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THE DETERMINATION AND EVALUATION OF THE ECONOMIC SIGNIFICANCE OF THE CONSUMER PRICE DIFFERENTIALS BETWEEN GENERIC AND BRAND NAME PRESCRIPTIONS.

The Ohio State University, Ph.D., 1971
Health Sciences, pharmacy

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1971
THE DETERMINATION AND EVALUATION OF THE ECONOMIC SIGNIFICANCE
OF THE CONSUMER PRICE DIFFERENTIALS BETWEEN
GENERIC AND BRAND NAME PRESCRIPTIONS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Ashok Kumar Gumbhir, B. Pharm., M.S.

* * * * *

The Ohio State University
1971

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Some Pages have indistinct print. Filmed as received.

UNIVERSITY MICROFILMS
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My sincere thanks to Mrs. Mary Bartels for her assistance in preparing and editing the manuscript.

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support from The Ohio State University and the Pharmaceutical Manufacturers Association was of great significance.

The author is fully responsible for the opinions and interpretations expressed in this study.
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INTRODUCTION

In 1970 American consumers spent approximately $67 billion on health care. This represents a net increase of $41 billion over such expenditures in 1960. In 1960 health care accounted for 5.1 per cent of the gross national product of the United States; in 1970 the percentage had increased to 6.9. It has been estimated that in 1980 total health care expenditures will be more than $170 billion—9.1 per cent of gross national product.

The major component of health care costs has been hospital expenditures. Physicians' fees rank second and expenditures for drugs are the third largest component of the total. Drugs account for approximately 11 per cent of each dollar spent on health care. Prescription drug expenditures doubled in the 1960's, matching the increase in total health care expenditures.¹ Not only have total prescription drug

¹As of July 1971, the only source of data on health care expenditures have been lay press publications. The above-quoted figures are taken from Time, Vol. 97, No. 23 (June 7, 1971), pp. 86-93. The official government figures are published by the Department of Health, Education, and Welfare in the "Prescription Drug Data Summary." The 1971 issue of this publication does not include the 1970 figures.
expenditures increased, but the average prescription price has also risen from $3.22 in 1960 to $4.02 in 1970.\textsuperscript{2}

This marked expansion in total health care expenditures and expenditures on prescription drugs has aroused public concern. As a result, several health insurance plans have been presented in Congress. Most of these plans include some type of coverage for prescription drugs.\textsuperscript{3}

At present there is no law which imposes a ceiling on prescription drug prices sold by the manufacturer to the pharmacist or prescription prices charged by the pharmacist to the patient. Some of the operational prescription drug coverage insurance plans, however, put a ceiling on the maximum charges for the pharmacist's professional services.

To control the rising costs of prescriptions to the patient or to third parties, who reimburse the pharmacist for the price of the prescription, several steps have been suggested. One of these suggestions for cost control is that drugs be prescribed by generic names rather than by the manufacturer's brand names. The rationale presented by the proponents of generic prescribing is that a generic drug usually costs less


\textsuperscript{3}For detailed discussion on drug coverage under the proposed health plans, the reader is recommended to review the Drug Research Reports, Vol. 14, No. 15 (April 14, 1971), pp. 818-821.
to the pharmacist, and conceivably should be less expensive to the patient.

To bring the contemporary generic-brand controversy into focus, it is necessary to enumerate the nomenclature of drugs as used in modern therapeutics. A drug can be designated by at least three names: A chemical name which usually describes the molecular structure of a drug; a United States Adopted Name (USAN: commonly known as the generic name) which is used by the United States Pharmacopoeia and the National Formulary; and one or more brand names given to the drug by the manufacturers. The pharmaceutical manufacturing industry in the United States, represented by the Pharmaceutical Manufacturers Association, has been a staunch supporter of brand names. On the other hand, some academic and institutional circles, government agencies, some relatively small pharmaceutical manufacturers, and a limited number of physicians and pharmacists have tried to stimulate interest in the generic name of the drug. The chemical nomenclature of a drug is rarely used in writing prescriptions.

In 1968 the Department of Health, Education, and Welfare's Task Force on Prescription Drugs published its reports. One of its recommendations was that those drugs, which are available under a generic name, should be prescribed...
by the generic name only. Such a step, according to the Task Force, would result in savings of $41.5 million to the elderly consumers of drugs. However, the Task Force's estimate of savings was based on the cost difference of the drugs, both generic and brand name, to the pharmacist from the manufacturer or wholesaler. Inasmuch as the Task Force's report was based on theoretical calculations, the actual price paid by the patient to the pharmacist was not determined. Therefore, a study is warranted to determine if prescribing and dispensing by generic name results in significant savings to the patient. This investigation is designed to determine and evaluate price differentials to the patient between generically written and dispensed prescriptions and brand name written and dispensed prescriptions, if any.

It is proposed to select a representative number of community pharmacies in metropolitan Columbus, Ohio, and audit their prescription files for a selected number of generic and brand name prescription prices. The price of only those prescriptions written and dispensed by generic name will be compared to their brand name counterparts. The mean per unit price for each generic product will be compared with the mean per unit price of brand name products. If significant price differentials to the consumer are observed, such price differentials will be evaluated in terms of the operational characteristics of the retail pharmacies. If a significant
relationship can be established between the price differential and the operational characteristics, the results will be meaningful to those interested in the economic effects of the generic-brand name controversy and to those engaged in the study of prescription pricing structures of retail pharmacy operations.

This presentation in the initial chapters covers the historical background of the generic-brand name drug controversy, the economic analysis of pharmaceutical manufacturing and retailing, and a conceptual presentation of the prescription and its price. The economic effects of the generic-brand name controversy and the mechanics of the actual research—methodology, discussion, results, and evaluation—will be presented in the latter portion of the dissertation.
CHAPTER I

THE DEVELOPMENT OF THE CONTEMPORARY GENERIC-BRAND DRUG CONTROVERSY

In the past decade, the question of prescribing drugs by their generic name or their brand name has assumed major importance. It is generally believed that generic drugs are much less expensive than their brand name counterparts. The quality of generics has been subjected to much criticism, but the fundamental factor in the controversy appears to be economic in view of the frequent discussion of the prices of prescription drugs.

The fundamental premise in this section is that there is a cyclical pattern in generic and brand prescribing; that is, at a given point in history, one type of prescribing, either brand or generic, will be dominant.

Definition of terms

Since some of the terms to be used in this and subsequent chapters have dual meanings, these terms are being defined in the context of their usage in this investigation.

Generic name: This term will be treated first, since its use in pharmacy differs from the accepted use of the word generic
in most other fields. For the purpose of this study, generic name is defined as follows:

... the common, chemical or unregistered names of drugs, or the names recognized by the United States Pharmacopoeia, the National Formulary, or the Homoeopathic Pharmacopoeia of the United States, or the names adopted by the Council of Pharmacy and Chemistry of the American Pharmaceutical Association, ... 1

It should be noted that the Kefauver-Harris Amendment of 1962, to the Federal Food, Drug, and Cosmetic Act of 1938, has presented a mandate to the authorities responsible for nomenclature to settle on one well-chosen, non-proprietary name for each drug. 2

The American Medical Association and the United States Pharmacopoeia Committee have established a combined nomenclature committee to negotiate with manufacturers to find a single suitable non-proprietary (generic) name for each drug in general use. The term "United States Adopted Name" ("USAN") is used to designate the non-proprietary name.

The current trend among medical and pharmaceutical authorities on nomenclature is to use the word "non-proprietary" rather than "generic." 3 For our purposes, the term "generic

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2 Memo sent to all colleges of pharmacy from Dr. Lloyd C. Miller, Director of Revision, The United States Pharmacopoeia, dated October 18, 1962.
name" is defined as an accepted name, available for unrestricted use, which is unprotected or for which trademark protection has been waived. The use of the term "generic drug" in this paper means a drug identified by its generic name, rather than by the name given by the manufacturer or by a brand name.

The reason generic names are adopted revolves about three factors:

1. Scientific chemical nomenclature is unwieldy.

2. The chemical name of many compounds is virtually meaningless to all but accomplished chemists.

3. A compelling legal reason for using a generic name in conjunction with a trademarked pharmaceutical product is to reduce the risk of having a trademark become descriptive of the product and fall into public domain.

**Brand name**: A brand or part of brand consisting of a word, letter, group of words, or group of letters comprising a name which identifies the goods or services of a seller or group of sellers and distinguishes them from those of competitors.⁴, ⁵

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Prescription price: The actual monetary value of the prescription in dollars, paid by the patient or by a third party, to the pharmacist as recorded on the prescription.

Third parties: Those agencies, either public or private, who reimburse the pharmacist for the price of the prescription drugs received by the patient. Examples of such third parties are state and county welfare departments, private insurance carriers, and industrial commissions. In most instances, the prescription price, if charged to a third party, is different from the customary and usual prescription prices of the participating pharmacies.

Chain pharmacy: When more than one terminal drug distribution outlet is operated under the same name, at different locations in the metropolitan area of Columbus, Ohio, this will be considered a chain pharmacy. All stores which do not conform to this definition will be considered independent pharmacies.

Historical perspective on drug nomenclature

Today a "drug" can be defined as a chemical substance endowed with some action on living matter. However, the same chemical substance can have (a) a chemical name, (b) a generic name, and (c) one or more brand names. For example, a commonly used, broad spectrum antibiotic has the following names:

1. Chemical name: 4-Dimethylamine-1, 4, 4a, 5, 5a, 6, 11, 12a, Octahydro 3, 6, 10, 12a, pentahydroxy-6 methyl-1, 11, dioxo-2-nephtacene carboxamide.
2. Generic name: Tetracycline.

3. Brand names: Achromycin of Lederle Laboratories, Cyclopar of Parke-Davis, Panmycin of Upjohn, Sumycin of Squibb, Tetracyn of Pfizer, Tetrex of Bristol, and others.

The practice of assigning brand names is not new. The first recorded brand name was given to magnesium sulfate in 1698 (in England) as Epsom Salts. The first American brand name for a medicine was "Tuscarora Rice" in 1711, and this brand name medicine was sold as a cure for consumption. However, in those days these brand name drugs were usually called patent medicines.

Therefore, it can be assumed that most drugs used for treating and curing the known diseases of that period were brand name drugs. In other words, the "drug market" was dominated by brand name drugs. A point worth noting is that most of the brand name drugs of the 17th and 18th centuries were mixtures of several supposedly active substances, whose chemical composition was either unknown even to the manufacturer or was kept as a closely guarded secret.

In order to evaluate the economic effects of contemporary generic-brand controversy, it is necessary to trace the early patent legislation, and the emergence of generic drugs.

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The influence of early patent legislation

In the United States, the first patent law was enacted in 1790. The first American patent dealing with therapeutic matters was granted to a physician in 1796. The original patent law remains virtually unchanged up to the present time, in spite of the efforts made to change the law in the early 1960's by Senator Kefauver. The active patent life of drug patents is still seventeen years from the date of issue. However, trademarks, being different from patents in their life span, have become more important in contemporary pharmaceutical industry. Unlike patents, trademarks are protected under the Lanham Act and are virtually unlimited in their lifespan.

From its inception, the patent law has been misused by some unethical manufacturers. Many physician-apothecaries patented their own formulas and exploited the public through the temporary monopoly granted to the patent holder under the patent act. This resulted in flooding the market with medicines of very questionable value under protected patent names or a proprietary name used as a trademark. The concurrent development of the newspaper industry in the early 1800's served as a convenient vehicle for reaching all corners of the country by these unscrupulous patent holders.

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9 Ibid., p. 24.
Most of these "patented medicines" were brand named, and usually failed to perform in accordance with their advertised claims. In reality, many of them were more poison than medicine. This rampant quackery led to their decline in the market and drugs of botanical origin gained more importance. However, these new drugs, derived from medicinal plants as they were, could not be patented, because they were naturally occurring substances and not the invention of a single person. This situation provided the impetus needed to usher in a new era in medicine—the generic era.

The Generic Era: 1850 to 1920

Within the profession of pharmacy, a small, but very active group of pharmacists had begun a reform movement to elevate the general standards of professional practice. The efforts of this reform group brought into being the concept of "ethical specialty."\textsuperscript{11}

An account of one such reformer is as follows:

Disgusted with the rampant quackery of the time, Mr. Stearns resolved to offer a few simple preparations in popular sized packages, bearing full directions for use, and in addition a plain statement of the names and quantities of their ingredients. . . . Other druggists, lacking Mr. Stearns' manufacturing facilities, adopted the plan and had him manufacture and finish simple preparations for them, bearing their names.\textsuperscript{12}

\textsuperscript{11} Kedersha, op. cit., p. 26.
\textsuperscript{12} Kremers and Urdang, op. cit., p. 430.
Although these products were intended for over-the-counter sale to consumers by pharmacists, they were also prescribed by some physicians. One old pharmaceutical manufacturer, has implied, in an account describing its early history, that substitution or brand interchange with duplicate or similar products was a problem to innovators almost at the very inception of "ethical specialities." This account described the following condition in 1858:

The partnership's advertisements to the retail trade, appearing in the Druggists' Circular, featured a large variety of specialties, including "Compound Syrup of Phosphate or Chemical Food" which became so popular among prescribing physicians that Blair and Wyeth felt obliged to denounce imitations as a "reprehensible appropriation."13

Now drugs were being prescribed by their generic names and the myth of patent medicines had been exploded. Though the most commonly used drugs at that time were galenicals, some product differentiation could be achieved by a limited number of manufacturers based on their reputation for quality and their ethical distributive practices. However, the seventh and eighth decades of the 19th century were the formative years of the United States pharmaceutical industry. Most of these manufacturers made similar preparations, such as tinctures, fluid extracts, etc., and directed their marketing efforts to the pharmacist, who used these preparations in compounding the

physician's prescription orders. At the turn of the century, a majority of the prescriptions were written by their generic names and the so-called proprietary brand name medicines had declined to a small fraction of the total prescription drug market.

Returning to the fundamental premise of a cyclical pattern in prescribing, it can be observed that the original brand name market had become a generic-dominated market. The general professional aversion on the part of the pharmacists and physicians towards brand name drugs was readily seen under the "General Principles to be Followed in Revising the Pharmacopoeia" which appeared in The Pharmacopoeia of the United States - Seventh Decennial Revision of 1890, "Proprietary or Patented Articles": "No substance which cannot be produced otherwise than under a patented process or which protected by proprietary rights, shall be introduced into the Pharmacopoeia." This rigid policy of the United States Pharmacopoeia sealed the fate of brand name products. The policy was revised later.

The situation was different in Europe. Paul Erlich had started his pioneering work on specific chemotherapeutic agents (arsphenamine, etc.) and the therapeutic miracle of such organo-metallic compounds was making news headlines in the United States. However, these revolutionary new compounds were protected by patents in Germany. The United States had to depend on the German chemical industry for this new breed of drugs. When the United States entered World War I, the
government seized the German patents and made them available to American manufacturers. This resulted in a greater degree of self-sufficiency in the American synthetic organic chemical industry. These patent protected substances were not given "official" recognition until 1926. Eventually, in the 10th Decennial Revision of the United States Pharmacopoeia, recognition was given in a policy statement: "The Board of Trustees considered it wise to admit any substance that the Subcommittee on Scope may recommend and the Committee on Revision may accept."

The brand name, patented medicines were given a new lease on life.

The Period of Flux: 1920 to 1950

In these three decades, several miracle drugs were discovered: for example Sulfonamides in Germany, Penicillin in Great Britain, Chloramphenical, Streptomycin, Chlorotetracycline and Oxytetracycline in the United States. Several vitamins were also discovered in this period, but they could not be patented since they occurred in nature (that is, in plants, etc.). These discoveries were very expensive. The economics of drug innovation was becoming uppermost in the minds of drug manufacturers in the United States. So was the economics of drug obsolescence. For example, the discovery of Sulfonamide derivatives and their effectiveness in treating pneumonia completely replaced the

14 Kedersha, op. cit., p. 29.
biological therapy for this disease. The manufacturers of pneumonia antiserums were put out of business overnight.

The pharmaceutical industry in this country once again started seeking shelter under the protective roof of patents. One thing had become clear to the pharmaceutical manufacturers. That is, in order to survive in this state of flux, new products with their enormous profit potential were a necessity. The discovery of penicillin and the development of fermentation technology for its production had opened a new era of chemotherapy. Higher levels of sophistication in manufacturing and quality control were required and so were new dosage forms. In addition to these applied breakthroughs, during World War II the pharmaceutical industry was able to accumulate a great reservoir of fundamental chemical knowledge. Commercial development of penicillin had demonstrated that the ingenuity of the pharmaceutical industry could overcome almost any problem. Thus the future of drug development was sequestered in private industry rather than public institutions.

**The Brand Era: 1950 to 1960**

In this short span of time, the development and marketing of drugs by their brand names reached unprecedented proportions. Diuretics, hormones, antihypertensives, non-narcotic analgesics, antibiotics, tranquilizers, and other ataraxics were discovered and marketed. It is to the credit of the pharmaceutical industry of having invested millions of dollars in research laboratories
in search of new and better drugs. This was a risky venture. On the other hand, the marketing departments of various manufacturers were given a free hand in pricing the newly discovered and patented products. Prices were set in order to enable the manufacturer to recover the capital invested in research and development of a new product and to cover losses sustained through the obsolescence of their existing product lines. Brand names become the order of the day. A case in point to prove this explosion in brand names is tetracycline. The first broad-spectrum antibiotic, Aureomycin, was marketed in 1948 as a brand name product. There was no chemical name since the chemical structure was not known. Similarly, there was no generic name, since none had been assigned. The only way a physician could prescribe this product was to use the brand name, Aureomycin. Moreover, no one except the discoverer could legally manufacture this drug in this country, unless licensed, since it was a patented drug.

The pharmaceutical industry became one of the most profitable industries during this era. The ingenious method of emphasizing the brand names resulted in a complete reversal of the generic-brand name picture, inasmuch as by the end of 1960, brand name drugs accounted for over 94% of the total prescription market. This could be called the era of brand name drugs.

The high profitability of brand name manufacturers was not without side effects. In December of 1959, Senator Kefauver began his much publicized hearing on monopoly in the drug industry. With the precedent set by the investigation of the United States pharmaceutical industry, other countries proceeded to study their drug industries. For example, the Sainsbury Committee was impaneled to investigate the pharmaceutical industry of Great Britain.  

The resurgence of generics: 1961 to the present

The investigations of the Kefauver Committee have officially been terminated, but the actual investigation is carried on by Senator Nelson's subcommittee. Drug profits have become a subject of heated controversy, much as they were three centuries ago when "apothecaries charge" was a synonym for unreasonably high prices. As a result of Senator Nelson's hearings, it has been suggested that drugs prescribed by their generic name cost far less to the patient than their brand name counterparts. The Task Force on Prescription Drugs recommended prescribing by a generic name, and projected a savings of $4.1 million if available generic drugs would be prescribed exclusively by generic

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name for the sixty-three drugs which are obtainable by generic name; that is, drugs available from several sources are less expensive if ordered by their generic names rather than by the brand name counterparts.

The issue appears to have become that of the economics of drug prescribing. The United States pharmaceutical industry prefers to maintain the status quo in favor of brand prescribing. The brand name manufacturers, represented by the Pharmaceutical Manufacturers Association, support the hypothesis that chemical equivalents are not necessarily clinical equivalents, and this has touched off unprecedented arguments over the issue of the equivalency of generic and brand name products. In some instances, generic drugs have been withdrawn from the market because they did not achieve the same blood levels as their brand name counterparts, which were considered as reference products. Some physicians have voiced concern regarding compulsory generic prescribing, maintaining that prescriptions by generic name should not be required.

However, the FDA had never made a categorical statement regarding the clinical equivalence of two chemically identical

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20Reese, op. cit., p. 74.

products until January 1971. At that time the Food and Drug Administration Commissioner told Senator Nelson's committee that if two products have been certified by the FDA as chemically equivalent, then they are also clinically equivalent. If this line of argument is pursued further, then brand name manufacturers have only minor support for the hypothesis that chemical equivalents may not be biological equivalent, because of differences in formulation techniques. However, the Commissioner limited his remarks to only those products which were either certified by the FDA or those for which New Drug Applications have been approved by the FDA. Since the FDA at present certifies all batches of antibiotics, insulin, and only a limited number of other products, his statement can not be considered all-inclusive. Evidently, the FDA is inclined to support the generic bandwagon.

The American Pharmaceutical Association has also come forward in favor of generic prescribing. Last year the House of Delegates passed a resolution calling for the repeal of the antisubstitution laws which require that a prescription written for a brand name product must be filled with that product and no other. However, these laws do not apply to prescriptions written by generic name, which can be filled with any brand name product.

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23 FDC Reports, Vol. 33, No. 6 (February 8, 1971), p. 16.
product. The resolution to repeal these laws is due for more debate before it is finally accepted.

Original research studies on the economics of generic and brand name prescriptions are lacking. Azarnoff conducted one study using a single drug available under both brand name and as a generic product, and concluded that the prescription written by generic name costs less than the brand name prescription. Hammel and McCormick audited brand and generic name prescriptions for twelve commonly prescribed products, and found that statistically significant priced differentials to the patient existed in two of the twelve products. The results and shortcomings of these and other research will be discussed in greater detail in Chapter IV.

From an historical standpoint, the generic share of the total prescription market has shown a consistent increase in the past decade, as shown in the table below. It is expected that the controversy on generic and brand name drugs will continue as far as their quality, economy, and usefulness is concerned.


TABLE 1
GENERIC DRUG SHARE OF THE TOTAL PRESCRIPTION DRUG MARKET

<table>
<thead>
<tr>
<th>Year</th>
<th>Per Cent of Total Market</th>
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<tr>
<td>1961</td>
<td>5.5</td>
</tr>
<tr>
<td>1962</td>
<td>5.6</td>
</tr>
<tr>
<td>1963</td>
<td>5.3</td>
</tr>
<tr>
<td>1964</td>
<td>5.8</td>
</tr>
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<td>1965</td>
<td>6.2</td>
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<td>1966</td>
<td>6.2</td>
</tr>
<tr>
<td>1967</td>
<td>7.0</td>
</tr>
<tr>
<td>1968</td>
<td>8.1</td>
</tr>
<tr>
<td>1969</td>
<td>8.6</td>
</tr>
<tr>
<td>1970</td>
<td>9.0</td>
</tr>
</tbody>
</table>


From the foregoing discussion, it is evident that there is a renewed interest in prescribing and dispensing generic products. In this chapter the relevant facts and assumptions about generic and brand name drugs have been presented in very broad terms. All these facets of prescription pricing will be dealt with in detail in the main body of the dissertation. Our interest throughout the discussion will be limited to the economics of the controversy rather than the therapeutic efficacy of generic products.
Economics of pharmaceutical manufacturing

In the United States there are 1300 companies engaged in pharmaceutical manufacturing.¹ Ninety-five per cent of all the ethical pharmaceuticals are produced by 124 firms which are members of the Pharmaceutical Manufacturers Association (hereafter referred to as PMA).

The pharmaceutical industry can be characterized as research oriented and highly profitable. The competition within the industry is product oriented, rather than price oriented. The pharmaceutical industry has no "rule of thumb" formula for pricing its products. (If there is such a formula, it has never been divulged.)

The number of new products introduced by the pharmaceutical manufacturers has declined in the past five years. Table 2 illustrates this point.

TABLE 2

NUMBER OF NEW DRUG PRODUCTS INTRODUCED IN THE UNITED STATES
(1956 - 1970)

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of New Products</th>
<th>5-Year Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956</td>
<td>467</td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>496</td>
<td></td>
</tr>
<tr>
<td>1958</td>
<td>479</td>
<td></td>
</tr>
<tr>
<td>1959</td>
<td>419</td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>409</td>
<td>2270</td>
</tr>
<tr>
<td>1961</td>
<td>371</td>
<td></td>
</tr>
<tr>
<td>1962</td>
<td>339</td>
<td></td>
</tr>
<tr>
<td>1963</td>
<td>265</td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>203</td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>141</td>
<td>1319</td>
</tr>
<tr>
<td>1966</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>133</td>
<td>543</td>
</tr>
</tbody>
</table>


Not only has the number of new products declined in recent years, but the number of new single drug entities has also declined, as can be seen in the following table.

This decrease in the number of fresh arrivals in the market is expected to continue, in view of the strict enforcement of the 1962 Kefauver-Harris Amendment by the Food and Drug Administration. In the past, the United States has led
TABLE 3
NUMBER OF NEW SINGLE CHEMICAL DRUG ENTITIES
MARKETED IN THE UNITED STATES
(1956 - 1970)

<table>
<thead>
<tr>
<th>Years</th>
<th>No. of Products</th>
<th>5-Year Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>1958</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>1959</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>1961</td>
<td>41</td>
<td>245</td>
</tr>
<tr>
<td>1962</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>1963</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>23</td>
<td>127</td>
</tr>
<tr>
<td>1966</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>16</td>
<td>79</td>
</tr>
</tbody>
</table>


The research and development expenditures of the pharmaceutical industry has shown a consistent increase in the past two decades, in spite of the decrease in the number of new products. Table 5 presents data on research and development expenditures of the industry.
**TABLE 4**

SOURCES OF NEW MEDICINES CLASSIFIED BY NATIONAL ORIGIN  
(1940 - 1969)

<table>
<thead>
<tr>
<th>Nation</th>
<th>Number of New Drugs Introduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>536*</td>
</tr>
<tr>
<td>Switzerland</td>
<td>57</td>
</tr>
<tr>
<td>Germany</td>
<td>41</td>
</tr>
<tr>
<td>England</td>
<td>40</td>
</tr>
</tbody>
</table>

*92% of these came from the industry's own laboratories.


**TABLE 5**

PHARMACEUTICAL INDUSTRY RESEARCH SPENDING

<table>
<thead>
<tr>
<th>Year</th>
<th>Dollars Spent (in millions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>$39</td>
</tr>
<tr>
<td>1951</td>
<td>50</td>
</tr>
<tr>
<td>1953</td>
<td>67</td>
</tr>
<tr>
<td>1955</td>
<td>91</td>
</tr>
<tr>
<td>1957</td>
<td>127</td>
</tr>
<tr>
<td>1959</td>
<td>197</td>
</tr>
<tr>
<td>1961</td>
<td>238</td>
</tr>
<tr>
<td>1963</td>
<td>282</td>
</tr>
<tr>
<td>1965</td>
<td>351</td>
</tr>
<tr>
<td>1967</td>
<td>448</td>
</tr>
<tr>
<td>1969*</td>
<td>557</td>
</tr>
<tr>
<td>1970*</td>
<td>600</td>
</tr>
</tbody>
</table>

*Estimated.


Note: The research and development expenditure figures quoted in the above table are taken from PMA sources. Other sources have disputed the accuracy of these expenditures but have not offered any figures of their own.
Research and development expenditures are geared to discovering and developing patentable new products. A survey of the top fifty prescription drugs sold in the United States reveals that thirty-eight of these are single chemical entities. Of these thirty-eight, nineteen have already lost patent protection and an additional six are generics. Patent expiration dates for selected single chemical entity products are given in Table 6.

### TABLE 6

**PATENT EXPIRATION DATES OF IMPORTANT PRODUCTS**

<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
<th>Year of Patent Expiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darvon</td>
<td>Lilly</td>
<td>1972</td>
</tr>
<tr>
<td>Librium</td>
<td>Roche</td>
<td>1976</td>
</tr>
<tr>
<td>Diuril</td>
<td>Merck, Sharpe, &amp; Dohme</td>
<td>1974</td>
</tr>
<tr>
<td>Noludar</td>
<td>Roche</td>
<td>1971</td>
</tr>
<tr>
<td>Hydrodiuril</td>
<td>Merck, Sharpe, &amp; Dohme</td>
<td>1981</td>
</tr>
<tr>
<td>Declomycin</td>
<td>Lederle</td>
<td>1978</td>
</tr>
<tr>
<td>Orinase</td>
<td>Upjohn</td>
<td>1978</td>
</tr>
<tr>
<td>Indocin</td>
<td>Merck, Sharpe, &amp; Dohme</td>
<td>1981</td>
</tr>
<tr>
<td>Illosone</td>
<td>Lilly</td>
<td>1978</td>
</tr>
<tr>
<td>Valium</td>
<td>Roche</td>
<td>1985</td>
</tr>
<tr>
<td>Gantanol</td>
<td>Roche</td>
<td>1976</td>
</tr>
<tr>
<td>Ampicillin*</td>
<td>Beecham</td>
<td>1978</td>
</tr>
</tbody>
</table>

*Might be vacated earlier due to pending court actions against Beecham.

Source: Personal Communication from Mr. Neil J. Gittleman of Roche Laboratories, Nutley, New Jersey.

From the previous table, it is clear that many of today's major products will lose their patent protection in this decade. As the number of new patentable products introduced into the

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market decreases, the competition from generic products will increase. This statement is based on the assumption that there will be no change in the status quo of the present patent life of a drug. So far, all attempts to reduce the patent life of drugs have failed.

Generic manufacturers usually wait for the expiration of the patent on an important and fast-selling drug product. Upon expiration of the patent, generic manufacturers generally introduce the same chemical entity at substantially lower prices to the pharmacist. The brand name manufacturer, who in many cases is also the original patent holder, either substantially reduces the price of his brand product (as in the case of Thorazine, made by Smith, Kline, & French) or introduces a new and better brand named product (as in the case of Pfizer's Terramycin; upon expiration of its patent in 1959, Pfizer introduced a newer and better broad spectrum antibiotic under the name Vibramycin). In other instances, if the patent is lost before the normal seventeen year patent life as a result of legal action by the Government, generic competition can be introduced at an earlier date (as in the case of Tetracycline).

In summary, then, it can be said that the number of new products introduced in the market is decreasing, the cost of introducing a new product is increasing, and, in the coming years the competition from generic manufacturers is expected to increase.
Economics of drug retailing

There are two major types of terminal drug distribution outlets: (1) the community retail pharmacy (a drugstore) and (2) hospital pharmacies. In the United States, in 1968, there were a total of 52,367 community pharmacies engaged in the retailing of prescription drugs. In addition to these, there were 4,905 hospitals with pharmacies. These institutions of drug retailing were manned by 124,486 active pharmacists.\(^3\)

Since this study is limited to retail drug distribution at the community level, the discussion in this, as well as subsequent chapters will be confined to community pharmacies. Elimination of hospital pharmacies attached to hospitals from this study is due to the following reasons:

(1) The inventory of drugs in a hospital pharmacy is geared to the needs of a particular hospital; for example, a pharmacy attached to a children's hospital will, in most instances, stock pediatric dosage forms of drugs;

(2) Since the pharmacy caters to the needs of a given hospital, its brand selection or generic drug selection is usually dictated by a committee of physicians and pharmacists, commonly called the Pharmacy and Therapeutics Committee;

\(^3\)This data was obtained by the Social Security Administration, Office of Research and Statistics, from various sources, and is reported annually in their publication Prescription Drug Data Summary. The statistics quoted are from the July 1970 issue, p. 29.
(3) Most manufacturers offer special quantity rates to many hospitals, which are lower than the rates charged the community pharmacies;

(4) The patients admitted in the hospitals have no choice but to get their drugs from the hospital pharmacy only. So there is no price competition in a hospital pharmacy setting, whereas the price competition is intense in retail pharmacy outlets on a community pharmacy level.

The community pharmacy practice of drug distribution is generally classified into two main groups: independent pharmacies and chain pharmacies (as defined in Chapter I). From an institutional point of view, the two are different in the following respects:

(1) Independent pharmacies are usually owned and operated by a single person who is a pharmacist and the manager of the store. Being a one man operation, there is considerable flexibility in making and modifying operational policies. Such policies may include buying both generic and brand name drugs, advertising, pricing of prescriptions, and maintaining relationships with the prescribing physicians.

(2) The service component of prescription filling (offering delivery, credit, family prescription records, etc.) is governed by the pharmacist-manager in independent pharmacies, whereas the chain pharmacies in most instances have a uniform policy of offering or deleting this component of prescription dispensing.
In general, it can be concluded that chain pharmacies exhibit more operational rigidity and uniformity with a chain's stores; independent pharmacies are characterized by diversity and flexibility. Chain stores accounted for 42 per cent of all prescriptions filled in 1970 in community pharmacies. Independent pharmacies accounted for the remaining 58 per cent.

Chain pharmacies showed an average net profit before taxes of 5.3 per cent in 1970 as a per cent of sales, whereas independent pharmacies had an average net profit before taxes of 4.5 per cent.

A significant difference between independent and chain pharmacies is that, in a chain pharmacy, the prescription department sales account for 16.8 per cent of total sales as compared to 43.7 per cent in an independent pharmacy. Evidently, an independent pharmacy must depend more on prescriptions as a major source of revenue, while a chain store earns its major revenue from departments other than prescriptions.

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4 The total number of chain stores in the United States in 1970 was reported as 15,898. Each chain store filled an average of 107 prescriptions per day, approximately 621 million in 1970. The total number of prescriptions filled in 1970 is estimated at 1.43 billion. These figures are taken from The Chain Store Age, Vol. 47, No. 4 (April, 1971), pp. 136-138.

5 Ibid., p. 141.


7 The Chain Store Age, op. cit., p. 134.

8 Slavin, op. cit., p. 10.
Thus, it can be seen that, while both chain and independent pharmacies are engaged in the retail prescription business, they have several differentiating characteristics. These characteristics can have a direct bearing on the price that a consumer pays for a prescription. Consequently, the next chapter is devoted to an analysis of this and other factors involved in prescription pricing.
CHAPTER III

THE PRESCRIPTION AND ITS PRICE

The retail prescription price paid either by the patient or by any other agency consists of three basic costs:

1. Cost of the ingredient to the pharmacist from the manufacturer or the wholesaler.

2. Cost of the professional and customer services of the pharmacist to the patient.

3. Desired profit of the pharmacy as a return on the investment and for the risks involved.

In 1970, the retail pharmacies in the United States dispensed 1.43 million prescriptions.\(^1\) Selected average prescription price to the patient in independent and chain pharmacies over the past twenty years is shown in Table 7. This steady increase in prescription prices could be due to one or more of the following causes:

1. An increase in ingredient cost (the cost of the drug to the pharmacist from the manufacturer or the wholesaler). In 1970, ten products out of the top 100 drugs increased in

---

TABLE 7
SELECTED AVERAGE PRESCRIPTION PRICE
(1950 - 1970)

<table>
<thead>
<tr>
<th>Year</th>
<th>Independent Pharmacy</th>
<th>Chain Pharmacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>$1.77</td>
<td>n.a.*</td>
</tr>
<tr>
<td>1960</td>
<td>3.19</td>
<td>n.a.*</td>
</tr>
<tr>
<td>1966</td>
<td>3.59</td>
<td>$3.16</td>
</tr>
<tr>
<td>1967</td>
<td>3.66</td>
<td>3.22</td>
</tr>
<tr>
<td>1968</td>
<td>3.78</td>
<td>3.29</td>
</tr>
<tr>
<td>1969</td>
<td>3.90</td>
<td>3.51</td>
</tr>
<tr>
<td>1970</td>
<td>n.a.*</td>
<td>3.63</td>
</tr>
</tbody>
</table>

*Not available.


cost to the pharmacist. The cost to the pharmacist of three other products of the same group declined in the same period. This increase in ingredient cost is usually passed on to the consumer, resulting in higher prescription prices.

2. An increase in the pharmacist's fee for professional services or in the retail markup. Table 8 presents relevant data on the increase in proprietor's salary, employees' wages, and gross margin in a typical retail pharmacy operation. It should be noted that this increase is in absolute dollar amounts, not as a percentage of sales.

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TABLE 8
YEARLY SALARY OF PROPRIETORS OF INDEPENDENT PHARMACIES
AND WAGE EXPENSE OF INDEPENDENT PHARMACIES

Expressed in Dollars

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales</th>
<th>Gross Margin</th>
<th>Proprietor's Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>$138,342</td>
<td>$49,517</td>
<td>$11,377</td>
</tr>
<tr>
<td>1961</td>
<td>139,176</td>
<td>50,047</td>
<td>11,595</td>
</tr>
<tr>
<td>1962</td>
<td>146,185</td>
<td>52,692</td>
<td>12,244</td>
</tr>
<tr>
<td>1963</td>
<td>153,262</td>
<td>55,847</td>
<td>12,610</td>
</tr>
<tr>
<td>1964</td>
<td>161,773</td>
<td>58,333</td>
<td>12,840</td>
</tr>
<tr>
<td>1965</td>
<td>167,647</td>
<td>60,753</td>
<td>13,396</td>
</tr>
<tr>
<td>1966</td>
<td>174,646</td>
<td>62,745</td>
<td>13,604</td>
</tr>
<tr>
<td>1967</td>
<td>188,429</td>
<td>67,643</td>
<td>14,926</td>
</tr>
<tr>
<td>1968</td>
<td>198,917</td>
<td>71,045</td>
<td>15,896</td>
</tr>
<tr>
<td>1969</td>
<td>213,710</td>
<td>77,341</td>
<td>17,023</td>
</tr>
</tbody>
</table>

Expressed in Percentage of Sales

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales</th>
<th>Margin</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>100.0</td>
<td>35.8</td>
<td>8.2</td>
</tr>
<tr>
<td>1961</td>
<td>100.0</td>
<td>36.0</td>
<td>8.3</td>
</tr>
<tr>
<td>1962</td>
<td>100.0</td>
<td>36.0</td>
<td>8.4</td>
</tr>
<tr>
<td>1963</td>
<td>100.0</td>
<td>36.4</td>
<td>8.2</td>
</tr>
<tr>
<td>1964</td>
<td>100.0</td>
<td>36.1</td>
<td>7.9</td>
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<td>1965</td>
<td>100.0</td>
<td>36.2</td>
<td>8.0</td>
</tr>
<tr>
<td>1966</td>
<td>100.0</td>
<td>35.9</td>
<td>7.8</td>
</tr>
<tr>
<td>1967</td>
<td>100.0</td>
<td>35.9</td>
<td>7.9</td>
</tr>
<tr>
<td>1968</td>
<td>100.0</td>
<td>35.7</td>
<td>8.0</td>
</tr>
<tr>
<td>1969</td>
<td>100.0</td>
<td>36.2</td>
<td>8.0</td>
</tr>
</tbody>
</table>


A general rise in overhead expenses of the pharmacy contributes to a steady increase in prescription prices. This is further evidenced by the fact that several private insurance carriers have increased the professional fee of the Ohio pharmacies from $1.95 to $2.15, beginning May 1, 1971.
3. Larger number of units per prescription. A physician is at liberty to prescribe any reasonable number of units (capsules, tablets, etc.) in a prescription. Over the last two decades, maintenance drugs have shown considerable market penetration. These maintenance drugs are oral anti-diabetics, cardiotonics, diuretics, or some drugs affecting the central nervous system. Many of these drugs have to be taken by the patient for the rest of his life. Once a physician has determined the suitability of a drug for a patient, the physician is more inclined to write a prescription for a larger quantity. It is not uncommon to find a prescription order covering a period of two or three months for a maintenance drug. Firestone investigated this aspect of prescriptions over a ten year period (1960 to 1969) and found that, in 1969, the number of doses per prescription was 27 per cent more than that in 1960. In Firestone's opinion, the steady increase in prescription prices in this period is due to a greater number of units per prescription.\(^3\)

The preponderance of maintenance drugs in the total prescription drug market can be further illuminated by the fact that sixty-one of the 100 top selling drugs are meant for long-term therapy of chronic disease.\(^4\) Firestone concluded that, if


\(^4\)Gosselin, op. cit., p. 31.
the number of units per prescription was held constant, today's prescription should cost 5.8 per cent less than that of 1960.\footnote{Firestone, op. cit., p. 6.}

In spite of Firestone's observations, prescription prices as reported by two leading trade publications, cited above, have shown a considerable increase.

4. Third party programs, provided and paid for by the federal, state, or local government; other agencies, e.g., Medimet prescription coverage provided by the Metropolitan Life Insurance Company which operates on a straight professional fee of $2.15 per prescription (in Ohio); state welfare programs, for example, the Ohio Welfare Department programs which operate on a cost plus 50 per cent of cost markup system; etc. In the past five years, the number of third parties reimbursing the pharmacist for his prescription services has increased considerably. Dr. T. Donald Rucker of the Social Security Administration has stated:

Before the early part of 1976, it seems possible that some 70 per cent of all prescribed medications will be covered by the combined enrollments under private and public drug insurance plans. Moreover, if universal national health insurance should be enacted, this figure would jump to nearly 100 per cent.\footnote{T. Donald Rucker, "Drug Insurance and Vendor Compensation," paper presented at the annual meeting of the California Pharmaceutical Association, Fresno, California, June 5, 1970.}

The expanded involvement of third parties in reimbursing the pharmacist can have a profound effect on the average prescription price. Before going into detail regarding reimbursement
mechanisms offered by third parties, we can illustrate the effect of the two conventional pricing systems used by pharmacies to calculate the prescription price.

Assuming that a typical prescription calls for 100 tablets of Equanil 400 mg., the direct purchase cost of the drug to the pharmacist is $6.00. The selling price under the professional fee system of pricing (given a professional fee of a typical pharmacy of $2.00) would be $8.00. With the markup system of pricing, the retail price to the patient (if the markup equals 50 per cent of cost) would be $9.00. The quantity called for in the prescription (100 tablets) should be noted. Had the prescription called for twenty tablets of Equanil 400 mg., the prescription price to the patient under the fee system will be $1.20 plus $2.00, that is, $3.20; under the markup system, the price would be $1.20 plus $.60, or $1.80.

Most third parties favor reimbursing a pharmacist on a straight fee basis. (The Ohio Welfare Department is a notable exception.) In spite of some legal complication, most private insurance carriers reimburse the pharmacist under a simple formula of the acquisition cost of the drug plus a fixed

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professional fee. This fee may vary regionally. The only state in which this formula can not be applied is Virginia, where the courts have ruled that fixed fee prescription prepayment plans result in illegal restraint of trade because it allows price-fixing among competitors.

If the professional fee was to become the single, universal method for payment to all pharmacists, the average prescription price would rise sharply. Since the majority (57.5 per cent) of all prescriptions are priced between $1.51 and $4.00, the strict use of the professional fee system would result in raising the average prescription price on over 50 per cent of all prescriptions. The use of a professional fee has been strongly advocated, however, by Apple, Hartlieb, Myers, Jacoff, and Fuller.

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However, the current thinking is to use a professional fee which is individualised for each pharmacy, depending upon the expense, i.e., salaries, overhead, profit margins, volume of prescription business, etc. So far there is no universally acceptable fee for all the pharmacies in the country.

5. The intrinsic differences in products prescribed.
For example, modern drugs have more specific indications, therefore, a more limited market potential which results in a reduced inventory turnover. One source has estimated that 75 per cent of today's prescriptions are written for products which were not available ten years ago. The antibiotic era, ushered in by penicillin in the early 1940's, reached a peak in the 1950's. Since then the number of new antibiotics has declined to six as compared to twenty-one in the 1950's. Another case in point is that of corticosteroids, which enjoyed their maximum usage in the late 1950's and the early 1960's. In the last ten years, no new corticosteroid has been introduced into the market. Drugs affecting the central nervous system (tranquilizers, etc.), which as a therapeutic category account for the single largest share of the market, are products developed in the late 1950 early 1960 era. In almost all of the cases mentioned here, each product represents a major breakthrough in the therapy for a disease or group of diseases. Each product has a specific set

of indications and contraindications, and, as such, another product cannot be substituted in the treatment of the specific phase of the disease.

This situation is in direct contrast to the use of Galenicals, hand-compounded ointments, etc., where one product could be used for a multiplicity of diseases. For example, tincture of belladonna was indicated in intestinal spasm, colic, asthma, Parkinsonoid symptoms, hyperacidity, and a host of other conditions.

Today's synthetic drugs have replaced tincture of belladonna in modern therapy. There are fifty-four drugs and dosage forms available for the same indications as for tincture of belladonna. These numerous drugs and dosage forms required the approval of the Food and Drug Administration for introduction into the market at considerable expense to the manufacturer. Therefore, the differences between drug products available today and those available three or four decades ago result in increased cost of production and higher distribution and promotional expenditures, and hence account for part of the increase in prescription prices.

Having discussed some of the possible causes for the increase in the average prescription price, the balance of this chapter is devoted to a discussion of the three prescription pricing systems commonly utilized by community pharmacies.

There are three distinct prescription pricing systems in use today: (1) the professional fee system, (2) the markup
system, and (3) a combination of (1) and (2) (sometimes called the "sliding fee" system).

Professional fee system

The concept of the professional fee as formulated by Fuller\textsuperscript{15} and Abrams\textsuperscript{16} is founded on three basic tenets:

1. A prescription drug is not an ordinary article of commerce, capable of being bought and sold by anyone.

2. The functions performed by a pharmacist in dispensing medication are professional services requiring specialized knowledge and a greater degree of responsibility than that associated with most commercial transaction.

3. The cost of providing prescription services is not now, nor has it ever been, a function of the cost of the physical ingredients.

Acceptance of the three tenets is an essential prerequisite to the acceptance of the professional fee concept. Before a pharmacist can accept or implement the fee concept, he must first have the conviction that he is performing more than a mere commercial or distributive function when he dispenses a prescription.

The professional fee is a single sum which is added to the acquisition cost of the drug. This sum should be large enough


to adequately cover the costs of providing prescription dispensing services and in addition produce a reasonable income for the pharmacist. Specifically, it should cover the following expenses:

1. Compensation for the pharmacist.
2. Cost of containers and labels.
3. Cost of prescription files.
4. Maintenance and replacement of equipment.
5. Cost of open and non-returnable packages of prescription packages which had to be destroyed because of spoilage or obsolescence.

and a portion of the overhead, such as:

7. Delivery.
8. Office and administrative expense.
9. Fixed expenses, such as rent, light, insurance, telephone, etc.¹⁷

Several formulas have been offered for determining the professional fee of an individual pharmacy. Smith discusses two of these formulas in his article:¹⁸

Fuller's formula: \[ \frac{\text{all expenses} - \text{proprietor's salary}}{\text{per cent prescription sales/total number of prescriptions dispensed}} + \$0.50 \text{ direct labor cost} + \text{net profit} = \text{professional fee} \] ¹⁹

Abram's formula: \[
\frac{(\text{all expenses} - \text{proprietor's salary}) \times \text{per cent prescription sales} + \text{proprietor's salary/total number of prescriptions dispensed}}{\text{net profit}} = \text{professional fee.}^{20}
\]

When these were applied to 1966 Lilly Digest pharmacies, the professional fee for all pharmacies by Fuller's method was shown to be $1.33 plus desired net profit. When Abram's formulas was applied to the same pharmacies, the corresponding professional fee was $1.51 plus desired net profit.\(^{21}\)

Myers reported the experiences of thirty-six pharmacies who actually used professional fee in pricing prescriptions.\(^{22}\) None of the pharmacists using the professional fee system was dissatisfied with his decision to adopt the fee system, while only four respondents (10 per cent) stated that they were merely "satisfied." The remaining 90 per cent were either "very satisfied" or "extremely satisfied." Evidently, the professional fee is a practical and satisfactory method for pricing prescriptions.

There are, however, several objections to the professional fee system of pricing prescriptions. These include inflexibility, inequity in the cases of patients who can afford to purchase only a small quantity of medication at a time, and, finally, that the


\(^{21}\)Smith, op. cit., p. 648.

universal application of the professional fee system would serve
to raise the prices of low-cost generic drugs to the patient.

**Markup system**

The fundamental concept in the markup system of pricing
is that drugs are commodities in which the pharmacist has made
an investment and expects a reasonable return on that investment
and for the risks he is taking. Markup is the amount added to the
cost to determine the selling price. Markup percentage may be
based on either the cost value or the retail selling price. If
markup-on-cost is used, determination of a price becomes: cost +
markup = selling price, and is figured mathematically as costs +
(markup per cent x cost) = selling price. If retail price is
used as the base for determining selling price, the proper
terminology for the percentage used is markup-on-retail or margin
percentage. In pharmacy the word markup used alone can mean
either margin percentage or markup-on-cost percentage. Thus,
when a pharmacist states that his "markup" is 33.3 per cent, he
really means that his markup-on-retail is 33.3 per cent, but his
markup-on-cost is 50 per cent.

There are two types of markup-on-retail in pharmacy
practice, either the straight percentage markup in which a
fixed percentage, e.g., 50 per cent, is used to determine a
prescription selling price regardless of prescription ingredient
cost, or the decreasing percentage markup in which the percentage
applied to ingredient cost decreases as ingredient cost increases.
Sliding fee

This is a combination of the professional fee and markup systems. Most pharmacies have a minimum prescription charge which is usually applied to those prescriptions in which the ingredient cost is insignificant or the quantity prescribed is very small. For example, the usual ingredient cost of 100 tablets of phenobarbital 15 mg. to the pharmacist is $0.15 to $0.20. Under a strict markup system, assuming a 50 per cent markup on cost, the patient would be charged $0.22 to $0.30. Under a strict fee system, assuming a professional fee of $2.00, the prescription price would be $2.22 to $2.30. In practice, however, the selling price falls somewhere between these two extremes, amounting to a minimum prescription charge. The minimum prescription charge is arbitrarily determined by the pharmacist, probably based on his observations of competitors practices. Such an arbitrary method of pricing is called the sliding fee system which usually imposes a high markup on low-cost prescriptions and a low markup on high-cost prescriptions. There is no conceptual justification for such a system of pricing in spite of its widespread use.

It can be noted that the average prescription has been steadily increasing in price and quantity of doses prescribed. While pricing a prescription, pharmacists in general use a markup system which may or may not be a constant percentage of cost; or a professional fee, or a combination of both the professional fee and the markup systems. In spite of the fact
that the professional fee has been favored in academic circles as the method of choice in pricing prescriptions, a flexible markup system of pricing continues to be widely used and favored by practicing pharmacists.

In summary, then, the prescription price can vary from one pharmacy to another, depending upon which system of pricing the pharmacy uses. The average prescription price reported by different publications has shown considerable variation from publication to publication. The following table presents the average prescription price as reported by some of the leading pharmacy publications. These apparent differences are presumably techniques used by the investigators and also the type of pharmacies for which the particular publication is geared. For example, The Lilly Digest samples independent pharmacies, and the results of The National Prescription Audit are based on a sample of all community pharmacies regardless of ownership.
TABLE 9
AVERAGE PRESCRIPTION PRICE REPORTED BY LEADING PHARMACY PUBLICATIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>Lilly Digest</th>
<th>National Prescription Audit</th>
<th>American Druggist</th>
<th>Drug Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957</td>
<td>$ 2.85</td>
<td>$ 2.92</td>
<td>$ 2.93</td>
<td>$ 2.64</td>
</tr>
<tr>
<td>1958</td>
<td>2.96</td>
<td>2.99</td>
<td>3.08</td>
<td>2.78</td>
</tr>
<tr>
<td>1959</td>
<td>3.09</td>
<td>3.15</td>
<td>3.14</td>
<td>2.83</td>
</tr>
<tr>
<td>1960</td>
<td>3.19</td>
<td>3.22</td>
<td>3.22</td>
<td>2.98</td>
</tr>
<tr>
<td>1961</td>
<td>3.25</td>
<td>3.27</td>
<td>3.22</td>
<td>2.97</td>
</tr>
<tr>
<td>1962</td>
<td>3.32</td>
<td>3.26</td>
<td>3.21</td>
<td>3.06</td>
</tr>
<tr>
<td>1963</td>
<td>3.39</td>
<td>3.35</td>
<td>3.23</td>
<td>3.09</td>
</tr>
<tr>
<td>1964</td>
<td>3.41</td>
<td>3.42</td>
<td>3.26</td>
<td>3.12</td>
</tr>
<tr>
<td>1965</td>
<td>3.48</td>
<td>3.48</td>
<td>3.35</td>
<td>3.20</td>
</tr>
<tr>
<td>1966</td>
<td>3.59</td>
<td>3.56</td>
<td>3.43</td>
<td>3.26</td>
</tr>
<tr>
<td>1967</td>
<td>3.66</td>
<td>3.63</td>
<td>3.49</td>
<td>3.32</td>
</tr>
<tr>
<td>1968</td>
<td>3.70</td>
<td>3.70</td>
<td>3.56</td>
<td>3.41</td>
</tr>
<tr>
<td>1969</td>
<td>3.87</td>
<td>3.86</td>
<td>3.68</td>
<td>3.57</td>
</tr>
<tr>
<td>1970</td>
<td>4.03</td>
<td>4.02</td>
<td>3.77</td>
<td>3.67</td>
</tr>
</tbody>
</table>


Note: Variations in average charges for the same year are believed to be attributable to the differing methods used in sampling outlets. For sampling methodologies, the reader is advised to contact the sources. A summary description appears on pages 15-19 in The Drug Users, Task Force on Prescription Drugs, Background Papers, U.S. Government Printing Office, Washington, D.C., 1968.
CHAPTER IV

THE ECONOMICS OF THE GENERIC-BRAND NAME DRUG CONTROVERSY

In this chapter an attempt will be made to portray the existing generic drug share of the total prescription drug market, to identify the economic factors responsible for the increase in generic prescribing and dispensing over the last five years, and to make a search of the literature on the economic effect of generic prescribing and dispensing.

Market performance of generic products, 1966 to 1970

According to Gosselin, generic prescriptions accounted for nine per cent of all prescriptions written in the United States in 1970.\(^1\) Table 10 gives the number of new generic prescriptions, new and refill generic prescriptions, and the per cent of all prescriptions written in the United States. The number of new generic prescriptions in 1970 was 53,605,000 and the number of refills of generic prescriptions was 53,629,000.\(^2\)

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\(^2\) Ibid., p. 29.
TABLE 10
MARKET SHARE OF GENERIC PRESCRIPTIONS
(1966 - 1970)

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of New Generic Rxs</th>
<th>No. of New &amp; Refill Generic Rxs</th>
<th>Per Cent of All Rxs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>29,741,000</td>
<td>69,592,020</td>
<td>6.4</td>
</tr>
<tr>
<td>1967</td>
<td>34,500,000</td>
<td>77,900,000</td>
<td>7.0</td>
</tr>
<tr>
<td>1968</td>
<td>43,293,000</td>
<td>95,391,000</td>
<td>8.2</td>
</tr>
<tr>
<td>1969</td>
<td>48,425,000</td>
<td>101,541,000</td>
<td>8.8</td>
</tr>
<tr>
<td>1970</td>
<td>53,605,000</td>
<td>107,234,000</td>
<td>9.0</td>
</tr>
</tbody>
</table>


The revival of generic prescribing and dispensing is primarily due to the general belief that generic prescriptions for a chemical entity are less expensive to the patient than their brand name counterparts for the same entity. The pro-generic movement has gained an added impetus by the FDA's regulation requiring that the generic name must appear (at least one-half the size of the brand name) every time the brand name of the drug is used. Burack, in his recent publication, has given full support to generic name drugs in general and to generic prescribing in particular. He has attempted to compile a list of generic manufacturers, their products, and their prices to the

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pharmacist, as an alternative to the brand name oriented
Physicians' Desk Reference. Some hospital formularies list a
drug by its generic name and include the brand name in paren-
theses. The agencies of the federal government (Department of
Defense, Veterans Administration, etc.), when calling for price
quotations on drugs, now use the generic name in their inquiries.
Any manufacturer can offer his product (be it generic or brand
name) as long as it meets the specifications outlined in the
government agency's inquiry. All reputed textbooks on Pharma-
cology now list the contemporary drugs by their generic names.
The United States Pharmacopoeia and the National Formulary use
generic names in their official monographs. In spite of this
renewed interest in the generic names of drugs, brand name drugs
dominate the prescription drug market, presumably because of the
overwhelming promotional efforts directed toward physicians by
brand name manufacturers.

Most of the brand names designated by manufacturers are
easier to remember than generic names. Some examples of generic
and brand names are given below.

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4 See the Drug Formulary of The Ohio State University
Hospitals, Columbus, Ohio.

5 Louis S. Goodman and Alfred Gilman, Pharmacological
1965).
<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Generic Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aventyl</td>
<td>Nortriptyline hydrochloride</td>
</tr>
<tr>
<td>Chlor-Trimeton</td>
<td>Chlorpheniramine maleate</td>
</tr>
<tr>
<td>Equanil</td>
<td>Meprobamate</td>
</tr>
<tr>
<td>Lanoxin</td>
<td>Digoxin</td>
</tr>
<tr>
<td>Medrol</td>
<td>Methylprednisolone</td>
</tr>
<tr>
<td>Noctec</td>
<td>Choral hydrate</td>
</tr>
<tr>
<td>Pentids</td>
<td>Penicillin G potassium</td>
</tr>
<tr>
<td>Raudixin</td>
<td>Rauwolfia serpentina</td>
</tr>
<tr>
<td>Serpasil</td>
<td>Reserpine</td>
</tr>
<tr>
<td>Teldrin</td>
<td>Chlorpheniramine maleate</td>
</tr>
<tr>
<td>Penbritin</td>
<td>Ampicillin trihydrate</td>
</tr>
<tr>
<td>Librium</td>
<td>Chlordiazepoxide hydrochloride</td>
</tr>
<tr>
<td>Valium</td>
<td>Diazepam</td>
</tr>
<tr>
<td>Vistaril</td>
<td>Hydroxyzine pamoate</td>
</tr>
</tbody>
</table>

The 1962 amendment to the Food, Drug, and Cosmetic Act gave the Secretary of the Department of Health, Education, and Welfare the right to designate official generic names for drugs when he sees fit. Any person, regardless of affiliations, is free to propose an official generic name. The general rules guiding the proposal of a generic name for a drug are:

1. Useful primarily to health practitioners.
2. Short, easy to pronounce, easy to recognize and recall.
3. Such that it reflects pharmacologic, chemical, or other characteristics and relationships of actual practical value to the user.

4. Free of conflict with other drug names and neither confusing nor misleading.

5. A name of established usage if it conforms reasonably well to the other guiding principles.  

Some studies have been conducted to investigate the effect of the length of the name of a drug on its prescription potential. Muller conducted two investigations on the length of the generic name versus the brand name, and found that the brand name was shorter than the generic name and that physicians tend to refer to newer drugs by their brand names. She found remarkable consistency in the physician's prescribing habits of referring to some drugs exclusively by their brand names while others by their generic names. Muller also found that doctors prefer a shorter name for drugs as opposed to a longer name.  

As mentioned earlier in Chapter II, many of the top-ranking single chemical entities will lose their patent protection in the 1970's. None of the drugs mentioned in Table 6 has shown a decline in sales volume. These drugs are high volume sales

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6. Reese, _op. cit._, p. 70.


specialties of major brand name manufacturers. With the expiration of the patents, it can be foreseen that generic drug manufacturers will market low-cost generic products (chemical equivalents) to introduce price competition for these products. It must be remembered, however, that on the expiration of a patent, introduction of generic drugs is not guaranteed. The technological know-how of the original patent holder gained over the years of experience in manufacturing is a substantial asset. Much depends on the extent to which the manufacturing technology has been made public. The strong market position attained by the original brand can be a further deterrent to the introduction of low-cost generics. This can be illustrated by the case of the erythromycin's patent expiration in September 1970. No reputed generic manufacturer has entered the $50 million per year erythromycin market, in spite of the patent expiration.9 Other major antibiotic manufacturers plan to begin selling brand name erythromycin products in mid 1971 presumably by brand names.

Some other products requiring a less sophisticated technological base are the targets of generic manufacturers as soon as the original patent expires. In 1970 the patent on penicillin V expired and many manufacturers (both generic and brand name houses) wasted no time introducing their products in the highly profitable oral penicillin market.10

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10Ibid., p. 7.
It is obvious that mere patent expiration does not connote the beginning of generic competition. Efficient manufacturing technology, marketing strength, and trademark protection are other important criteria for introduction of generic competition. It will be interesting to observe the fate of the number one selling drug in the country, Darvon (Lilly), when its patent expires in 1972.\(^\text{11}\)

Factors responsible for the resurgence of generic drugs, 1965 to 1970

Four factors can be isolated as responsible for the rejuvenation of the market performance of generic drugs:

1. Emphasis on generic name as the drug's primary name in academic circles (discussed earlier in this chapter).

2. Availability of important drugs from generic manufacturers; for example, tetracycline (the total tetracycline market in the United States is estimated as $200 million),\(^\text{12}\) prednisone (the most commonly used cortico-steroid), digoxin (a long-term maintenance drug for coronary patients), etc.

3. The FDA's emphasis on single drugs. The Food and Drug Administration has taken an anti-combination posture in recent months and has forced manufacturers to withdraw antibiotic combinations from the market. The Panalba case, is an example,

while Signemycin of Pfizer is another such instance. The major fixed-combination antibiotic manufacturers are faced with more stringent controls by the FDA regarding the efficacy and safety of such combinations. Almost all combination drugs are protected by the trademark, which has a longer life than the patent. Since most of the brand name manufacturers advertise and promote their products by brand name of the combination, they feel relatively secure even if the patent on the original drug expires. The recent FDA-sponsored studies of combination drugs have, in general, discouraged their use. Since most generic drugs are single chemical entities, the possible elimination of trademarked combinations from the pharmaceutical market will ease market entry of generic drugs because they no longer have to compete with combinations. For example, many of the fixed-ratio antibiotic combinations have been ordered off the market by the FDA. Panalba® of Upjohn and Signemycin® of Pfizer are no longer available in the antibiotic market. The removal of such combinations from the market gives an additional impetus to generic manufacturers to introduce single generic antibiotics into the antibiotic market. Therefore, the generic manufacturer can use the lower price to his advantage.

4. A general belief that prescriptions written by generic names are less expensive than those written by brand name. Senator Nelson has been emphasizing the alleged economies

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of generic purchasing by government agencies. However, prescriptions written generically have been shown to be filled with brand name drugs, thus, neutralizing any economies of generic prescribing. 14

Economics of generic prescribing

As stated in Chapter I, a physician can use the chemical name, the generic name, or a brand name of the drug in his prescription. When prescribing a drug, the therapeutic efficacy and the patient's convenience are uppermost in the physician's mind. Prescription prices to be paid by the patient is subordinate to these considerations. Hammel and McCormick investigated the physician's attitudes towards product selection and estimates of generic and brand name prescription prices and compared the physician's estimated price to the actual price paid by the patient. Twenty-eight of the sixty physicians (46.7 per cent) said that physicians should choose the specific product when prescribing a drug available from several sources. Twenty-seven (45 per cent) said the choice of the specific product should be made by the pharmacist. Five physicians gave other responses. As far as the physicians' estimates of the prescription price versus the actual price paid by the patient were concerned, with the exception of one product, the physicians'
estimates were reasonably close to the actual price. One can conclude from this empirical study that physicians are aware of the alleged price differentials between generic and brand name prescriptions.

A survey conducted by Kedersha revealed that most physicians do not make any specific requests to the pharmacies in the neighborhood to stock generic drugs, even though they did prescribe these drugs by generic name. In the same study, only 29 per cent of the pharmacies received prescriber's comments which were generally favorable towards generic products. On the other hand 31 per cent of the prescribers commented adversely toward generic products. The balance of the pharmacies did not receive either favorable or unfavorable comments. Pharmacists on their part generally do not take the initiative of "detailing" physicians on the availability of generic drugs, even when the pharmacists carry these in their regular inventory.

This author was unable to find any studies in which the attitudes of patients toward generic and brand name drugs were investigated. In Kedersha's study, only one of the thirty-five high-volume pharmacies in New Jersey reported receiving any frequent inquiries from the patients regarding the availability

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16 Kedersha, op. cit., p. 113.
of generic drugs. It can be presumed that the consumers assume only a passive role in drug prescribing and dispensing environments because neither the physician nor the pharmacist espouses the cause of generic drugs. One of the reasons for this apathy on the part of pharmacists could be the usual "cost-plus" system of markup, on which most pharmacies price their prescriptions. It is generally believed that the per unit cost (per tablet or capsule) of generic drugs to the pharmacist is lower than that of brand name drugs. Due to this lower cost base, the pharmacist would realize a lower gross margin on generic prescriptions—a policy not acceptable to most pharmacists. Details of prescription pricing policies have been discussed in an earlier chapter.

In summation, then, the physician is primarily concerned with efficacy of the drug, and the pharmacist's first interest is gross margin realized from the prescriptions. Neither of these factors lend themselves to voluntary generic prescribing and dispensing.

Economics of generic dispensing

In 1969, according to Gosselin figures, 8.3 million new generic prescriptions were written for tetracycline, but only 5.9 million were filled with generic tetracycline. It should be noted here that there is no law which prohibits dispensing a brand name drug for generic prescriptions. Similarly, out of

the 2.8 million generic prescriptions written for penicillin G, only 1.2 million were filled with generic products. Ampicillin was prescribed in 13.9 million new prescriptions, but 99.8 per cent of these prescriptions were filled with six major brand names. The total ampicillin market in the United States is estimated to be $85 million. The reason for the almost complete dominance by brand name products in generic ampicillin prescriptions is that the only generic supplier of ampicillin, Zenith Laboratories, made most of its sales to hospitals rather than to retail outlets.

The number of new prescriptions, written generically, has been increasing at a faster rate than the percentage gains recorded for all new prescriptions. In 1969 generics had a 11.9 per cent increase compared to 5.3 per cent for new prescriptions as a whole.\(^{19}\)

The faster rate of increase in generic prescribing and dispensing has been accompanied by an equally faster rise (7.5 per cent) in the price of a generic prescription. The average charge for all new prescriptions in 1969 has been estimated as $3.86, 4.3 per cent higher than in 1968. The comparable figures for new generic prescriptions is $3.02, 7.5 per cent more than that in 1968.\(^{20}\)

\(^{19}\)Ibid., p. 7.
\(^{20}\)Ibid., p. 8.
Economics of price differentials between generic and brand name prescriptions

The Task Force on Prescription Drugs compiled a Master Drug List (MDL) of 409 products most frequently dispensed to the elderly in 1966. These products accounted for 88 per cent of all prescriptions written for the elderly and also represented 88 per cent of all drug costs to the elderly. At the time of publication of the Task Force's report, 293 of the 409 drugs were patented and were available from a single supplier. (Since 1969, patent protection on at least three of these products has elapsed, but generic counterparts have not been offered for sale.) In addition, the report noted that there were thirty products which are actually prescribed and dispensed by generic name. It is noteworthy that these thirty products include such low-cost products as nitroglycerine, thyroid, and phenobarbital, etc. Finally, the balance of eighty-six products (now eighty-nine) are no longer protected by patent and can be purchased from more than one source. However, for twenty-three products of the eighty-six, which were available as generics in 1966, the generic equivalents of these products were priced either the same or higher than the brand name counterparts. Thus, the envisaged savings were limited to sixty-three.

These sixty-three products for which generic equivalents were available, if low cost generic drugs were prescribed and dispensed as recommended by the Task Force, would have resulted
in a savings of $41.5 million, 5 per cent of the total drug bill for the elderly. The Task Force itself said that the projected savings assumes (1) national availability of generic drugs, and (2) that the quality of generic and brand name drugs is identical, i.e., chemical equivalency denotes clinical equivalency—a point which is the center of much debate. Moreover, the 5 per cent savings made no allowances for the costs of administering such a generically oriented program. Twenty of the sixty-three drugs mentioned by the Task Force could account for $40.7 million of the computed $41.5 million savings. In computing the expected savings resulting from generic prescribing, the Task Force considered the price differential between the lowest priced generic drugs and the brand name drugs for which it was considered a substitute. The Task Force report applied a fixed $1.81 dispensing fee to the cost of the generic drug in arriving at the prescription price for a generic prescription. An alternative approach adopted by the Task Force in arriving at the price differential was to use a "customary and usual markup" for both groups of drugs, and compute the price differentials.

The above-mentioned report leaves much to be desired as far as computing the savings offered by generic prescribing and dispensing. One can question the rationale of using the lowest priced generic products to be available nationally. Secondly, the constant professional fee of $1.81 to be added to the actual acquisition cost which could vary from region to region,
state by state, or even pharmacy to pharmacy. The other drawback of the Task Force's report is the assumption that the dispensing fee of $1.81 equates all pharmacies as far as the services component of the prescription price is concerned. Moreover, the actual acquisition cost of the brand name or generic drug is different from the Red Book cost, due to the variety of discounting systems offered to the pharmacist by wholesalers and manufacturers.

The General Accounting Office of the federal government submitted a forty-two page report to the Congress on November 23, 1970, on the Ohio Medicaid program. This report appeared to assume that chemical equivalence equals clinical equivalence. The report began its two-page section on "Savings Available Through Prescribing Chemically Equivalent Drugs" with the premise that:

Significant saving could be available to the states and federal government if physicians were to prescribe lower-priced chemically equivalent drugs instead of higher priced brand-name drugs.22

This report used two drugs as examples to illustrate the savings that could be achieved in the Ohio Medicaid program by generic prescribing and generic dispensing. In June 1969 the GAO report contended that the Ohio Welfare Department could have saved $3100 on 733 prescriptions written for and dispensed as

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21 The Red Book (New York: Topics Publishing Company, Inc.)
Serpasil, if these prescriptions had been generically prescribed and dispensed. On digoxin, savings of $1600 were projected for 3.075 prescriptions on a similar basis. In addition, the $1.00 minimum prescription charge was criticized because of the extremely low cost of some of the medications to the pharmacist. The report concluded that the markup system used by Ohio Medicaid "gives pharmacies an incentive to sell higher cost drugs to obtain greater profits."²³

The studies previously mentioned deal primarily with the price of generic and brand name drugs to the pharmacist. Wertheimer conducted a study to determine the range of prices quoted for generic products in the Red Book and the Blue Book. The following table lists the range of low and high generic prices and also includes the price of a similar brand name product.²⁴

A thorough search of the literature has revealed only three studies which have been conducted to determine retail price differentials to the patient between generic and brand name prescriptions. The most recent of these is Hammel's study of the economics of generic prescribing.²⁵ This study was carried out in Wisconsin, where Hammel and McCormick audited prescription

²³Ibid., p. 18.
²⁵Hammel and McCormick, op. cit., p. 9.
<table>
<thead>
<tr>
<th>Product</th>
<th>Strength</th>
<th>Package</th>
<th>Low Generic Price</th>
<th>High Generic Price</th>
<th>Brand Name</th>
<th>Brand Name Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracycline</td>
<td>250 mg.</td>
<td>100's</td>
<td>$1.40</td>
<td>$8.50</td>
<td>Achromycin</td>
<td>$4.50</td>
</tr>
<tr>
<td>Penicillin G</td>
<td>400,000 units</td>
<td>100's</td>
<td>1.40</td>
<td>9.45</td>
<td>Pentids</td>
<td>8.45</td>
</tr>
<tr>
<td>Meprobamate</td>
<td>400 mg.</td>
<td>1000's</td>
<td>8.00</td>
<td>49.00</td>
<td>Miltown</td>
<td>61.20</td>
</tr>
<tr>
<td>Digoxin</td>
<td>0.25 mg.</td>
<td>1000's</td>
<td>2.50</td>
<td>8.67</td>
<td>Lanoxin</td>
<td>7.20</td>
</tr>
<tr>
<td>Conjugated Estrogens</td>
<td>1.25 mg.</td>
<td>1000's</td>
<td>16.15</td>
<td>50.00</td>
<td>Premarin</td>
<td>59.78</td>
</tr>
<tr>
<td>Chlortal Hydrate</td>
<td>500 mg.</td>
<td>100's</td>
<td>1.05</td>
<td>2.50</td>
<td>Noctec</td>
<td>4.20</td>
</tr>
<tr>
<td>Prednisone</td>
<td>5 mg.</td>
<td>1000's</td>
<td>4.29</td>
<td>26.60</td>
<td>Meticortin</td>
<td>105.28</td>
</tr>
<tr>
<td>Thyroid</td>
<td>1 gr.</td>
<td>1000's</td>
<td>1.40</td>
<td>6.30</td>
<td>Armour Thyroid</td>
<td>5.72</td>
</tr>
<tr>
<td>Dextroamphetamine</td>
<td>5 mg.</td>
<td>1000's</td>
<td>0.85</td>
<td>16.80</td>
<td>Dexedrine</td>
<td>22.60</td>
</tr>
<tr>
<td>Reserpine</td>
<td>0.25 mg.</td>
<td>1000's</td>
<td>0.59</td>
<td>13.50</td>
<td>Serpasil</td>
<td>39.50</td>
</tr>
</tbody>
</table>
files of retail pharmacies for twelve generic products and their brand name counterparts. The daily treatment cost to the patient was established as the criterion to determine if there is a statistically significant price differential between generic and brand name prescriptions for a single chemical entity. Such differences were found in only two of the twelve products. The investigators did acknowledge that the results of their study are subject to criticism because the price differentials, or the absence of such differentials, were considered a function of generic prescribing rather than generic dispensing. To quote their example, generically written prescriptions for erythromycin were almost exclusively filled with two brand name products. Evidently, such a prescription will not show any price differential simply because the same two brands will be used on brand name prescriptions as well. In some other products, for example, thyroid tablets 60 mg., no brand name prescription was audited. Consequently, if price differentials to the patient were observed, this study did not reflect realistic price comparisons.

Azarnoff, et al., conducted a study in a large midwestern city with a single product (meprobamate). A bonafide prescription for fifty tablets of Miltown (Carter Wallace brand of meprobamate 400 mg.) was filled and purchased in twenty-three pharmacies (ten chain and thirteen independent pharmacies). One week later, a generic prescription for the same quantity of meprobamate was taken to the same stores by a different individual. The mean
price of Miltown was \$4.94 for fifty tablets, while that for meprobamate purchased by generic name was \$3.88, representing a saving of 21 per cent. Another finding of this study was that chain stores were consistently priced lower than the independent stores both for generic and brand products. If one product can represent the total spectrum of generic and brand prescription prices, this study could be considered a pioneering attempt to determine if the pharmacist passes on the savings of generic drugs to the patient.\textsuperscript{26}

Kunin and Diercks investigated the economic effects of generic versus brand prescribing in Charlottesville, Virginia, by cooperative efforts of the physicians and the local pharmacists.\textsuperscript{27} In their investigation only eleven widely-used, generically available drugs were found to offer enough of a price advantage to the pharmacist and the patients to warrant inclusion in the list of recommended generic products, jointly agreed upon by the pharmacists and the physicians. Prescribing of these recommended generic drugs increased from 36.4 per cent before the study to 59.8 per cent in the three month period following the adoption of generic prescribing, but dropped to 49.5 per cent six months later. Significant savings were observed in four of

\textsuperscript{26}Azarnoff, \textit{op. cit.}, pp. 1253-1256.

the eleven most commonly prescribed drugs, thus, making generic prescriptions less expensive than brand name prescriptions.

To conclude this chapter, it can be summarized by stating that the question of clinical equivalence of chemical equivalents is far from settled. The economic effects of generic prescribing and dispensing, and the resulting savings, needs more intensive and extensive investigation before one can categorically state that there exists any price differential to the patient, in spite of some differences in the price to the pharmacist. The real test of savings is to determine if the patient pays less for a generic prescription than for a brand name one. It is beyond the realm of this investigation to delve deeper into the question of therapeutic equivalence, but it may suffice to say that unless the FDA guarantees such an equivalence, there will always be some question about efficacy of lower priced generic drugs.

This study is primarily concerned with determining and evaluating the economics of the generic-brand drug controversy. When a patient purchases a prescription drug from the pharmacist, he is paying for two components of the prescription—the ingredients and the services. Each pharmacist determines a dynamic equilibrium between these two components. Should the ingredient cost component dominate in the total prescription price, it is logical to assume that generic prescriptions will be cheaper than brand name prescriptions. However, if the services component accounts for a larger percentage of the total
prescription price, it would appear that the prescription price differentials between brand name and generic prescriptions will diminish or vanish.
CHAPTER V
IDENTIFICATION AND DEFINITION OF THE PROBLEM AND PROPOSED METHODOLOGY

In the foregoing chapters, an attempt has been made to present the economic environments of drug manufacturing and retailing, and the current status of the generic prescription market. This chapter is devoted to the statement of the problem and justification for undertaking this research project.

Statement of the problem

Stated briefly, the problem to be investigated is the determination of retail price differentials to the patient between generic and brand name prescriptions. If retail price differentials to the patient are observed, such differentials will be evaluated in terms of the operational characteristics of the retail pharmacies.

A literature search has revealed that the problem of retail price differentials between generic and brand name drugs has not been investigated fully. The two studies—Hammel and McCormick's, and Azarnoff's—have touched the fringes of the determination of retail price differentials to the patient between generic and brand name prescriptions. To reiterate, Azarnoff's study was based on a single drug (Miltown and
Meprobamate); Hammel and McCormick's, although included twelve drugs, did not differentiate between generic prescribing and generic dispensing. Other available studies are completely theoretical. For instance, the recommendations of the Task Force on Prescription Drugs are based on theoretical differences between the cost of drugs to the pharmacist rather than the prescription prices paid by the patient. After consideration of the scarcity of published studies on this subject and the shortcomings of those published reports, a broad study to investigate the problem of retail price differentials to the patient is warranted.

The feasibility of this study was evaluated by conducting a pilot study to determine the consumer price differentials. The Columbus, Ohio, area pharmacists have an excellent rapport with The Ohio State University College of Pharmacy and have willingly participated in several previous projects sponsored by the College of Pharmacy.

The general plan to be followed in the investigation is outlined below.

Step 1 Selection of products (generic and brand).
Step 2 Selection of the pharmacies (independent and chain).
Step 3 Statement of hypotheses.
Step 4 Audit for generic and brand name prescription prices.
Step 5  Recording of store characteristics.
Step 6  Statistical analysis on the date obtained from the prescription price audits for comparison of prices.
Step 7  Determination of price differentials on each product.
Step 8  Evaluation of the observed differentials, if any, in terms of store characteristics.
Step 9  Results, discussion, and conclusions.

Selection of the products

Every year the R. A. Gosselin and Company publishes a list of 200 drugs which account for the major portion of the prescription drug market. This list includes the generic drugs available from unspecified manufacturers and the brand name products of specific manufacturers. This list of 200 products is divided into four groups of fifty products each. As a whole, the top 200 products represented 66.15 per cent of all prescriptions in 1970.1 The "first fifty" group represented 34.36 per cent of all new and refill prescriptions. Six generic products appear in the first fifty group. Similarly, three generic products each appear in both the second fifty and the third fifty group, while the fourth fifty group contains four generic products. The generic products included in the 1970 list of the top 200 drugs is given below.

---

Ampicillin
Meprobamate
Phenobarbital
Prednisone
Tetracycline hydrochloride
Thyroid
Digoxin
Nitroglycerin
Penicillin G potassium
Nicotinic acid
Quinidine sulfate
Reserpine
Chloral hydrate
Digitoxin
Erythromycin
Paregoric

In view of the widespread use of these sixteen products, as evidenced by their inclusion in the top 200 drugs, it is appropriate to select the sample of generic drugs from the above list.

The criterion used in the selection of the generic products to be included in the prescription audit is: The drugs selected must have generic and brand name products on the retail prescription market. The reason for establishing this criterion is because this study is designed to determine the price
differentials between two types of prescriptions—those written and dispensed by a generic name and those written and dispensed by a brand name (for the same drug). It follows, therefore, that if a generic product does not have a widely used brand name counterpart available on the market, the price comparisons can not be made. The same reasoning applies to drugs for which the availability is limited to brand name products.

The application of this criterion to the list of sixteen generic products results in the following table. Therefore, only seven of the sixteen products previously listed qualify for inclusion in the proposed investigation.

All these seven products have a very definite place in modern therapy of diseases. Two (tetracycline and penicillin) are antibiotics, one (meprobamate) is a tranquillizer, another is a synthetic cortico-steroid (prednisone), whereas digoxin and reserpine are drugs of prime importance in cardio-vascular conditions. Chloral hydrate is a relatively safe hypnotic with a limited duration of action. The following list was compiled to include the generic as well as brand name products for the same chemical entity. The name of the brand name manufacturer is also included. All the brand name products are from reputed pharmaceutical manufacturers.
<table>
<thead>
<tr>
<th>Product</th>
<th>Selected</th>
<th>Reason for inclusion/exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracycline</td>
<td>Yes</td>
<td>Both generic and brand name products in top 200 list.</td>
</tr>
<tr>
<td>Penicillin</td>
<td>Yes</td>
<td>Both generic and brand name products in top 200 list.</td>
</tr>
<tr>
<td>Prednisone</td>
<td>Yes</td>
<td>Both generic and brand name products in top 200 list.</td>
</tr>
<tr>
<td>Meprobamate</td>
<td>Yes</td>
<td>Both generic and brand name products in top 200 list.</td>
</tr>
<tr>
<td>Reserpine</td>
<td>Yes</td>
<td>Both generic and brand name products in top 200 list.</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Yes</td>
<td>Both generic and brand name products in top 200 list.</td>
</tr>
<tr>
<td>Chloral hydrate</td>
<td>Yes</td>
<td>Both generic and brand name products in top 200 list.</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>No</td>
<td>No brand name product in the top 200 list of Gosselin.</td>
</tr>
<tr>
<td>Thyroid</td>
<td>No</td>
<td>No brand name product in the top 200 list of Gosselin.</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>No</td>
<td>No brand name product in the top 200 list of Gosselin.</td>
</tr>
<tr>
<td>Nicotinic acid</td>
<td>No</td>
<td>No brand name product in the top 200 list of Gosselin.</td>
</tr>
<tr>
<td>Quinidine</td>
<td>No</td>
<td>No brand name product in the top 200 list of Gosselin.</td>
</tr>
<tr>
<td>Digitoxin</td>
<td>No</td>
<td>No brand name product in the top 200 list of Gosselin.</td>
</tr>
<tr>
<td>Paregoric</td>
<td>No</td>
<td>No brand name product in the top 200 list of Gosselin.</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>No</td>
<td>No generic product widely available on the retail market.</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>No</td>
<td>No generic product widely available on the retail market.</td>
</tr>
</tbody>
</table>
1. Tetracycline Capsules 250 mg.
   a. Achromycin Capsules (Lederle)
   b. Achromycin V Capsules (Lederle)
   c. Cyclopar Capsules (Parke-Davis)
   d. Panmycin Capsules (Upjohn)
   e. Sumycin Capsules (Squibb)
   f. Tetracyn Capsules (Pfizer)
   g. Tretex Capsules (Bristol)

2. Penicillin G Tablets 400,000 units
   a. Pentids (Squibb)
   b. Pfizerpen (Pfizer)

3. Prednisone Tablets 5 mg.
   a. Deltasone (Upjohn)
   b. Deltra (Merck, Sharpe, & Dohme)
   c. Meticorten (Schering)
   d. Paracort (Parke-Davis)

4. Meprobamate Tablets 400 mg.
   a. Equanil (Wyeth)
   b. Kessobamate (McKesson)
   c. Miltown (Wallace)

5. Reserpine Tablets 0.25 mg.
   a. Rau-Sed (Squibb)
   b. Reserpid (Upjohn)
   c. Sandril (Lilly)
   d. Serpasil (Ciba)

6. Digoxin Tablets 0.25 mg.
   a. Lanoxin (BW)

7. Chloral Hydrate Capsules 500 mg.
   a. Noctec (Squibb)
   b. Somnos (Merck, Sharpe, & Dohme)
A brief summary of the year of introduction, therapeutic use, current medical status, and current patent status of each of the seven products is presented below.

1. **Tetracycline:** This product was first introduced in the American market as a brand name product in 1953 by Lederle Laboratories and Roerig. This is a broad-spectrum antibiotic used primarily for treating a large number of acute infections. Recently, it has been used in long-term therapy of acne. Though Pfizer held the original patent on tetracycline, the leading brands are Achromycin, Sumycin, and Tetrex. Pfizer's patent has been declared invalid and many of the generic products are fabricated from imported tetracycline (mainly from patent-free Italy). Though exact figures are not available, it is estimated that the total tetracycline market in the United States is over $200 million.²

2. **Penicillin G Potassium:** This was the first antibiotic to be introduced in 1940 by the Oxford University Research Group. Since the discovery was made in a publicly owned university laboratory in England, there is no patent granted on penicillin G. The first commercial product was introduced in 1945. The most popular brand name product is Pentids (Squibb), introduced in 1951. Modifications of the basic penicillin molecule resulted in

the evolution of phenoxy-methyl-penicillin (penicillin V) which was patented. The total market estimates for penicillin G are not available, but both the generic and the brand name products feature in the "Top 200 List." Penicillin G is usually given orally for acute infection.

3. Prednisone: This drug is a dehydrogenated version of naturally occurring adreno-cortico-steroid cortisone, first introduced in 1955. The product patent on prednisone has since run out and prednisone is usually produced by a semisynthetic process using basic steroid material derived from plants. Deltasone (Upjohn) and Meticorten (Schering) are the most popular brand names. Prednisone is a "basic drug," useful in a host of indications ranging from asthma to leukemia. However, prednisone is mainly prescribed by dermatologists for its anti-inflammatory effect on allergic skin manifestations.

4. Meprobamate: This drug ushered in the era of tranquilizers when first introduced in 1955. The patent was originally held by Carter Wallace Company, but the government intervened to force Carter Wallace to sell bulk meprobamate to any purchaser at a maximum price of $20.00 per kilogram. Meprobamate is a relatively simple molecule and has gained wide acceptance both as a single entity and in combination with other drugs. The widespread use of this drug has resulted in reported drug dependence on meprobamate. On July 6, 1970, meprobamate was included in the list of drugs with potential for abuse. The most common brand names for meprobamate are Equanil (Wyeth) and Miltown (Wallace).
5. **Reserpine**: This is the basic alkaloid derived from a plant which grows wild in India and Africa. Being a natural product, patent protection on reserpine was never granted. The main commercial source of reserpine is still botanical. Reserpine is used in long-term treatment of essential hypertension, either alone or in combination with other anti-hypertensive agents. Reserpine is usually imported in bulk from other countries and the finished products (usually 0.25 mg. tablets) are fabricated in the United States. Serpasil (Ciba) is the most important brand name product.

6. **Digoxin**: This is a glycoside obtained from the digitalis plant. Hence, there is no patent protection. Digoxin was first introduced in 1934. The principal use of digoxin is based upon its cardiotonic action and it is mostly used for patients with a history of heart failure. In contrast to antibiotics, digoxin is a long-term drug. The most commonly used brand is Lanoxin (Burroughs Wellcome). Being a long-term drug, digoxin is usually sold at discounted prices by many pharmacies. The cost differential between generic digoxin and Lanoxin is rather low.

7. **Chloral Hydrate**: This is chemically a simple drug and is used for inducing sleep. First introduced in 1869, its hypnotic use was superseded by the widespread acceptance of barbiturates as superior drugs. The addiction liability of barbiturates and their potential for abuse has rejuvenated
medical interest in chloral hydrate, in spite of the fact that chloral hydrate itself can be misused. Though chloral hydrate has been available generically for over a century, only in 1952 did Squibb market its brand name counterpart Noctec. There is no patent protection on chloral hydrate at present and leading chemical companies produce the bulk of chloral hydrate liquid. The finished product is fabricated by several generic manufacturers.

Sample selection of pharmacies

A list of the retail pharmacies located in metropolitan Columbus, Ohio, was obtained from the Directory of the Academy of Pharmacy of Central Ohio, which lists a total of 204 pharmacies. The pharmacies were divided into two groups, independent pharmacies and chain pharmacies. (The criterion used for this classification has been explained in Chapter I.) The composition of retail prescription outlets in Columbus is shown in the following table.

<table>
<thead>
<tr>
<th>Type of Store</th>
<th>Number of Stores</th>
<th>Per Cent of Total Stores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independents</td>
<td>110</td>
<td>53.92</td>
</tr>
<tr>
<td>Chains</td>
<td>94</td>
<td>46.08</td>
</tr>
<tr>
<td>Total</td>
<td>204</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Since the population of the pharmacies in metropolitan Columbus, Ohio, is known, the following formula was used to determine sample size from a finite population. The sample size was computed as follows:

\[
N = \frac{\sqrt{x^2}}{h^2 + \frac{\sqrt{x^2}}{N}}
\]

\(x\) - Population Standard Deviation
\(h\) - Confidence Level
\(N\) - Population
\(n\) - Sample

\[
N = \frac{.25}{.0196 + .25}
\]

\[
N = \frac{.25}{.00294 + .00125}
\]

\[
N = \frac{.25}{.00419}
\]

\[= 60\]

The population standard deviation was assumed to be .5 and the confidence level was 85 per cent.

The size of the sample derived from the formula above can be further justified by the fact that the sample represents over 25 per cent of the population and this number of pharmacies can be audited for the required information from a practical standpoint.

Moreover, most statisticians agree on the proposition that any number over thirty is an optimum number in a sample which approaches the normal distribution.

Since the ratio of independent to chain pharmacies in the total population is close to one in Columbus, it was decided to draw equal samples of independent and chain pharmacies.

Statement of hypotheses

Having selected the products for determining the retail price differentials between generic and brand name products, the following hypotheses for these seven drugs were proposed.

1. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for tetracycline capsules 250 mg.

2. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for penicillin G tablets 400,000 units.

3. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for prednisone tablets 5 mg.

4. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for meprobamate tablets 400 mg.

5. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for reserpine tablets 0.25 mg.
6. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for digoxin tablets 0.25 mg.

7. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for chloral hydrate capsules 500 mg.

The purpose of proposing the null hypotheses only is because a null hypothesis can be rejected on the basis of the sample, whereas an alternate hypothesis can not be accepted although the sample data might indicate the hypothesis to be valid. The alternate hypothesis can only be confirmed, not categorically accepted.

This chapter has identified and stated the problem, formulated a basic plan for carrying out the investigation, established the feasibility of the plan, and enunciated and applied the required criteria for product selection and pharmacy selection.
CHAPTER VI

DETERMINATION OF RETAIL PRICE DIFFERENTIALS

In this chapter an attempt will be made to outline the mechanics involved in selecting the sample of pharmacies in developing the instruments of data collection, in auditing the prescription files of various pharmacies, and in analyzing the raw data to determine the retail price differentials, if any. Further, the observed price differentials will be discussed for each product to explain the existence of such differentials.

Sample selection

The pharmacies listed in the Directory of the Academy of Pharmacy of Central Ohio were divided into two groups: independent pharmacies and chain pharmacies. The independent and chain pharmacies were assigned serial numbers; a random drawing of thirty numbers from each of these two groups was made. The sample drawing was without replacement. The number drawn was matched with the name of the pharmacy and a list of thirty independent and thirty chain pharmacies was compiled. Each of the independent pharmacies drawn in the sample was assigned a three-digit code number beginning with the digit 1. Similarly, each member of the chain pharmacy group was assigned a three-digit code
number beginning with the digit 2. For example, the independent pharmacies could each have a code number taken from the sequence beginning with 101 through 130. The chain pharmacies were assigned code numbers in the same manner. Once the coding was completed, the data analysis was carried out by using the code numbers only.

The selected pharmacies were contacted by telephone, the purpose of the project was explained to them, and their participation in the investigation was requested. Those pharmacies which agreed to allow the audit of their prescription files were asked for a suitable date and time for an appointment for the actual audit of their prescription files.

The instrument of data collection

Three instruments were used to collect the required data. The Prescription Audit Form (see Appendix A) was used to obtain the pharmacy's name and address, enter the code number, indicate classification of the pharmacy by type of ownership (independent or chain), and whether or not the pharmacy carried generic products in its inventory of prescription drugs. The Personal Interview Form (see Appendix B) was used to obtain the name of the pharmacist and/or the manager who granted the interview and other operational characteristics of the pharmacy, such as, location, pricing policy, minimum prescription charge, and services offered. The Product Audit Form (see Appendix C) was
used to record the necessary information about the generically written and generically dispensed prescriptions for one generic product. The lower portion of the same form was used to collect the required information on brand name written and dispensed prescriptions for one drug at a time. At the conclusion of the prescription audit, nine forms were filed for each store. Seven of these were Product Audit Forms (see Appendix C), one for each of the seven drugs being audited, and two were the interview forms.

Prescription file audit

The prescription file audit of the various pharmacies was begun in the first week of October 1971 and continued until February 10, 1971. A typical audit was conducted in the following manner:

1. The pharmacist/manager of the store was telephoned in advance and a suitable appointment was obtained. On reaching the pharmacy, the author requested that the pharmacist give a personal interview to obtain the information specified on the Prescription Audit Form and the Personal Interview Form. It may be emphasized that the pharmacist/manager was asked to give information on the store characteristics based on his perception of the particular characteristic. For example, as to the location of the store, the pharmacist was asked to state whether the store was located in a neighborhood or in a shopping center, based on his own
perception thereof. After completing the two forms, the actual prescription audit was begun.

2. To complete the prescription audit, seven Product Audit Forms were used for each pharmacy, one form for each drug. The pharmacist was requested to furnish the interviewer with the prescription files of the pharmacy. The actual audit of the prescription file was limited to the most recent prescriptions of the pharmacy. For example, if a pharmacy was audited on October 10, 1970, the first prescriptions in the audit were those dispensed on October 9, followed by those dispensed on October 8, and so on, until one of these two checkpoints were reached: either all the required information for the Product Audit Form for each drug was obtained (five prescriptions for generic drugs and five for brand name products), or the date of January 1, 1970, on the prescription files, was reached, whichever earlier. These end-points were necessary to keep the data on prescription prices as current as possible.

Another provision was made for those pharmacies which did not carry one particular generic drug. For example, if a pharmacy did not carry generic chloral hydrate in its inventory, conceivably the generic chloral hydrate prescriptions received by the pharmacy would be filled with brand name products. In such cases the information was recorded only from those prescriptions which were written and dispensed by a brand name. Where a generic prescription was filled with a brand name product, this prescription was eliminated from the audit.
The following information was recorded on each of the seven Product Audit Forms:

1. the generic name of the product;
2. the store code;
3. the date of the audit;
4. the number of units prescribed, the number of units dispensed, and the price charged for each of five prescriptions which were written and dispensed by generic name;
5. the number of units prescribed, the number of units dispensed, and the price charged for each of five prescriptions which were written and dispensed by a brand name.

Reproduced below is a typical, completed Product Audit Form for one product from one store.

The pharmacists were sent a letter of appreciation for their cooperation in the survey (see Appendix D).

Data analysis

Although a sample of sixty pharmacies was drawn at the time of sample selection, the prescription price audit was completed in forty-six of the sixty pharmacies. Of these forty-six, twenty-three were independent pharmacies and twenty-three were chain pharmacies. The following Table 15 lists the reasons offered by those pharmacies which either did not participate in the survey at all or the information obtained from these pharmacies was incomplete.
TABLE 14

PRODUCT AUDIT FORM

<table>
<thead>
<tr>
<th>Product: Meprobamate</th>
<th>Date: Nov. 11, 1970</th>
<th>Store Code: 119</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Units</td>
<td>Number of Units</td>
</tr>
<tr>
<td></td>
<td>Prescribed</td>
<td>Dispensed</td>
</tr>
<tr>
<td>1.</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>2.</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>3.</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4.</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>5.</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Totals</td>
<td>284</td>
<td>284</td>
</tr>
</tbody>
</table>

Mean Price per unit = $0.079

<table>
<thead>
<tr>
<th>Product: Meprobamate</th>
<th>Date: Nov. 11, 1970</th>
<th>Store Code: 119</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brand Name</td>
<td>Number of Units</td>
</tr>
<tr>
<td></td>
<td>Prescribed</td>
<td>Prescribed</td>
</tr>
<tr>
<td>1.</td>
<td>Equanil</td>
<td>18</td>
</tr>
<tr>
<td>2.</td>
<td>Miltown</td>
<td>36</td>
</tr>
<tr>
<td>3.</td>
<td>Miltown</td>
<td>40</td>
</tr>
<tr>
<td>4.</td>
<td>Equanil</td>
<td>24</td>
</tr>
<tr>
<td>5.</td>
<td>Miltown</td>
<td>100</td>
</tr>
<tr>
<td>Totals</td>
<td>210</td>
<td>210</td>
</tr>
</tbody>
</table>

Mean Price per unit = $0.108

The primary data collected from the stores was analyzed in the following four steps:

1. The mean per unit price was calculated for each generic product and its brand name counterparts in each of the forty-six stores (see Table 14).

2. The mean number of units prescribed per prescription was calculated in all forty-six stores for generic products as...
TABLE 15
REASONS OFFERED FOR NON-COOPERATION

<table>
<thead>
<tr>
<th>Reason Given</th>
<th>Type of Store</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Independent</td>
</tr>
<tr>
<td>1. Company policy prohibits*</td>
<td>0</td>
</tr>
<tr>
<td>prescription audit</td>
<td></td>
</tr>
<tr>
<td>2. Too busy to grant an interview</td>
<td>4</td>
</tr>
<tr>
<td>3. Closed for business</td>
<td>2</td>
</tr>
<tr>
<td>4. Burned down by fire</td>
<td>0</td>
</tr>
<tr>
<td>5. Incomplete information offered</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
</tr>
</tbody>
</table>

*This chain has eight pharmacies in the Columbus, Ohio, area while the company headquarters are in Cleveland. The store managers of Columbus, some of them non-pharmacists, expressed their inability to cooperate because the chain headquarters had issued specific orders to them forbidding them to divulge the prescription prices to anyone other than a patient. The company headquarters in Cleveland was contacted, but the vice-president would not permit the audit in any of the Columbus stores.

well as their brand name counterparts. Table 16 lists the mean of units in generic and brand name prescriptions for each product in all forty-six stores.

Since the number of units prescribed in the generic and brand name prescriptions was so close, an analysis of variance failed to reveal any statistically significant differences in the mean number of units per prescription as far as generic and brand name products are concerned. Furthermore, if the pharmacies used
<table>
<thead>
<tr>
<th>Product</th>
<th>No. of Stores Carrying Inventory</th>
<th>Total No. Rxs Audited</th>
<th>Total No. Units</th>
<th>Mean No. Units Per Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracycline 250 mg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic</td>
<td>40</td>
<td>200</td>
<td>6659</td>
<td>33</td>
</tr>
<tr>
<td>Brand</td>
<td>46</td>
<td>230</td>
<td>7363</td>
<td>32</td>
</tr>
<tr>
<td>Penicillin G 250 mg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic</td>
<td>38</td>
<td>190</td>
<td>5697</td>
<td>31</td>
</tr>
<tr>
<td>Brand</td>
<td>46</td>
<td>230</td>
<td>6733</td>
<td>29</td>
</tr>
<tr>
<td>Prednisone 5 mg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic</td>
<td>40</td>
<td>180</td>
<td>6981</td>
<td>39</td>
</tr>
<tr>
<td>Brand</td>
<td>45</td>
<td>225</td>
<td>9539</td>
<td>42</td>
</tr>
<tr>
<td>Meprobamate 400 mg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic</td>
<td>45</td>
<td>225</td>
<td>11306</td>
<td>50</td>
</tr>
<tr>
<td>Brand</td>
<td>46</td>
<td>230</td>
<td>11738</td>
<td>51</td>
</tr>
<tr>
<td>Reserpine 0.25 mg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic</td>
<td>42</td>
<td>200</td>
<td>13200</td>
<td>66</td>
</tr>
<tr>
<td>Brand</td>
<td>46</td>
<td>230</td>
<td>13922</td>
<td>60</td>
</tr>
<tr>
<td>Digoxin 0.25 mg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic</td>
<td>23</td>
<td>110</td>
<td>7778</td>
<td>70</td>
</tr>
<tr>
<td>Brand</td>
<td>46</td>
<td>230</td>
<td>17306</td>
<td>76</td>
</tr>
<tr>
<td>Chloral hydrate 500 mg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic</td>
<td>33</td>
<td>162</td>
<td>4926</td>
<td>31</td>
</tr>
<tr>
<td>Brand</td>
<td>46</td>
<td>230</td>
<td>7171</td>
<td>31</td>
</tr>
</tbody>
</table>
the markup system, the material effect of the difference in number of units of all seven generic and brand name prescriptions is negligible and would not result in significant differences in the price paid by the patient to the pharmacy.

3. The mean price per unit of each product for generic prescriptions from all the forty-six pharmacies was pooled to arrive at the mean generic price per unit for all pharmacies. Similar computations were done for brand name prescriptions. Table 17 summarizes the data on the mean price per unit for all generic and brand name prescriptions in all pharmacies and includes other basic statistics.

TABLE 17
BASIC STATISTICS ON PRICE PER UNIT IN ALL STORES

<table>
<thead>
<tr>
<th>Product</th>
<th>Mean Generic Price</th>
<th>Mean Brand Price</th>
<th>Lowest Generic Price Per Unit</th>
<th>Lowest Brand Price Per Unit</th>
<th>Highest Generic Price Per Unit</th>
<th>Highest Brand Price Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrac.</td>
<td>$.095</td>
<td>$.126</td>
<td>$.059</td>
<td>$.060</td>
<td>$.175</td>
<td>$.212</td>
</tr>
<tr>
<td>Pen. G</td>
<td>.085</td>
<td>.124</td>
<td>.047</td>
<td>.059</td>
<td>.142</td>
<td>.192</td>
</tr>
<tr>
<td>Pred.</td>
<td>.066</td>
<td>.071</td>
<td>.032</td>
<td>.040</td>
<td>.123</td>
<td>.152</td>
</tr>
<tr>
<td>Mepro.</td>
<td>.074</td>
<td>.096</td>
<td>.044</td>
<td>.065</td>
<td>.112</td>
<td>.155</td>
</tr>
<tr>
<td>Reser.</td>
<td>.038</td>
<td>.069</td>
<td>.022</td>
<td>.043</td>
<td>.073</td>
<td>.103</td>
</tr>
<tr>
<td>Digoxin</td>
<td>.024</td>
<td>.024</td>
<td>.015</td>
<td>.014</td>
<td>.049</td>
<td>.041</td>
</tr>
<tr>
<td>Chlor.H.</td>
<td>.078</td>
<td>.096</td>
<td>.048</td>
<td>.072</td>
<td>.124</td>
<td>.154</td>
</tr>
</tbody>
</table>

In order to compare the mean price per unit of generic drugs with the mean price per unit of brand name drugs, One-Way Classification of Variance (ANOVA computer program) was used. Table 18 presents the results of a one-way classification of variance.
<table>
<thead>
<tr>
<th>Product:</th>
<th>Tetracycline</th>
<th>Source of Variation</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F value Calculated</th>
<th>F value from table</th>
<th>Significant/Not significant (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>between</td>
<td>1</td>
<td>195.50</td>
<td>194.50</td>
<td>18.994</td>
<td>3.96</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>within</td>
<td>84</td>
<td>859.97</td>
<td>10.24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Totals</td>
<td>85</td>
<td>1054.48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Penicillin G</td>
<td>between</td>
<td>1</td>
<td>314.53</td>
<td>314.53</td>
<td>30.18</td>
<td>3.96</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>within</td>
<td>80</td>
<td>833.32</td>
<td>10.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Totals</td>
<td>81</td>
<td>1147.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prednisone</td>
<td>between</td>
<td>1</td>
<td>5.69</td>
<td>5.69</td>
<td>0.929</td>
<td>3.95</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>within</td>
<td>85</td>
<td>520.38</td>
<td>6.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Totals</td>
<td>86</td>
<td>526.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE 18—continued

<table>
<thead>
<tr>
<th>Product: Meprobamate</th>
<th>Source of Variation</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F value Calculated</th>
<th>F value from table</th>
<th>Significant/Not significant (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>between</td>
<td>1</td>
<td>101.44</td>
<td>101.44</td>
<td>33.70</td>
<td>3.95</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>89</td>
<td>268.25</td>
<td>3.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>90</td>
<td>369.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product: Reserpine</th>
<th>Source of Variation</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F value Calculated</th>
<th>F value from table</th>
<th>Significant/Not significant (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>between</td>
<td>1</td>
<td>213.05</td>
<td>213.05</td>
<td>126.83</td>
<td>3.96</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>87</td>
<td>146.11</td>
<td>1.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>88</td>
<td>359.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product: Digoxin</th>
<th>Source of Variation</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F value Calculated</th>
<th>F value from table</th>
<th>Significant/Not significant (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>between</td>
<td>1</td>
<td>.05</td>
<td>.05</td>
<td>0.064</td>
<td>3.99</td>
<td>Not significant</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>67</td>
<td>39.35</td>
<td>.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>68</td>
<td>39.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 18—continued

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F value Calculated</th>
<th>F value from table</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>between</td>
<td>1</td>
<td>62.82</td>
<td>62.82</td>
<td>15.137</td>
<td>3.97</td>
<td>Significant</td>
</tr>
<tr>
<td>within</td>
<td>76</td>
<td>315.32</td>
<td>4.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>77</td>
<td>378.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results

From Table 18 it may be seen that statistically significant differences were observed in mean generic and brand name per unit prices in five of the seven products. Therefore, the hypotheses proposed in Chapter V were tested to reject them or not reject them. The following list presents the hypotheses and the status of their rejection.

<table>
<thead>
<tr>
<th>Proposed Hypotheses</th>
<th>Status Based on Mean Per Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for tetracycline capsules 250 mg.</td>
<td>Rejected</td>
</tr>
<tr>
<td>2. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for penicillin G tablets 400,000 unit.</td>
<td>Rejected</td>
</tr>
<tr>
<td>3. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for prednisone tablets 5 mg.</td>
<td>Not rejected</td>
</tr>
</tbody>
</table>
4. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for meprobamate tablets 400 mg. 
5. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for reserpine tablets 0.25 mg. 
6. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for digoxin tablets 0.25 mg. 
7. There is no statistically significant price difference to the patient between generic and brand name prescriptions written for chloral hydrate capsules 500 mg.

Since five of the seven drug products included in this sample show significant price differentials to the patient, the observed differences will be evaluated in terms of the operational characteristics of the retail pharmacies in Chapter VII. However, a discussion on all of the seven products, in an attempt
to explain the observed price differentials in five products and the lack of such differentials for two of the products, is included hereunder.

1. **Tetracycline capsules 250 mg.** - The mean price per unit to the patient for generically written and dispensed tetracycline capsules was $0.095, and the mean per unit price to the patient for brand name written and dispensed tetracycline capsules was $0.125. This price differential is expected because of the wide disparity between the price of generic and brand name tetracycline capsules from the manufacturer or wholesaler to the pharmacist. Generic tetracycline capsules are usually sold in packages of 1000 capsules and the price to the pharmacist depends upon the source of supply. Most generic manufacturers price this product in the vicinity of $30.00 per 1000 capsules. Two of the three most popular brand name tetracycline products, Achromycin V capsules and Tetrex capsules, at the time of this survey were priced at approximately $12.00 per 100 capsules. The third brand name product, Sumycin capsules, was priced at approximately $4.25 per 100 capsules to the pharmacist. (The price to the pharmacist of Achromycin V capsules has since declined to $4.50 per 100 capsules. The price of Tetrex capsules has remained constant at $14.95 per 100 capsules.) The decline in the price to the pharmacist of Achromycin V capsules and the introduction of a larger package (1000 capsules for $43.50) may tend to diminish the price differential to the patient in the future.
2. **Penicillin G tablets 400,000 units** - The mean per unit price to the patient of penicillin G tablets in generic prescriptions was $0.085. The mean per unit price to the patient for brand name prescriptions of penicillin G tablets was $0.124. The possible reason for the observed price differentials for penicillin G is the same as that for tetracycline capsules (see above). The generic penicillin G products are lower in price to the pharmacist than the brand name products. The most popular brand name penicillin G, Pentids 400 tablets, costs $8.45 per 100 tablets to the pharmacist and is not available in a larger package. Most generic penicillin G products are priced in the vicinity of $25.00 per 1000 tablets to the pharmacist. This large difference in the price paid by the pharmacist to the manufacturer or wholesaler could be the reason for the observed price differential to the patient for penicillin G tablets.

The results of this investigation agree with the results of the study by Hammel and McCormick, inasmuch as their investigation also revealed the existence of retail price differentials in the cases of tetracycline and penicillin.¹

3. **Prednisone tablets 5 mg.** - The generic and brand name prescriptions written and dispensed for prednisone tablets did not show statistically significant retail price differentials. The mean per unit price to the patient for prednisone tablets in

¹Hammel and McCormick, *op. cit.*
generic prescriptions was observed to be $0.066 and the mean per unit price for brand name prescriptions was $0.071. The absence of retail price differentials may be due to the steady decline in the price to the pharmacist of brand name prednisone tablets 5 mg. over the past decade, to the point that the price spread to the pharmacist between generic and brand name prednisone products is negligible as far as its effect on the prescription price to the patient is concerned. A notable exception to this statement is Meticorten tablets, where the price to the pharmacist is $10.00 per 100 tablets. Meticorten does not appear in the list of the top 200 drugs because of its relatively high price. Probably for this reason very few prescriptions for Meticorten tablets were encountered in the prescription audit portion of this study. It should be noted that prednisone therapy becomes long-term in the treatment of some diseases, like arthritis. In such instances, pharmacists tend to price their prescriptions at less than the customary and usual markup. Similarly, in Hammel and McCormick's study, no retail price differentials were observed in the case of prednisone tablets 5 mg.

4. **Meprobamate tablets 400 mg.** - The mean per unit price of generic meprobamate tablets to the patient was $0.074; the mean per unit price of brand name meprobamate tablets was $0.095. Once again the generic products are priced much lower to the pharmacist than their brand name counterparts. The reasons listed for tetracycline capsules and penicillin G tablets are also
applicable in explaining the observed price differentials of meprobamate to the patient.

In Hammel and McCormick's study significant price differentials were not observed for meprobamate tablets 400 mg. (The per day therapy price to the patient was higher for generic prescriptions than for brand name prescriptions.) This apparent difference between this study and that of Hammel and McCormick may be explained by differences in methodology of data collection. In Hammel's study a generic prescription was defined as one where the drug's generic name was used in writing the prescription. In this study a generic prescription is defined as one not only written by generic name but also filled with a generic name product. As mentioned earlier, the practice of substituting a brand name product for a generically written prescription is not uncommon. This practice of substitution of a brand name drug for a generically written prescription may be due to a higher margin of profit per prescription on brand name drugs. This is especially true when the brand name drug has a faster turnover rate than the generic counterpart. To illustrate this point, the most popular brand name meprobamate tablets 400 mg. are Equanil and Miltown, both of which are included in the list of the top 200 drug products, published by Gosselin. As a result of the overwhelming popularity of brand name meprobamate products, many pharmacies are discouraged from stocking generic meprobamate tablets at all. This absence of generic meprobamate tablets from
the inventory of a typical pharmacy could lead to substitution of
brand name products on generic meprobamate prescriptions.

The results of the present investigation tend to confirm
the results of Azarnoff's study where a generically written
prescription was filled with a generic name product. In
Azarnoff's study the price differential to the patient for
meprobamate was projected to be 21 per cent, whereas in this
study the price differential to the patient is approximately
22 per cent.

5. Reserpine tablets 0.25 mg. - The mean per unit price
to the patient for generic prescriptions of reserpine tablets
was $0.038; the mean per unit price of brand name prescriptions
was $0.069. The observed price differentials for reserpine
tablets can be explained in the same manner as the cases of
tetracycline capsules and penicillin G tablets. The most popular
brand name reserpine tablets is Serpasil which is included in the
top 200 drug list published by Gosselin. In Hammel's study only
three generic reserpine prescriptions were audited, while nineteen
brand name reserpine prescriptions were audited. Hammel's study
did not find the price to the patient to be significantly differ­
ent between generic and brand name prescriptions for reserpine
tablets. The apparent disagreement between this study and that
of Hammel can once again be explained by the differences in the
methodology of the two studies.

---

*Azarnoff, op. cit.*
6. Digoxin tablets 0.25 mg. - The mean price per unit to the patient was $0.0235 for generic prescriptions for digoxin tablets and $0.0236 for brand name prescriptions for digoxin tablets. The analysis of variance indicates that the price differential to the patient between generic and brand name prescriptions for digoxin tablets is not statistically significant. Twenty-three of the forty-six pharmacies in this survey did not carry generic digoxin in their inventory. The most popular brand of digoxin tablets is Lanoxin, which is available to the pharmacist in a large package (5000 tablets for $27.00). The substitution of a brand name product, Lanoxin, is a very common practice in this case. For most of the patients on digoxin therapy, this cardiotonic drug has to be taken for the rest of the patient's life. Being a maintenance drug, most pharmacies include Lanoxin on their competitive list. Discounting Lanoxin prescriptions is not uncommon. Those pharmacies which did carry generic digoxin tablets in stock, usually charged the minimum

3Depending on the therapeutic characteristics of a drug, a large number of pharmacies discount some prescription drugs, and the price to the patient is only 10% to 15% above the pharmacist's acquisition cost. Since it is a very common practice in the retail prescription market to offer maintenance drugs, such as, anti-diabetics, conjugated estrogens, some analgesics, and anti-epileptic drugs, at competitive prices, most pharmacies prepare a list of such products, usually called the competitive list. This practice is more widespread among chain and discount pharmacies than in independent pharmacies. Lanoxin is invariably included in such a list. Two of the forty-six pharmacies included in this study discounted Lanoxin below their expressed acquisition cost.
prescription charge on generic digoxin prescriptions, regardless of the quantity prescribed. The results on digoxin tablets in this study agree with the results of Hammel's study.

7. Chloral hydrate capsules 500 mg. - The mean per unit price to the patient for chloral hydrate was $0.078 for generic prescriptions and $0.096 for brand name prescriptions. The most popular brand name for chloral hydrate capsules is Noctec which is priced to the pharmacist at $4.20 per 100 capsules, as compared to $2.00 per 100 capsules for most generic products. The same reasons used in the cases of tetracycline capsules and penicillin G tablets may be used to explain the price differentials between generic and brand name prescriptions for chloral hydrate capsules. In Hammel's study no significant price differential was found for chloral hydrate capsules, but once again differences in the methodology used for data collection in the two studies can explain this difference.

To summarize, in this chapter the retail price differentials between generic and brand name prescriptions have been determined, based on the statistical analysis of the data, and the results of this investigation compared with the results of those studies previously reported in the literature. The observed price differentials have been explained and the principal reason for the price differential appears to be the higher price to the pharmacist from the manufacturer or wholesaler of brand name products, which is passed on to the patient in the form
of higher prescription prices. The validity of the methodology employed in auditing only those generic prescriptions which are filled with a generic name product is demonstrated by the fact that some products, which heretofore were reported as not showing any price differential, have shown statistically significant price differentials in this study.
CHAPTER VII

EVALUATION OF OBSERVED PRICE DIFFERENTIALS

The objective of this chapter is to quantify the observed price differentials to the patient between generic and brand name prescriptions and to evaluate these in terms of those characteristics of the pharmacies which have direct bearing on the prices charged to the patient.

In Chapter VI an attempt was made to explain the observed differentials in terms of the intrinsic characteristics of the drug, such as, its therapeutic classification, the price of the drug to the pharmacist, and the competitive position of the drug in the market. This chapter will attempt to analyze the extrinsic factors affecting the prescription price, such as, the type of retail pharmacy, the services offered by the pharmacy, the pricing policy used by the pharmacy, and the location of the pharmacy.

In June 1971 R. A. Gosselin and Company published a list of thirty-six reasons for the differences in prescription prices of various pharmacies.¹ The top eight factors, in order of

¹R. A. Gosselin, "There are Thirty-Six Factors which Cause Rx Prices to Vary," Pharmacy Times, Vol. 37, No. 6 (June, 1971), p. 34.
importance, indicate that variation in prescription prices depend upon:

1. Region of the United States;
2. Type of pharmacy;
3. Special services to the customers;
4. Local urbanization and income;
5. Pharmacy's purchasing sources;
6. Welfare and insurance programs involved;
7. Duties and services of the pharmacists;
8. Community services performed by the pharmacists.  

The Gosselin study recommended that the reimbursement to the pharmacist be based on the Prescription Service Index (PSI), which is based upon the factors listed above. Gosselin has outlined a method to quantify all thirty-six major factors and establish a fixed PSI for each pharmacy. The purpose of including this discussion is to emphasize the fact that extrinsic factors have a direct bearing on prescription price. The next step is to determine the effect of these factors on the observed price differentials to the patient between generic and brand name prescriptions. Data on the following five characteristics was collected from each of the participating pharmacies using the

2Ibid., p. 34.
Prescription Audit Form and the Personal Interview Form (see Appendix A and B):

1. Type of pharmacy
   a. Independent
   b. Chain

2. Prescription pricing system
   a. Professional fee
   b. Markup

3. Location of pharmacy
   a. Shopping center
   b. Neighborhood

4. Services offered
   a. High service content
   b. Low service content

5. Minimum prescription charge
   a. Lower than the mean for all pharmacies in the sample
   b. Higher than the mean for all pharmacies in the sample

4 The service content of the pharmacy was classified into these two groups by using the criterion of the monetary effect of the services on the total prescription price. For example, prescription delivery, credit, and family prescription records have a direct bearing on the prescription price because monetary costs are incurred by the pharmacist in rendering these services. Therefore, those pharmacies offering delivery, credit, and family prescription records were classified as high service content pharmacies, whereas those pharmacies which did not offer these services were classified as low service pharmacies.

5 The mean minimum prescription charge of all forty-six pharmacies was computed to be $1.44.
The following table lists the distribution of the pharmacies in terms of the above-mentioned characteristics.

**TABLE 19**

**PERCENTAGE DISTRIBUTION OF THE PHARMACIES ACCORDING TO OPERATIONAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number of Pharmacies</th>
<th>Percentage of Pharmacies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Type of pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent</td>
<td>23</td>
<td>50</td>
</tr>
<tr>
<td>Chain</td>
<td>23</td>
<td>50</td>
</tr>
<tr>
<td>2. Prescription pricing system used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional fee</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Markup</td>
<td>37</td>
<td>81</td>
</tr>
<tr>
<td>3. Location of pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shopping center</td>
<td>22</td>
<td>48</td>
</tr>
<tr>
<td>Neighborhood</td>
<td>24</td>
<td>52</td>
</tr>
<tr>
<td>4. Services offered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High service content</td>
<td>32</td>
<td>70</td>
</tr>
<tr>
<td>Low service content</td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>5. Minimum prescription charge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over $1.44</td>
<td>16</td>
<td>34</td>
</tr>
<tr>
<td>Under $1.44</td>
<td>30</td>
<td>66</td>
</tr>
</tbody>
</table>

In order to test the effect of these extrinsic operational characteristics on the observed price differentials, the following hypotheses are proposed.

**Statement of hypotheses**

1. There is a statistically significant effect on the observed price differentials to the patient between generic and brand name prescriptions by the type of pharmacy.
2. There is a statistically significant effect on the observed price differentials to the patient between generic and brand name prescriptions by the prescription pricing system of the pharmacy.

3. There is a statistically significant effect on the observed price differentials to the patient between generic and brand name prescriptions by the location of the pharmacy.

4. There is a statistically significant effect on the observed price differentials to the patient between generic and brand name prescriptions by the services offered by the pharmacy.

5. There is a statistically significant effect on the observed price differentials to the patient between generic and brand name prescriptions by the minimum prescription charge of the pharmacy.

To test these hypotheses, the observed price differential was considered the dependent variable and the five operational characteristics of the pharmacy were considered independent variables.

Quantification of variables

The dependent variable was quantified by subtracting the sum mean per unit price for the generic prescriptions of all seven products for each pharmacy from the sum of mean per unit price on brand name prescriptions of all seven products for each pharmacy. Table 20 gives an example of a typical computation.
TABLE 20
QUANTIFICATION OF PRICE DIFFERENTIALS

<table>
<thead>
<tr>
<th>Product</th>
<th>Mean Brand Price Per Unit</th>
<th>Mean Generic Price Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracycline 250 mg.</td>
<td>$0.0973</td>
<td>$0.0629</td>
</tr>
<tr>
<td>Penicillin G 400,000 units</td>
<td>0.1046</td>
<td>0.0748</td>
</tr>
<tr>
<td>Prednisone 5 mg.</td>
<td>0.0527</td>
<td>0.0440</td>
</tr>
<tr>
<td>Meprobamate 400 mg.</td>
<td>0.0929</td>
<td>0.0798</td>
</tr>
<tr>
<td>Reserpine 0.25 mg.</td>
<td>0.0555</td>
<td>0.0326</td>
</tr>
<tr>
<td>Digoxin 0.25 mg.</td>
<td>0.0198</td>
<td>0.0174</td>
</tr>
<tr>
<td>Chloral hydrate 500 mg.</td>
<td>0.0759</td>
<td>0.0483</td>
</tr>
<tr>
<td>Total</td>
<td>0.4987</td>
<td>0.3598</td>
</tr>
</tbody>
</table>

Price Differential = $0.1389 (0.4987-0.3598)

The next table gives the price differential for each of the forty-six pharmacies. From the table it is evident that forty-five out of the forty-six pharmacies showed a higher mean per unit price for brand prescriptions than for generic prescriptions. The widespread occurrence of higher price for brand prescriptions in independent and chain pharmacies could be due to the fact that both these types of pharmacies have the same source of supply, i.e., they use the services of the same wholesaler or in other instances buy the prescription drugs from the manufacturer.
### TABLE 21
QUANTIFIED PRICE DIFFERENTIALS BETWEEN SUM OF BRAND AND SUM OF GENERIC PER UNIT PRESCRIPTION PRICES FOR SEVEN PRODUCTS

<table>
<thead>
<tr>
<th>Store Code</th>
<th>Price Differentials Between Brand and Generic Drugs</th>
<th>Store Code</th>
<th>Price Differentials Between Brand and Generic Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>$0.1248</td>
<td>201</td>
<td>$0.1653</td>
</tr>
<tr>
<td>102</td>
<td>0.1708</td>
<td>202</td>
<td>0.1512</td>
</tr>
<tr>
<td>103</td>
<td>0.2108</td>
<td>203</td>
<td>0.2846</td>
</tr>
<tr>
<td>104</td>
<td>0.2154</td>
<td>204</td>
<td>0.1301</td>
</tr>
<tr>
<td>105</td>
<td>0.3511</td>
<td>205</td>
<td>0.3794</td>
</tr>
<tr>
<td>106</td>
<td>0.1482</td>
<td>206</td>
<td>0.1915</td>
</tr>
<tr>
<td>107</td>
<td>0.2655</td>
<td>207</td>
<td>0.1324</td>
</tr>
<tr>
<td>108</td>
<td>0.0175</td>
<td>208</td>
<td>0.0816</td>
</tr>
<tr>
<td>109</td>
<td>0.1182</td>
<td>209</td>
<td>0.1369</td>
</tr>
<tr>
<td>110</td>
<td>0.0946</td>
<td>210</td>
<td>0.0566</td>
</tr>
<tr>
<td>111</td>
<td>0.0435</td>
<td>211</td>
<td>0.1859</td>
</tr>
<tr>
<td>112</td>
<td>0.0865</td>
<td>212</td>
<td>0.0335</td>
</tr>
<tr>
<td>113</td>
<td>0.0218</td>
<td>213</td>
<td>0.0685</td>
</tr>
<tr>
<td>114</td>
<td>0.0729</td>
<td>214</td>
<td>0.0465</td>
</tr>
<tr>
<td>115</td>
<td>0.2228</td>
<td>215</td>
<td>0.2695</td>
</tr>
<tr>
<td>116</td>
<td>0.0195</td>
<td>216</td>
<td>0.0433</td>
</tr>
<tr>
<td>117</td>
<td>0.1389</td>
<td>217</td>
<td>0.1775</td>
</tr>
<tr>
<td>118</td>
<td>0.0131</td>
<td>218</td>
<td>0.0618</td>
</tr>
<tr>
<td>119</td>
<td>-0.0027</td>
<td>219</td>
<td>0.0806</td>
</tr>
<tr>
<td>120</td>
<td>0.1045</td>
<td>220</td>
<td>0.0045</td>
</tr>
<tr>
<td>121</td>
<td>0.0709</td>
<td>221</td>
<td>0.1836</td>
</tr>
<tr>
<td>122</td>
<td>0.0132</td>
<td>222</td>
<td>0.0532</td>
</tr>
<tr>
<td>123</td>
<td>0.0945</td>
<td>223</td>
<td>0.1460</td>
</tr>
</tbody>
</table>
Step-wise regression analysis of the observed price differentials and store characteristics

The dependent variable, i.e., observed price differential, was regressed against the five independent variables, namely, the type of pharmacy (independent or chain), the location of the pharmacy (shopping center or neighborhood), the pricing policy of the pharmacy (professional fee or markup), the minimum prescription charge of the pharmacy (high or low), and the number of services offered by the pharmacy (high or low). The next table gives the statistical summary of the variables.

<table>
<thead>
<tr>
<th>Name of Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Type of store</td>
<td>1.5000</td>
<td>0.5055</td>
</tr>
<tr>
<td>2. Location of store</td>
<td>1.4565</td>
<td>0.5036</td>
</tr>
<tr>
<td>3. Pricing policy</td>
<td>1.8043</td>
<td>0.4011</td>
</tr>
<tr>
<td>4. Minimum prescription charge</td>
<td>1.3478</td>
<td>0.4815</td>
</tr>
<tr>
<td>5. Services offered</td>
<td>1.5435</td>
<td>0.5036</td>
</tr>
<tr>
<td>6. Price differential</td>
<td>0.1235</td>
<td>0.0912</td>
</tr>
</tbody>
</table>

A step-wise computer program was designed to enter the variable responsible for explaining the major portion of the variance first. The sequence in which the other variables were entered is governed by the per cent of variance explained by
the variable in question. Table 23 lists the sequence in which the variables were entered, the per cent of variance explained by the variable, and the statistical significance of the F-ratio computed by the step-wise regression program.

### TABLE 23

**SUMMARY STATISTICS OF THE VARIABLES IN THE REGRESSION AND THE TESTS FOR SIGNIFICANCE**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Per Cent of Variance Explained</th>
<th>df</th>
<th>Observed F-ratio</th>
<th>F-ratio from Table at 0.05 level</th>
<th>Significant/Not significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>9.59</td>
<td>44</td>
<td>2.977</td>
<td>4.06</td>
<td>Not significant</td>
</tr>
<tr>
<td>Pricing</td>
<td>4.09</td>
<td>43</td>
<td>3.37</td>
<td>4.07</td>
<td>Not significant</td>
</tr>
<tr>
<td>Type</td>
<td>2.64</td>
<td>42</td>
<td>3.43</td>
<td>4.07</td>
<td>Not significant</td>
</tr>
<tr>
<td>Min. Chrg.</td>
<td>2.31</td>
<td>41</td>
<td>2.55</td>
<td>4.07</td>
<td>Not significant</td>
</tr>
<tr>
<td>Services</td>
<td>2.40</td>
<td>40</td>
<td>2.13</td>
<td>4.08</td>
<td>Not significant</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21.03</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Since none of the five variables has a statistically significant effect on observed differentials, we can reject all the proposed hypotheses. In other words, from the sample of pharmacies under investigation it can be concluded that type of pharmacy, prescription pricing policy, location of the pharmacy, services offered, and minimum prescription charge have no significant effect on the price differentials between generic and brand name prescriptions. Therefore, there must be some other characteristics of the prescription itself (rather than
the operational characteristic of the pharmacy) responsible for the unexplained variance. As discussed in Chapter VI, the relatively lower price to the pharmacist of the generic name drugs should be the major determinant of the magnitude of the price differentials to the patient.

To summarize this chapter, then, it can be stated that the observed price differentials are a function of the characteristics of the prescription rather than the characteristics of the pharmacy. Since we have already discounted the price-volume effect (in Chapter VI), it is clear that a prescription written and dispensed by generic product has a lower price to the patient for five of the seven products, and the operational characteristics of the pharmacy have little, if any, effect on the price differential between brand and generic prescriptions. The other explanation could be that the retail pharmaceutical market is composed of such factors which were not investigated in this study. Nevertheless, the operational characteristics selected for this study are those which have a direct bearing on the prescription price. A detailed study is warranted to investigate the pharmacist's, the physician's, and the consumer's attitudes towards the quality of generic products versus that of brand name products.
CHAPTER VIII

SUMMARY AND CONCLUSIONS

In this chapter an attempt will be made to summarize the principal findings of this investigation, to present the results deduced from analysis of the data, to enunciate the implications based on the observed results, and to define the limitations of this study. The last part of the chapter is devoted to some suggestions for further research on the economic effects of generic-brand name prescribing and dispensing.

Summary of the findings and conclusions

A total of forty-six pharmacies, twenty-three independent, and twenty-three chain pharmacies were investigated to determine the consumer price differential for seven drug products: tetracycline capsules 250 mg., penicillin G tablets 400,000 units, prednisone tablets 5 mg., meprobamate tablets 400 mg., reserpine tablets 0.25 mg., digoxin tablets 0.25 mg., and chloral hydrate capsules 500 mg. which are available by both generic and brand names. A total of 1267 prescriptions for these seven generic name drugs were audited from the forty-six pharmacies. The similar figure for brand name prescriptions was 1605. The mean price per unit of generic prescriptions was lower than the mean price
per unit of brand name prescriptions for five of the seven drugs (tetracycline capsules 250 mg., penicillin G tablets 400,000 units, meprobamate tablets 400 mg., reserpine tablets 0.25 mg., and chloral hydrate capsules 500 mg.) in forty-five of the forty-six pharmacies. Therefore, a prescription written and dispensed by generic name for any one of these five products is priced lower to the patient than a prescription for the same drug written and dispensed by a brand name. Further analysis of the observed retail price differentials revealed that these differentials are not dependent upon the operational characteristics of the pharmacies, but are probably dependent on the difference in the price to the pharmacist from the manufacturer or wholesaler. It was also found that the mean quantity of units per prescription is not significantly different in generic and brand name prescriptions.

The methodology of this investigation is different from that employed in previous investigations carried out in this area of prescription pricing, the salient difference being that a prescription to be considered generic, in this study, must not only be written by the generic name of the drug by the physician but also filled with a generic name product by the pharmacist. This methodology presumably gives a better insight into the contemporary pricing policies of retail pharmacies on generic and brand prescriptions.
The other conclusion that can be drawn from this study is that pharmacists price prescriptions based on the prices of the products which they receive from the manufacturer or the wholesaler.

Finally, this study supports the recommendation of the Task Force on Prescription Drugs that generically written prescriptions, if filled with a generic name drug, are less expensive to the patient than brand name prescriptions for five of the seven drugs included in this investigation. As the price range to the pharmacist of generic and brand name drugs converges, the retail price differential to the patient tends to disappear. Therefore, the pharmacists do pass on some of the savings to the patient.

Limitations of this study

As stated in Chapter I, this study is limited to only the economic considerations of generic and brand name prescribing and dispensing. The question of the comparative quality of generic and brand name products has been omitted deliberately. This omission does not mean that the quality of generic and brand name products has been considered identical, and neither should it be construed to mean that brand name drugs are of superior quality, and vice versa.

In an economically oriented study as this one is the question of drug quality is not involved. It remains for the
experts in other fields to resolve the debate over the differences in the quality of generic and brand name products. Once the question of quality is settled, and any differences in quality quantified, a cost-benefit ratio analysis will become feasible, and the difference in quality and price could be evaluated.

The second limitation of this study is that the methodology adopted in the evaluation of the observed price differentials between generic and brand name prescriptions in terms of the operational characteristics of the pharmacies needs considerable refinement. Better and more precise methods of data collection regarding demographic characteristics could have been used and more sophisticated statistical analysis performed. Due to the limited scope of the importance of these factors in this particular study, the operational characteristics of the pharmacies could not be investigated to a greater degree. More detailed work in this area is needed.

Finally, the study is geared to determine the retail price differentials to the patient. It would, perhaps, be meaningful to quantify the price differentials to the pharmacist and then establish and analyze a relationship between the differentials to the pharmacist and the differentials to the patient. The questions of determination of actual acquisition cost are still unresolved. However, if the actual acquisition costs of the drugs by the pharmacist are available, a typical pharmacy's gross margin on generic prescriptions versus that
for brand name prescriptions should be investigated. In this study no such attempt was made.

**Implications of this study**

The main purpose served by this study is to clearly demonstrate that if a generically written prescription is filled with a low-cost generic product, in most cases the prescription price to the patient is lower. However, there is no law or regulation which requires the pharmacist to fill a generically written prescription with a low-cost generic drug. This voluntary act on the part of the pharmacist results in a lower prescription price on generic prescriptions. This study could be used to support any legal stand that generically written prescriptions should be filled with low-cost generic products to offer some savings to the patient.

The retail pharmacy's operational characteristics, like location, pricing policy, organizational structure, services offered, and minimum prescription charge, fail to explain the observed differentials. Therefore, the observed price differentials may be a function of generic prescribing and generic dispensing.

The patents on many of the contemporary widely used products are due to run out in the next ten years. Therefore, these high volume brand name products will be open to generic competition in the near future. Should these products retain
their position of prominence in modern therapeutics, it is conceivable that many small generic companies will be lured into the market. Other reputed manufacturers could also offer generic drugs at substantially lower prices to the pharmacist. Consequently, there will be a profit squeeze in the pharmaceutical industry, thus shifting the product oriented competition to a price oriented competition. In view of the current stringent FDA controls on the introduction of new products into the retail prescription market, the number of high volume, profitable, and fast-moving brand name drugs is expected to decrease. In addition to the reduced number of new products, the FDA in recent months has adopted an anti-combination products stance, mostly on brand name combinations. Some of these combination products are being ordered out of the market, the action being based on the recent efficacy studies conducted by the National Research Council. If most of the combination products are withdrawn from the market, the single chemical generic drugs will come into increased prominence.

The involvement of the government on a large scale in paying for drug costs to the patient is likely to bring some kind of price regulation in the brand name drug industry. This will put the drug industry on the defensive to justify their pricing policies heretofore unknown to the drug manufacturers. Although this drastic change is not imminent, it seems unavoidable. Nevertheless, the brand name drug industry may be heading for hard times.
Suggested areas for further research

This investigation can be considered a part of the continuum of the studies on the economic aspects of the generic-brand name controversy. The major contribution of this research is to show that generic filling of prescriptions is just as important as is generic prescribing. The next step in the continuum should be the examination of the economic consequences of substituting brand name products on generically written prescriptions. In view of the current position of the American Pharmaceutical Association's emphasis to repeal the antisubstitution laws (which would give the right of brand selection to the pharmacist), the economic consequences of such an action would either substantiate or neutralize this newly developing role of the pharmacist.

The other suggested area for further research is to settle the question of therapeutic efficacy of generic products as compared to that of brand products. If the physician and the pharmacist are adequately satisfied with the quality of low-cost generic products and assured of equivalent therapeutic performance, then the economic factors will come to the forefront. So far, the debate has centered around the issue of therapeutic equivalency of generic and brand products. Therefore, this area of quality should be delegated to qualified clinical pharmacologists who should be able to either accept or reject
the therapeutic equivalency of generic drugs as a class, or as individual products.
PRESCRIPTION AUDIT FORM

1. Name and address of the store:

2. Code #

3. Group I II

4. Generic products inventory
   No _______ Yes _______

5. Comments:
PERSONAL INTERVIEW FORM

1. i. Name and address of the store
   ii. Name of the pharmacist (manager)

2. Perceived image of the store
   i. Neighborhood ______
   ii. Shopping Center ______

3. Group Classification
   i. Independent ______
   ii. Chain ______

4. Pricing Policy
   i. Professional fee _____; $ ________ per prescription
   ii. Markup _____ per cent on cost

5. Minimum prescription charge $ ________ per prescription
   i. On brand name products ______
   ii. On generic products ______

6. Services offered
   i. None ______
   ii. Credit ______
   iii. Delivery ______
   iv. Family prescription records ______
   v. Year end prescription purchase records ______
APPENDIX C
PRODUCT AUDIT FORM

Product ______________________ Date ______________________

Store Code _________

PRESCRIPTIONS WRITTEN AND DISPENSED GENERICALLY

<table>
<thead>
<tr>
<th>#</th>
<th>Prescribed</th>
<th>Dispensed</th>
<th>Price Charged</th>
<th>Patient</th>
<th>Third Party</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
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<td></td>
<td></td>
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<td>4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Price Per Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PRESCRIPTIONS WRITTEN AND DISPENSED BY BRAND NAMES

<table>
<thead>
<tr>
<th>#</th>
<th>Prescribed</th>
<th>Dispensed</th>
<th>Price Charged</th>
<th>Patient</th>
<th>Third Party</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Price Per Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
January 7, 1971

Dear Mr.

I wish to express my appreciation and gratitude to you for the interview you gave to Mr. A. K. Gumbhir, one of our graduate students, on the subject of generic and brand name drugs. Your comments are of great value to us and will surely help Mr. Gumbhir toward completion of his Ph.D. degree in Pharmacy Administration.

We are confident that you will continue to extend your cooperation to us in our research efforts.

Thank you once again.

Sincerely,

Christopher A. Rodowskas, Jr., Ph.D.
Associate Professor of Pharmacy Administration
BIBLIOGRAPHY
Books


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______ Vol. 33 No. 6 (February 8, 1971), p. 17.


