and the volume of prescriptions, they dominate the prescription drug market. Moreover, it is clear that trade-name drugs mainly marketed by these large firms account for a major proportion of the prescription market.

Unfortunately, information and data on the small drug producers is scarce. Over 400 of the 650 U. S. ethical drug firms are relatively small and are often labeled as "the generic producers", although they

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[8]Pharmaceutical Manufacturers Association, Rx Pharmaceutical Industry Operations, Annual Survey Report, 1968-1969 (Washington, D. C., 1969), p. 6.

[9]Gosselin, p. 36.

do, in some cases, sell their products under trade names.[10] Few of these firms conduct research and hold patents on their products. However, they do provide an additional source of potential competition to the larger manufacturers on unpatented products. The companies' sales in this group ordinarily range from one to ten million dollars.[11]

The Relevant Market

The picture drawn above of concentration and the composition of the drug industry is inadequate to determine the degree of competition in the industry. The above evidence gives a picture of overall concentration whereas the more relevant concept for economic analysis is that of industry concentration -- with the "industry" defined on the basis of cross elasticity of demand. A particular drug is obviously not a good substitute on the demand side for any other drug.

Ethical drugs may be classified in a number of ways. The major breakdown of drugs is by therapeutic category. However, certain contradictions may prohibit the use of some drugs if others are already being taken. Among drugs in a certain therapeutic category there still exists a degree of substitutability. Even though this is true, drugs in a single therapeutic category may differ by potency, toxicity and number and nature of adverse reactions. The point to be made here is that for any particular drug there is a substitute, although it may be a relatively poor one. Certainly, between therapeutic classes the degree of substitutability is negligible.

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[10] U. S. Department of Health, Education and Welfare, p. 9.

[11] Ibid.

A relevant drug market then, from an economist's standpoint, is a therapeutic category which includes drugs with varying degrees of substitutability. The demand curve for a particular drug would not be perfectly inelastic, although the demand curve for an entire therapeutic class might be. Thus, the price elasticity of the demand curve for a particular drug would depend upon the willingness of doctors to prescribe it, and upon their knowledge of other drugs in the class. The degree of elasticity would also depend on the various other factors (adverse reactions, etc.) mentioned above and the consumer's willingness and ability to have a prescription filled.

Cost Conditions

The actual costs of producing ethical drugs is a closely-guarded trade secret. However, the nature of the production process and the limited volumes in which individual drugs are produced give definite indications that constant returns to scale, accompanied by constant costs, are present in a large part of the industry's production.

The two leading therapeutic classes by new and refill prescription sales in 1968 were antibiotics and hormones, in that order.[12] Batch methods predominate in their manufacture. In order to increase output, the firm must add one or more fermentation vats and these will be identical to those already in use. This implies constant returns to scale.[13]

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[12]Gosselin, p. 10.

[13]Henry Steele, "Monopoly & Competition in the Ethical Drugs Industry," Journal of Law and Economics, V (1962), p. 134.

On the basis of this sort of information, it appears that constant costs are present to a large extent in the drug industry. This apparent lack of economies of scales leads one to the conclusion that smaller drug firms face approximately the same cost conditions that the larger firms do. As is pointed out later, the possibility that large manufacturers face higher cost conditions than small producers would serve to reinforce the findings of this study.

Conduct of the Firms

The conduct of firms in the ethical drug industry has been directed mainly at product differentiation among drugs. The pricing policies of the larger firms have been ones of maintaining excess profits, part of which are used to further enhance their market positions. The product differentiation policies of the large firms are well documented and may be summarily separated, although the two practices are closely coordinated, as (1) research and development practices and (2) promotional practices.

R and D Practices[14]

Ethical drugs are "sold" to an intermediate consumer in the person of a medical doctor. Thus, to differentiate drugs, they must appear

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[14]See William S. Comanor, "Research & Competitive Product Differentiation in the Pharmaceutical Industry in the U. S.," Economica, XXXI (1964), pp. 372-384; "The Drug Industry & Medical Research: The Economics of the Kefauver Committee Investigations," Journal of Business of University of Chicago, XXXIX (January, 1966), pp. 12-18; "Research & Technical Change in the Pharmaceutical Industry," Review of Economics and Statistics, XLVII (May, 1965), pp. 182-190; and "The Economics of Research and Development in the Pharmaceutical Industry" (unpub. Ph.D. dissertation, Harvard University, 1963).

physically different. Research laboratories offer an excellent device to accomplish this end. If, through research, a new product can be developed, a patent can be obtained on this product, thus conferring a monopoly position to the firm holding the drug patent. In 1961, it was estimated that two-thirds of all prescription sales were for patented drugs.[15]

Amount. To engage in this type of research for the purpose of improving a firm's market position, the firm must be able to invest a considerable sum in the form of a research staff and facilities. Funds for research in the drug industry come almost wholly from industry sources, only four percent coming from Federal contracts in 1966.[16] Thus, an important source of these funds is a firm's profits.

Profits are not scarce in the pharmaceutical industry. According to the Fortune 500 Survey, pharmaceuticals ranked first in return on invested capital with a 17.9 percent return in 1968 and second in return on sales with a 9.0 percent return.[17] Three drug manufacturers ranked in the top ten firms in the U. S. for return on sales; Searle with an 18.5 percent return on sales, Merck with 15.9 percent and Smith, Kline and French with 15.0 percent.[18]

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[15] Comanor, "Research & Competitive Product Differentiation...," p. 379.

[16] Pharmaceutical Manufacturers Association, Prescription Drug Industry Fact Book (Washington, D. C., 1968), p. 38.

[17] Fortune (July, 1969), pp. 185-186.

[18] Ibid.

In 1968, all firms in the industry spent $521 million for research and development.[19] In 1967, the firms spent $476 million which was 10.95 percent of sales.[20]

Nature. The nature of research conducted in the U. S. drug firms' research facilities has been primarily directed toward the development of new products rather than developing new and more efficient methods of producing established products.[21] As a result, the efforts made toward reducing costs of production have been relatively small.

Instead, then, of reducing costs in order to increase the level of profits, new products have been developed. These new products may be patented for seventeen years and monopoly profits can be reaped for this period if not, as will be seen, longer.

Monopoly positions are enviable, especially by those who are unable to achieve them. In the ethical drug industry there have been many firms who have not been able to use the patent system to attain monopoly power since they do not have the initial funds to begin the research and development establishment necessary for such ventures. These smaller, less-profitable firms must rely on the production and sale of unpatentable drugs or drugs whose patents have expired.

Promotional Practices

When the R & D establishments of large drug concerns discover or

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[19] U. S. Department of Commerce, p. 178.

[20] Pharmaceutical Manufacturers Association, Prescription Drug Industry Fact Book, p. 2.

[21] Comanor, "Research & Competitive Product Differentiation...," p. 377.

invent a new drug, the task remains of promoting it to doctors who decide which drugs patients should have. Here, as in research and development, the large drug producers have undertaken massive efforts.

Amount. There are today approximately 200,000 physicians in the United States. Since ethical drugs are not promoted to the public at large, an intensive promotional campaign is directed at this much smaller number of prescribers.

Ethical drugs are promoted to physicians by advertisements in periodicals, professional journals, postal flyers and by personal visits of detail men (i.e., drug salesmen). In 1966, it was estimated that drug producers spent about $600 million per year on promotion of their products.[22] This means approximately $3,000 per year per physician was spent on promotional efforts. One estimate for 1968 was put at $4,500 per year per physician.[23] As a percent of sales, marketing expenditure estimates run from fourteen percent to nearly thirty-three percent.[24] There are approximately 15,000 detail men employed by drug firms.[25]

Nature. When a new drug is developed by a large drug manufacturer, it is assigned three names: (1) the chemical name which is often long, (2) the generic name which is the common name for the drug and is often long and difficult to pronounce and (3) the trade name which is usually short, catchy and is unique to a particular manufacturer even though another firm may be licensed to produce and sell the identical drug.

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[22] U. S. Department of Health, Education and Welfare, p. 28.

[23] Ibid.

[24] Ibid, p. 27.

[25] Bernard Barber, Drugs and Society (New York, 1967), p. 60.

When the drug has been assigned these names and after it has been approved by the Food and Drug Administration, the drug is promoted to physicians by its trade name only. Even after the patent has expired on a drug, physicians may continue to prescribe by the trade name. This fact can have important economic consequences. These consequences will come under scrutiny later.

Relationship Between Manufacturers and Pharmacies

Since the data for this study is gathered from retail sources rather than directly from manufacturers, the relationship existing between the manufacturers and the retailers must be studied. Price differentials between two brands of the same drug may differ depending upon whether producers' prices or retailers' prices are compared. The retailing units for ethical drugs are, of course, the local pharmacies. Drug manufacturers exert an influence on drug prices from both the supply and the demand side of the picture.

The Direct Route

Pharmacies may purchase the drugs they sell directly from the manufacturer or they may follow the less direct route of purchasing the drugs through a wholesaler. Both methods are used to some extent.

The distribution of drugs from manufacturers to wholesalers has been declining. In 1954, 58.6 percent of manufacturers' drug sales were made to wholesalers. By 1965 that percentage had fallen to 48.4.[26] In

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[26]Pharmaceutical Manufacturers Association, p. 12.

1968, 47.5 percent were sales to wholesalers.[27]

On the other hand, manufacturers' sales directly to pharmacies have been relatively stable. Between 1954 and 1965 the percent of manufacturers' drug sales to retailers rose from 29.4 percent to 30.25 percent.[28] In 1968, because of an increasing percentage of sales to institutions, this percentage dropped slightly to 29.2.[29] Thus, the relative decline in importance of wholesalers appears to have resulted from increased institutional purchasing of drugs directly from manufacturers rather than from increased buying by pharmacies directly from manufacturers.

The Indirect Route

The drugs that pharmacists must stock in their inventories is directly dependent on the drugs which physicians are currently prescribing. Pharmacists must dispense the particular drug, even by a specific manufacturer, that a physician prescribes by brand name. In most instances, it is illegal for a pharmacist to exercise discretion among drugs or manufacturers.

The role of manufacturers in affecting the demand side of the picture is through their promotional efforts. Since physicians are an important element in determining the composition of demand for prescription drugs, their thoughts and emotions are the primary target of

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[27]Pharmaceutical Manufacturers Association, Rx Pharmaceutical Industry Operations..., p. 10.

[28]Pharmaceutical Manufacturers Association, Prescription Drug..., p. 12.

[29]Pharmaceutical Manufacturers Association, Rx Pharmaceutical Industry Operations..., p. 10.

ethical drug promotion. If a manufacturer is able to persuade physicians of a drug's therapeutic efficacy and the danger or dubious nature of non brand-name drugs, it is likely that the brand name manufacturer's drug will be the one prescribed most often.

When a drug is prescribed, pharmacists must dispense that particular drug and, if a trade-name is used in the prescription, the drug dispensed must be by that particular manufacturer or, in the event the pharmacy does not stock that brand, the patient must be referred to another pharmacy. Many of the drugs produced by large manufacturers are combination products of patented and unpatented drugs and, in some cases, the patented trade-name drug may have a generic counterpart or it may be available from a low-cost, brand-name producer.

Noticeably, the consideration of price is absent in this entire sequence. Physicians are, in many cases, unaware of the prices of drugs or of the availability of lower-cost, equivalent (identical) drugs.[30] The pharmacist, on the other hand, who is aware of prices and the availability of generic equivalents is unable to make practical use of such knowledge.

There may also be an element of inefficiency involved in the nature of pharmacists' inventories. Since quantity and volume discounts are often available on larger purchases of drug shipments, a cost savings could be achieved by allowing pharmacists to stock larger quantities of certain manufacturers' drugs instead of forcing them to have on hand a smaller stock of each manufacturer's brand of a particular drug. To the

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[30]Steele, p. 133.

extent these cost savings are passed on to the consumer in the form of lower prices a gain in consumer welfare may be the result.

Role of the State Board of Pharmacy

Pharmacies and pharmacists are, for reasons of public health, supervised by state and federal regulations. Federal laws regarding the practices of pharmacists are directed mainly at drug abuse. The laws which most directly interfere with the operation of the market mechanism arise at the state level. The state agency appointed to regulate the practice of pharmacy is the state board of pharmacy. Therefore, it would seem germane to make a cursory examination of the structure and activities of this body. Since this study is particularly concerned with the State of Oklahoma, the Oklahoma State Board of Pharmacy will primarily be considered. Although this will be the case, the activities of state boards of pharmacy do not substantially differ and the Oklahoma State Board of Pharmacy can be viewed as a representative board.[31]

The Oklahoma State Board of Pharmacy consists of five persons who are members of the Oklahoma Pharmaceutical Association and have practiced pharmacy for at least five years. The members are appointed by the Governor from a list of names elected by members of the Oklahoma Pharmaceutical Association.

The Board, in regulating the practice of Pharmacy and the sale of drugs, accepts or rejects all applications for the licensing of pharmacists and/or pharmacies. Therefore, it establishes the standards and

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[31]For a detailed examination of differences among state boards of pharmacy see F. Marion Fletcher, Market Restraints in the Retail Drug Industry (Philadelphia, 1967).

qualifications, including education, training, and moral character of all would-be pharmacists and establishes the physical requirements for pharmacies. All necessary inspections, hearings, etc., pursuant to the enforcement of these regulations are conducted by the Board. Specific requirements which affect the level of drug prices will be viewed with regard to their economic impact later.

The Antisubstitution Law

The nature and economic implications of the antisubstitution law are presented in this section. The manner in which the law came into existence, the possible economic effect of the law, and other laws and regulations which have economic significance are discussed here.

History

The Oklahoma antisubstitution law was enacted in 1961. The law itself states:

> It shall be unlawful for any pharmacist being requested to sell, furnish, or compound any drug, medicine, chemical or other pharmaceutical preparation, by prescription or otherwise, to substitute or cause to be substituted therefore, without authority of the prescriber or purchaser, any other drug, medicine, chemical, or pharmaceutical preparation.[32]

Substitution, as the physical act was originally conceived, meant to substitute literally one generic drug for another. For example, if a pharmacist received a prescription for penicillin, it would be illegal substitution if he dispensed another antibiotic such as tetracycline. The practice of this type of substitution obviously could have adverse repercussions. With substitution defined in this way, the pharmacist

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[32]Oklahoma Session Laws, 1961, Title 58, Chap. 8, Section 21.

is obliged under an antisubstitution law to dispense the drug which the physician has prescribed. Substitution, under this definition, has been occurring for hundreds of years, the first historical reference being made to it in 880 B. C.[33]

The above definition of substitution was used for many years until, in the early 1950's, some firms of the ethical drug industry sought to have the definition enlarged. In the words of a prominent physician:

> In 1955 the National Pharmaceutical Council was kind enough to give to all the world a new definition of substitution. Substitution previously was understood to be to substitute one drug for another. But in 1955 the National Pharmaceutical Council, as part of its program, enlarged this definition and has been pushing it ever since.[34]

The "new" definition, as it was espoused by the National Pharmaceutical Council (a group of twenty-two trade-name firms), was that substitution meant the substituting of one brand of a drug for another brand, even though the drug involved was physically identical in each case. In other words, one manufacturer's brand of, say, meprobamate could not be substituted for another manufacturer's brand even though in each instance the drug is still meprobamate.

The National Pharmaceutical Council's campaign to get this definition of substitution accepted by state boards of pharmacy is described in detail in the hearings on the drug industry conducted by

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[33]Statement of Newell Stewart, Executive Vice-President, National Pharmaceutical Council, Inc., in U. S. Senate, Committee on the Judiciary, Subcommittee on Antitrust and Monopoly, Hearings, Administered Prices in the Drug Industry, 86th Cong., 2d sess., 1960, pp. 8285-8288.

[34]Statement of Dr. August H. Groeschel, Associate Director, The New York Hospital, New York in U. S. Senate, Administered Prices..., p. 11576.

Senator Estes Kefauver in the late 1950's.[35] The success of its campaign is evidenced by the fact that in 1954 only about eight states had antisubstitution laws and these were written under the "old" definition of substitution.[36] At present, forty-seven states have anti-substitution laws and the practice of substituting is prohibited by professional ethics in two others.[37] In addition to this fact, the American Druggist placed the rate of substitution in 1957 at 4.3 percent compared with 14.7 percent in 1953, a substantial decline.[38] Apparently, substitution, as defined for determination of this percentage, includes both types of substitution.

The rigorous efforts of the National Pharmaceutical Council included the compilation of a state-by-state list of the situation regarding the legality of substitution in each state.[39] The list was dated January, 1958. Regarding Oklahoma, it was stated in the list that:

> There is no particular authority in the law but the Board will cooperate to the best of its ability. The Board will cite a pharmacist to appear who is guilty of substituting. The Board would like to have some shopping done in one state to determine the extent of the problem.[40]

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[35] Ibid., p. 1ff.

[36] Ibid., p. 11714.

[37] U. S. Department of Health, Education and Welfare, p. 80.

[38] Robert A. Hardt, Journal of the American Pharmaceutical Association, Practical Pharmacy Edition, XVIII, February, 1957, reproduced in U. S. Senate, Administered Prices..., pp. 11756-11760.

[39] Exhibit 405 of Statement of Newell Stewart in U. S. Senate, Administered Prices..., p. 11802.

[40] Ibid., p. 11807.

It was assumed in a National Pharmaceutical Council memorandum dated December 19, 1955 that the incidence of substitution in Oklahoma was not significant.[41] This suggests that there would have been little substitution without the law since the practice of substitution was not prevalent even before its enactment. However, since 1955, much information concerning generic equivalency has come to light and pharmacists' attitudes regarding substitution may have changed or the threat of legal consequences may have always been present.

The legality of antisubstitution laws of various states has been upheld many times. There has been one notable exception. In the State of Michigan, Wayne County Circuit Court Judge Carl M. Weideman held that substituting the generic drug prednisone for the trade-name version Meticorten was not substitution as defined in the law since chemically and by assay the drugs were identical.[42] However, the meaning of this decision was not clear because, in this instance, the prescribing physician had given prior approval to the substitution.

In addition to rulings under antisubstitution laws, it has been held in at least two cases that substitution of a generic drug for a trade-name drug is a violation of the manufacturer's trademark under the Lanham Act of 1946 and, therefore, constitutes unfair competition on the part of the pharmacist who substitutes.[43]

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[41] Ibid., p. 11818.

[42] Ibid., p. 11761.

[43] R. G. Kedersha, "The Impact of Brand Name Prescription Products on the Traditional Practices of High Prescription Volume Pharmacies in Northern New Jersey: A Study of the Brand Name vs. Generic Name Prescription Product Problem" (unpub. Ph.D. dissertation, New York University, 1964), p. 38.

Effect on Competition

If the type of market conduct described above involving large-scale promotional and R & D practices of the dominant drug manufacturers is continued, the antisubstitution law can help these firms maintain monopoly positions for certain drugs. In order for the antisubstitution law to be responsible for any welfare loss resulting from monopoly the following conditions must be present:

(1) Some drug firms must be marketing the drug under trade names. If all drugs were marketed under generic names alone, the antisubstitution law would be inconsequential in stifling competition.

(2) There must be no patent currently in effect for the drug. A patent conveys a monopoly position to the firm holding the patent on a particular drug. Substitution would be impossible since there would be no available substitutes. An exception to this condition exists when the patent is licensed to other manufacturers or if the drug is sold in bulk to other manufacturers to be repackaged and sold under their own trade names or by generic name.

(3) Some physicians must be prescribing drugs, which have generic equivalents, by trade name. If all drugs were prescribed by generic name then the choice of the manufacturers would be left to the pharmacist although it is possible for the consumers to exert some influence in the decision by "shopping around." This discretionary power would also exist in the absence of an antisubstitution law.

(4) Pharmacists must be willing and able to substitute generic drugs or less expensive trade-name drugs for higher-priced trade-name drugs. Pharmacists, upon receiving a prescription for a trade-name drug must be willing to substitute a lower-priced generic equivalent

otherwise the absence of an antisubstitution law alone would not engender price competition among brands of a drug. Some people, such as Newell Stewart of the National Pharmaceutical Council, have argued that, "For a pharmacist to impose his judgment upon that of the physician is assuming a responsibility he is not qualified to assume."[44] Others think differently. This question is examined more fully in Chapter V.

In addition to the pharmacist's willingness to substitute lower-priced generic equivalents, he must have the ability to do so. The ability of a pharmacist to substitute a lower-priced generic equivalent upon receipt of a trade-name prescription is directly dependent upon the pharmacist's inventory. Since many physicians today do prescribe by trade name, it may be that pharmacists do not stock generic-name drugs. In this event, substitution could not occur. The nature of pharmacists' inventories is explored in Chapter V.

The above conditions must be present for a firm to maintain a monopoly position for a drug as a result of the antisubstitution law and product differentiation. The first condition, from evidence already presented, is present to a considerable extent in the ethical drug industry.

The second condition certainly is present in a number of cases. In a recent Task Force study, a list was compiled of the 409 most frequently prescribed drugs for individuals sixty-five years of age and older.[45] Of these 409 drugs, 293 were still under patent and thirty products were available and actually dispensed under generic name. This

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[44]U. S. Senate, Administered Prices..., p. 11699.

[45]U. S. Department of Health, Education and Welfare, Task Force on Prescription Drugs: The Drug Users, pp. 38-57.

left eighty-six drugs which were ordinarily sold under trade names but which were also available under their generic names. Therefore, there are several high-selling drugs which satisfy the second condition.

The third condition is one of the topics which is discussed in Chapter V. Evidence is presented in that chapter on this subject.

Therefore, the effectiveness of an antisubstitution law in reducing competition or the possibility of its elimination increasing competition turns on several empirical questions. It is the purpose of Chapter V to investigate the effectiveness of the antisubstitution law.

Other Considerations

Besides the antisubstitution law, there exist other factors which may affect competition and the level of retail drug price differentials, especially between trade-name and generic-name drugs. The central elements are those of a legal nature and those which arise from the professional orientation of pharmacists.

The legal constraints in all the states on competition have been exhaustively studied elsewhere.[46] It should be noted here, however, that a particular impairment to competition via price is the prohibition in Oklahoma of any advertising of prescription drug prices by pharmacists.[47] This constraint could be especially damaging if, in the absence of an antisubstitution law, some pharmacists were willing to substitute while others were not. Then, only those individuals who are on maintenance drugs (i.e., those who repeatedly have their prescription

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[46] See F. Marion Fletcher, Market Restraints.

[47] Oklahoma State Board of Pharmacy, Oklahoma State Laws Pertaining to the Practice of Pharmacy (Oklahoma City: 1969), p. 26.

refilled) could gain the full benefit of substitution since they would have the opportunity to "shop around."

There has been a lasting concern for several years among pharmacists that pharmacy should be upgraded from the level of merchants to the status of a profession. In the 1961 Oklahoma legislation, pharmacy is declared to be a profession.[48] This professional orientation has resulted in pharmacists frowning on almost any kind of competition, especially on the basis of price. This seems to be a general feeling among pharmacists and, to some extent, indicates why pharmacists oppose a reduction in drug prices if there is to be a concomitant loss in drug quality. However, the professional fee system, which is consistent with the movement of pharmacy toward a true profession, offers hope for a smaller vested interest in dispensing the most expensive drugs. Under the professional fee system, a constant amount would be charged for the filling of a prescription regardless of the cost of the drugs sold. The system currently in use is the standard percentage markup on cost. The professional fee system, the extent of its current use and the economic implications of its use are explained in Chapter V.

This chapter has attempted to place in perspective the antisubstitution law in the overall fabric of the ethical drug industry and its system of distribution. This chapter, then, has described the source of the welfare loss which is computed in Chapter IV.

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[48] Ibid., p. 6.

CHAPTER III

THE TOOLS OF ANALYSIS

The estimation of welfare loss which is made in Chapter IV is based on the concept of consumer's surplus. For this reason, the literature concerning the development of this concept is reviewed in this chapter. In addition, the mechanics involved in the estimation of a welfare loss are discussed. This discussion includes derivations of the formulae which are used to make such an estimate.

The Concept of a Welfare Loss

The first description of the concept of consumer's surplus is credited to a French engineer named Jules Dupuit.[1] Dupuit made a distinction between value in use and value in exchange as had Adam Smith and David Ricardo. Dupuit thus offered as a measurement of utility the maximum sacrifice a consumer would be willing to make to obtain a good.[2]

Of course, the economist who popularized the concept of consumer's surplus was Alfred Marshall in his Principles of Economics. Marshall sought to examine the question of how the price of a good was related to

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[1] R. W. Pfouts, "A Critique of Some Recent Contributions to the Theory of Consumers' Surplus," Southern Economic Journal, XIX (1953), p. 315.

[2] Ibid.

the utility derived from that good.[3] He describes consumer's surplus as "The excess of the price which he (the consumer) would be willing to pay rather than go without it (the good), over that which he actually does pay . . . ."[4] He states that this surplus can be measured by the area under the demand curve of a consumer and above the price the consumer actually pays. Marshall had, unfortunately, assumed cardinal utility, a constant marginal utility of money, and ignored the effect of related goods in deriving this measure. As is indicated below, all of these assumptions are unnecessary.

The spate of literature which later arose in regard to the concept of consumer's surplus was not, however, mainly concerned with the assumptions which Marshall had made, but with Marshall's inconsistency between his definition of consumer's surplus and the measurement technique he had described. They obviously relate to different concepts since the definition refers to an all-or-none situation, whereas the measurement technique involves the area under a Marshallian demand curve.

Hick's Contributions

J. R. Hicks saw important properties of consumer's surplus which fit neatly into the Kaldor-Hicks criterion of welfare economics.[5] According to the Kaldor-Hicks criterion, a movement from one state to

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[3] Alfred Marshall, Principles of Economics, 8th edition, (New York, 1950), p. 124.

[4] Ibid.

[5] J. R. Hicks, "The Rehabilitation of Consumer's Surplus," Review of Economic Studies, VIII (1940-41), pp. 108-116.

another is an improvement if those who gain from the move are able to compensate those who lose so that they are no worse off than before. Hicks used what he termed the compensating variation to determine the extent of gains and losses of a consumer resulting from a price change. The compensating variation is the amount of income which must be taken away from an individual after a fall in the price of a good to make the individual no better off than he was before the price fall. Hicks noted that the measurement of consumer's surplus under a market demand curve tells nothing about the distribution of the gains from which gainers could compensate the losers.[6] Hicks saw special importance in the concept for partial welfare analysis.[7]

Even with Hicks' rehabilitation of consumer's surplus and the abandonment of the assumption of the constancy of the marginal utility of money, it remained for A. Henderson to point out the inconsistency of definitions used by Marshall and Hicks, respectively. As Henderson states:

> Marshall's definition corresponds to the amount the consumer would be willing to pay, if he could not get any of the commodity otherwise, for the opportunity to buy, at the existing price, the amount which he is in fact buying, whereas Hicks' definition refers to the amount which the individual would be willing to pay, if he had to, for the opportunity to buy the commodity in whatever quantities he wishes.[8]

The total dollar amount resulting from the use of each of these definitions to measure consumer's surplus is different since as R. W. Pfouts states:

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[6] Ibid.

[7] Ibid.

[8] A. Henderson, "Consumer's Surplus and the Compensating Variation," Review of Economic Studies, VIII (1940-41), pp. 117-121.

> The compensating variation (Hicks) is larger than (Marshall's) consumer's surplus, except in the case of inferior goods, because a license to buy any desired amount is more valuable than a license to buy only a specified amount.[9]

Henderson goes on to say, however, that, in practice, these differences are only a fine point and, given difficulties of measurement, there will be little actual difference between them.

Hicks soon realized the relevance of Henderson's statements and later generalized on Henderson's arguments. It was noted that a different measure was obtained depending upon whether a price rise or a price fall was considered and from where on the indifference map an individual began. As a result, four separate measures of consumer's surplus were found.[10]

David Winch has neatly summarized Hick's measures verbally as:

> (1) the compensating surplus, or the amount of money which the consumer would have to lose, after committing himself to the purchase of that amount which he would choose to purchase after the price fall if no adjustment to his income were made, in order to have him just as well off as he was before the price fall,
> (2) the compensating variation, or the amount of money the consumer would have to lose, before committing himself to the amount of his purchase after the price fall, in order to have him just as well off as before the price fall,
> (3) the equivalent variation, or the amount of money the consumer would have to gain in the absence of the price fall, before committing himself to the amount of his purchases, in order to make him as well off as he would be with the price fall and no adjustment in income, and
> (4) the equivalent surplus, or the amount of money which the consumer would have to gain in the absence of either price

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[9] Pfouts, p. 320.

[10] See J. R. Hicks, "The Four Consumer's Surpluses," Review of Economic Studies, XI (1943-44), pp. 31-41, and "The Generalized Theory of Consumer's Surplus," Review of Economic Studies, XIII (1945-46), pp. 68-74.

> fall or money adjustment, in order to have him just as well off as he would be with no money adjustment after the price fall.[11]

Hicks' defice to illustrate the differences among these measures is that shown in Figure 1.[12] Quantitites of a single good X are measured by the abscissa while the price of X is measured by the ordinate. The curve AB is the uncompensated demand curve or the demand curve of an individual as it is ordinarily thought of. Thus at a price of OH, OF units of good X will be taken. If, then, the price of X falls to OK, KB units will be taken. If, however, when the price of good X falls to OK an amount of income is taken from the consumer so that he is no better off than before the price fall, he will not take KB units of X at price OK, but he will take some smaller amount, say Kb. The amount of income which must be removed to place the consumer at his initial level of satisfaction is called the compensating variation. It is measured by the area HAbK under the compensated demand curve AC. Therefore, the consumer's level of satisfaction is the same at point A as it is at b.

In order to find the compensating surplus, the consumer must already have selected his level of purchases after the price fall which in the illustration given is amount OG. Hicks divides the increment in surplus resulting from the price fall into two parts. The increment in surplus on the units being purchased before the price fall and the increment in surplus from the purchase of the additional units after the good's price has fallen. On the OF units purchased before the price

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[11] David M. Winch, "Consumer's Surplus and Compensation Principles," American Economic Review, LV (1965), p. 396.

[12] J. R. Hicks, A Revision of Demand Theory (London, 1956), p. 100.

fall there is a gain in surplus equal to the cost difference the consumer pays and is measured by the area of the rectangle HANK. The increment in surplus arising from the additional FG units purchased is measured by the marginal valuation of each unit under the compensated marginal valuation curve AbC minus the cost of those additional units. It is thus the difference between the areas AFGC and NFGB, which is also the difference between triangles ANb and CBb. The total increment then is the difference between the areas HAbK and the triangle CBb. Thus, the compensating surplus is smaller than the compensating variation in income by the area of the triangle CBb.

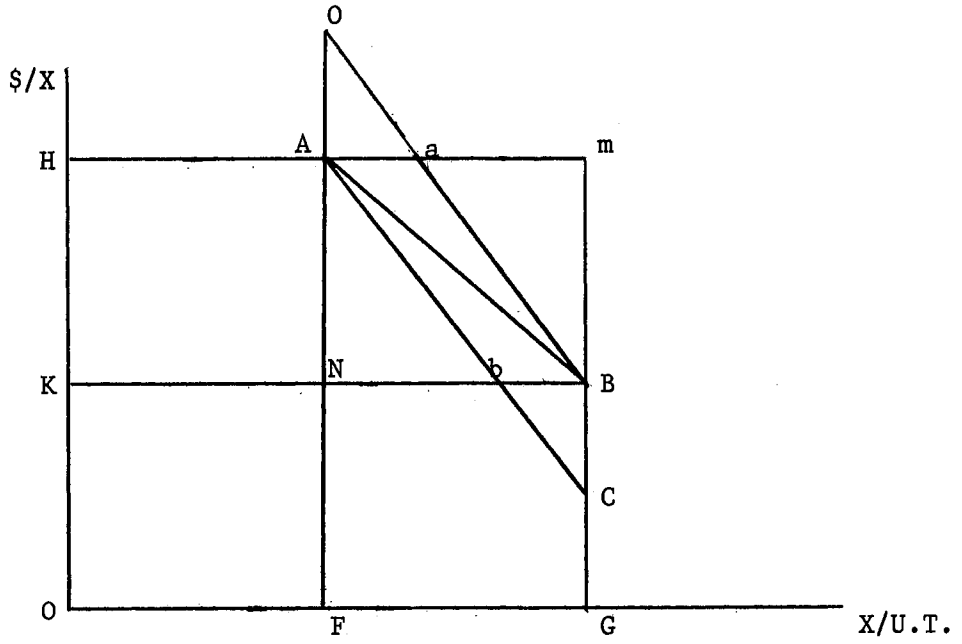

Figure 1. Compensated and Uncompensated Demand Curves

The equivalent variation is measured in a similar manner except the question involved is what amount of income would be necessary in the absence of a price fall to move the consumer to a level of satisfaction which he could have attained if the price fall had actually occurred. The compensated demand curve through B now becomes the relevant one since any point on this curve is at the same level of satisfaction as at point B. This curve is labeled DaB. The equivalent variation in income then becomes HaBK, since if this amount of income were given to the consumer in the absence of a price fall he could attain the same level of satisfaction as when the price fall actually occurred. Using the same line of reasoning as above, the equivalent surplus thus becomes the area of the rectangle HANK plus the area of the triangle DNB.

It is readily apparent from the diagram that the order of magnitudes of the various measures is that given originally in the order of definitions, i.e., in descending order these are the equivalent surplus, the equivalent variation, the compensating variation and the compensating surplus. The Marshallian measure is the area under the uncompensated demand curve and is smaller than the equivalent variation and surplus and larger than the compensating variation and surplus.

The above exposition is a cursory one since Hicks has already described his concept in detail elsewhere.[13] However, it was necessary to set out Hicks' measures in order to prepare for the discussion below of other contributions in the literature.

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[13] Ibid., chapters 7, 8, 9, 10.

Winch's Contributions

A real contribution and the foundation on which this study is based was made by D. M. Winch.[14] Hicks used his measure to determine the addition to a consumer's satisfaction under the Kaldor-Hicks welfare criterion. This criterion has received much criticism since it does not require that compensation actually be paid. If compensation were made, the move would be an improvement even under the Pareto criterion because everyone would be better off than before. Winch's paper examines the measurement of consumer's surplus in situations where compensation is not actually made. He agrees that Hicks changed the triangular measure given by Marshall to fit his definition.[15] Winch, however, sought to change the definition given by Marshall to fit the triangle.

By using the same diagram as Hicks, which is reproduced in Figure 2, it can be shown that the Marshallian measure of the area of the triangle under the uncompensated demand curve is the relevant one for welfare decisions where compensation will not actually be paid. In Figure 2, DD represents the uncompensated demand curve, AA_2 the compensated demand curve through A, B_2B_1 the compensated demand curve through B and C_2C the compensated demand curve through C. Consider an initial price of OH, where the consumer is purchasing HA units of X. If the price falls to OH_1, the compensating variation is measured by the area HAA_1H_1 as Hicks has shown.

Assume now that the price falls to OH_2. The amount of the compensating variation in income depends upon whether the compensating

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[14] Winch, pp. 395-423.

[15] Ibid.

variation in income for the first fall in price was or was not removed. If the compensating variation was removed, the variation for the price fall from OH_1 to OH_2 is measured by $H_1A_1A_2H_2$ since the consumer would have been at A_1. However, if the compensating variation for the first price fall was not removed, the consumer would have been at B on the uncompensated demand curve and the compensating variation for the second price fall is $H_1BB_1H_2$ as measured by the compensated demand curve through B.

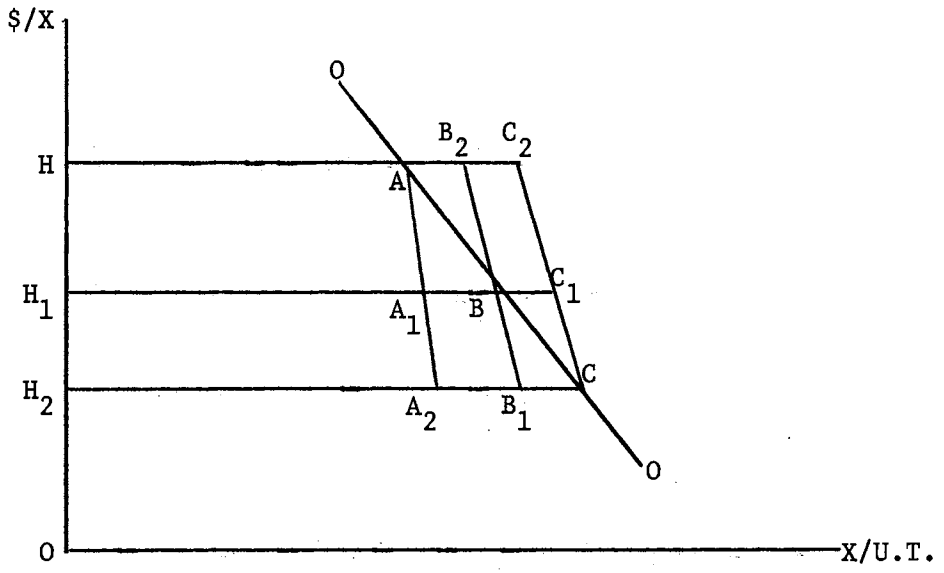

Figure 2. The Compensated Demand Curves and the Normal Demand Curve

For the entire price fall from OH to OH_2, the extent of the consumer's "gain", as Winch prefers to call it, is accurately estimated by Hicks if the compensation is actually deducted but if it is not

deducted, the gain is underestimated by Hicks' measures. If the entire price fall is visualized as a series of small price falls, the consumer's gain is accurately measured by the area under the uncompensated demand curve, the original Marshallian measure.[16]

The Winch argument given above illustrates that the most accurate measure of a consumer's gain from a price fall is given by the Marshallian measure of the triangular area under the demand curve. The assumption of a linear demand curve is made for expositional convenience. Hicks also shows that the Hicksian and Marshallian measures allow for a changing marginal utility of money.[17] In addition, he shows that the Hicksian measures assume an ordered sequence of the income and substitution effects whereas the consumer's gain measure assumes they occur simultaneously.[18]

When gains and losses for individuals are aggregated, there may be either a net gain or a net loss. This, however, does not tell whether the society will or will not favor the redistribution which will occur. If compensation is actually made, then even in the Pareto sense there is an increase in the welfare of society. In cases where compensation does not, in fact, take place, a value judgment becomes necessary concerning the nature of the redistribution involved. To avoid complications of this type, it is assumed in this study that society is indifferent to the redistribution which occurs. Thus, if there is a net gain, and

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[16] Ibid.

[17] Ibid.

[18] Ibid.

society favors the new distribution over the old, then the decision favoring the fall in price is reinforced.

Hotelling's Contribution

The first attempt to show the empirical possibilities of consumer's surplus for welfare problems was made in 1938 by Harold Hotelling.[19] He showed that anytime sales are not made at marginal cost there is a dead-weight loss to society. His measurement technique is the same as that of Marshall and Dupuit. As Pfouts has stated, his rationale is simply that consumers prefer more goods to less and, at lower prices, more goods will be purchased. His argument, therefore, is restricted since he ignores the interrelationships among the goods in determining the demand for a particular good.[20] Hotelling indicates that whenever relative prices are distorted, whether by taxes, public utility regulation or by other means, there is a dead-weight loss to society and that the consumer's and producer's surplus concepts are useful in approximating that loss. He deals exclusively with market demand curves as a representation of the total utility of a collection of individuals in an ordinal framework. Therefore, although his rationale does not include related goods, his measurement technique does.

Loss Estimate Equations

Having established a theoretical base for the welfare loss to be

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[19] H. Hotelling, "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates," Econometrica, VI (1938), pp. 242-269.

[20] Pfouts, p. 332.

estimated in this study, attention is now turned to the deviation of formulae for the actual calculation of a welfare loss. The situation facing a profit-maximizing firm in long-run equilibrium is depicted in Figure 3. The monopolist determines output and price by equating long-run marginal cost (LMC) with marginal revenue (MR). He produces output OX_m and charges price P_m. Constant costs are assumed here as they are throughout this study. The purely competitive industry would produce output OX_c and charge price P_c. The restriction of output due to monopoly is thus $OX_c - OX_m$ and the elevation of price resulting from monopoly is $P_m - P_c$. The welfare gain which could be achieved by making the monopolized industry one of pure competition is represented by the area of the triangle ABC. If, for simplification, the demand curve is assumed to be linear over the AC range, the area to be determined is simply

$$(1)\quad W = \tfrac{1}{2}\,(AB)\,(BC)$$

where W denotes the welfare loss. This equation can be put in a more convenient form for estimation. Let the price differential AB equal T. Then the percentage divergence of the monopolistic from the competitive price level is $\frac{T}{P_c}$. Let this equal t. Also, from the definition of the elasticity of demand:

$$E_d = \frac{\frac{\Delta X}{X}}{\frac{\Delta P_x}{P_x}} = \frac{\frac{\Delta X}{X}}{t}$$

then $\frac{\Delta X}{X} = t\,E_d$

$$(2)\quad \text{or}\quad \Delta X = t\,X\,E_d$$

$\Delta X = BC$ in formula (1)

Since $t = \frac{T}{P_c}$

(3) then $T = t P_c$.

Substituting from (2) and (3) into (1) and multiplying by a minus to cancel the negative sign implicit within the E_d,

(4) $W = -\frac{1}{2} X_m P_c E_d t^2$.

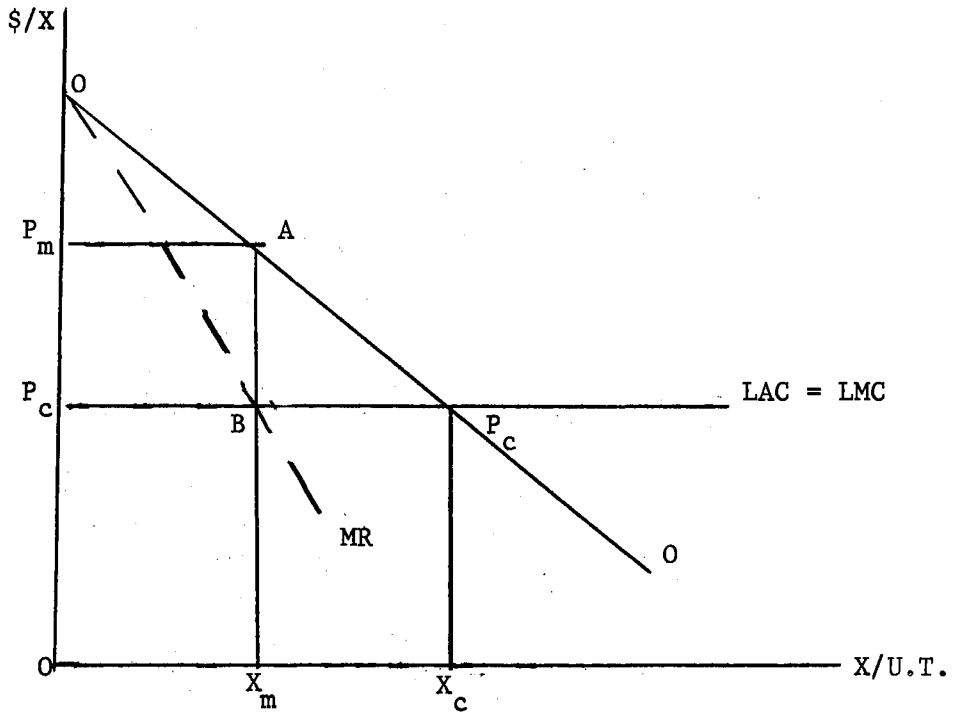

Figure 3. A Profit-Maximizing Firm in Long-Run Equilibrium

This is only one of the forms into which equation (1) can be put. However, for this study, it is the most convenient to use.[21] Inspection

[21]It should be noted that, in Figure 3, $P_m ABP_c$ is the amount of monopolistic profits and can be related to the area of the welfare loss

of equation (4) indicates that the data needed to estimate the loss are (a) the monopoly output level, (b) the competitive price level (which is equal to the level of competitive costs), (c) an estimate of the elasticity of demand and (d) the percentage divergence of the monopolistic from the competitive price level (which, in this case, is the same as the percentage divergence of price from marginal cost).

Previous Empirical Studies

Before estimating the welfare loss resulting from the antisubstitution law, it would be useful to review some of the previous studies of welfare losses resulting from monopoly. In this way it would be possible to point out the specific differences between the methods and policy implications of this study and those of earlier studies.

Harberger

Estimation of the welfare cost of the misallocation of resources resulting from monopoly was first attempted by Arnold Harberger.[22] He investigated seventy-three manufacturing industries for the period 1924 to 1928. He selected this period because it was one of reasonable economic stability in that it had no large shifts in demand or changes in the structure of the economy.

Harberger used the average of the profit rates of these industries as the "normal" rate of return on capital. It was then possible to

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triangle. Since other studies have used profit data, their form of equation (1) has differed slightly from formula (4) above.

[22]Arnold C. Harberger, "Monopoly & Resource Allocation," American Economic Review, XLIV (1954), p. 77.

estimate the extent and direction of the reallocation of resources which would be necessary to equate profit rates among the industries. In finding this estimate, he assumed that the elasticity of demand was unity.[23] Harberger found that a reallocation of $12 billion or 1½ percent of the total resources of the economy would need to have been reallocated to bring profit rates into line.[24]

Using Hotelling's formula for the welfare loss, he found a loss of $26.5 million for his sample or $59 million for the entire economy.[25] This astoundingly low figure was less than one-tenth of one percent of national income. Harberger states that at every stage of the analysis an effort was made to overstate the loss.

George Stigler criticized the findings of Harberger on two general grounds.[26] First, Stigler argued that monopolists do not operate where their marginal revenue is zero and therefore that the assumption of an elasticity of demand of one was a poor one.[27] Secondly, he challenged the accuracy of the profit data which Harberger had used. Both of these modifications would tend to increase the welfare loss estimates.

Schwartzman

David Schwartzman accepted the challenge of Stigler and attempted

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[23] Ibid., p. 79.

[24] Ibid., p. 81.

[25] Ibid., p. 82.

[26] George Stigler, "The Statistics of Monopoly and Merger," Journal of Political Economy, LXIV (1956), pp. 33-40.

[27] Ibid.

to find a new set of welfare loss estimates.[28] He employed the same model as Harberger but he used estimates of profits which he had made for the year 1954 and he assumed an elasticity of demand of two. Assuming an elasticity of demand of two and using his own profit data, Schwartzman found the extent of resource misallocation to be $7.2 billion.[29] Using his own profit data and an elasticity of demand of one, he found the extent of resource misallocation to be $3.6 billion.[30] His estimates of the welfare loss confirmed the findings of Harberger as being less than $234 million or less than 0.1 percent of national income.

Kamerschen

Some economists were still dismayed by these findings and would probably agree with Stigler's comment on Harberger's study that, "If this estimate is correct, economists might serve a more useful purpose if they fought fires or termites instead of monopoly."[31] As a result, another attempt to estimate the welfare loss resulting from monopoly was made. David Kamerschen used profit data for the five-year period 1956-57 to 1960-61.[32] He explains that the facts that these data were collected more recently than those of the other studies and that

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[28]David Schwartzman, "The Burden of Monopoly," Journal of Political Economy, LXVIII (1960), p. 627.

[29]Ibid.

[30]Ibid., p. 629.

[31]Stigler, p. 34.

[32]David Kamerschen, "An Estimation of the 'Welfare Losses' from Monopoly in the American Economy," Western Economic Journal, IV (1966), pp. 221-236.

statistical procedures improved over time have resulted in his study providing a better estimate of the welfare loss than earlier studies. Also, several other modifications were made on the profit data to make it better conform to economists' definition of excess profits. The loss equation employed was the same as that of Harberger and Schwartzman.

In addition to the new profit data, Kamerschen made a further improvement by attempting to estimate the elasticity of demand rather than assuming it to be one or two as had Harber and Schwartzman, respectively. Since his procedure for estimating the elasticity of demand is the same as that used in this study, discussion of the method is deferred until a later point.

Using his industry elasticity estimates and profit data, Kamerschen found that the welfare loss ranged from $20.9 billion to $26.4 billion or from 5.4 to 6.2 percent of national income.[33] When he used the same methods and assumptions as those of Harberger, a welfare loss in the neighborhood of two percent of national income was found.[34] This difference was attributed to the improved data.

This, then is the current state of the literature on estimates of welfare losses resulting from the presence of monopoly elements in the United States. It should be pointed out that, in general, the studies mentioned have all dealt with rather broad industry classifications, profit data were in all cases used as a means of estimating the misallocation of resources and were used in lieu of cost data, and the

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[33] Ibid., p. 233.

[34] Ibid.

welfare loss estimates of these studies have ranged from extremely low ones (less than 0.1 percent of national income) to rather large ones (5.4 to 6.2 percent of national income).

In order to complete the review of the development of the concept of a welfare loss and the studies to date on the subject, it seemed necessary not to interrupt the discussion with criticisms. Also, the assumptions were not always made explicit. The following two sections are devoted to these topics in order to give a full explanation of the ideas and empirical content of the previous studies concerning the estimation of welfare losses.

Assumptions

The criticisms often made of consumer's surplus as a welfare tool are many times directed at the restrictive assumptions which must be made. Therefore, most of the assumptions involved in the three empirical studies described above are listed below. For the Harberger and Schwartzman studies, Kamerschen has pointed out twenty-three assumptions.[35] It is not necessary to reproduce the entire list here but instead only to give the most salient ones, especially those which concern the present research.

1. All three studies assume that all production takes place at constant costs. This assumption was made for convenience since profit data could then easily determine the extent of the reallocation of resources necessary to eliminate excess profits. This assumption is

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[35]David R. Kamerschen, "An Estimation of the 'Welfare Losses' from Monopoly in the American Economy" (unpublished Ph.D. thesis, Michigan State University, 1964), pp. 68-69.

also made in the present study because the nature of the production process as described in Chapter II gives all indications of a lack of economies of scale.

2. Harberger assumes an elasticity of one, Schwartzman of one and two, and Kamerschen estimates elasticities for the various industries. For the present study, elasticity estimates for the relevant drugs have been calculated.

3. All studies assume the industries are in long-run equilibrium positions. This is also necessary in the present study to insure that prices and outputs are at equilibrium levels.

4. Studies of this type must necessarily assume that whatever redistribution of income occurs is not a welfare loss. This assumption may alternatively be stated as one which provides that the marginal utility of income is the same for everyone or that fiscal adjustments are made to keep everyone's money income the same. This is not the same assumption that Marshall made when he held the marginal utility of money constant. Constancy of the marginal utility of money was appropriately criticized by Paul Samuelson[36] and was shown to be unnecessary by Winch.[37]

5. It must also be assumed that all the industries are producing for direct consumption. L. W. McKenzie has shown that where intermediate products are involved Hotelling's formula does not apply.[38]

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[36] P. A. Samuelson, "Constancy of the Marginal Utility of Income," Studies in Mathematical Economics and Econometrics, ed. O. Lange (Chicago, 1942), pp. 75-91.

[37] Winch, pp. 395-423.

[38] L. W. McKenzie, "Ideal Output and the Interdependence of Firms," Economic Journal, LXI (1951), pp. 785-803.

6. In order to avoid complexities which would be introduced by second best considerations, it is necessary to assume that resource misallocations arising from exogenous factors are absent. F. M. Scherer has noted that second-best considerations are of little significance in the prescription drug industry because of its weak interdependence with other sectors of the economy.[39]

7. Ten of the other assumptions listed by Kamerschen had to be introduced as a result of the profit data which they were using. Since profit data are not used in the present study, these assumptions do not need to be made here.

Criticisms

Harberger has listed four principal reasons why economists have been hesitant in attempting to measure welfare losses.[40] They are: (1) certain key parameters (elasticities of demand, etc.) must be estimated and may be sources of error; (2) second-best considerations are usually ignored and thus, recommended policies may actually lead to a worse situation; (3) redistribution considerations are ignored so as to avoid value judgments; and (4) some economists still are suspicious of the consumer's surplus concept. In addition to these four general criticisms two more have recently been added: (5) allocative vs. X-efficiency and (6) unmeasurable losses or gains in welfare.

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[39] F. M. Scherer, Industrial Market Structure and Economic Performance (Chicago, 1970), p. 26.

[40] Arnold C. Harberger, "The Measurement of Waste," American Economic Review, LIV (1964), pp. 59-60.

None of the above criticisms is without some value, although the first and fourth seem now to be the least significant. Even though some estimates of parameters are necessary, their estimation certainly is important in order to establish some basis for policy. The concept of consumer's surplus or consumer's gain, as Winch has renamed it, is now more well-defined and its positive aspects from the evidence already cited give the concept a definitive value

Ignoring of second-best considerations[41] is a valid criticism although its degree of seriousness has not been empirically determined. For reasons stated above, its importance in the ethical drug industry is likely to be minimal. Questions involving the redistribution of income are probably the most pertinent. However, as Winch has discussed,[42] the redistribution of income involves a value judgment. If society deems the redistribution to be good and the net gain from the measurement of the consumer's gain is positive, the decision is reinforced. Indifference of society toward the redistribution and a positive net gain again suggest that the proposed policy should be implemented. Only if the redistribution is disfavored by society and the net gain measured is positive is there a question as to whether or not the policy move should be taken. Even so, policy makers will find it extremely useful to know the extent of the welfare loss from a misallocation of resources in making policy decisions.

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[41] K. Lancaster and R. G. Lipsey, "The General Theory of Second Best," Review of Economic Studies, XXIV (1956-57), pp. 11-32.

[42] Winch, pp. 406-407.

X-efficiency Considerations

Two recent articles[43] have suggested that the welfare losses estimated in past studies have been too small. They have, it is claimed, assumed both monopolistic and purely competitive firms are achieving maximum output from a least-cost combination of resources. Harvey Leibenstein stated that the costs of production may be significantly above their possible minimum as a result of psychological, motivational factors which he termed X-efficiency.[44] Considerable evidence is presented by Leibenstein in support of his contentions. The accent is especially placed on the possibility of increasing the productivity of all types of labor through the "stick" of competition. To the extent that this sort of inefficiency is present, monopolists are producing at higher costs than purely competitive firms would be. The argument also extends to the more rapid introduction of innovations by competitive firms over their monopolistic counterparts.

Where losses from a lack of X-efficiency are present, the welfare losses from monopoly calculated in previous studies may provide a serious underestimate. This can be illustrated by reproducing a figure used by Connor and Leibenstein and labelled here as Figure 4.[45] Assume that the demand curve facing the monopolist is AE in Figure 4. His output and price are Oq_0 and OM, respectively. If the monopolist's

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[43] Harvey Leibenstein, "Allocative Efficiency vs. X-Efficiency," American Economic Review, LVI (1966), pp. 392-415, and William S. Comanor and Harvey Leibenstein, "Allocative Efficiency, X-Efficiency, and the Measurement of Welfare Losses," Economica, XXXVI (1969), pp. 304-309.

[44] Leibenstein, American Economic Review, p. 352.

[45] Comanor and Leibenstein, Economica, p. 305.

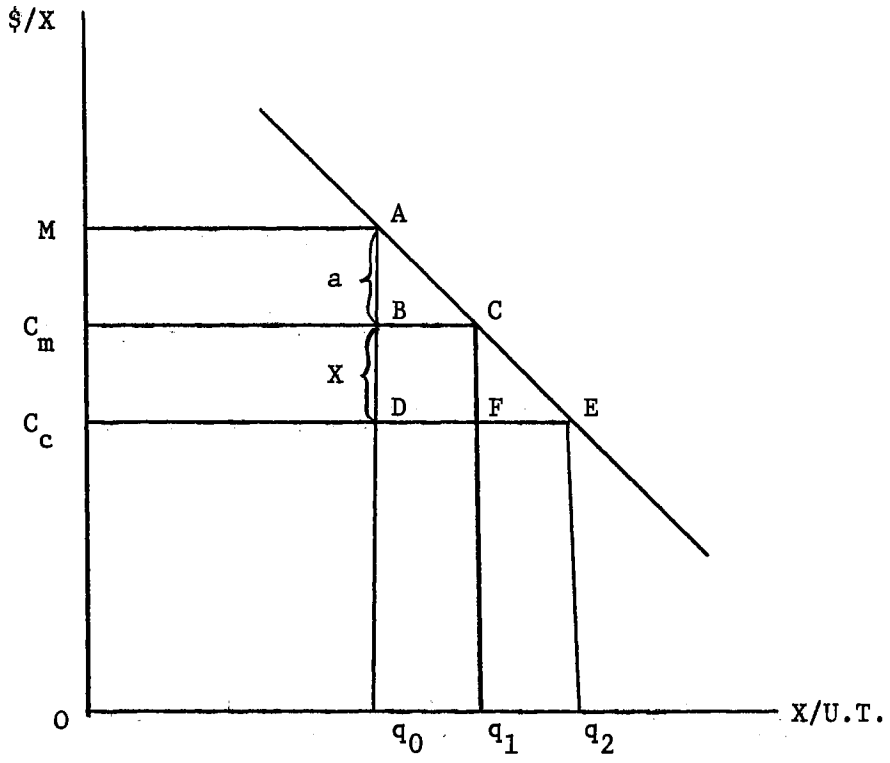

Figure 4. Welfare Loss with X-Efficiency

and the pure competitor's costs are equal to C_m, the extent of divergence of price and output from the competitive level are BA = a and BC = q_0q_1. If, however, costs under pure competition are actually C_c instead of C_m as a result of X-efficiency gains, then there could be an additional reduction in price of DB = X and an additional increase in quantity of FE = q_1q_2 if the monopoly situation were changed to one of pure competition. As a result, the welfare loss from allocative efficiency would be increased from ΔABC (the usual measure) to ΔADE, a sizable increase. In addition, there would be a welfare gain from the cost reduction resulting from the increase in X-efficiency measured by the rectangle C_mBDC_c. The calculations of this study presented in Chapter IV do not measure this additional welfare gain by cost reduction, i.e., area C_mBDC_c, and thus, the computations will provide an underestimate of the "true" welfare loss when X-efficiency considerations are made.

Although the present study does not separate the two types of efficiency gains, it does take account of these gains with the exception mentioned above and they are included in the welfare loss measure. Since the drug industry has a purely competitive market and a monopolistic market existing side-by-side, the divergence of the monopoly price from the competitive cost is measured by actually using the "true" competitive cost level as a base. This, in itself, may provide a unique contribution of this study to the extent that there are X-efficiencies present in the ethical drug industry.[46] [47]

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[46] Ibid., pp. 307-308.

[47] Comanor and Leibenstein point out that this larger gain may more than offset any welfare losses ignored by not considering second-best

Unmeasurable Aspects of Welfare

One other criticism which deserves some mention is that made by Gordon Tullock.[48] His contention is that expenditures by a monopolist which are used to maintain, achieve, or enhance the firm's monopoly position result in wasted resources from a societal point of view. In fact, he argues, the capitalized value of those expenditures, discounted for risk, would be worth more than the increased transfer (excess profits) the monopolist is trying to achieve. These types of expenditures can not, as Tullock admits, be accurately measured and their presence means that the estimate of the welfare loss made in the present study is, to some extent, an underestimate.

Elasticity and the Nature of Demand

It was mentioned above that the elasticity figures necessary for the welfare loss estimation of this study are being estimated instead of assumed as was done in all of the studies mentioned above except Kamerschen's. The nature of the demand curve facing the trade-name producer was discussed in Chapter II. The problem now is to find the estimates of the elasticity of that demand curve for a particular drug.

Elementary microeconomic theory shows the relationship between marginal revenue (MR) and price (P) as

$$MR = P(1 + \frac{1}{E_d}).$$

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consequences and thus make policy statements derived from the results more tenable.

[48] Gordon Tullock, "The Welfare Costs of Tariffs, Monopolies, and Theft," Western Economic Journal, V (1967), pp. 224-232.

Thus

$$E_d = - \frac{P}{P-MR} .$$

If, as it is assumed here, the firm is in long-run equilibrium and is maximizing profits, marginal revenue (MR) will be equated with marginal cost (MC). Therefore,

$$E_d = - \frac{P}{P-MC} .$$

This form of the estimating equation is the reciprocal of the Lerner index of monopoly power.[49] This provides an estimate of the point elasticity of demand providing that price and marginal cost data are available. Price, in this study, is the price of the trade-name drug. Marginal cost is assumed equal to average cost and the generic price level is being used as an estimate of both since a generic producer is operating under conditions very similar to those of pure competition.[50]

This estimate of the elasticity of demand certainly has its shortcomings. It would be preferable to have an estimate of the arc elasticity between the monopolistic and competitive points of operation on the demand curve. This estimate is based on a single firm situation and becomes less reliable as the number of firms in the industry

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[49] A. P. Lerner, "The Concept of Monopoly and the Measurement of Monopoly Power," Review of Economic Studies, I (1933-34), pp. 157-175.

[50] If X-efficiency considerations are relevant then the monopolist is not actually in a profit-maximizing equilibrium position. His marginal revenue is not equal marginal cost since his marginal costs are higher than those of the competitive firms. The elasticity estimate will then be incorrect.

increases.[51] However, this procedure does provide an actual estimate of the elasticity of demand which certainly seems to be a more valid approach than merely assuming the elasticity of demand to be one or two as some of the past studies have done. In addition, the industry is narrowly defined in this study, a notable improvement over the estimates of the Kamerschen study.[52] Also, the industries of this study are often composed of only one firm so that the estimates are further improved over the estimates of elasticity for more "competitive" industries.

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[51] D. R. Kamerschen and Phillip P. Caruso, "Two Shorthand Methods for Estimating Product Price Elasticities," Metroeconomica, XVII, p. 103.

[52] Kamerschen, Western Economic Journal, pp. 221-236.

CHAPTER IV

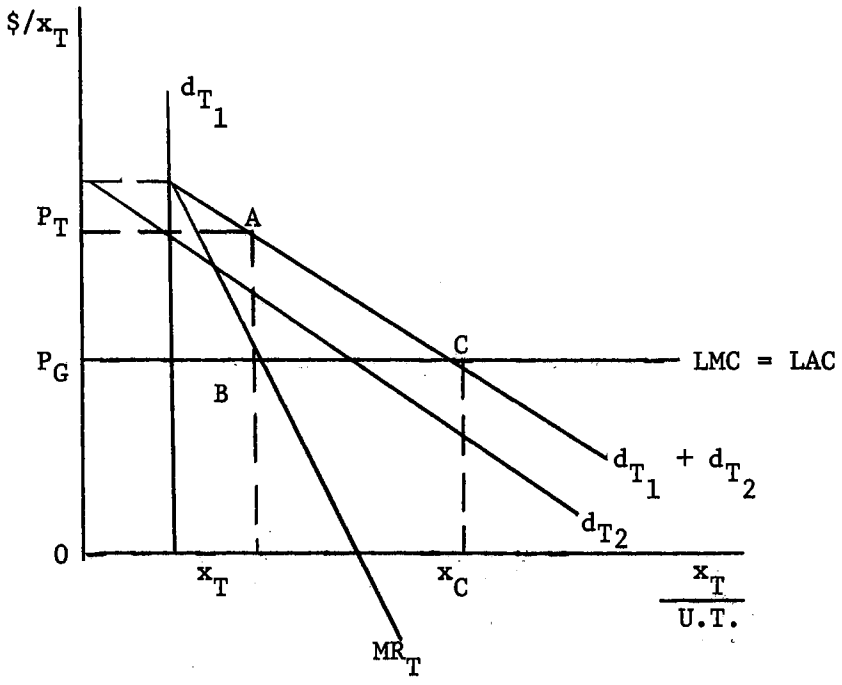
APPLICATION AND QUANTIFICATION

This chapter presents the actual measurement of welfare losses for the sample of drugs for which price and quantity information was collected. A discussion of the sample, its nature and means of collection, are also included in this chapter.

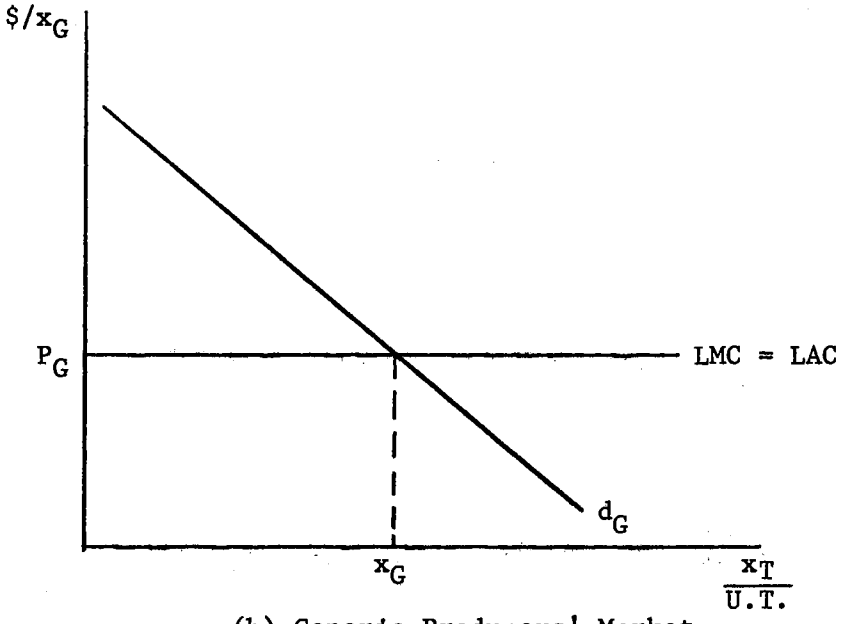
Applying the Tools to the Drug Industry

This section organizes and sets forth the analytical approach appropriate to the particular market situation in ethical drugs. The market can be graphically shown as that of Figure 5. Figure 5(a) shows the demand and cost conditions facing a large producer selling a specific trade-name drug. Figure 5(b) depicts the demand and cost conditions facing all the firms which sell the generic version of the same drug.

The condition of demand facing the producer of a trade-name drug is made up essentially of two components. First, there are those physicians who prescribe by trade name thus allowing the pharmacist no discretion in filling the prescription (assuming an antisubstitution law is present) regardless of the prices of generic equivalents. Implicit within this component of demand is that a group of consumers will have their prescriptions filled regardless of the price, at least in the portion of the demand curve under consideration. This element of demand



(a) Trade-Name Drug Market



(b) Generic Producers' Market

Figure 5. Trade and Generic-Name Producers' Market Situations

is represented by the completely inelastic demand curve d_{T_1} in Figure 5(a). The second component of the demand for a trade-name producer's drug is somewhat more elastic. This element is composed of price-conscious physicians and of institutions (such as some hospitals) who purchase their drugs on the basis of competitive bidding or by government agencies (e.g., the Military Medical Supply Agency) who follow a similar procedure. Consumers of the drugs who follow such alternatives as refusing to have their prescriptions filled or who "shop around" on the basis of price would contribute to this less than perfectly inelastic portion of the demand curve. This component of demand is represented by d_{T_2} in Figure 5(a). As a result of these two components of demand, the total demand for a trade-name producers' drug is shown as $d_{T_1} + d_{T_2}$ which is the horizontal summation of d_{T_1} and d_{T_2}.

The cost conditions facing the trade-name producer were discussed in Chapter II. To reiterate, his cost conditions are those of constant costs. Therefore, long-run marginal cost equals long-run average costs. The curve depicting this situation is labeled on Figure 5(a) as LMC = LAC.

The market conditions for producers who sell the same drug by generic names are pictured in Figure 5(b). The demand curve facing these producers is downward-sloping to the right and is labeled d_G. This is very plausible since, if a drug is prescribed by generic name, the pharmacist can dispense any manufacturer's version of the drug he chooses and it is possible that he will dispense, at least to some extent, on the basis of price. In the event of competitive bidding, price again is a primary factor determining the choice of a particular producer.

Cost conditions for generic producers were also discussed in Chapter II. Those conditions were constant costs with long-run marginal cost equalling long-run average costs. This is labeled LMC = LAC in Figure 5(b) since the level of average costs for generic producers was the same as that faced by the trade-name producers.

Since conditions very similar to pure competition are present in the market for a particular generic drug, the price and output levels are determined by the market forces of demand and supply. As indicated on Figure 5(b), the price of the generic version of the drug is determined as P_G which is equal to the level of average costs. The output level of all generic producers is shown as X_G. Therefore, the equilibrium price level of the generic drug is equal not only to the average costs of the generic producer, but also the the average cost level of the trade-name producer. The level of average costs for the trade-name producer is, therefore, also labeled as P_G on Figure 5(a).

The price and output levels of the trade-name drug are determined by the trade-name producer in the usual monopoly fashion. The marginal revenue curve associated with the trade-name producer's demand curve is drawn in Figure 5(a) as MR_T. Assuming that the trade-name producer is attempting to maximize profits, he will equate marginal revenue with long-run marginal costs. The price and output levels of the trade-name drug are thus determined as P_T and X_T, respectively.

In order to describe the welfare loss resulting from the lack of competition for the trade-name producer, it is necessary to indicate the level of output and price which would prevail for the trade-name drug if the industry were one of pure competition. If the price level were bid

down to the competitive level, it would equal long-run average costs. Given the demand conditions facing the trade-name firm, at a price of P_G the industry would sell an output of X_C. Thus, the resulting welfare loss, as described in Chapter III, is shown as the area of the triangle ABC in Figure 5(a).

The analysis described above obviously applies when there is a single firm producing the trade-name drug and there are many firms producing the generic version of the drug. This situation is, of course, only possible in instances where the patent on a drug has expired. In the case of several drugs, however, even though the patent has expired, there still remain several large producers manufacturing and selling the drug under a trade name. In this study, when there are two or more large firms selling different trade-name versions of a single drug, each is considered a monopolist. In the presence of an antisubstitution law, this effectively is the case.

Data Sources

The data collected for this study can be separated into two categories: (1) data relating to the calculation of the welfare loss and (2) information relating to the effectiveness of the antisubstitution law in stifling competition. Both types of information were collected via the same questionnaire. In this chapter, only data collected which directly relates to the size of a possible welfare loss is discussed. Information collected regarding the effectiveness of the antisubstitution law is covered in Chapter V.

The Drug Sample

As stated in Chapter II, eighty-six drugs are still sold under trade names even though, in many cases, lower cost generic equivalents are available.[1] The first task in sampling was, then, to select a group of the eighty-six drugs on which to collect price and quantity data for the State of Oklahoma.

In order to choose drugs from important therapeutic categories, total sales for each of the forty-six therapeutic categories for the year 1968 were computed. The top ten categories, on this basis, are listed in Table II. They are ranked in descending order. Within these top ten therapeutic categories, an attempt was made to choose drugs which were significant in their respective therapeutic classes. Since actual sales data for individual drugs is not available, the criterion used as an indicator of significance was a drug's appearance on the Gosselin list of the largest selling 200 drugs by new prescription volume. In those cases where a drug was on the list by generic name as well as trade name, an effort was made to include the drug in the sample.

Since pharmacists were asked on the questionnaire for both wholesale and retail prices for the drugs listed and for the quantity of capsules or tablets, an effort was made to limit the drug sample size to a relatively small number of drugs which were significant in terms of their dollar sales. As a result of this, only eight drugs were chosen for the sample. These drugs are listed in Table III.

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[1] For some drugs generic equivalents are available only at the same price as the trade-name versions. These cases are not relevant to this study.

TABLE II

RANKING OF THE TOP TEN THERAPEUTIC CATEGORIES

Therapeutic Category	Total Sales*	Percent of Total Sales	Rank
		Drug	
Antibiotics	471,263,039	24.6	1
Hormones	177,400,107	9.3	2
Ataraxies	164,180,741	8.6	3
Analgesics	154,880,949	8.1	4
Cough & Cold Preparations	120,582,054	6.3	5
Cardiovascular Preparations	86,882,128	4.5	6
Anti-Obesity Preparations	64,121,280	3.5	7
Sedatives & Hypnotics	56,124,509	2.9	8
Diuretics	55,467,744	2.9	9
Antispasmodics	52,225,952	2.7	10

*Derived from 1968 data in the National Prescription Audit, R.A. Gosselin and Co., Dedham, Massachusetts.

For the first two drugs on the sample, tetracycline and meprobamate, there are, in addition to the generic version of each drug, three trade-name drugs available. As stated before, the manufacturer of each of these trade-name drugs is considered here to be a monopolist. For the other drugs, since there is only one trade-name version of the drug, there exists a clear case of monopoly versus competition.

TABLE III

SAMPLE DRUGS BY THERAPEUTIC CATEGORY

1. Tetracyline HCl (250 mg)
   (a) Generic
   (b) Achromycin
   (c) Achromycin-V
   (d) Tetracyn
2. Meprobamate (400 mg)
   (a) Generic
   (b) Equanil
   (c) Meprospan
   (d) Miltown
3. Digoxin (.25 mg)
   (a) Generic
   (b) Lanoxin
4. Chloral Hydrate (7½ gr)
   (a) Generic
   (b) Noctec
5. Penicillin G Pot. (400,000 U)
   (a) Generic
   (b) Pentids
6. Reserpine (.25 mg)
   (a) Generic
   (b) Serpasil
7. Dexamethasone (.75 mg)
   (a) Generic
   (b) Decadron
8. APC/Codeine (½ gr)
   (a) Generic
   (b) Empirin Compound/codeine

Each of the eight drugs selected for the sample is classified under its respective therapeutic class in Table IV. Drugs from the other four of the top ten therapeutic classes were not included either because: (1) there were no drugs in that category on which patents had expired and, as a result, there were no generic equivalents available or (2) generic equivalents were available only at the same price as the trade-name version of the drug.

TABLE IV

GENERIC VERSIONS OF DRUGS BY THERAPEUTIC CATEGORY

Therapeutic Category	Drugs Included on Sample
1. Antibiotics	Tetracycline Penicillin G. Potassium
2. Hormones	Dexamethasone
3. Ataraxics	Meprobamate
4. Analgesics	APC/codeine
5. Cardiovascular Preparations	Reserpine Digoxin
6. Sedatives and Hypnotics	Chloral Hydrate

The Pharmacy Sample

As far as can be ascertained, there is absolutely no information available on the parameters of the population of pharmacists in the

State of Oklahoma. That is, nothing is known about what the response rates of pharmacists would be according to size of community, type of pharmacy, etc. Therefore, the questionnaire requesting data on prices and quantities sold of the sample drugs and questions testing pharmacists' attitudes was mailed to every pharmacy in the State of Oklahoma. That is, a smaller mailing was not possible since unknown differences in response rates could not be compensated for.

According to a list received from the Oklahoma State Board of Pharmacy, there are 832 active pharmacies in the State. Of the 832 questionnaires sent out, a total of 288 or 34.6 percent were returned by pharmacists. Some of the pharmacists were, however, unwilling to provide data on the prices and quantities for the sample of drugs. As a result, data from only 239 of the pharmacies were available for use in calculation of the welfare loss. A copy of the table pharmacists were asked to complete is shown in Table V.

A more detailed breakdown of the sample of pharmacists is portrayed in Table VI. By type of pharmacy business organization (sole proprietorship, partnership, etc.), the responses were reasonably uniform. The tabulated results are listed in Table VI(a). Approximately thirty to thirty-five percent of each type reported. The reason for the large proportion reporting from the hospital pharmacy category is unknown. However, since their number is small, the results of this study are not unduely biased by this large response. The "Other" category includes pharmacies which are held in receivership, etc., or pharmacies whose form of business organization is unknown.

In Table VI(b) the composition of the sample, as categorized by the size of community in which the pharmacies are located, is shown.

TABLE V

DRUG TABLE FROM QUESTIONNAIRE

II. PLEASE COMPLETE THE FOLLOWING TABLE USING THESE SUGGESTIONS. Amount sold per month should be an estimate of the number of tablets or capsules, of the dosage size shown in parentheses, sold during an average month. Your acquisition cost is the price you pay for the drug per 100 or 1,000 (please indicate which). Retail price is the price you charge for a specific amount of the drug (please indicate the amount). The source may be designated by a W (from wholesaler) or an M (direct from manufacturer. Generic means a drug from a little-known, low-cost, brand-name producer or a drug from a producer who sells by generic name. If you do not stock one of the drugs, please place a DNS (do not stock) in any of the columns.

Item	Estimate of Amount Sold Per Month	Your Acquisition Cost	Retail Price	Source
1. Tetracycline HCl (250 mg)				
a) Generic				
b) Achromycin				
c) Achromycin-V				
d) Tetracyn				
2. Meprobamate (400 mg)				
a) Generic				
b) Equanil				
c) Meprospan				
d) Miltown				
3. Digoxin (.25 mg)				
a) Generic				
b) Lanoxin				
4. Chloral Hydrate (7½ gr)				
a) Generic				
b) Noctec				
5. Penicillin G Pot. (400,000 U)				
a) Generic				
b) Pentids				
6. Reserpine (.25 mg)				
a) Generic				
b) Serpasil				
7. Dexamethasone (.75 mg)				
a) Generic				
b) Decadron				
8. APC/Codeine (½ gr)				
a) Generic				
b) Empirin Compound/codeine				

TABLE VI

COMPOSITION OF PHARMACY SAMPLE

Sample Response by Pharmacy Type of Business Organization

Form of Business	Population	Number Responding	Percent Response
Sole Proprietorship	370	131	35
Partnership	135	45	33
Corporation	277	82	29
Hospital	27	14	51
Other	29	11	38

(a)

Sample Response by Size of Community in Which the Pharmacies are Located

Size of Community	Number of Pharmacies in Population	Number Responding	Percent Response
Under 5,000	250	85	34
5,000 - 25,000	228	95	42
25,000 - 50,000	93	25	27
Over 50,000	251	71	28

(b)

Although, according to this breakdown, the response rates were less uniform, there were not exceedingly large discrepancies in response by size of community.

Welfare Loss Estimates

The technique for calculating welfare loss estimates for the sample of drugs, its rationale and development, has previously been established. The computed results from the data compiled are now presented.

There were three preliminary tasks involved in the calculation of the welfare loss resulting from each trade-name drug. These were: (1) the establishment of a single price for the generic versions of each drug, (2) the establishment of a single price for the trade-name version(s) of each drug and (3) calculation of the elasticity of demand for each of the trade-name drugs.

A single price for the generic version of each drug was not readily available for a number of possible reasons. First, there are many firms producing each drug and selling it by generic name alone. In addition, some pharmacists listed as a generic equivalent, trade-name drugs which were sold by small manufacturers and whose prices are slightly above the competitive level. The inclusion of these observations in the sample tends to overstate the competitive cost level and will, therefore, cause a slight downward bias of the welfare loss estimates.

Second, some pharmacies sell higher volumes of the generic version of a drug than others. Consequently, their acquisitions are larger and this is ordinarily accompanied by a reduction in the price per tablet or capsule purchased. The third possible reason generic prices may vary

is that pharmacists provided data for only a single generic version of the drug. Therefore, different pharmacies sometimes listed different generic versions, i.e., by different manufacturers. These varied from a drug sold by a trade-name producer under its generic name only to a drug produced by a little-known manufacturer who sells the drug only by its generic name.

To arrive at a single price for the generic version of each drug, it was necessary to calculate a weighted-average price for the generic version of each drug. The weights were assigned on the basis of the volume of the individual pharmacy for that drug. The weighted-average price of each drug sold by generic name is indicated in Table VII. Furthermore, since it was found that there were varying differences between the price of the trade-name and the price of the generic-name versions for each drug depending upon whether wholesale or retail prices were used, weighted-average prices were calculated at both the wholesale and retail levels. The weighted-average wholesale generic prices are shown in column one of Table VII and weighted-average retail prices are in column two.

Determination of a single price for the trade-name version of each drug was less difficult since the drug is manufactured by only one producer. However, the problem of different prices for the drug depending on the amount purchased was also encountered here. As a consequence of these quantity discounts there were small price differences reported by some pharmacies even though the drug is purchased and sold by a single firm. Once again, a weighted-average price was determined for the trade-name version of each drug. A similar procedure to that used for the generic versions was employed. Wholesale and retail weighted-

average prices were calculated and are listed in columns one and two of Table VIII, respectively.

TABLE VII

WEIGHTED-AVERAGE PRICES FOR GENERIC VERSIONS OF EACH DRUG

Drug	Weighted-Average Wholesale Price (dollars/tablet or capsule)	Weighted-Average Retail Price (dollars/tablet or capsule)
1. Tetracycline	.031	.081
2. Meprobamate	.019	.053
3. Digoxin	.0075	.017
4. Chloral Hydrate	.016	.044
5. Penicillin G Potassium	.020	.080
6. Reserpine	.007	.029
7. Dexamethasone	.045	.086
8. APC/codeine	.036	----

It should be pointed out that Achromycin and Achromycin-V are approximately the same drug and are produced by the same manufacturer (Lederle). One can be readily substituted for the other by a pharmacist even on a prescription written by trade name. Therefore, pharmacists ordinarily stocked only one of the drugs. Thus, in calculations below, the two drugs are viewed as a single drug and their volumes are combined.

TABLE VIII

WEIGHTED-AVERAGE PRICES FOR TRADE-NAME VERSIONS OF EACH DRUG

Drug	Weighted-Average Wholesale Price (dollars/tablet or capsule)	Weighted-Average Retail Price (dollars/tablet or capsule)
1. Tetracycline		
a) Achromycin & Achromycin-V	.113	.164
b) Tetracyn	.044	.107
2. Meprobamate		
a) Equanil	.058	.094
b) Meprospan	.118	.182
c) Miltown	.059	.091
3. Digoxin		
Lanoxin	.0085	.023
4. Chloral Hydrate		
Noctec	.041	.085
5. Penicillin G Potassium		
Pentids	.085	.158
6. Reserpine		
Serpasil	.038	.060
7. Dexamethasone		
Decadron	.127	.209
8. APC/codeine		
Empirin/codeine	.0363	----

The estimation technique for the elasticity of demand for each trade-name drug, as explained earlier, makes use of the average prices computed above. The actual calculated values, using the reciprocal of the Lerner index, are shown in Table IX. Since the pharmacists' demand for the drugs is a derived demand, elasticity estimates were made using both wholesale and retail prices. These estimates are found in columns one and two of Table IX, respectively. E_1 indicates the pharmacists' elasticity of demand for the drug and E_2 the consumers' elasticity of demand. It should be recalled that Harberger assumed the elasticity of demand to be one. All of the estimates in this study show the elasticity of demand to be greater than one.

With the above information and the total volume figures for each of the various drugs, values for all of the variables of the welfare loss estimation equations are present. The computed welfare loss estimates for the sample of pharmacies are presented in Table X. Welfare loss estimates were calculated for both the wholesale and retail levels since it was thought that a different welfare loss estimate might arise at the retail level because of the profit-markup determination methods of pharmacists. W_1, in column one of Table X, refers to the welfare loss estimate at the wholesale level and W_2 the welfare loss estimate for the final consumer.

Because only seven pharmacies out of those responding to the questionnaire replied that they stocked the generic version of APC with codeine, the data on the generic price of this drug are probably not reliable. As can be seen from the wholesale welfare loss estimate calculated for Emprin Compound with codeine, there exists virtually no

TABLE IX

ELASTICITY OF DEMAND ESTIMATES FOR THE SAMPLED TRADE-NAME DRUGS

Drug	1	2
1. Tetracycline		
a) Achromycin & Achromycin-V	-1.387	-1.978
b) Tetracyn	-3.608	-4.144
2. Meprobamate		
a) Equanil	-1.474	-2.316
b) Meprospan	-1.189	-1.415
c) Miltown	-1.465	-2.404
3. Digoxin		
Lanoxin	-8.566	-3.609
4. Chloral Hydrate		
Noctec	-1.609	-2.066
5. Penicillin G Potassium		
Pentids	-1.315	-1.995
6. Reserpine		
Serpasil	-1.231	-1.946
7. Dexamethasone		
Decadron	-1.549	-1.700
8. APC/codeine		
Empirin/codeine	-165.227	------

TABLE X

WELFARE LOSS ESTIMATES FOR ONE MONTH FROM THE SAMPLE OF PHARMACIES

Drug	W_1 (thousands of dollars)	W_2 (thousands of dollars)
1. Tetracycline		
a) Achromycin & Achromycin-V	6.119	3.519
b) Tetracyn	.367	.747
2. Meprobamate		
a) Equanil	13.540	7.842
b) Meprospan	3.359	2.361
c) Miltown	4.645	2.379
3. Digoxin		
Lanoxin	.113	.901
4. Chloral Hydrate		
Noctec	.389	.464
5. Penicillin G Potassium		
Pentids	5.334	3.157
6. Reserpine		
Serpasil	4.458	1.729
7. Dexamethasone		
Decadron	2.592	3.341
8. APC/codeine		
Empirin/codeine	.009	-----
TOTAL	40.923	26.442

welfare loss from this drug. Many pharmacists stated that they desired to keep their narcotics stock to a bare minimum and thus they did not stock the generic version of the drug.

Before proceeding to analyze these findings, two adjustments are necessary in order to calculate the annual welfare loss from the sample of drugs considered. First, the volumes of the drugs estimated by the pharmacies contacted were for an average month of business. Each welfare loss was thus multiplied by twelve in order to find the loss on an annual basis. Secondly, the annual welfare loss computed via the above procedure is only for a portion of the total number of pharmacies in the State of Oklahoma. Therefore, assuming that the reporting group of pharmacies is a representative sample, it is possible to extrapolate these welfare losses for all pharmacies in the State attributed to the sample of drugs. Approximately thirty-five percent of the pharmacies returned the questionnaire while about twenty-nine percent returned the table of prices and quantities of drugs completed. In an effort to understate the welfare loss, the larger thirty-five percent figure was used as a base for extrapolation on all the drugs. The estimated annual welfare losses for 100 percent of the pharmacies are listed in Table XI. Column one (W_1) shows the extrapolated losses at the wholesale level and column two (W_2) displays the extrapolated loss estimates at the final consumer (retail) level.

The first apparent conclusion from the calculated losses is that the total estimated welfare loss at the wholesale level is larger than that at the retail level. It can be shown that the size of a calculated welfare loss turns largely on the difference between the monopoly and the competitive price where the competitive price is an estimate of

TABLE XI

ESTIMATED ANNUAL WELFARE LOSS FOR 100 PERCENT OF OKLAHOMA PHARMACIES

	W_1 (thousands of dollars)	W_2 (thousands of dollars)
1. Tetracycline		
a) Achromycin & Achromycin-V	209.791	120.656
b) Tetracyn	12.580	25.620
2. Meprobamate		
a) Equanil	464.230	268.866
b) Meprospan	115.167	80.936
c) Miltown	159.242	81.567
3. Digoxin		
Lanoxin	3.879	30.895
4. Chloral Hydrate		
Noctec	13.336	15.926
5. Penicillin G Pot.		
Pentids	182.865	108.251
6. Reserpine		
Serpasil	152.844	59.296
7. Dexamethasone		
Decadron	88.877	114.556
8. APC/codeine		
Empirin/codeine	.292	-------
TOTAL	1,403.105	906.570

the level of average costs. This dependence is shown in Appendix A. The ratios of trade-name drug prices to those of generic-name drugs are smaller at the retail than at the wholesale level. This smaller ratio at the retail level results from the method of determining a profit markup used by pharmacists. And, as is shown in Chapter V, their method results in generic retail prices being a gross overstatement of the competitive cost level. Thus, the estimated welfare loss at the retail level is a poorer estimate of the "true" welfare loss than the welfare loss estimate made at the wholesale or manufacturer level.

The absolute dollar amounts of welfare losses lend little in the way of interpreting the results. Therefore, a relative magnitude is needed. All of the previous studies concerning estimation of welfare losses have computed the welfare loss from monopoly for the entire United States economy. They then have used Gross National Product as the base on which to compare the loss to consumers. Since this study is concerned with only a small portion of the U. S. economy, a more relevant base is that of the value of the total output of the markets studied or, in other words, the total dollar sales of the trade-name drugs in the sample. It should be noted that the welfare loss estimates of this study do not include the possible welfare losses from the other trade-name drugs which have generic counterparts nor possible losses from the large number of other trade-name drugs which are still under patent protection; moreover, it must be stressed that these estimates are only for the State of Oklahoma.

The amount of the total annual welfare loss to the State of Oklahoma resulting from the sample of trade-name drugs as a percent of the total sales of all the sampled trade-name drugs in Oklahoma is shown

in Table XII. On this basis, the size of the welfare loss to the consumers of the State of Oklahoma is substantial at either the wholesale or the retail level. A seemingly unusual result from the table is that, at the wholesale level, the amount of the welfare loss is actually larger than the amount consumers spent on trade-name drugs. The necessary conditions for this result are also examined in the Appendix to the study.

TABLE XII

ANNUAL WELFARE LOSS AS A PERCENT OF TOTAL SALES

Source	Welfare Loss (thousands of dollars)	Total Sales (thousands of dollars)	Percent
Wholesale	1,403,105	1,377,736	101.8
Retail	906,570	2,157,349	42.0

In either case, however, the value of the satisfaction that consumers had to forego, possibly as a result of the current interpretation of the antisubstitution law, was considerable. Chapter V investigates the presence of the conditions necessary for the elimination or modification of the antisubstitution law to be able to reduce or completely eradicate this welfare loss.

CHAPTER V

PERIPHERAL QUESTIONS INVOLVING THE EFFECTIVENESS OF THE ANTISUBSTITUTION LAW

This chapter examines the evidence collected on the extent to which the Oklahoma antisubstitution law is responsible for the welfare loss found in Chapter IV for the sample of trade-name drugs. It more specifically investigates the presence or absence of the conditions necessary for the antisubstitution law to bear responsibility for the welfare loss. In addition, this chapter presents the possible effects of a currently discussed alternative method of determining profit markups on drugs for pharmacists called the professional fee.

Generic Prescribing

As stated previously, if all prescriptions were written by generic name, the dispensing of a particular manufacturer's version of the drug would be at the discretion of the pharmacists. Therefore, the antisubstitution law would be ineffectual. However, this has not been the case. The large drug manufacturers have apparently been successful in their promotion of trade-name drugs. Henry Steel states that, ". . . surveys show that almost ninety percent of drug prescriptions are written by use of brand names."[1]

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[1]Henry Steele, "The Fortunes of Economic Reform Legislation: The Case of the Drug Amendments Act of 1962," reproduced in U. S. Senate,

Thus, pharmacists must currently, in the case of most prescriptions, dispense only the particular manufacturer's drug as designated by its trade name. The antisubstitution law, therefore, is effective in preventing competition among different manufacturer's versions of a single drug.

Attitudes of Pharmacists Toward Substitution

Whether or not elimination of the antisubstitution law would bring about price competition among different manufacturers' versions of a particular drug depends upon a number of factors. If the antisubstitution law were eliminated, each prescription for a drug, whether it was written by generic or trade name, could be considered a generic prescription since the pharmacist could fill the prescription with any manufacturers' version of the drug he chose.

Information was therefore collected with regard to the attitudes of pharmacists in filling prescriptions. An exact duplication of the page of questions which pharmacists were asked to answer is contained in Table XIII. First, if a pharmacist received a generic prescription, would he fill it with the lowest-priced drug? Essentially, the attitude being investigated here is whether or not pharmacists consider the price of a drug when dispensing it to a consumer. Question two in Table XIII relates to this attitude. The total of responses to this question are listed in Table XIV(a). Of the 281 pharmacists who responded to this question, 107 answered that they would dispense the lowest-priced drug

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Select Committee on Small Business, Subcommittee on Monopoly, Hearings, Competitive Problems in the Drug Industry, 90th Cong., 2d sess., 1967, p. 1999.

TABLE XIII

ATTITUDINAL QUESTIONS FROM QUESTIONNAIRE

III. QUESTIONS

1. Does your profit margin include:

   /__/ a percentage cost of the drug

   or is

   /__/ a constant amount per prescription (Professional fee system) used

   or

   /__/ a combination of the two?

2. If you were given a prescription which was written by generic name, would you fill it with the lowest-priced drug?

   /__/ Yes /__/ No

   Why or why not? _____

3. Would you always fill a generic prescription with a trade-name drug?

   /__/ Yes /__/ No

   Why or why not? _____

4. If you were given a prescription for a trade-name drug and if it was legal to substitute a lower-priced generic, would you do so?

   /__/ Yes /__/ No

   Why or why not? _____

5. In those drugs which are usually prescribed by trade name but also have generic equivalents, does your inventory include the generic equivalent?

   /__/ Always

   /__/ Usually

   /__/ Seldom

   /__/ Never

TABLE XIV

PHARMACISTS' RESPONSES TO A GENERIC PRESCRIPTION

Lowest-Priced Drug on a Generic Prescription	
Response	Number of Pharmacists
Yes	107
No	135
Depends	39
Total	281

(a)

Trade-Name Drug on a Generic Prescription	
Response	Number of Pharmacists
Yes	73
No	200
Total	273

(b)

on a generic prescription. There were 135 who responded that they would not dispense the lowest-priced drug. It is interesting to note that thirty-nine entered as a response that it would depend upon what the lowest-priced drug was. Their responses were, in general, that they would dispense the lowest-priced drug consistent with, what they considered to be, acceptable quality. Many stated that generic versions of a drug produced by "reputable" manufacturers would be of acceptable quality. If this group of thirty-nine is added to those who would dispense the lowest-priced drug, the total is brought to 146 which is a majority of the pharmacists surveyed.

A related question, which was asked of pharmacists, pertained to whether or not they would always dispense a trade-name drug when given a prescription written by generic name. This question measures, to some degree, the effectiveness of the promotional efforts of the large, trade-name manufacturers. The responses are listed in Table XIV(b). Of the respondents to this question, only seventy-three pharmacists indicated that they would always dispense a trade-name drug when handed a generic prescription. On the other hand, 200 pharmacists stated that they would, at least in some cases, dispense a generic version of a drug. A variety of reasons were listed for doing so, including: lower prices, confidence in the quality of generic drugs, and profitability.

The most important questions asked of pharmacists for the purpose of this study related to the willingness and ability of pharmacists, in the absence of an antisubstitution law, to substitute lower-priced generic versions of drugs for higher-priced, trade-name drugs called for on a prescription if it were legal to do so. The responses are shown

in Table XV(a). Out of the pharmacists responding to the question of willingness to substitute, 159 of the 272 answered that they would not substitute one brand of drug on a prescription written for another brand of the same drug unless it was first approved by the physician. With the physician's approval, substitution is, of course, presently legal. Of the 113 remaining pharmacists, ninety-two stated that they would in most cases freely substitute brands of drugs. The other twenty-one pharmacists said that they would sometimes substitute depending upon their professional assessment of the alternative brands of the drug available.

Reasons given by the pharmacists who would not substitute were mainly twofold. First, they did not trust generic manufacturers' products and, therefore, would not be responsible for their distribution, and/or secondly, they felt the choice of a particular manufacturer's version of a drug was to be made by the physician and they would not question that choice.

Pharmacists who stated that they would sometimes or most of the time substitute versions of a drug gave many of the same reasons that were listed for dispensing the lowest-priced drug on a prescription written by generic name. Additional motives were also mentioned. These included: (1) trade-name drugs are "over-priced," (2) it would allow them to compete more effectively with other pharmacies, (3) it would permit them to exercise their professional judgment, (4) the profit per prescription filled is larger when the acquisition cost is lower, (5) it would enable them to reduce their inventories since fewer brands of a single drug would need to be stocked, and (6) quantity discounts

TABLE XV

PHARMACISTS' RESPONSES ON GENERIC EQUIVALENTS

Willingness to Substitute	
Response	Number of Pharmacists
Yes	92
No	159
Sometimes	21
Total	272

(a)

Stock of Generic Equivalents	
Response	Number of Pharmacists
Always	1
Usually	101
Seldom	148
Never	17
Total	267

(b)

could be achieved since they would be able to purchase larger quantities of the fewer necessary brands of a drug.

Reasons five and six listed above would likely alter the current composition of pharmacists' inventories. One of the questions asked of pharmacists dealt with the nature of their current inventories. They were asked to what extent they stocked generic equivalents of drugs which are usually prescribed by trade name. From question five of Table XIII it can be seen that the alternative responses were, for pragmatic reasons, rather broad.

The reported composition of pharmacists' inventories is shown in Table XV(b). Of the 267 pharmacists responding to this question, only one stated that he always had the generic equivalent for a trade-name drug in stock. On the other hand, only seventeen responded that they never stocked generically equivalent drugs. The "usually" and "seldom" responses were reasonably close, 101 reporting that they usually had a generic equivalent in stock and 148 stating that they seldom did. Currently then, many pharmacies do not stock generic equivalents and could not substitute even if it were legal to do so.

Effectiveness of the Antisubstitution Law

The responses to all of the above questions asked of pharmacists indicated that the antisubstitution law is quite effective in blocking competition among different brands of a single drug. A summary evaluation of the responses of pharmacists lists the following important findings:

(1) Most pharmacists will not always dispense a trade-name drug upon receiving a prescription which is written by generic name. Thus,

pharmacists apparently think they can, in most cases, rely on generically equivalent drugs from a quality standpoint.

(2) Almost one-half of the pharmacists surveyed would, if given the legal opportunity, substitute lower-priced generic equivalents upon receiving a prescription written by trade name. This would, undoubtedly, foster price competition at the retail or pharmacy level and thus encourage other pharmacists to substitute different brands of drugs.

(3) Over one-half of the pharmacists responding seldom or never presently stock generic equivalent drugs. Since the pharmacists' demand for drugs is derived from the prescriptions they receive, it would be expected that elimination of the antisubstitution law would have a significant impact on the pharmacists' demands. Pharmacists, in the absence of an antisubstitution law, could stock only those manufacturers' versions of a drug that they desired. Therefore, the present nature of pharmacists' inventories could be substantially altered and need not be a discouraging factor in proposing that elimination or revision of the antisubstitution law would engender price competition among various brands of a single drug.

The Professional Fee

Earlier in this study it was stated that the method of determining profit margins used by pharmacists had a significant impact on the size of the welfare loss estimates at the retail level. Some evidence collected on the method used currently by pharmacists is presented here and a widely discussed alternative method called the professional or dispensing fee system is scrutinized with respect to its impact on the

size of the resulting welfare loss estimates and on pharmacists' profits.

Responses to question one in Table XIII showed that most pharmacists use a percent of the acquisition cost of a drug as a profit margin to determine the final retail price of a drug although the percent used from one drug to another was found seldom to be consistent. How pharmacists responded to this question is shown in Table XVI. Of the 271 pharmacists responding, 140 used the conventional percentage of cost method markup. Only nineteen used the newer professional fee method while 112 employed some combination of the two. The average percentage markups for each of the drugs on the sample are listed in Table XVII.

TABLE XVI

TYPE OF MARK-UP SYSTEM USED

Response	Number of Pharmacies
Percentage of Cost	140
Professional Fee	19
Combination of the Two	112

The average percentage markups consistently show that the versions of drugs whose acquisition costs are lower receive the higher percentage markups. Several pharmacists stated that this type of procedure tends

TABLE XVII

AVERAGE PERCENTAGE MARK-UPS OF ALL DRUGS

Drug	Average Percentage Markup
1. Tetracycline	
a) Generic	188.8
b) Achromycin	72
c) Achromycin-V	77.9
d) Tetracyn	208.8
2. Meprobamate	
a) Generic	99.8
b) Equanil	73
c) Meprospan	60.2
d) Miltown	66.7
3. Digoxin	
a) Generic	372.3
b) Lanoxin	189.3
4. Chloral Hydrate	
a) Generic	199.8
b) Noctec	108.9
5. Penicillin G. Pot.	
a) Generic	256.7
b) Pentids	90.4
6. Reserpine	
a) Generic	230.1
b) Serpasil	82
7. Dexamethasone	
a) Generic	66.6
b) Decadron	63.8
8. APC/Codeine	
a) Generic	384.5
b) Empirin/Codeine	190.1

to bring prices of lower-priced versions of the drug more into line with prices of higher-priced versions. The use of this procedure accounts for smaller retail price differentials and ratios among different versions of a drug and thus, as was found in Chapter IV, a smaller observed welfare loss at the retail than at the wholesale (manufacturer) level. The prices of the generic drug are being used as an estimate of the marginal costs of the drug which is the same for the trade-name and generic versions. The larger percentage markup on the generic drugs thus makes their retail prices an overstatement of the actual opportunity costs of producing and dispensing them.

The current discussed professional fee system does not use the acquisition cost of a drug to determine the profit markup. Under the professional fee system a constant amount or fee for the pharmacist's service is added to the acquisition cost of each prescription sold to determine the retail price. With the data gathered from the sample of pharmacists, two investigations were conducted: (1) If pharmacists presently employed a professional fee of $2.00 per prescription instead of using the percentage markup method, what would be the effect on pharmacists' revenues, costs, and profits and the probable effect on the welfare loss? Question one actually refers to the use of a professional fee with no substitution of generic for trade-name drugs while question two views the probable outcome if there were free substitution and a professional fee was employed.

Without Substitution

With regard to question one, a professional fee of $2.00 per average prescription size was added to the acquisition cost of each

drug. Of the few pharmacists in Oklahoma who reported that they used a professional fee system, this was most often listed as the amount used. Average prescription sizes were determined from the Task Force on Prescription Drugs.[2] The average prescription size for each of the drugs, the per tablet or capsule markup, the acquisition cost and the final retail price thus derived are shown in Table XVIII.

It should be noted that retail prices including a professional fee are in all eighteen of the comparable cases higher than the retail prices which include a percentage markup as presently employed by pharmacists. Since prices of the drugs are higher and quantities dispensed would concomitantly be lower, the area of the welfare loss triangle would be increased. This is in accordance with the view that the use of a professional fee system eliminates price competition on drugs at the retail level. This loss of competition at the retail level places an additional welfare loss on that generated at the manufacturer level.

Since the estimated elasticities of demand were all greater than one in absolute value, the increase in drug prices would tend to reduce the total revenue accruing to pharmacists. However, whether the profits of pharmacists would increase or decrease depends upon the initial position of the pharmacists' prices and output levels. If the drugs' prices were initially lower than the profit-maximizing levels, then an increase in their prices would likely increase profits. If, however, the prices were initially above the profit-maximizing level,

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[2]U. S. Department of Health, Education and Welfare, Task Force on Prescription Drugs: The Drug Users (Washington, D. C., 1969), pp. 48-57.

TABLE XVIII

HYPOTHETICAL RETAIL DRUG PRICES WITH PROFESSIONAL FEE OF $2.00 PER PRESCRIPTION

Drug	Average[1] Prescription Size (number of tablets or capsules)	Markups per tablet or capsule (dollars)	Weighted-Average Acquisition Cost (dollars/tablet or capsule)	Retail Price including PF (dollars/tablet or capsule)
1. Tetracycline				
a) Generic	22	.09	.031	.121
b) Achromycin & Achromycin-V	16	.12	.113	.233
c) Tetracyn	17	.12	.044	.164
2. Meprobamate				
a) Generic	37	.04	.019	.059
b) Equanil	43	.05	.058	.108
c) Meprospan	29	.07	.118	.188
d) Miltown	45	.04	.059	.099
3. Digoxin				
a) Generic	63	.03	.0075	.0375
b) Lanoxin	60	.03	.0085	.0385
4. Chloral Hydrate				
a) Generic	30	.07	.016	.086
b) Noctec	26	.08	.041	.121

TABLE XVIII, Continued

	Average[1] Prescription Size (number of tablets or capsules)	Markups per tablet or capsule (dollars)	Weighted-Average Acquisition Cost (dollars/tablet or capsule)	Retail Price including PF (dollars/tablet or capsule)
5. Penicillin G Pot.				
a) Generic	27	.07	.020	.09
b) Pentids	18	.11	.085	.195
6. Reserpine				
a) Generic	70	.03	.007	.037
b) Serpasil	52	.04	.038	.078
7. Dexamethasone				
a) Generic	23[2]	.09	.045	.135
b) Decadron	23	.09	.127	.217
8. APC/Codeine				
a) Generic	22	.09	.0361	.1261
b) Empirin/Codeine	23	.09	.0363	.1263

(1) Source: U. S. Department of Health, Education and Welfare, Task Force on Prescription Drugs: The Drug Users (Washington, D. C., 1969), pp. 48-57.
(2) The average prescription size for the generic is not listed, therefore, the average prescription size of the trade-name drug was not used.

the reverse would be true. To the extent that the lessening of competition tends toward a joint-monopoly solution, the profits of pharmacists, as a group, would likely increase.

With Substitution

If pharmacists sold the same volume of all drugs that they presently do and free substitution resulted in the blending of all versions of a drug into a single group, it is possible that price competition among manufacturers would force all drug prices down to the competitive level as currently illustrated by the generic price level. That is, competition via substitution would cause the trade-name generic-name price differential to be erased. The welfare loss arising at the manufacturer's level would thus be eliminated by definition, assuming that generic price level is representative of the true opportunity costs of supplying the drug.

The impact of the occurrence of substitution and a professional fee system on pharmacists' costs, revenues, and profits can be seen by referring to Table XIX. Pharmacists' costs include only the acquisition costs of the drugs and it is assumed that their other costs of doing business do not vary as a result of substitution and the use of a professional fee system of pricing. The profit figures shown in the table thus only represent a net of revenues over the acquisition costs of the drugs and are not a true accounting or economic profit figure. They can, however, be compared with profit information based on the data received from pharmacists if the other costs of doing business do not vary. The data shown in the table are only for the sample of pharmacies for a one-month period.

TABLE XIX

HYPOTHETICAL COSTS, REVENUES AND PROFITS WITH A PROFESSIONAL FEE AND FREE SUBSTITUTION

	Average Prescription Size of all Versions of the Drug	Professional Fee Per Pill (dollars)	Retail Price Including PF	Total Revenue (dollars)	Total Costs (dollars)	Profit (dollars)
Tetracycline	18	.11	.14	30,194	6,686	23,508
Meprobamate	41	.05	.07	32.821	8,909	23,913
Digoxin	62	.03	.04	8,639	1,620	7,091
Chloral Hydrate	28	.07	.09	5,288	940	4,348
Penicillin G Pot.	22	.09	.11	7,952	1,446	6,506
Reserpine	61	.03	.04	3,495	612	2,883
Dexamethasone	23	.09	.14	3,440	1,105	2,334
APC/Codeine	22	.09	.13	9,529	2,645	6,883
TOTAL				101,359	23,964	77,396

The data actually received from pharmacists, using the percentage of cost markup method and presumably no substitution, yields a profit from these drugs of $43,088. This obviously is a smaller profit than would be achieved by pharmacists if they used a professional fee system and freely substituted. The sources of the increased profits are the reduced acquisition costs caused by price competition at the manufacturer level and the elimination of price competition at the retail level via use of a professional fee system.

Although the above situation would apparently eliminate the welfare loss resulting from monopoly elements at the manufacturer level, there may be a new welfare loss to consumers arising from tacit price collusion at the retail level. To the extent that retail drug prices using a professional fee system are above the opportunity costs of supplying these drugs, this would be the case.

The findings with regard to the retail prices of the drugs with substitution and a professional fee showed mixed results. The retail prices of the generic versions of the drugs, when a professional fee system is employed, are in every case higher than the retail prices of the drugs when the percentage of cost method is used. However, for seven of the ten trade-name drugs, the generic version price including a professional fee is lower than the current retail prices of the trade-name drugs.

Conclusions on the Professional Fee System

The use of a professional fee system of pricing, with or without substitution of versions of drugs, would serve to limit or virtually eliminate price competition at the retail level. To the extent that

drug prices are increased as a result of its use an additional welfare loss to consumers may be generated at the retail level. The fact that pharmacists' profits, with substitution and the use of a professional fee, are larger would seem to bear out the conclusion that the professional fee system is, in effect, a form of tacit price collusion.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The ethical drug industry is a highly concentrated one with a rather large competitive fringe of generic drug producers. The large drug manufacturers have, through the use of trade names for their products and relatively large promotional efforts, been able to secure a major portion of the prescription drug market. The smaller drug producers who ordinarily market their drugs by generic name have been unable to gain a significant share of the prescription drug market for drugs whose patents have expired. This is true even though their prices are substantially lower than their trade-name counterparts.

A major reason why competition among different versions of a drug has not developed stems from the presence of antisubstitution laws. Pharmacists, who possess the knowledge of different versions of a single drug and their respective prices, are prevented from using that knowledge to promote price competition among drug manufacturers on drugs whose patents have expired. Forty-seven states, including Oklahoma, presently have antisubstitution laws. These laws were originally intended to prevent the substitution of <u>one drug for another</u>. They have been interpreted and, in some cases, specifically state that <u>one brand of a drug can not be substituted for another brand of the same drug</u> when a prescription is written for a particular brand unless the substitution is first authorized by the physician who wrote the prescription.

The welfare loss to the consumers of the State of Oklahoma has been substantial, even on the small sample of drugs for which data were collected. Data received from the pharmacy sample showed that the value of the consumers' loss for a one-year period was approximately one and one-half million dollars on the eleven trade-name drugs of the sample at the wholesale or manufacturer level. This amount was just over 100 percent of the actual dollar sales of the trade-name drugs themselves. That is, the value of the loss in economic well-being to the consumers of the State of Oklahoma was larger than the amount they spent on the drugs under consideration.

The information collected on the attitudes of pharmacists indicates that pharmacists do, in many cases, have confidence in drugs produced by small generic manufacturers. Over half of the pharmacists indicated that they would, if given the legal opportunity, substitute lower-priced generic versions of drugs when given a prescription written for a higher-priced trade-name version of the drug. The motives for being willing to do so were varied. They included higher profits and concern about high prescription drug prices. An important motive given was that substitution of versions of drugs would allow the pharmacies to compete more effectively on the basis of price with other pharmacies. Thus, even though many pharmacists would not presently be willing to substitute, the "stick" of competition may serve to encourage them to reassess their views.

It thus becomes apparent that elimination of modification of existing antisubstitution laws may well serve to stimulate price competition at the retail and manufacturer level. This price competition would, in turn, tend to drive down the prices of trade-name drugs

and reduce or eliminate the large welfare loss to consumers which now exists. It should be recalled that the welfare loss estimate given above pertains only to the small sample of eleven trade-name drugs sampled. No mention is made of a possible welfare loss on the remaining unpatented drugs which have generic counterparts or of that resulting from the numerous patented trade-name drugs which have no generic versions.

To re-emphasize a point made earlier in this study, it is not recommended that pharmacists be allowed to substitute one drug for another. It is only recommended that a pharmacist be allowed to use his professional competence and the information he possesses to prudently substitute one manufacturer's version of a drug for another manufacturer's version of the same drug. Thus, price competition could be engendered with no loss in the quality of the drugs dispensed. It would, in many states, require only a modification of the existing law to permit this kind of substitution.

The professional or dispensing fee which has been discussed by many pharmacists as an alternative to the present percentage of cost method of markups was also investigated in this study. The findings with respect to this method were that, whether or not substitution was allowed, there would be an additional welfare loss imposed on consumers at the retail level. Pharmacists' profits would likely be increased by its use and retail drug prices would also be increased. It was found that the professional fee system represents a form of tacit price collusion which would serve to eradicate price competition on drugs at the retail level. Therefore, the conclusions of this study are that the conventional percentage of cost markup method should be retained as it

encourages price competition at the retail level and results in lower retail prescription drug prices.

Suggestions for further study in this area follow two general lines. The large welfare loss of this study seems to cast doubt on the small welfare loss estimates for the entire economy found in studies alluded to earlier. It is, therefore, suggested that other studies of welfare losses resulting from monopoly elements be made in specific industries to further investigate the validity of this doubt.

Secondly, the areas for needed research in the drug industry would seem to be limitless. Primary areas suggested would be in the area of the patented trade-name drugs and the international sales of drug producers, especially competition in the international drug market.

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APPENDIX

The importance of the difference in price between trade-name (monopoly) and generic-name (purely competitive) drugs arises from the method used to calculate the welfare loss in this study. The welfare loss estimation equation is:

$$1)\quad W = -\tfrac{1}{2}x_T P_G E_d t_x^2$$

where: W = welfare loss

x_T = volume (in pills or tablets) of the trade-name drug

P_G = price of the generic drug

$$E_d = -\frac{P_T}{P_T - P_G}$$

$$t_x^2 = \left(\frac{P_T - P_G}{P_G}\right)^2$$

Substituting the expressions for E_d and t_x^2 into the welfare loss equation:

$$2)\quad W = -\tfrac{1}{2}x_T P_G \left(-\frac{P_T}{P_T - P_G}\right)\left(\frac{P_T - P_G}{P_G}\right)^2$$

Therefore:

$$3)\quad W = -\tfrac{1}{2}x_T \left(-\frac{P_T}{P_G}\right)\left(P_T - P_G\right)$$

It is readily seen from equation (3) that the larger the price of the trade name vis-a-vis the price of the generic drug, the larger will be the estimated welfare loss.

For the welfare loss to be greater than the dollar sales volume of the trade-name drug:

$$4)\quad W = -\tfrac{1}{2}x_T \left(-\frac{P_T}{P_G}\right)\left(P_T - P_G\right) > P_T x_T = \text{total dollar sales}$$

where:

$$x_T > 0$$

$$P_T > 0$$

$$P_G > 0$$

$$P_T - P_G > 0$$

Therefore:

$$-\tfrac{1}{2}\left(\frac{P_T - P_G}{P_G}\right) > 1$$

or

$$5)\ P_T > 3P_G$$

Again, the relative prices of the trade and generic-name drugs determine the answer. If the price of the trade-name drug is greater than three times the price of the generic-name drug, then the welfare loss estimated will be greater than the total sales of the trade-name drug itself.

For the eleven trade-name drugs in the sample, using wholesale prices, eight trade-name prices were greater than three times the price of their generic equivalents. This accounts for the estimated wholesale welfare loss being greater than the total wholesale dollar sales of the trade-name drugs.

Using retail prices, only one trade-name drug's price was more than three times greater than the generic equivalent's price. As a result, the estimated welfare loss at retail was less than the total dollar sales of the trade-name drugs.

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