NEW COMMUNITY PHARMACIES' ECONOMIC GROWTH PATTERNS

by

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Chapter I

INTRODUCTION

This is a study of the economic growth patterns of successful community pharmacies originally opened in Wisconsin during the period January, 1955 through October, 1960.

Once a new pharmacy opens, there are both internal and external factors which influence its economic growth. Before the site is selected, location and often the size of the pharmacy are variable, but once established they become relatively fixed. Within this new environment, the pharmacy's growth may be influenced by many external factors such as other community pharmacy competition, community size, and number of practicing physicians in the area. What influence such factors have on a new pharmacy's economic growth rate also were sought.

Current Need of the Study

The importance of a new pharmacy's growth cannot be over-emphasized, for it often means either success or failure. "Typically a store has a life cycle of three successive stages: ascent, peak, and decline. The ascent and decline stages may be very steep or gradual, and the

peak stage may be of long or short duration."[1] The cycle depicted by any pharmacy depends on many factors, including that all important location selection.

Although "location alone won't of itself assure success for a pharmacist. . ., the careful choice of a place to start will eliminate the hopeless situation in which no amount of effort could possibly mean success . . . ."[2]

With reference to the importance of location in retailing, Ratcliff states, "The importance of location in retailing is fundamental, for in a large degree merchants succeed or fail as their locations within the city structure are favorable or unfavorable. Literally billions of dollars are staked on the selecting of proper locations for retail outlets. Skillful merchandising can modify but not extinguish the handicap of an inappropriate site."[3]

Commenting on the same subject, Nolen and Maynard state, "The selection of a proper location is one of the most important vital elements in the success of any retail business.

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1. William Applebaum, "Store Performance in Relation to Location and Other Characteristics," Chain Store Age, Drug. Exec. Ed., 41:11 (November, 1965) p. E16.

2. Paul C. Olsen, "The Problems Corner--'Do-It-Yourself' Store Location Analysis," Drug Topics, 102:18 (September 1, 1958) p. 101.

3. Richard U. Ratcliff, The Problem of Retail Site Selection, Michigan Business Studies, IX;1, University of Michigan, School of Business Administration, Bureau of Business Research, Ann Arbor, 1939, p. 1.

Particularly is this true in the drug business. Other factors that make for success--such as training, experience, capital, and personality--may all be offset by a location that makes it impossible to secure the necessary volume or one that secures high volume at disproportionately high costs."[4]

Speaking specifically about choosing a pharmacy site, Seymour states, "Location is the primary consideration in any real estate venture--whether it be a pure apothecary or a more diversified enterprise. When evaluating a prospective site for your pharmacy, consider it for convenience to your prospective clientele and physicians."[5] McEvilla wrote, "The proper location is of vital importance to the success of a community pharmacy. It very often determines the extent of annual sales and thus the profits to be realized from efficient operation. The selection of a good location may offset a certain amount of inefficient management. A poor location, however, is a major obstacle to the development of a successful store, even with efficient management."[6]

Therefore, a pharmacist who is planning to establish a new pharmacy makes a critical decision when he selects the location for the pharmacy. In order to evaluate the adequacy of a proposed location, one should have some knowledge of the

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4. Herman C. Nolen and Harold H. Maynard, Drug Store Management, McGraw-Hill, New York, 1941, p. 15.

5. "Locating a Pharmacy is Risky; Learn the 'Ins and Outs' First," SK & F Pharmacy News, 5:6 (August, 1964) p. 2.

6. Joseph D. McEvilla, "Pharmacy Administration," Remington's Pharmaceutical Sciences, 13th ed., Mack Publishing Co., Easton, Pa., 1965, p. 1847.

growth potential associated with this site. "A site evaluation begins with an estimate of sales that can reasonably be expected with suitable store facilities. Several market factors are taken into consideration in this evaluation: accessibility, population, competition, and economic stability."[7]

Over the last ten years, community pharmacies have been challenged in many ways, but growth has still prevailed and is predicted to continue. For the period 1954 through 1965 inclusive, the average total sales per pharmacy increased from $93,019[8] to $186,735[9], a 100.7% increase, with average prescription volume showing a more marked increase of from $20,170 to $58,411, or a 189.6% increase. Pharmacies in Wisconsin also have experienced increased growth; for in 1954, average total sales per outlet was $97,595,[10] whereas in 1963, this figure had risen to $141,260,[11] or an increase of 44.7%.

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7. Saul B. Cohen and William Applebaum, "Evaluating Store Sites and Determining Store Rents," Economic Geography, 36:1 (January, 1960) p. 1.

8. Computed from data in "Rx Sales Skyrocket 15.4% Above 1954," Drug Topics, 100:5 (March 5, 1956) p. 1.

9. Robert A. Leibson, "12.7% Rise in Rx Volume Won by Independents," Drug Topics, 110:6 (March 21, 1966) p. 41.

10. "N.C., Va., Texas Lead in Rxs Per Store," American Druggist, 144:2 (July 24, 1961) p. 17.

11. "Drug Store Volume Jumped 25% from 1958 to 1963, U.S. Census Reveals," American Druggist, 151:7 (March 29, 1965) p. 12.

As for what the future will hold, Olsen predicted total "sales of the average drug store will exceed $300,000 in 1975."[12] Kazin forecasts, "The drug store future, although replete with new types of competition, was expected to adjust to a future of unparalleled opportunity in the providing of professional services and in the gaining of economic success."[13] "This expanding economy of ours will insure opportunities for all kinds of retail drug stores."[14]

Although the future looks bright, we cannot overlook the fact that some pharmacies are unsuccessful. Of the 130 new community pharmacies opened in Wisconsin from January, 1955 through October, 1960, inclusive, twenty-seven were no longer in existence at the time of this study. On a national basis, Dun and Bradstreet's annual data on pharmacy failures have ranged between the 180's to the low 200's since 1961.[15,16] Further, the majority of bankruptcies always has involved pharmacies that were relatively new. "The first few years

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12. "1975 Drug Store Sales will Average $300,000," Drug Topics, 103:22 (October 26, 1959) p. 3.

13. Louis E. Kazin, "No Panic in Richmond," Drug Topics, 107:20 (October 7, 1963) p. 23.

14. Louis E. Kazin, "Bright with Promise," Drug Topics, 103:14 (July 6, 1959) p. 17.

15. "Ratio of Drug Store Failures Resulting from Inventory Woes Triples in 2 Years," American Druggist, 152:4 (August 16, 1965) p. 11.

16. "Drug Store Failures Drop 8.8% in 1962," American Druggist, 147:8 (April 15, 1963) p. 55.

are the hardest--and the evidence of this in the drug field is that more than half of all drug stores that failed in the past decade were less than 5 years old."[17]

This study's major objectives are, therefore, to determine statistical formulae most representative of new community pharmacies' economic growth and to study how certain factors influence their growth.

Related Studies of Interest

Regarding factors that influence success, Ellwood states, "The new store will succeed only if it offers enough added convenience and special appeal to pull enough customers away from their present supply to justify the cost of the new store."[18] Mertes believes that, "Of all location factors to consider, the site's accessibility to customers is the most important."[19]

Consumer patronage studies have shown that convenience of a pharmacy's location is important in determining the pharmacy's patronage and growth. A report based on a study conducted by George C. Engel and Associates concluded, "So

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17. "Failures of Established Pharmacies Soar Under the Impact of Price-Cutting," American Druggist, 145:11 (May 28, 1962) p. 5.

18. Leon W. Ellwood, "Estimating Potential Volume of Proposed Shopping Centers," The Appraisal Journal, 22:4 (October, 1954) p. 581.

19. John E. Mertes, Store Location, Small Business Bibliography #16, Small Business Administration, Washington, D.C., January, 1964 Revision.

far as drugs were concerned, 87% of the people interviewed said they chose a store for its convenience, 11% for its price, and 2% for its assortments."[20] Myers' thesis on community pharmacies' patronage patterns showed that the median distance from the patient's home to the pharmacy was only 0.90 miles. This distance varied with the type of location, but Myers concluded that for "general pharmacies in the downtown area and for prescription pharmacies, 'convenient location' implied a location which is convenient to the prescriber's office. For general pharmacies located outside of the downtown area, 'convenient location' implied a location which is convenient to the patient's residence."[21]

Constantine, in his thesis on the patronage patterns of six pharmacies located in Salt Lake County, reported that 62% of the customers lived within a mile radius of the pharmacy where they were interviewed. When asked if this was the closest pharmacy to their home, 67.4% answered "yes," and 83.3% of these respondents reported that they made the "majority" of their purchases there.[22]

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20. "Convenience is Tops in Shopper's Mind," American Druggist, 150:10 (November 9, 1964) p. 59.

21. Maven John Myers, The Patterns of Prescription Patronage, Unpub. M.S. thesis, University of Wisconsin, 1963, p. 58.

22. George Harmon Constantine, Jr., An Analysis of Retail Pharmacy Location Patterns for Neighborhood Sites in Salt Lake County, Unpub. M.S. thesis, University of Utah, June, 1962.

The Burgoyne studies[23] have shown that convenient location is a major factor in selecting the customer's favorite pharmacy, and once selected, most of the customer's drug needs are purchased at this pharmacy.

These studies show that location is important for patronage, and in turn, sales and economic growth.

Growth studies and forecasting are used in many fields of endeavor--the government to forecast the economy,[24] industries[25] and companies to forecast their economic growth, and even to forecast individual product sales. Few growth studies are published. Two such published studies are the National Industrial Conference Board's study of certain industry growths,[26] and Mayer and Goldstein's study of the

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23. Ben L. Schapker, Annual Survey of Drug Store Shopping Habits, Cincinnati, Ohio: Burgoyne Grocery and Drug Index, Inc., 1958-1960; 1962.

24. For example see: Economic Indicators, Prepared for the Joint Economic Committee by the Council of Economic Advisers, United States Government Printing Office, Washington, 89th Congress, 2nd Session, March, 1966; Wisconsin Economic Indicators, Issued by the Wisconsin Industrial Commission, January, 1966; Survey of Current Business, United States Department of Commerce, Office of Business Economics, Washington, D.C., 46:3 (March, 1966).

25. For example see: John G. Udell, 1975 U.S. Newsprint Consumption, Prepared for American Newspaper Publishers Association, New York, December, 1965.

26. J. Frank Gaston, Growth Patterns in Industry: A Reexamination, National Industrial Conference Board, #75, New York, 1961.

problems of small retail firms' growth and survival.[27] One unpublished study of interest is Stone's growth study and forecast of the pharmaceutical industry through 1975.[28] Although many studies have been conducted to determine what factors contribute to success, no known growth curve studies have been published which deal specifically with new community pharmacies.

Definition of Terms

The following definitions are employed for this study:

Successful Pharmacy--A pharmacy that opened in Wisconsin between January, 1955 through October, 1960 inclusive, and has remained in operation since that time.

Community Pharmacy--An establishment licensed by the Wisconsin State Board of Pharmacy to compound and dispense medication, provided that the services are available to all members of the community. This definition excludes hospital pharmacies, mail order pharmacies, and special group pharmacies such as industrial and nursing home pharmacies.

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27. Kurt B. Mayer and Sidney Goldstein, The First Two Years: Problems of Small Firm Growth and Survival, Small Business Research Series No. 2, Small Business Administration, Washington, D.C., 1961.

28. George Bailey Stone, A Long Range Economic Outlook for the Ethical Drug Industry, unpub. M.S. thesis, M.I.T., 1958.

New Pharmacy--A community pharmacy which has been opened for the first time in a particular location. This excludes pharmacies opened before 1955 that have moved during the study's time period from a previous location to their present location, and "patent medicine" outlets that have been converted to community pharmacies.

Downtown Pharmacy--A community pharmacy located in the central business district of a city. This usually is located in the center and one of the oldest parts of the community.

Neighborhood Pharmacy--A community pharmacy located in a residential area of the community, either by itself or as one of several other establishments grouped together. These other establishments are primarily service or convenience goods outlets. These outlets usually are independently owned and have limited parking facilities.

Shopping Center Pharmacy--A community pharmacy located in an area which usually is developed according to an overall plan, under unified ownership or control, and with planned free parking.

Medical Center Pharmacy--A community pharmacy located in a medical building housing the offices of physicians, dentists, or other practitioners licensed by law to prescribe medication. This type of pharmacy may be located in any part of the community.

Small Town Pharmacy--A community pharmacy located in a community with less than 10,000 population.

Traditional Pharmacy--A community pharmacy in which less than 60% of total sales are obtained from dispensing prescribed medication.

Prescription Pharmacy--A community pharmacy in which at least 60% of its total sales are obtained from dispensing prescribed medication.

Agency Pharmacy--A community pharmacy in which the owner obtains the right to use a nationally recognized drug company name, such as Walgreen or Rexall, and to offer for sale this company's products.

Chain Pharmacy--A community pharmacy which is owned along with three or more other community pharmacies, all of which use the same name.

Independent Pharmacy--A community pharmacy either owned separately, or along with only one or two other community pharmacies.

Prescription Order--An order, either written or verbal, from a licensed practitioner directing a pharmacist to dispense some specified medication for a specific patient or patients.

Chapter II

METHODOLOGY

The primary data in this study are based on an analysis of information obtained for 54 community pharmacies. Each of these 54 pharmacies opened in Wisconsin between February, 1955 through August, 1960 inclusive; and at the time of this study was still in operation. The following information was requested for each:

First sixty complete monthly sales figures, either as actual or indexed values.

Date the pharmacy opened.

Total floor space, excluding storage area.

Change of location during this period, if any.

Type of location.

Number of physicians who practiced within a three-quarter mile radius and from whom the pharmacist received prescription orders.

Number of other community pharmacies located within a three-quarter mile radius of the pharmacy.

Yearly percentage of prescription volume to total volume for each of the five years.

What factors the owner believed helped or hindered the pharmacy's growth.

In addition, all independent pharmacy owners were asked to report whether or not their pharmacy was an agency pharmacy.

Population estimates for the communities were obtained from various issues of Sales Management, "Survey of Buying

Power,"[1] and The Wisconsin Blue Book.[2] Estimates from the former corresponded with the third year the pharmacy was open, and the latter with 1960 census data.

Research Design

The number of new pharmacies opened in Wisconsin from January, 1955 through October, 1960 inclusive, was determined by recording each pharmacy listed under the "Pharmacy Changes" section of The Wisconsin Pharmacist[3] for this time period. From reviewing the "Closed Pharmacy" section of The Wisconsin Pharmacist, current Wisconsin telephone books, and with cooperation from the Wisconsin State Board of Pharmacy, this preliminary list of 139 was reduced to 110 pharmacies, seven of which were new chain pharmacies.

Each pharmacy owner's cooperation was sought by sending him an individually typed letter on letterhead stationery plus a monthly tabulation sheet, questionnaire, and a self-addressed, stamped return envelope.

Initial mailings were sent to 103 independent pharmacy owners on October 2, 1965 (Appendix A). Within two weeks,

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1. For example, see "Survey of Buying Power," Sales Management, 82:10 (May 10, 1959) pp. 718-720, 722, 724, 728.

2. The Wisconsin Blue Book, 1964, Compiled by Wisconsin Legislative Reference Bureau, Madison, Wisconsin, pp. 606-614.

3. For example, see the "Pharmacy Changes" section in Paul A. Pumpian, "Pharmacy Law in Action," The Wisconsin Pharmacist, 28:3 (March, 1960) pp. 18, 22.

twenty usable returns had been received. A return was considered usable if it had at least one year's monthly data, plus four yearly totals. Eight nonusable replies were received during this time, plus one stating the pharmacy was over 25 years old, and an original mailing returned because the pharmacy was no longer in existence.

The first follow-up was mailed to the remaining 73 pharmacy owners on October 16, 1965 (Appendix B). Each of these cover letters was individually typed. Within two weeks, eleven additional usable returns were received, plus twelve nonusable replies.

The second follow-up with individually typed cover letters was mailed to the remaining 50 pharmacy owners on October 30, 1965 (Appendix C). During the next two weeks, six additional usable returns were received.

Nonusable replies consisted of those from owners who did not have the requested monthly data or who did not wish to cooperate.

After November 14, each of the remaining pharmacy owners was telephoned to determine whether he had any questions about the study. As a result of these calls, it was learned that five of the pharmacies had opened before January 1, 1955. Within the next three months, twelve more usable returns were received.

A mailing was sent to executives representing the seven chain pharmacies on October 12, 1965 (Appendix D). During the next three weeks, replies were received for all seven, of

which five were usable. A summary of the population and response rate is given in Table I (page 16). Of the 54 usable returns, 49 respondents provided 60 months' data, and five, both partial monthly plus yearly data. Monthly values were calculated from yearly values using a proportionate ratio of the monthly figures provided.

The monthly sales sheet allowed the owner to record either his actual monthly sales figures or to index them based on the first complete month's sales. Since all the data were to be indexed for analysis anyway, the alternative was offerred to help assure confidentiality. Of the 54 usable returns, seven were received indexed.

The questionnaire was designed to provide information about certain variables which may affect pharmacies' growth. The question asking the pharmacy's opening date was included to assure that the pharmacy opened within the specified time period. The change of location question was asked to assure that the pharmacy had not moved into a new location with different potential. Three of the usable returns indicated such a change; one of a move next door, one within the same medical building, and one across the street. Since none of these showed a disproportionate increase in sales after the move, each was considered still usable. As can be noted in the follow-up questionnaire, questions 6, 7, 8, and 9 were modified slightly to increase clarity and obtain a more complete reply.

Table I

POPULATION AND RESPONSE RATE

	Number	Non-Response	Non-usable Replies	Usable Returns	Closed during Period	Not a Community Pharmacy	Opened before Jan. 1955	Population
Preliminary List					26	3		139 - 29 110
1st Mailing								
Independent	103		8	20	1		1	- 2
Chain	7		2	5				
								108
1st Follow-up								
Independent	73		12	11				
2nd Follow-up								
Independent	50			6				
Telephone Call								
Independent	44			12			5	- 5
Total		27	22	54	27	3	6	103

A summary of the study's population and usable returns based on type of ownership, year the pharmacy opened, and type of location, are shown in Tables II, III, and IV, respectively (page 18).

Indexing and Deseasonalizing

The relative growth rather than the absolute growth should be measured to compare the growth curves of individual pharmacies. Therefore, it was necessary to index the actual monthly data and reindex the indexed monthly data based on one common criterion. Since any one monthly value can be influenced by many factors, each pharmacy's 60 monthly values were indexed or reindexed based on the mean of that pharmacy's data.

Seasonal fluctuations have a big influence on some pharmacies monthly sales. Christmas, Easter, and like holidays cause marked fluctuations in retail sales. Based on unadjusted, estimated, monthly sales figures from the Survey of Current Business for the period 1939 through 1951, Hampton showed there are seasonal fluctuations in community pharmacy sales. He concluded, "Retail pharmacies are not at present faced with a serious seasonal problem with the exception of the holiday trade in December."[4] To help remove

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4. Richard J. Hampton, "Seasonal Fluctuations in Retail Drug Store Sales," American Journal of Pharmaceutical Education, 18:3 (July, 1954) p. 434.

Table II

NUMBER OF PHARMACIES BY OWNERSHIP

Type of Ownership	Population	Usable Returns	Percent of Population
Chain	7	5	71.4%
Independent	96	49	51.0%
Totals and weighted mean	103	54	52.4%

Table III

NUMBER OF PHARMACIES BY YEAR OF OPENING

Year	Population	Usable Returns	Percent of Population
1955	16	7	43.8%
1956	11	6	54.5%
1957	20	8	40.0%
1958	17	8	47.1%
1959	24	15	62.5%
Jan-Oct. 1960	15	10	66.7%
Totals and weighted mean	103	54	52.4%

Table IV

NUMBER OF PHARMACIES BY LOCATION

Type of Location	Population	Usable Returns	Percent of Population
Downtown	24	12	50.0%
Neighborhood	25	16	61.5%
Shopping Center	30	13	43.3%
Medical Center	24	13	54.2%
Totals and weighted mean	103	54	52.4%

this fluctuation, each pharmacy's indexed values were deseasonalized using the twelve-month centered moving average technique. See Appendix E for an explanation of this method (page 131).

Each pharmacy's monthly sales figures were punched on general purpose computer cards. Each card carried the pharmacy's assigned number, the month, and the actual or indexed sales figure for that month. Using an I.B.M. 1410 computer, the indexing and deseasonalizing were performed in one operation. See Appendix F for a sample of this output (page 133).

Computation of the Growth Curves

The deseasonalized, indexed data were transferred to new general purpose computer cards, with each card carrying the pharmacy's assigned number, the month, and the computed deseasonalized index value for that month. Using an I.B.M. 1410 computer, the method of least squares, and a multivariance regression and correlation program, the best statistical curve was fitted to each of the 54 pharmacy's data, all of the data taken together, and for the following classifications: type of location, community size, prescription versus traditional, chain versus independent, agency versus nonagency, pharmacy size, number of practicing physicians within the area, and number of other community pharmacies within the area. Table V shows a summary of these classifications and subclassifications (page 20). One

Table V

SUMMARY OF PHARMACY CLASSIFICATION

Classification and Subclassification	Number of Pharmacies
Type of Location	
Downtown	12
Neighborhood	16
Shopping Center	13
Medical Center	13
Community Size	
Under 10,000	12
10,000-49,999	20
50,000-250,000	10
Over 250,000	12
Prescription versus Traditional	
Prescription	17
Traditional	35
Chain versus Independent--medical center pharmacies excluded	
Chain	5
Independent	36
Agency versus Nonagency--medical center and chain pharmacies excluded	
Agency	7
Nonagency	29
Floor Space	
Under 500 sq. ft.	10
500-999 sq. ft.	12
1,000-1,999 sq. ft.	16
2,000-5,000 sq. ft.	13
Over 5,000 sq. ft.	3
Number of Physicians in Area	
0-1	11
2-3	15
4-10	12
11-20	8
Over 20	8
Number of Pharmacies in Area	
0	10
1	7
2	12
3-5	12
6 or more	12

pharmacy owner failed to record the number of other community pharmacies in the area; and two owners of independent pharmacies their percentage of prescription to total volume.

A form of the following general exponential equation with a maximum of five independent variables was fitted to the data:

$$Y = a + bx + cx^2 + dx^3 + e\ 1/X + f\ 1/X^2$$

where,

Y = computed monthly indexed sales value corresponding to the x value

x = specific month from one through sixty

a-f = constants

A natural log program with a maximum of three independent variables was fitted after the best exponential equation was determined for each individual pharmacy, all pharmacies taken together, and for each subclassification.

$$\text{Log } Y = \log a + x \log b + x^2 \log c + x^3 \log d$$

where,

Y = computed monthly indexed sales value corresponding to the x value

x = specific month from one through sixty

a-d = constants

An equation was considered the best for that pharmacy or subclassification if it had the highest coefficient of multiple determination, with the limitation that the "T

value" for each independent variable in the equation was greater than ±2.000.[5]

The coefficient of multiple determination for the best log and the best exponential equation for each pharmacy were compared. Of the 54 pharmacies, 26 had better log equations, whereas 27 had better exponential equations. One pharmacy's best log and exponential equations explained the same amount of total variation. The 26 better log equations explained a total of 32.5% more variation than did the corresponding exponential equations. For the 27 pharmacies with a better exponential than log equation, a total of 80.4% more variation was explained by using the exponential. Based on these differences as well as computer time and cost factors, it was decided not to determine the best log equation for all of the data taken together or for the various subclassifications.

Appendix G shows a sample of the exponential output (page 134). Appendix H shows a sample of the log output (page 135).

Mathematical Analyses

Sixty monthly Y values were calculated for each individual pharmacy using that pharmacy's best exponential

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5. The "T value" represents the "T" table value for the null hypothesis that the particular independent variable is equal to zero. If the "T value" is greater than ±2.000 we reject the hypothesis and accept the variable as being significant. For an explanation see Frederick E. Croxton and Dudley J. Cowden, Applied General Statistics, 2nd edition, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1955, pp. 643-647.

equation. Using the best exponential equation determined for each subclassification and for all pharmacies taken together, sixty corresponding Y values were calculated for each. Each set of values was plotted to represent the most characteristic growth pattern for each pharmacy, all pharmacies taken together, and for the various subclassifications. These are shown in Chapter III.

Three mathematical measurements were used to analyze each of these growth curves. They were the absolute change, percentage change, and slope. The slope, or average monthly change, was determined by dividing the absolute change by the number of months this change represented. Each yearly absolute change, percentage change based on that year's first month value, and each year's average monthly change or slope were determined. Each pharmacy's total five year absolute change, percentage change based on the first month value, and the average monthly change for this entire period also were determined. These data are given in Table VI (pages 38-39).

From these computed data, a mean, modified mean, median, and the range were determined for each of the three growth measures for each year and for the total five year period. These data are shown in Table VII (page 43). Using the one best exponential equation for all the pharmacies' growth, each yearly absolute change, percentage change based on that year's first month value, and each year's slope were determined. The total five year absolute, percentage, and slope

also were determined from this equation. These computed equation values are shown at the bottom of Table VII (page 43). These values may be compared to the mean, modified mean, and median of the three growth measures determined previously to see the relative accuracy of this one equation.

For each of the 29 subclassifications, a mean, median, and the range for each of the three growth measures were determined for the total five year period. For example, from the thirteen medical center pharmacies' total five year absolute change, percentage change, and slope values listed in Table VI, a mean, median, and the range were determined for each growth measure. These data are shown under the various classification tables in Chapter III as five year totals from individual pharmacies.

Each yearly absolute change, percentage change based on that year's first month value, and each year's slope were determined from the best exponential equation representing each of the 29 subclassifications. The total five year absolute, percentage, and slope also were determined using each of these equations. These computed values are shown under the various classification tables in Chapter III as equation values. The computed five year totals determined from the subclassification equation and the corresponding five year totals determined from the individual pharmacies within that subclassification are given to show the relative accuracy of the one subclassification equation.

A criterion was needed to determine if one of the new pharmacies or subclassifications had obtained its potential. Established pharmacies in the United States generally have experienced yearly increases in total sales over the period 1955 through 1965 inclusive. Based on the values that appear in Appendix I, it was determined that the median monthly growth or slope value was 0.568 indexed sales units (page 136). This value was considered normal economic growth and served as the criterion. When and if an individual pharmacy or subclassification monthly slope value equalled or fell below this criterion value, that pharmacy or subclassification was considered to have obtained its potential.

Some Limitations of the Study

Many limitations are inherent in any research design, particularly time series analyses and growth curve studies. The following factors should be noted:

The 54 pharmacies included in this study were not selected by a probability sampling procedure. Therefore, the data, analyses, and conclusions in this study are limited to the participating pharmacies.

With any survey research design, one may obtain a different experience from the nonrespondents. This also is true of the nonusable replies. This study probably represents a disproportionately low number of marginal as well as very successful pharmacies, although examples of both are

present. An owner probably would be more reluctant to submit data reflecting poor or exceptional success than if he thought his pharmacy had experienced a normal or typical growth pattern.

Time series analyses or growth curve studies depict only the condition that existed during that specific period. They say nothing about the immediate present or future, but only the past. When using any time series to forecast, this limitation must be realized, for in forecasting one generally assumes that the conditions that prevailed in the past will continue to prevail in the future. Many times this is not true, particularly in as dynamic an economy as ours.

Using as simple an economic growth model as this, it is necessary to assume that all other factors which influence growth such as economic conditions in the community, the owner's financial status, his managerial ability, and merchandise selection are constant. In the analysis of each classification, it is assumed that the only variables contributing to or effecting growth are time and that one factor, and all other factors are constant. This limitation is similar to that in the classic economic model of demand, where the only factor assumed to influence the quantity demand is price.

Although the data were deseasonalized, changes in the business economy or cyclical fluctuations on a national, state, and even local level, were not removed. No practical method was determined which would remove these possible fluctuations.

The mathematical analyses of the computed growth curves were based on the assumption that the data obtained from each pharmacy's best equation and the various subclassification's best equation were equally reliable. This was not the case, for although 39 out of the 54 best individual pharmacy equations explained over 90% of the variation, 15 equations explained smaller amounts.

Chapter III

ANALYSIS OF FINDINGS

The analyses of the 54 pharmacies' data indicate there are certain characteristic growth patterns. The expectation that a pharmacy generally will obtain its potential within the third or fourth year was not supported.[1]

Individual Pharmacy Analyses

The best exponential regression equation used to explain each pharmacy's growth varied widely from a simple straight line equation with one independent variable to a curvilinear equation with four independent variables. Appendix J lists each pharmacy's best exponential equation with its corresponding coefficient of multiple determination (page 138). Of the 54 equations, only four were straight line equations: $Y = a + bX$. Eleven equations contained no linear X term. These equations showed wide variation in the various combinations of independent X terms necessary to explain the pharmacies' growth.

The coefficient of multiple determination varied widely from a low of only 35.7% to a high of 98.3% explained

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1. For example, see A. Hamilton Chute and Esther J. W. Hall, The Pharmacist in Retail Distribution, Hemphill Publishing Co., Austin, Texas, 1960, p. 47; Dr. Paul C. Olsen, "The Problem Corner . . .'Make Sure the Store Has Plenty of Sales Space,'" Drug Topics, 101:19 (September 16, 1957) p. 84; and Charles Bernstein, "Not Footage But How It's Used That Counts," Drug News Weekly, 6:16 (April 18, 1966) p. 13.

variation. Of the 54 equations, 36 had a total explained variation in the 90 percentile; nine in the 80; two in the 70; three in the 60; one each in the 50 and 40; and two in the 30 percentile. One reason for the low explanation in the latter four cases is that two of these pharmacies' actual monthly sales never exceeded $6,000, and in the other two cases, never exceeded $3,000. With these low figures, even small variation in a monthly value caused that month's computed index value to vary widely, and therefore, resulted in an equation that explained less total variation.

Each individual pharmacy's growth curve was plotted and is shown in one of the figures A-D depending upon its type of location (pages 30-37).

The mathematical analysis of each pharmacy's growth curve is shown in tabular form in Table VI (pages 38-39). Each pharmacy's yearly absolute and percentage changes and slopes are given. The five year growth values also are shown.

Although all of these pharmacies are presently in operation, two (pharmacies 33 and 46) experienced a decrease in absolute growth over the total five years. Pharmacy 33 experienced a yearly increasing rate of decline, and the monthly slope value over this entire five year period averaged -0.497. Pharmacy 46 had an increasing growth during the first two years, but then for the remaining three years, a decreasing growth and the monthly slope value averaged -0.237 for the entire five year period. Pharmacy

FIGURE A

DOWNTOWN PHARMACIES' INDIVIDUAL GROWTH CURVES

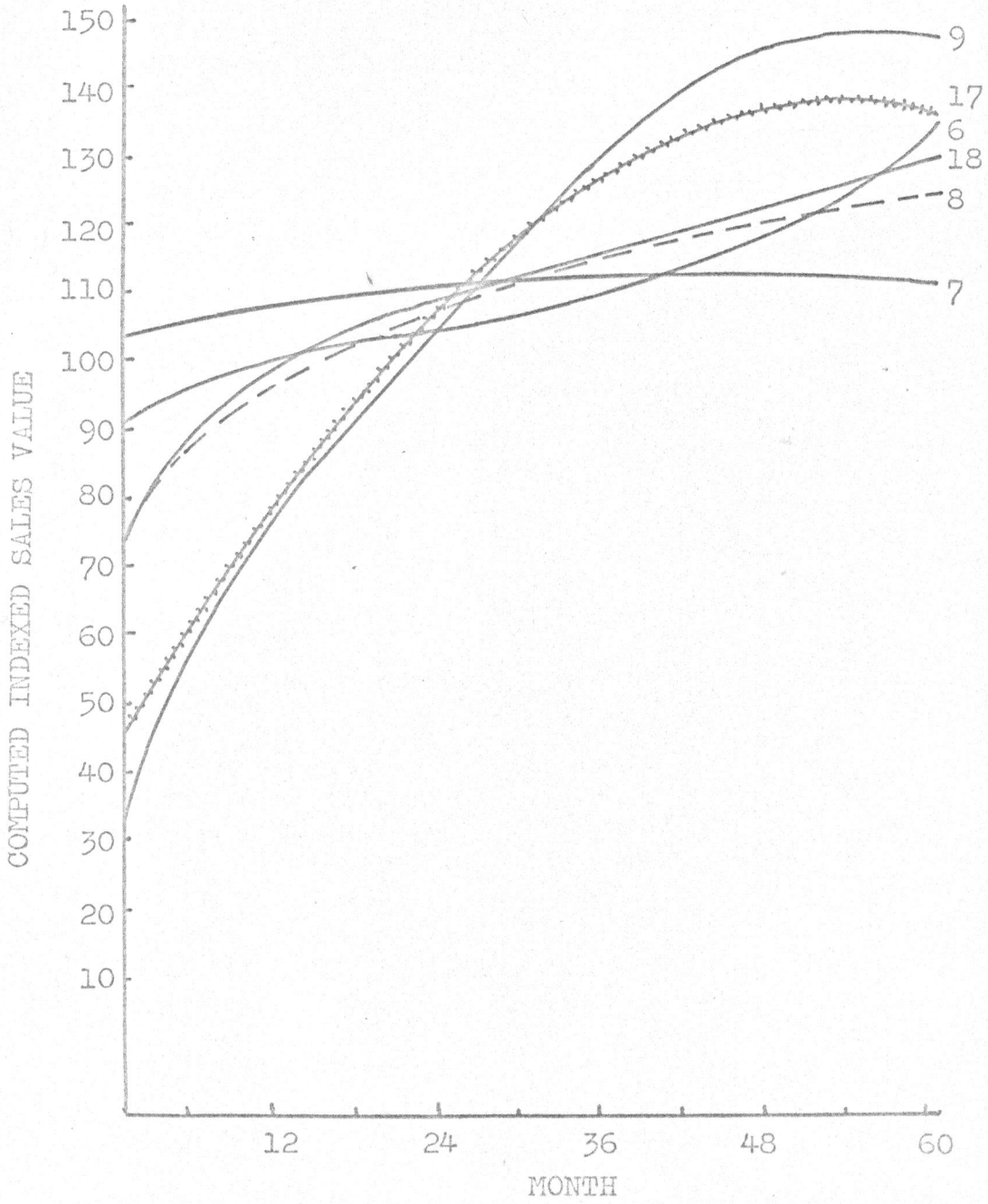


FIGURE A (Cont.)

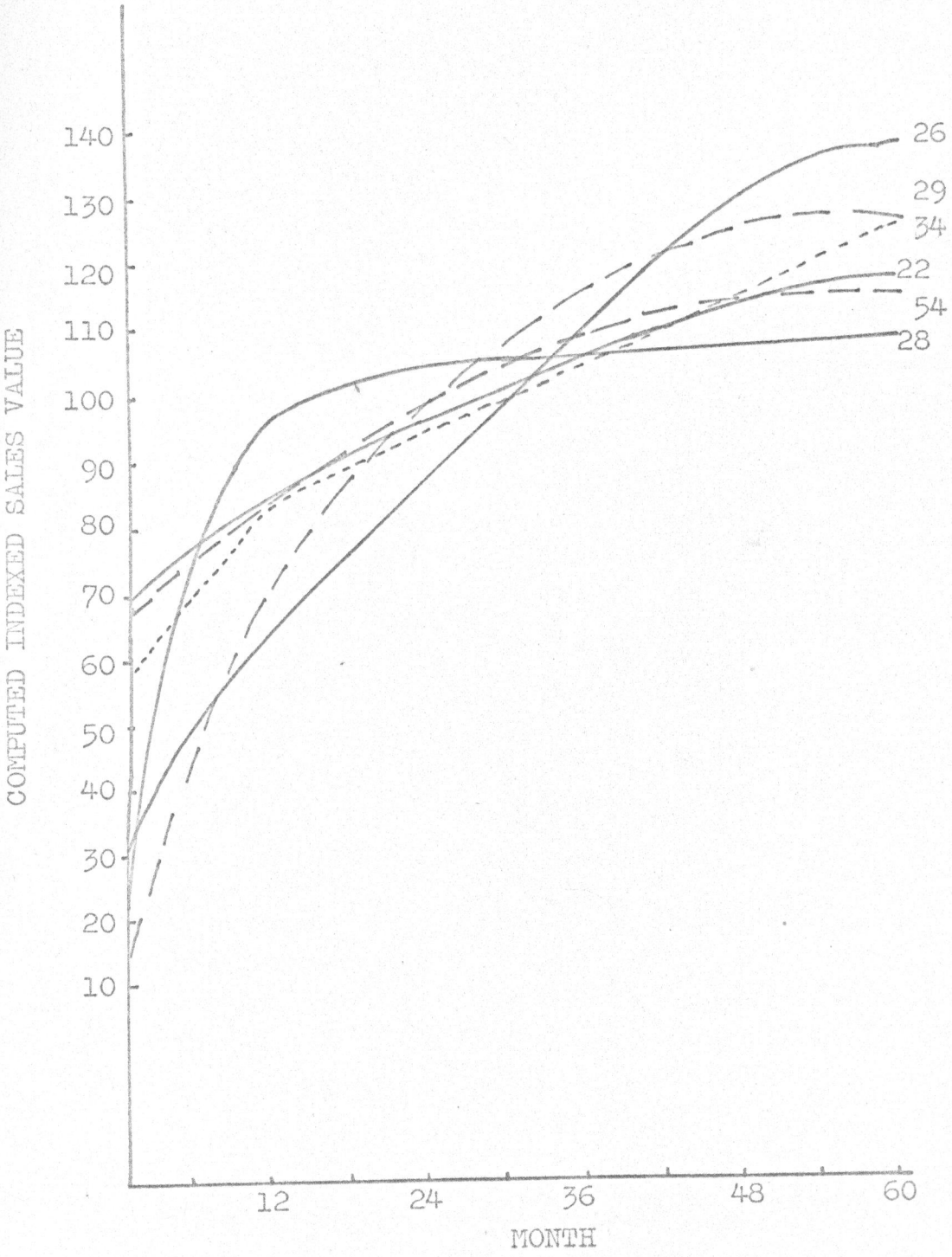


FIGURE B

NEIGHBORHOOD PHARMACIES' INDIVIDUAL GROWTH CURVES

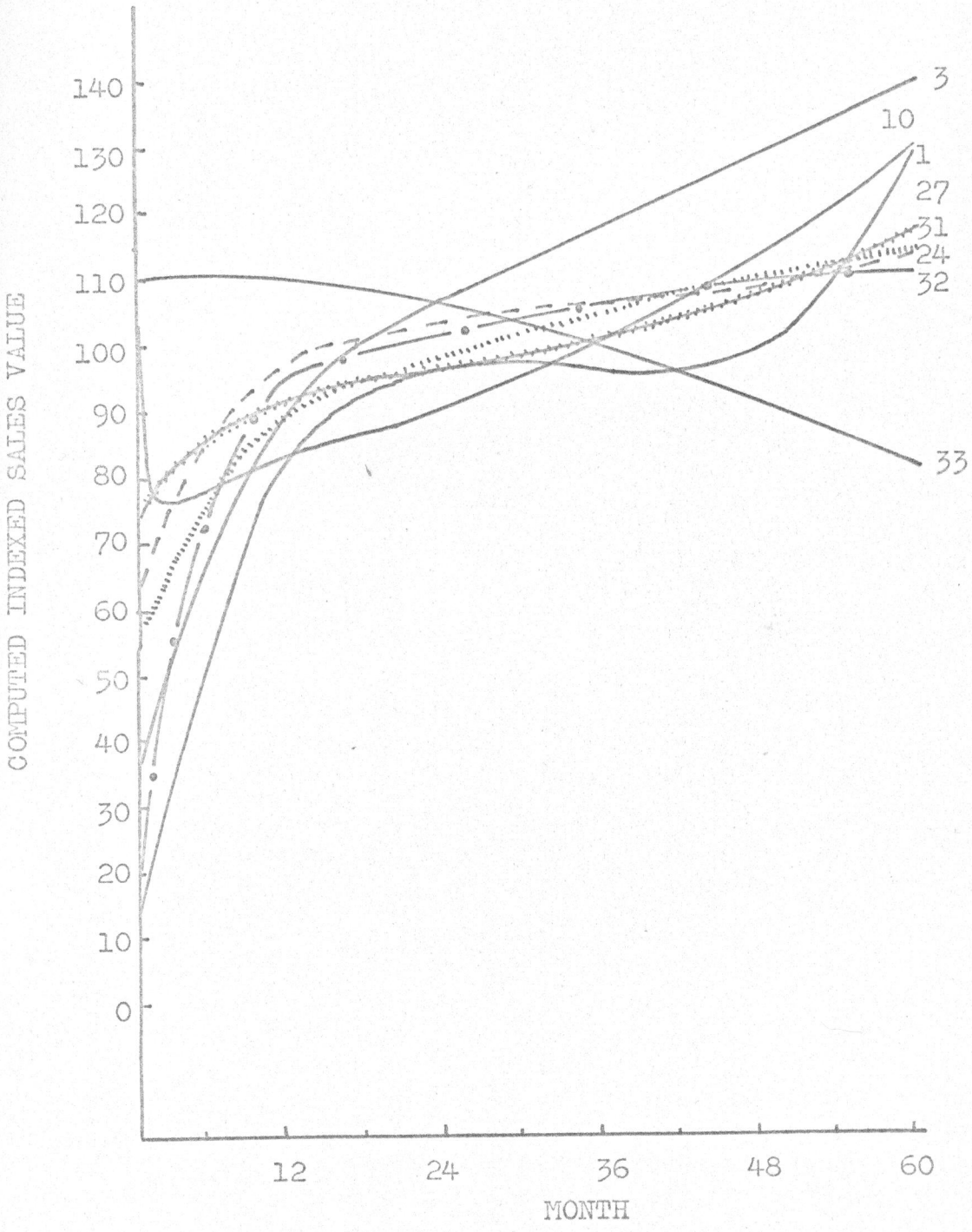


FIGURE B (Cont.)

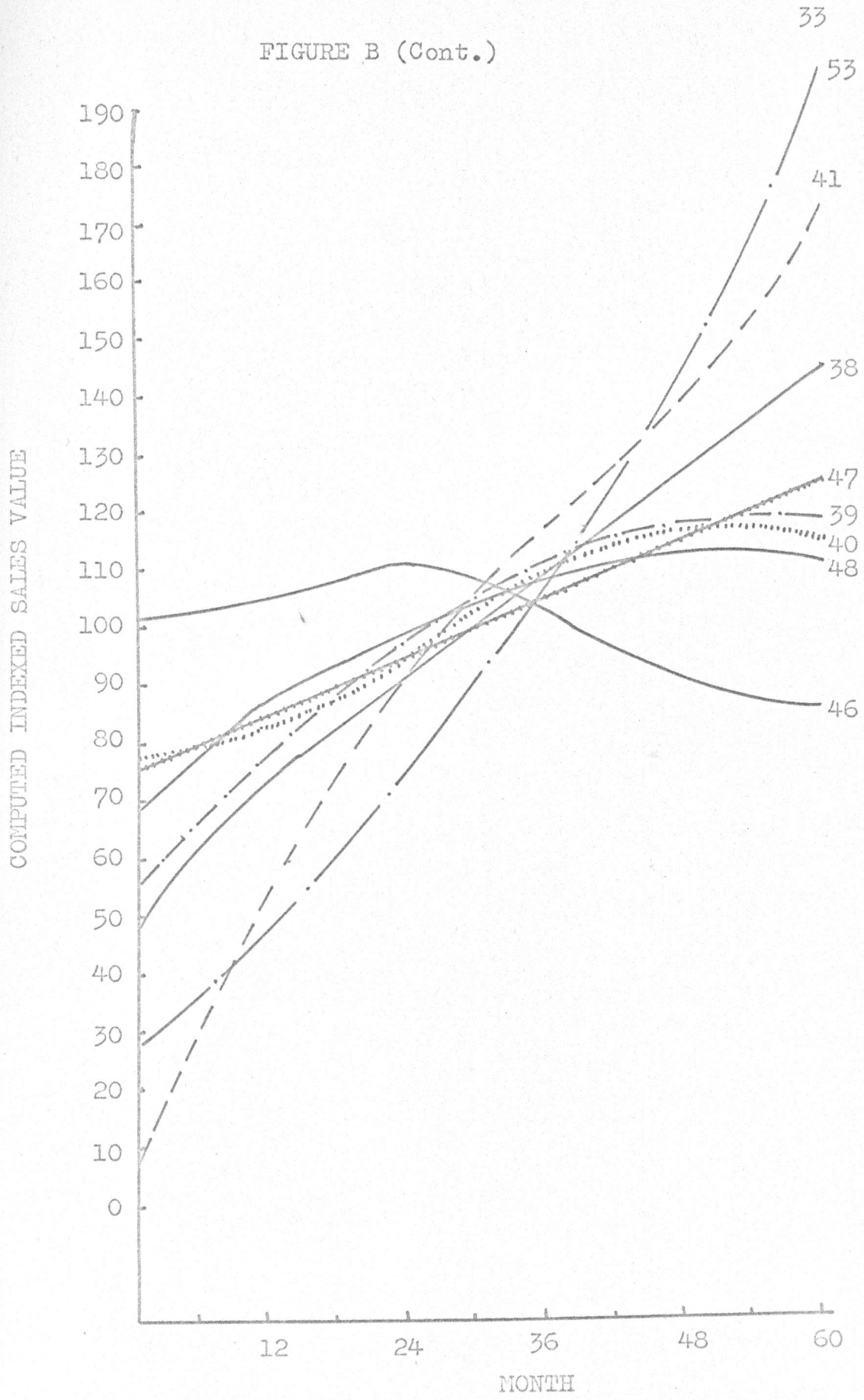


FIGURE C

SHOPPING CENTER PHARMACIES'
INDIVIDUAL GROWTH CURVES

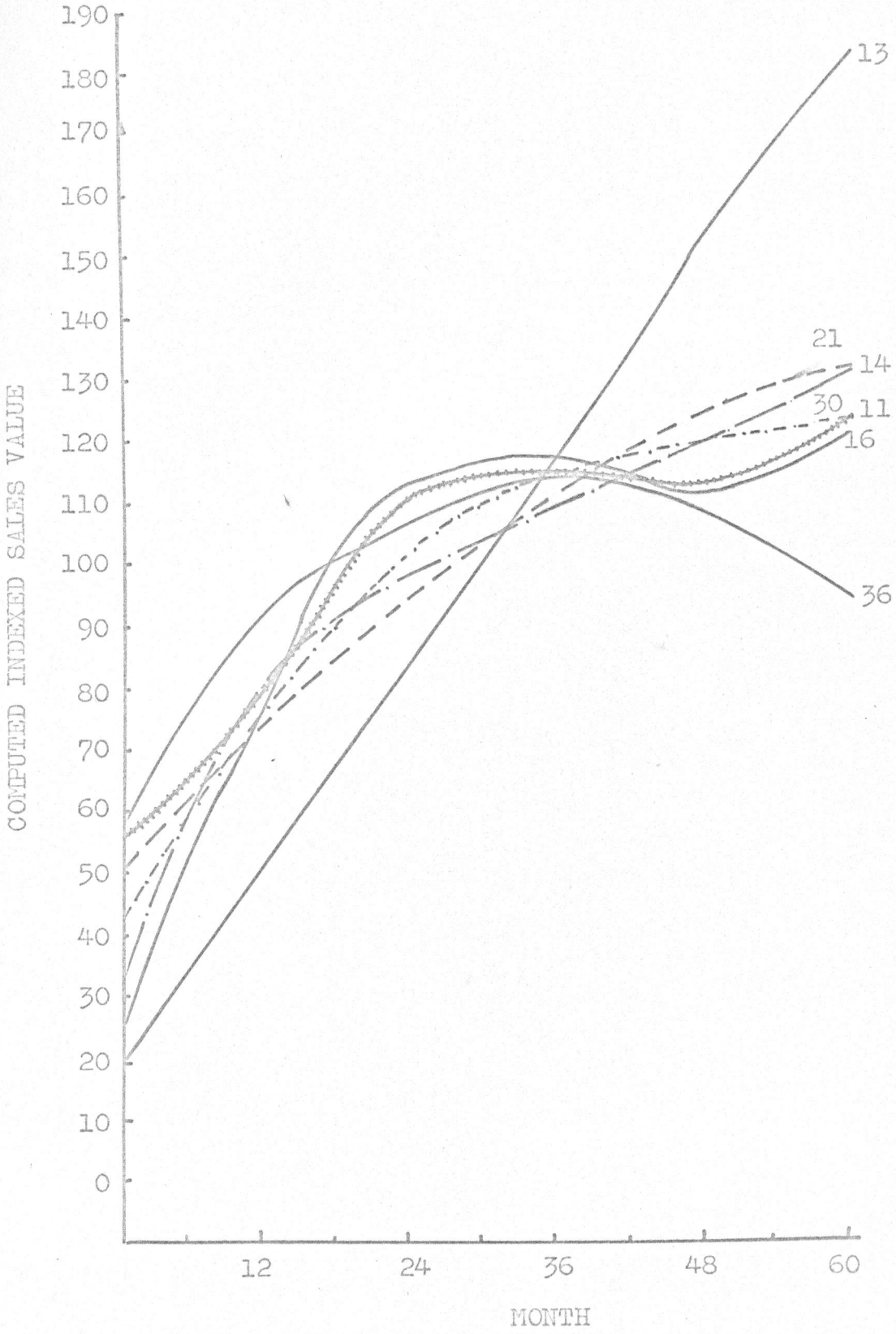


FIGURE C (Cont.)

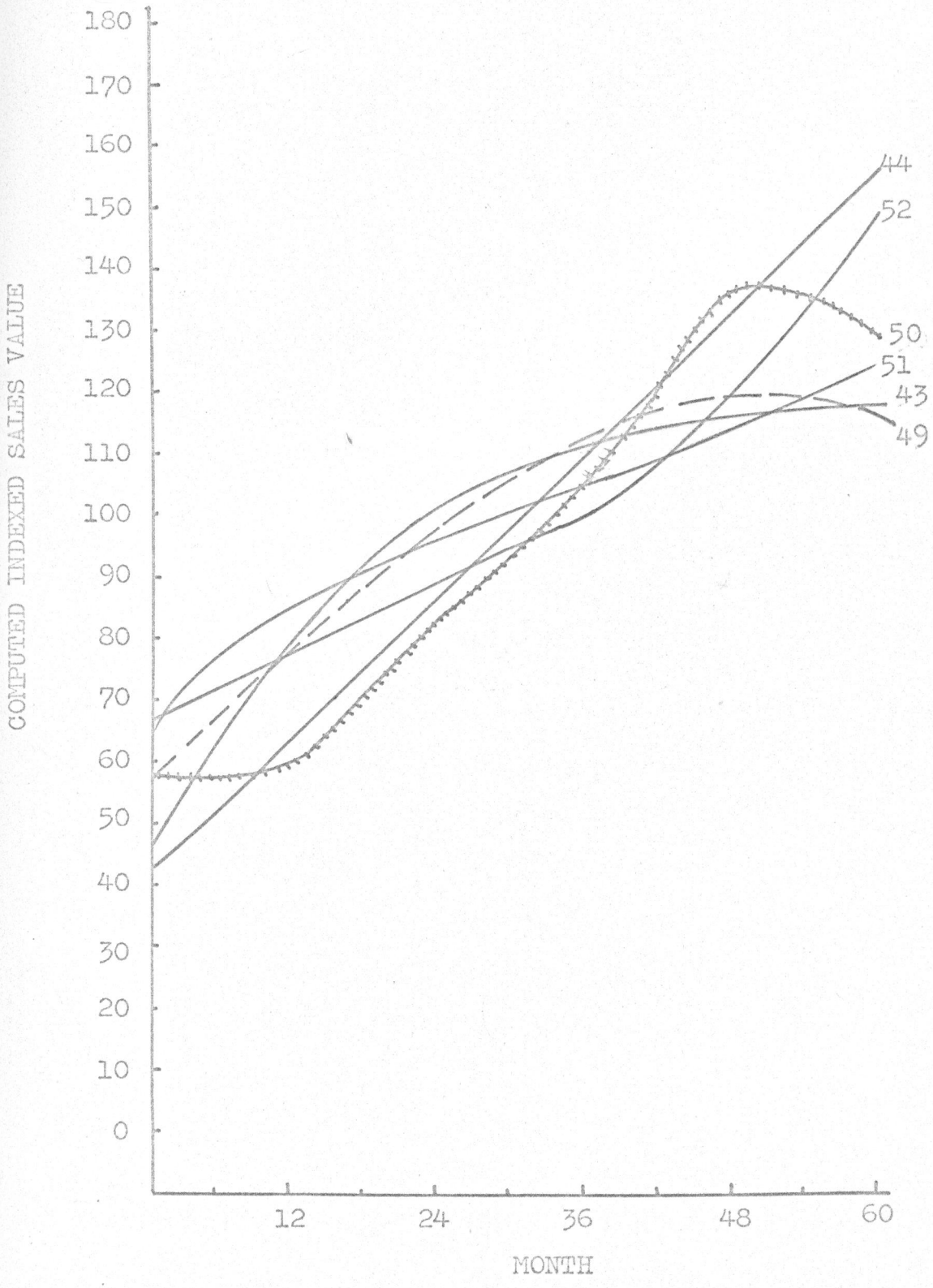


FIGURE D

MEDICAL CENTER PHARMACIES' INDIVIDUAL GROWTH CURVES

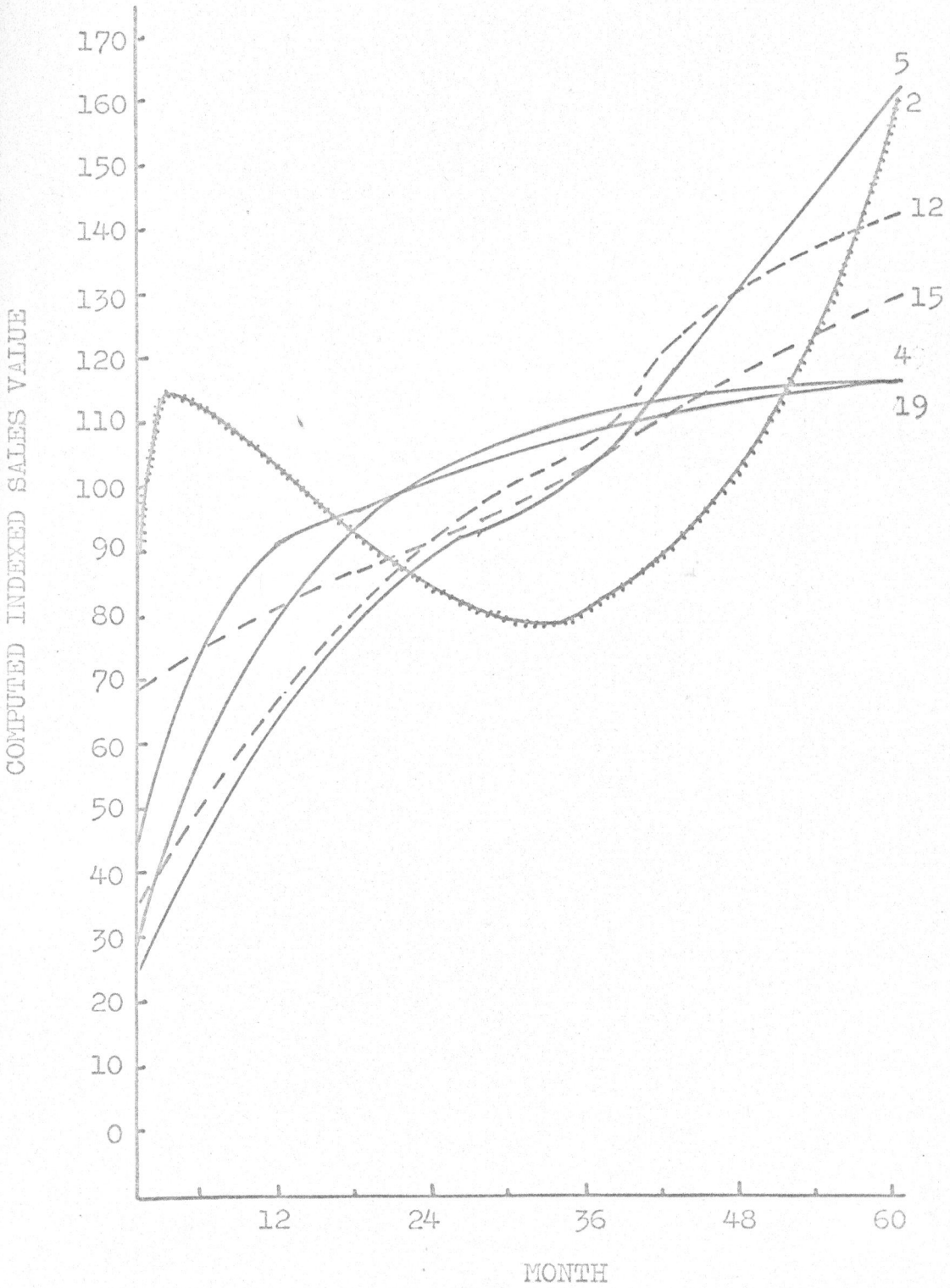
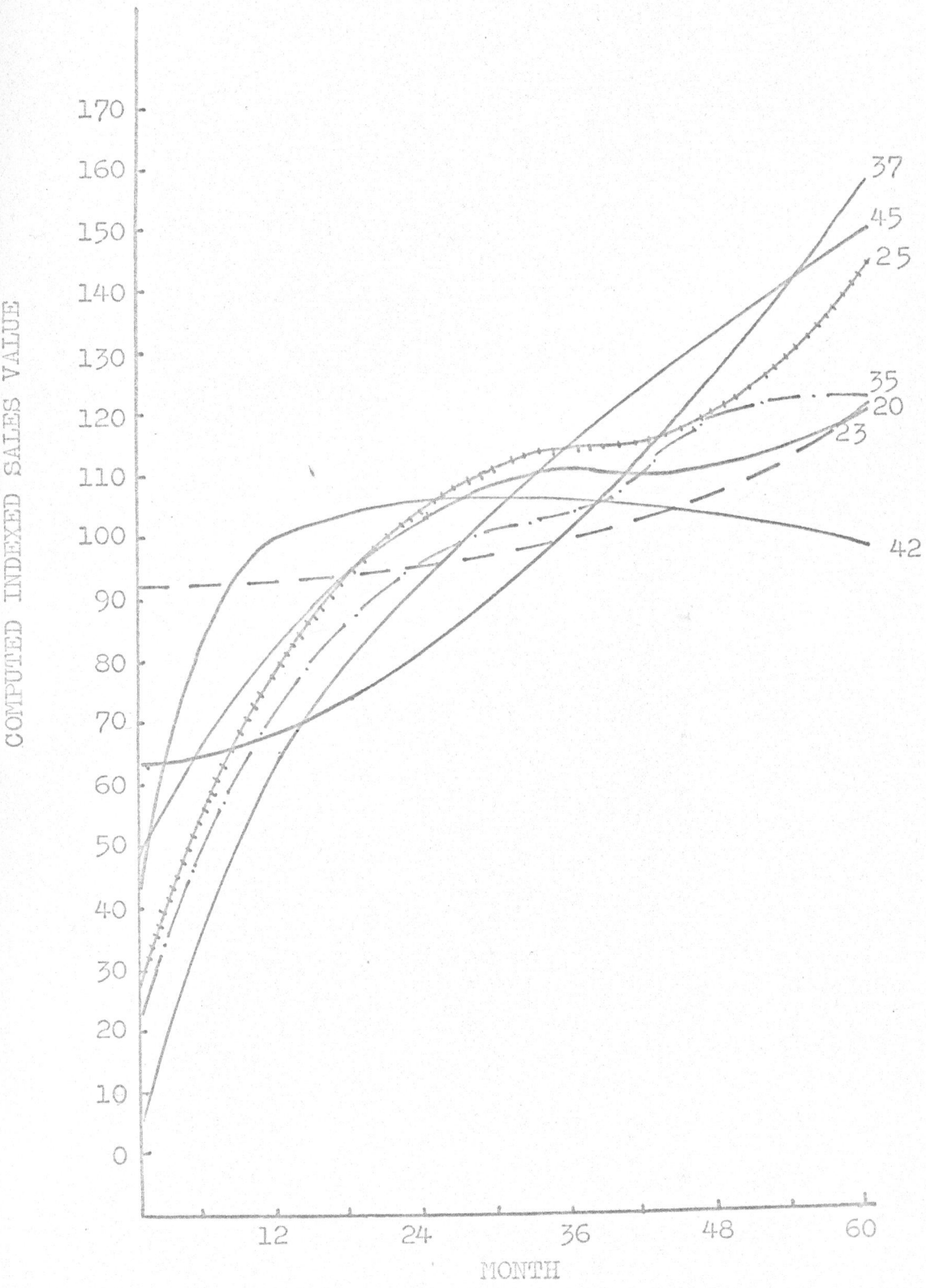


FIGURE D (Cont.)



MATHEMATICAL ANALYSES OF INDIVIDUAL PHARMACIES' GROWTH CURVES

Pharmacy	First Year Months 1-12			Second Year Months 13-24			Third Year Months 25-36			Four Mont
	Absolute	%	Slope	Absolute	%	Slope	Absolute	%	Slope	Absolute
1	71.478	636.7	5.956	14.726	17.8	1.227	-1.108	-1.1	-0.092	4.439
2	57.260	125.4	4.771	-18.214	-17.7	-1.517	-1.975	-2.3	-0.164	22.856
3	53.671	144.9	4.472	16.459	18.1	1.371	11.964	11.2	0.997	10.788
4	57.541	204.1	4.795	16.325	19.0	1.360	9.526	9.3	0.793	4.988
5	37.493	143.6	3.124	28.118	44.2	2.343	21.228	23.1	1.769	20.975
6	9.202	11.2	0.766	3.376	3.7	0.281	5.468	5.8	0.455	9.866
7	3.643	3.8	0.303	2.705	2.8	0.225	1.380	1.4	0.115	0.055
8	29.076	49.8	2.423	10.578	12.1	0.881	8.555	8.7	0.712	6.260
9	35.540	150.6	2.961	34.993	59.2	2.916	27.320	29.0	2.276	15.811
10	-19.778	-19.1	-1.648	7.399	8.8	0.616	10.007	10.9	0.833	13.438
11	22.996	41.0	1.916	31.043	39.2	2.586	5.372	4.8	0.447	-1.694
12	30.459	85.6	2.538	27.708	41.9	2.309	21.948	23.4	1.829	16.188
13	30.712	159.6	2.559	33.504	67.0	2.792	33.504	40.1	2.792	33.504
14	46.258	139.7	3.854	18.428	23.2	1.535	11.750	12.0	0.979	9.606
15	11.286	16.1	0.940	12.312	15.1	1.026	12.312	13.1	1.026	12.312
16	51.916	212.7	4.326	35.923	47.0	2.993	4.214	3.7	0.351	-4.195
17	34.056	94.8	2.838	28.320	40.4	2.360	19.104	19.4	1.592	9.888
18	28.852	47.8	2.404	9.221	10.3	0.768	7.294	7.4	0.607	6.792
19	45.771	103.0	3.814	11.300	12.5	0.941	6.449	6.3	0.537	5.177
20	35.271	72.6	2.939	19.395	23.1	1.616	7.345	7.1	0.612	3.382
21	23.078	45.2	1.923	21.036	28.3	1.753	16.716	17.5	1.393	12.396
22	16.776	24.6	1.398	9.562	11.2	0.796	10.963	11.6	0.913	9.240
23	0.240	0.2	0.020	1.681	1.8	0.140	4.564	4.8	0.380	8.887
24	27.004	42.9	2.250	13.566	15.0	1.130	3.907	3.7	0.325	1.372
25	52.932	197.2	4.411	25.774	32.3	2.148	8.551	8.1	0.713	7.918
26	35.376	121.4	2.948	30.864	47.8	2.572	22.800	23.9	1.900	14.736
27	19.714	27.1	1.642	3.959	4.2	0.329	5.468	5.6	0.455	7.399

IDUAL PHARMACIES' GROWTH CURVES

ond Year ths 13-24		Third Year Months 25-36			Fourth Year Months 37-48			Fifth Year Months 49-60			Total for five years		
%	Slope	Absolute	%	Slope	Absolute	%	Slope	Absolute	%	Slope	Absolute	%	Slope
17.8	1.227	-1.108	-1.1	-0.092	4.439	4.6	0.369	30.848	30.6	2.570	120.383	1072.3	2.006
-17.7	-1.517	-1.975	-2.3	-0.164	22.856	27.6	1.904	56.020	53.1	4.668	115.947	254.0	1.932
18.1	1.371	11.964	11.2	0.997	10.788	9.1	0.899	10.308	7.9	0.859	103.190	278.5	1.719
19.0	1.360	9.526	9.3	0.793	4.988	4.5	0.415	0.923	0.8	0.076	89.303	316.8	1.488
44.2	2.343	21.228	23.1	1.769	20.975	18.6	1.747	27.358	20.4	2.279	135.172	517.9	2.252
3.7	0.281	5.468	5.8	0.455	9.866	9.9	0.822	15.978	14.6	1.331	43.890	53.7	0.731
2.8	0.225	1.380	1.4	0.115	0.055	0.1	0.004	-1.269	-1.2	-0.105	6.514	6.9	0.108
12.1	0.881	8.555	8.7	0.712	6.260	5.9	0.521	3.340	3.0	0.278	57.809	99.0	0.963
59.2	2.916	27.320	29.0	2.276	15.811	13.0	1.317	0.468	0.3	0.039	114.132	483.8	1.902
8.8	0.616	10.007	10.9	0.833	13.438	13.3	1.119	17.051	14.9	1.420	28.117	27.1	0.468
39.2	2.586	5.372	4.8	0.447	-1.694	-1.4	-0.141	10.720	9.4	0.893	68.437	122.0	1.140
41.9	2.309	21.948	23.4	1.829	16.188	13.9	1.349	10.428	7.9	0.869	106.731	300.0	1.778
67.0	2.792	33.504	40.1	2.792	33.504	28.6	2.792	33.504	22.2	2.792	164.728	856.0	2.745
23.2	1.535	11.750	12.0	0.979	9.606	8.7	0.800	11.603	9.7	0.966	97.645	295.0	1.627
15.1	1.026	12.312	13.1	1.026	12.312	11.6	1.026	12.312	10.4	1.026	60.534	86.6	1.008
47.0	2.993	4.214	3.7	0.351	-4.195	-3.6	-0.349	10.768	9.6	0.897	98.460	403.5	1.641
40.4	2.360	19.104	19.4	1.592	9.888	8.4	0.824	0.672	0.5	0.056	92.040	256.4	1.534
10.3	0.768	7.294	7.4	0.607	6.792	6.4	0.566	6.588	5.8	0.549	58.747	97.4	0.979
12.5	0.941	6.449	6.3	0.537	5.177	4.7	0.431	4.658	4.1	0.388	73.355	165.1	1.222
23.1	1.616	7.345	7.1	0.612	3.382	3.0	0.281	7.507	6.5	0.625	72.900	150.0	1.215
28.3	1.753	16.716	17.5	1.393	12.396	11.0	1.033	8.076	6.4	0.673	81.302	159.2	1.355
11.2	0.796	10.963	11.6	0.913	9.240	8.7	0.770	4.155	3.6	0.346	50.696	74.5	0.844
1.8	0.140	4.564	4.8	0.380	8.887	8.9	0.740	14.652	13.5	1.221	30.024	32.4	0.500
15.0	1.130	3.907	3.7	0.325	1.372	1.2	0.114	5.960	5.4	0.496	51.809	82.3	0.863
32.3	2.148	8.551	8.1	0.713	7.918	6.9	0.660	23.873	19.6	1.989	119.039	443.7	1.984
47.8	2.572	22.800	23.9	1.900	14.736	12.4	1.228	6.672	5.0	0.556	110.448	379.1	1.840
4.2	0.329	5.468	5.6	0.455	7.399	7.2	0.616	9.416	8.6	0.784	45.956	63.3	0.765

Pharmacy	First Year Months 1-12			Second Year Months 13-24			Third Year Months 25-36			Fourt Month
	Absolute	%	Slope	Absolute	%	Slope	Absolute	%	Slope	Absolute
28	74.633	327.1	6.219	7.226	7.4	0.602	2.483	2.3	0.206	1.256
29	58.446	444.3	4.870	27.183	37.9	2.265	18.145	18.3	1.512	9.201
30	35.224	82.9	2.935	23.599	30.3	1.966	12.542	12.3	1.045	6.107
31	32.508	56.3	2.709	7.389	8.1	0.615	6.575	6.7	0.548	6.371
32	77.457	431.6	6.454	7.078	7.4	0.589	3.789	3.6	0.315	2.950
33	-1.187	-1.0	-0.098	-3.585	-3.2	-0.298	-5.976	-5.6	-0.498	-8.367
34	26.934	46.5	2.244	10.638	12.5	0.886	10.565	11.0	0.880	10.554
35	52.086	232.3	4.340	21.889	29.3	1.824	16.339	16.9	1.361	9.167
36	34.610	60.7	2.884	14.798	16.1	1.233	6.111	5.7	0.509	-2.971
37	5.566	8.8	0.463	15.059	22.0	1.254	21.868	26.2	1.822	26.033
38	26.160	56.1	2.180	18.140	24.9	1.511	17.839	19.6	1.486	17.763
39	23.386	42.0	1.948	19.440	24.6	1.620	13.104	13.3	1.092	6.768
40	5.216	6.7	0.434	12.045	14.5	1.003	13.230	13.9	1.102	8.819
41	49.430	800.4	4.119	36.425	65.5	3.035	26.229	28.5	2.191	24.329
42	58.223	132.8	4.851	4.037	3.9	0.336	-1.038	-0.9	-0.086	-2.361
43	33.777	73.2	2.814	21.847	27.3	1.820	10.731	10.5	0.894	4.279
44	20.955	47.7	1.746	22.860	35.2	1.905	22.860	26.0	1.905	22.860
45	61.261	1629.2	5.105	27.383	42.1	2.281	22.600	24.4	1.883	18.596
46	3.910	3.8	0.325	5.617	5.3	0.468	-7.783	-7.0	-0.648	-11.350
47	9.251	12.3	0.770	10.092	11.9	0.841	10.092	10.6	0.841	10.092
48	18.691	27.1	1.557	10.047	11.4	0.837	9.422	9.6	0.785	5.925
49	20.990	36.7	1.749	20.243	25.9	1.686	14.852	15.1	1.237	6.765
50	0.584	0.9	0.048	24.125	40.5	2.010	31.497	37.6	2.624	21.245
51	21.087	32.7	1.757	10.078	11.8	0.839	9.704	10.1	0.808	9.609
52	13.338	20.1	1.111	8.826	11.0	0.735	12.837	14.5	1.069	19.776
53	19.888	70.9	1.657	27.768	57.9	2.314	34.104	45.0	2.842	40.440
54	18.062	27.2	1.505	13.012	17.7	1.251	10.116	10.1	0.843	5.220

Third Year Months 25-36			Fourth Year Months 37-48			Fifth Year Months 49-60			Total for five years		
Absolute	%	Slope	Absolute	%	Slope	Absolute	%	Slope	Absolute	%	Slope
2.483	2.3	0.206	1.256	1.1	0.104	0.757	0.6	0.063	86.344	378.5	1.439
18.145	18.3	1.512	9.201	7.8	0.766	0.268	0.2	0.022	113.243	860.9	1.887
12.542	12.3	1.045	6.107	5.3	0.508	4.176	3.4	0.348	81.648	192.2	1.360
6.575	6.7	0.548	6.371	6.1	0.530	6.290	5.6	0.524	59.133	102.4	0.985
3.789	3.6	0.315	2.950	2.7	0.245	2.612	2.3	0.217	93.886	523.1	1.564
-5.976	-5.6	-0.498	-8.367	-8.4	-0.697	-10.756	-11.7	-0.896	-29.871	-27.0	-0.497
10.565	11.0	0.880	10.554	9.9	0.879	10.551	9.0	0.879	69.242	119.7	1.154
16.339	16.9	1.361	9.167	8.1	0.763	1.640	1.3	0.136	101.121	451.0	1.685
6.111	5.7	0.509	-2.971	-2.6	-0.247	-14.304	-13.0	-1.192	38.244	67.0	0.637
21.868	26.2	1.822	26.033	24.7	2.169	27.553	20.9	2.296	96.079	152.9	1.601
17.839	19.6	1.486	17.763	16.3	1.480	17.734	14.0	1.477	97.636	209.6	1.627
13.104	13.3	1.092	6.768	6.0	0.564	0.432	0.3	0.036	63.130	113.6	1.052
13.230	13.9	1.102	8.819	8.1	0.734	-1.192	-1.0	-0.099	38.118	49.1	0.635
26.229	28.5	2.191	24.329	20.5	2.027	30.723	21.5	2.560	167.136	2706.6	2.785
-1.038	-0.9	-0.086	-2.361	-2.2	-0.196	-2.899	-2.8	-0.241	55.962	127.6	0.932
10.731	10.5	0.894	4.279	3.8	0.356	2.494	2.1	0.207	73.128	158.5	1.218
22.860	26.0	1.905	22.860	20.6	1.905	22.860	17.1	1.905	112.395	256.0	1.873
22.600	24.4	1.883	18.596	16.1	1.549	14.748	11.0	1.229	144.588	3845.4	2.409
-7.783	-7.0	-0.648	-11.350	-11.1	-0.945	-4.655	-5.1	-0.387	-14.261	-14.1	-0.237
10.092	10.6	0.841	10.092	9.6	0.841	10.092	8.7	0.841	49.619	66.0	0.826
9.422	9.6	0.785	5.925	5.5	0.493	-1.205	-1.0	-0.100	42.880	62.3	0.714
14.852	15.1	1.237	6.765	5.9	0.563	-4.018	-3.3	-0.334	58.832	103.0	0.980
31.497	37.6	2.624	21.245	18.4	1.770	-6.633	-4.8	-0.552	70.818	120.1	1.180
9.704	10.1	0.808	9.609	9.1	0.800	9.573	8.3	0.797	60.051	93.3	1.000
12.837	14.5	1.069	19.776	19.5	1.648	28.560	23.5	2.380	83.337	125.7	1.388
34.104	45.0	2.842	40.440	36.8	3.370	46.776	31.1	3.898	168.976	603.2	2.816
10.116	10.1	0.843	5.220	4.7	0.435	0.324	0.2	0.027	48.734	73.4	0.812

owner 33 attributed the decline to the opening of two new "stores" in the immediate area, whereas the latter attributed the decline to depressed economic conditions in the community due to a large industry closing and a drought condition which affected the farm economy in the surrounding area.

Twelve other pharmacies experienced a decrease in absolute growth during at least one of their five years. As anticipated, the number increased over time. Of the twelve, seven had a decrease during the fifth year; four during the fourth year; three during the third; and only one each during the first and second years.

Pharmacies 41 and 45 had exceptional percentage increases in growth over the total five years, with the former experiencing a 2706.6% increase, and the latter, a 3845.4% increase. These remarkable increases were due to the relatively low computed first month indexed sales values (6.175 and 3.760, respectively), and each pharmacy's high five year absolute change of 167.136 and 144.588, respectively. The two owners gave no explanation for the exceptional growth, although the growth is at least partly attributed to the increase in the number of prescribing physicians in each area and to a probable increase in the respective practices of these physicians.

Based on the normal growth rate or criterion median value of 0.568, seventeen of the 54 pharmacies' yearly

slope values exceed this median value for each of the five years. It was, therefore, concluded that each of these pharmacies had not obtained their potential at the end of the fifth year. Of the remaining thirty-seven pharmacies, eight attained their potential during the first year, four during the second, nine during the third, ten during the fourth, and six during the fifth. Therefore, twenty-one or 38.9% of the 54 pharmacies had obtained their potential by the end of the third year, thirty-one or 57.4% by the end of the fourth, and thirty-seven or 68.5% by the end of the fifth year.

All Pharmacies

The best exponential equation for all 54 pharmacies taken together was: $Y = 57.088 + 2.446X - 0.039X^2 + 0.003X^3 - 9.527\ 1/X$. The coefficient of multiple determination for this equation was 0.636, and its standard error of estimate was 15.138. A graphic representation of this equation's calculated Y values is shown in Figure E (page 42). A mean, modified mean, median, and the range calculated for each year's absolute and percentage change and slope; plus the total five year absolute and percentage change and slope for all the pharmacies taken together are shown in Table VII (page 43). These measures of central tendency were determined by summing the corresponding columns listed in Table VI which represent each pharmacy's yearly and total five year growth values. A modified mean was determined for each

FIGURE E

GROWTH CURVE REPRESENTING ALL 54 PHARMACIES

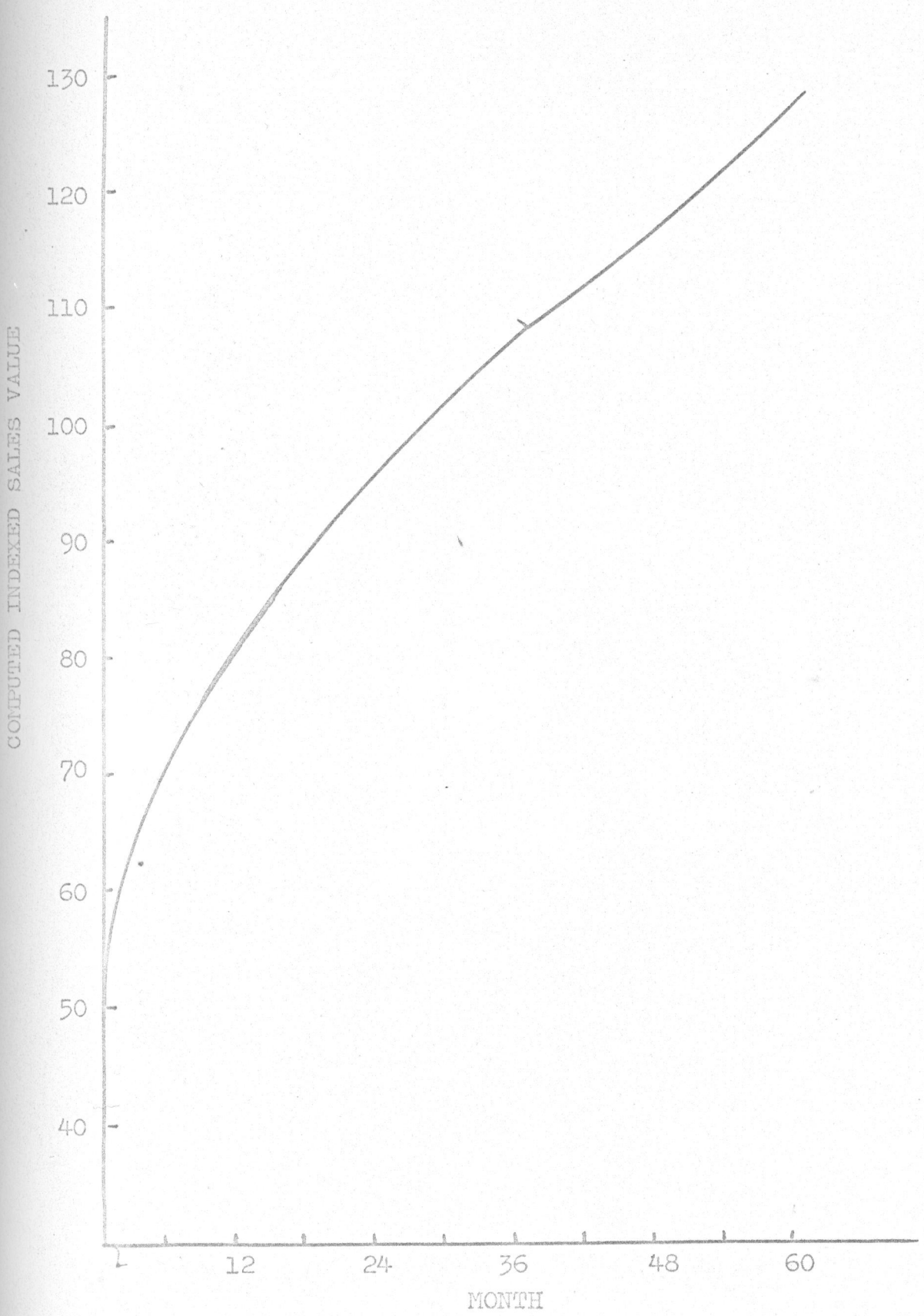


Table VII

YEARLY AND FIVE YEAR TOTALS FOR ALL FIFTY-FOUR PHARMACIES

Computed from Individual Pharmacy Equations

	First Year			Second Year			Third Year		
	Absolute	%	Slope	Absolute	%	Slope	Absolute	%	Slope
Mean	30.524	140.5	2.543	16.209	22.7	1.350	11.804	14.0	0.983
Modified Mean	30.650	95.5	2.557	16.046	22.2	1.336	11.497	13.8	0.957
Median	28.964	56.2	2.413	15.035	17.9	1.253	10.340	10.8	0.861
Range	-19.778+ 77.4	-19.1+ 1629.2	-1.648+ 6.454	-18.214+ 36.425	-17.7+ 67.0	-1.517+ 3.035	- 7.783+ 34.104	- 7.0+ 45.0	-0.648+ 2.842
	Fourth Year			Fifth Year			Five Year Totals		
Mean	9.841	8.9	0.820	9.909	7.9	0.825	78.286	344.3	1.304
Modified Mean	9.376	8.5	0.781	9.486	7.6	0.768	77.432	240.0	1.290
Median	9.027	8.1	0.752	7.089	6.1	0.590	73.241	151.4	1.220
Range	-11.350+ 40.440	-11.1+ 36.8	-0.945+ 3.370	-14.304+ 56.020	-13.0+ 53.1	-1.192+ 4.668	-29.871+ 168.976	-27.0+ 3845.4	-0.497+ 2.816

EQUATION VALUES COMPUTED FROM THE BEST EQUATION REPRESENTING ALL FIFTY-FOUR PHARMACIES

First Year			Second Year			Third Year		
Absolute	%	Slope	Absolute	%	Slope	Absolute	%	Slope
30.584	61.2	2.548	16.523	20.5	1.379	11.256	11.5	0.938
Fourth Year			Fifth Year			Five Year Totals		
9.287	8.5	0.773	10.469	8.9	0.872	78.119	156.3	1.301

of the yearly and five year growth measurements by removing the corresponding values of pharmacies 33, 46, 41, and 45. The first two represent the pharmacies which experienced a total five year decrease in absolute growth, while the latter two are the pharmacies which had exceptional percentage growth rates.

The yearly absolute and percentage change and slope determined from the one equation that best represented all 54 pharmacies' growth are shown along with the corresponding five year values at the bottom of Table VII (page 43).

Using the cited equation, the yearly absolute results show an increase of 30.584 for the first year; 16.523 for the second; 11.256 for the third; 9.287 for the fourth; and 10.469 for the fifth year. In terms of average monthly change or slope, the values are 2.548; 1.379; 0.938; 0.773; and 0.872, respectively. The total five year absolute increase was 78.119, with an average monthly slope of 1.301.

These results are similar to the yearly mean values computed from each pharmacy's absolute growth which are 30.524; 16.209; 11.804; 9.841; and 9.909. In terms of average monthly change, the slope values are 2.543; 1.350; 0.983; 0.820; and 0.825, respectively. For the total five year period, the mean absolute increase was 78.286 with a slope of 1.304.

Except for the slight increase in the fifth year, this declining rate of growth was anticipated. Each of the yearly slope values exceed the median criterion value of

0.568 by more than 0.200 indexed sales units. These pharmacies, as a group, experienced increasing growth over the entire five year period, and as of the end of the fifth year, had not obtained their peak or potential.

Type of Location

The importance of this factor to success is well established and is discussed in Chapter I. Locations may be classified on specific or a general basis. This study employed the latter type by only using four subclassifications --downtown, neighborhood, shopping center, and medical center. Although there is overlap, the two limitations of simplicity for the respondent and small sample size inhibited further subclassification.

Related Studies of Interest

Several location and new pharmacy opening studies are conducted annually. In a new pharmacy survey reported in Drug Topics, 31.9% of the 2,295 new pharmacies opened in 1964 were located in a "suburban shopping center"; 26.0% in a "small town"; 24.3% in a "city neighborhood" location; 9.9% in "other suburban" locations; and 7.9% in a "city business district."[2] In a similar study reported in American Druggist, 54% of all new pharmacies that opened from October,

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2. Robert A. Leibson, "1963 Record Is Broken as 2,295 New Pharmacies Open Their Doors in '64," Drug Topics, 109:8 (April 19, 1965) p. 43.

1961 through August, 1962 were located in "shopping centers"; 22.4% in "suburban neighborhood" locations; 12.1% in "city neighborhood"; 10.1% in a "downtown"; and 1.4% in "island" locations.[3]

Of the 54 pharmacies in this study, 22.2% were located downtown, 29.6% in a neighborhood location, 24.1% in a shopping center, and 24.1% in a medical center. Although the two published studies are not directly comparable with each other or with this study, these findings suggest that all types of location still possess potential if exposed to a favorable environment.

As reported in these studies, a large proportion of new pharmacy openings are in shopping centers. In 1956, although shopping centers contained only 3.3% of all community pharmacies, these pharmacies accounted for 7.6% of total pharmacy sales.[4] As of 1964, 6,815 pharmacies were located in shopping centers. They accounted for 35.2% of total pharmacy sales, but represented only 12.9% of all community pharmacies.[5]

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3. "Supers House 3.2% of New Pharmacies," American Druggist, 146:6 (September 17, 1962) p. 63.

4. "Shopping Center Druggists Up 22%; MDs Join Trend," American Druggist, 142:4 (August 22, 1960) p. 5.

5. "Number of MDs in Shopping Centers Rises 175% Since 1959, Study Finds," American Druggist, 152:6 (September 13, 1965) p. 12.

Rennick forecasts that by "1980 one third of all drug stores will be located in suburbs."[6] Suburbia and its potential should not be disregarded, but older markets such as downtown locations should not be overlooked either. Two large pharmacy chains consider these locations may offer excellent opportunities for new pharmacies. A Walgreen Drug Company executive stated, "Downtown areas will continue to offer excellent business potential in selected locations."[7] A spokesman for Osco Drug Company said that "main street locations provide all the traffic a drug store needs."[8] After a study of retail outlets located in the central business district of 109 U.S. cities during 1958-1964, Barker concluded that "indications are there's still room for small, specialized prescription and general drug stores . . . in central business districts."[9]

By studying the growth curves of pharmacies in the four types of locations, it is hoped to determine characteristic growth patterns of each type.

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6. "Migration to Suburbs is Just Starting," American Druggist, 133:7 (March 26, 1956) p. 71.

7. Arthur R. Schwalb, "Drug Chains Mount New Drive for Intown Volume," Chain Store Age, Drug Exec. Ed., 40:9 (September, 1964) p. 60.

8. Godfrey M. Lebhar, "Making Downtown Stores Pay," Chain Store Age, Drug Exec. Ed., 34:2 (February, 1958) p. 35.

9. "Centrally Located Stores Drop; Trend Will Last, Study Shows," Drug Topics, 109:8 (April 19, 1965) p. 12.

Equation Analyses

The best exponential equation calculated for each group of pharmacies varied from explaining 50.8% of total variation for neighborhood pharmacies, to explaining 78.0% of total variation for shopping center pharmacies. Table VIII shows the best exponential equation, coefficient of multiple determination, and standard error of estimate for each group (page 49). The identification numbers of the pharmacies in each type location also are given. Of the four equations, the only similarity is the presence of a linear X term in each equation. A graphic representation of each equation is shown in Figure F (page 50).

From each equation, the yearly absolute change, the percentage change based on that year's first month value, and each year's slope were determined. The total five year absolute and percentage change and slope also were determined.

These equation analyses and all later such analyses are based on the computed values obtained from the one equation that best represented that subclassification.

A mean, median, and the range for the entire five year period for each growth measure also was determined for each pharmacy group. These were computed from the individual pharmacy's five year totals within each location. These data are shown in tabular form in Table IX (pages 51-52).

The medical center pharmacies had the greatest five year growth, with a 94.323 absolute change and a 1.572

Table VIII

PHARMACY GROWTH EQUATIONS BY LOCATION

Type of Location	Best Exponential Equation	Coefficient of Multiple Determination	Standard Error of Estimate	Individual Pharmacies in Classification
Downtown	$Y = 65.806 + 1.611X - 0.011X^2 - 19.283\ 1/X$	0.664	13.206	6,7,8,9,17, 18,22,26,28, 29,34,54
Neighborhood	$Y = 80.762 + 0.772X - 66.829\ 1/X + 45.533\ 1/X^2$	0.508	16.630	1,3,10,24,27, 31,32,33,38, 39,40,41,46, 47,48,53
Shopping Center	$Y = 45.464 + 2.613X - 0.020X^2$	0.780	12.918	11,13,14,16, 21,30,36,43, 44,49,50,51, 52
Medical Center	$Y = 71.490 + 1.026X - 34.373\ 1/X$	0.637	15.784	2,4,5,12,15, 19,20,23,25, 35,37,42,45

FIGURE F

PHARMACY GROWTH CURVES BY LOCATION

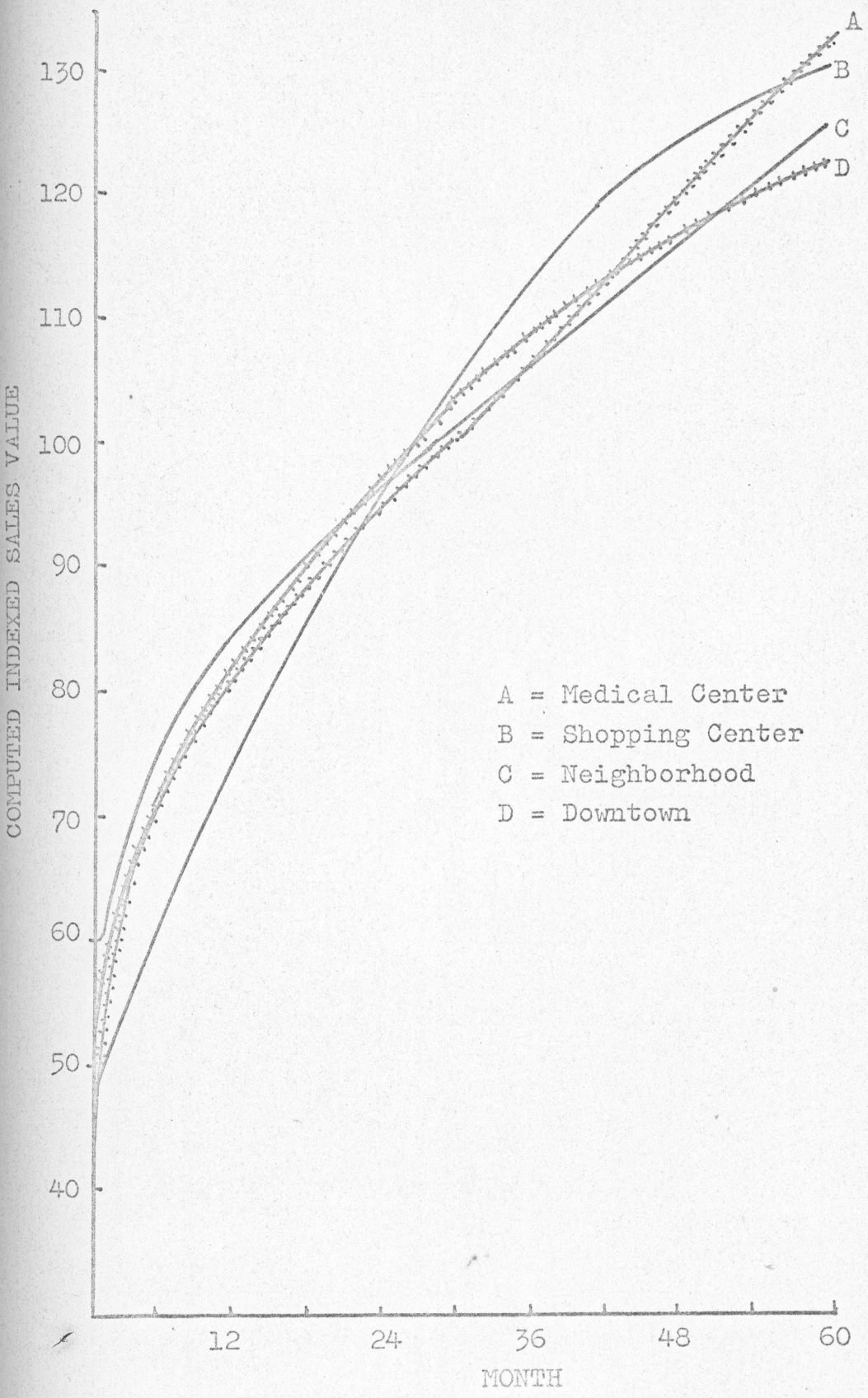

Table IX

PHARMACY GROWTH VALUES BY LOCATION

Type of Location	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Downtown Pharmacy	33.831	70.3	2.819	15.371	18.7	1.280	Mean	70.986	240.2	1.182
	Third Year			Fourth Year			Median	63.994	109.3	1.066
	11.682	12.0	0.973	8.379	7.6	0.698	Range	48.734+ 114.132	6.9+ 860.9	0.108+ 1.902
	Fifth Year			Five Year Total						
	5.156	4.3	0.429	74.419	154.6	1.240	Sample Size		12	
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Neighborhood Pharmacy	24.535	40.7	2.044	11.811	13.9	0.984	Mean	67.864	369.8	1.130
	Third Year			Fourth Year			Median	55.471	92.3	0.924
	10.148	10.5	0.845	9.713	9.1	0.809	Range	-29.871+ 168.976	-27.0+ 2706.6	-0.497+ 2.816
	Fifth Year			Five Year Total						
	9.535	8.1	0.794	65.742	109.1	1.095	Sample Size		16	

Table IX - Cont.

Type of Location	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Shopping Center Pharmacy	25.883	53.8	2.156	22.716	30.7	1.893	Mean	83.771	227.0	1.395
	Third Year			Fourth Year			Median	81.302	158.5	1.355
	16.956	17.5	1.413	11.196	9.8	0.933	Range	38.244+	67.0+	0.637+
	Fifth Year			Five Year Total				164.728	856.0	2.745
	5.436	4.3	0.453	82.187	171.0	1.369	Sample Size		13	

	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Medical Center Pharmacy	42.776	112.1	3.564	13.752	16.9	1.146	Mean	92.365	526.4	1.538
	Third Year			Fourth Year			Median	96.079	254.0	1.601
	12.793	13.5	1.066	12.553	11.6	1.046	Range	30.024+	32.4+	0.500+
	Fifth Year			Five Year Total				144.588	3845.4	2.409
	12.449	10.3	1.037	94.323	247.2	1.572	Sample Size		13	

average monthly change. Shopping center pharmacies had the second highest rate, with a total five year absolute change of 82.187 and a slope of 1.369. Downtown pharmacies were third with a five year absolute change of 74.419 and a slope of 1.240. The neighborhood pharmacy group had the lowest growth rate with a five year absolute change of 65.742 and a slope of 1.095.

It was anticipated that the latter two would show the lowest growth rate. This is due basically to the observation that these two locations' trading areas are more likely to be relatively stable and well-established. A pharmacy located in such an area would not be expected to experience as great a growth rate.

In studying the yearly growth measures, several interesting points were discovered. Each group of pharmacies experienced a decline in the growth rate over the five year period. The medical center pharmacy group experienced the lowest initial computed indexed sales value. This could be attributed to the common condition of such pharmacies, usually being one of the first occupants in the building, with practitioners' offices only partly occupied. Therefore, the pharmacy's volume increases as the number of prescribing practitioners and their practices increase. A related reason is that as new prescription volume increases, so does renewal volume, and since the majority of a medical center pharmacy's sales are derived from prescription orders, this increase in renewal volume can be substantial. Although

these pharmacies had the lowest initial sales value, they experienced the greatest rate of growth over the first year and for the total five year period.

As anticipated, downtown pharmacies experienced a high rate of growth, second only to medical center pharmacies, over the first year. This probably was due to the well-established nature of the downtown trading areas and their already built-in potential from pedestrian shoppers and office workers.

Shopping center and neighborhood pharmacies had the lowest rates of growth over the first year period; the former had a 25.883 absolute change, and the latter, a 24.535 absolute change. An explanation behind the slow initial economic growth of the shopping center pharmacies may be that it takes time for the center to become established and patronized frequently, since centers often are built in developing residential areas. One explanation behind the low rate shown by neighborhood pharmacies could be that their potential is attained very rapidly, and therefore, shows only moderate further growth due to the relatively stable nature of their trading areas.

Pharmacies in each type location exhibited relatively similar growth for the second and third year, with the exception of shopping center pharmacies. This group experienced a much higher rate, with an absolute increase of 22.716 for the second year, and an increase of 16.956 for the third. In terms of slope, this is an average monthly change of 1.893 and 1.413, respectively. These pharmacies'

growth during this two year period seems to support the previous explanation that it takes time for the center and the trading area to become developed, but once developed, shopping center pharmacies experience rapid growth.

During the fourth year, medical center and neighborhood pharmacies had a relatively constant rate of growth, but shopping center and downtown pharmacies had a marked decrease in their growth rate. This same general relationship prevailed during the fifth year. Although both of the latter groups of pharmacies had some further growth during the fifth year, it is concluded that the shopping center and downtown pharmacy groups obtained their potential during this year. This is based on the observation that both groups' monthly slope value for the fifth year was below the median criterion value of 0.568. At the end of the fifth year, both medical center and neighborhood pharmacies still were experiencing a greater than normal economic growth, and therefore, had not obtained their full potential.

Community Size

Population and population changes may play a big role in determining a pharmacy's success. Without adequate customer potential, little success or growth can be attained. For example, one main reason given for "the shift of business from Main Street to outlying areas is that population has shifted."[10]

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10. "Main Street--Bulwark of Retailing," Chain Store Age, Drug Exec. Ed., 33:2 (February, 1957) p. 146.

One of the study's objectives is to determine whether pharmacy growth patterns vary substantially within given community sizes. The following community size classifications are employed--under 10,000; 10,000-49,999; 50,000-250,000; and over 250,000 population.

Related Study of Interest

Some studies have been conducted on community size and its relationship to various retail outlets. An annual report in American Druggist gives the results of a survey of pharmacies located in communities of under 10,000 population. These studies have revealed some interesting contrasts.

The number of pharmacies operating in small towns has been relatively stable for a long time, showing only a 2.3% increase from 17,004 in 1948 to 17,387 in 1963. By comparison, the number of independent pharmacies located in cities of 10,000 or greater has increased by 16.1% from 26,549 in 1948 to 30,831 in 1963.[11]

The average independent small town pharmacy has had, yearly, lower average total sales than a corresponding average independent metropolitan pharmacy. For example, the former experienced average total sales of $110,945 for 1963, with the latter having average total sales of $130,583. Although the average independent small town pharmacy has had

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11. Dan Rennick, "Small Town Pharmacies Outgain City Stores on Total Sales and Prescription Operations," American Druggist, 151:3 (February 1, 1965) p. 66.

lower yearly total sales, these pharmacies have experienced a greater rate of growth than did independent metropolitan pharmacies in recent years. For the time period 1948 through 1963, the average small town independent experienced a 94.7% sales increase, whereas the average independent metropolitan pharmacy had only an 81.0% increase. Further, the average independent metropolitan pharmacy experienced a 0.4% decline in sales for 1963, whereas the average small town independent had a 1.2% increase.[12]

Equation Analyses

The best exponential equation representing each community size varied from explaining 57.0% of total variation for pharmacies located in communities of under 10,000 population, to explaining 68.8% of the variation for pharmacies located in communities between 10,000 and 49,999 population. Table X gives the best exponential equation, coefficient of multiple determination, and standard estimate for each group (page 58). The identifying numbers of the pharmacies within each group also are shown. The only similarity between each equation is the presence of a linear X term in each. The graphic representation of each equation is shown in Figure G (page 59).

The mathematical data computed from each of these equations, and the data computed from the pharmacies which

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12. Rennick, loc. cit.

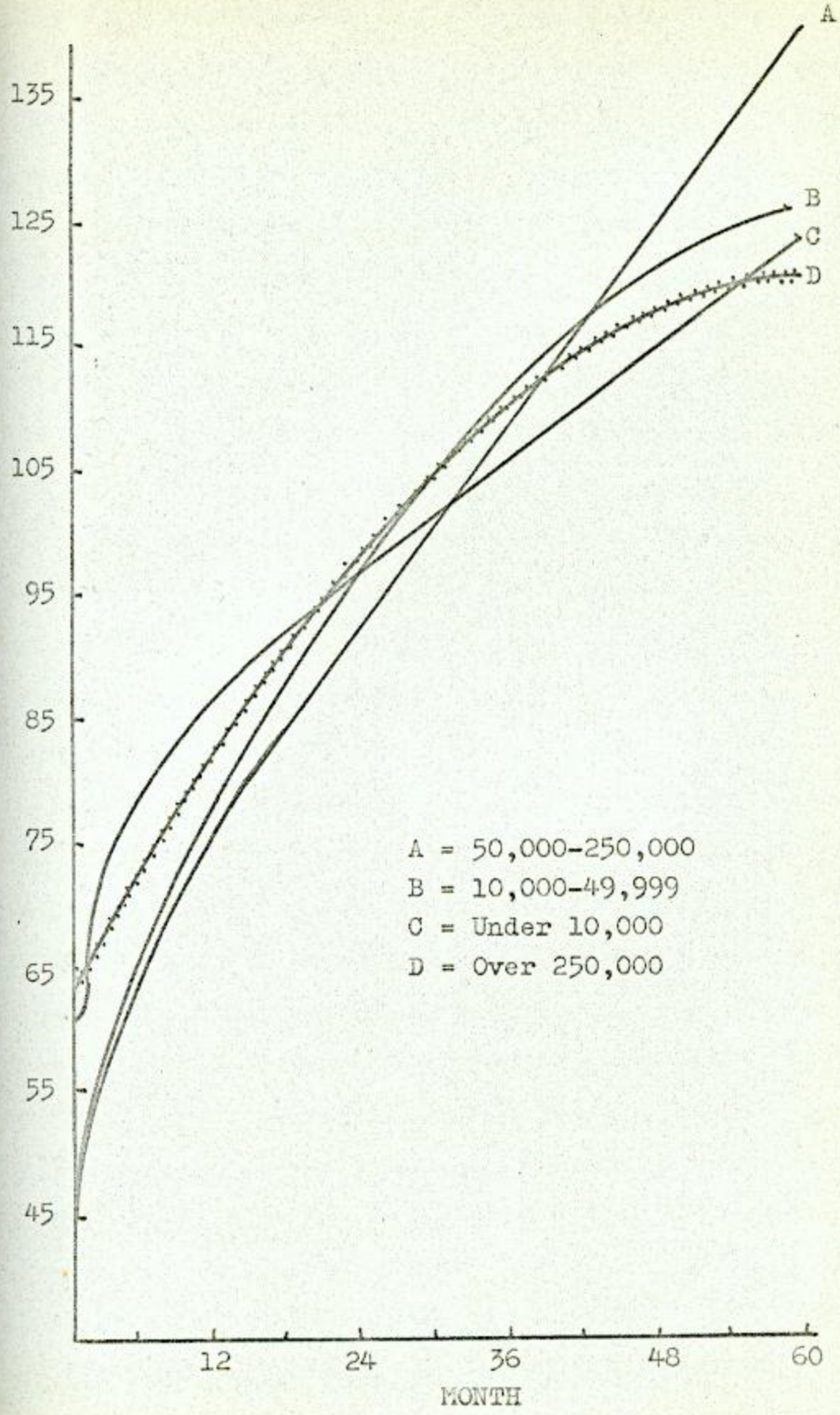
Table X

PHARMACY GROWTH EQUATIONS BY COMMUNITY SIZE

Community Size	Best Exponential Equation	Coefficient of Multiple Determination	Standard Error of Estimate	Individual Pharmacies in Category
Under 10,000	$Y = 82.538 + 0.701X - 62.541\ 1/X + 40.274\ 1/X^2$	0.570	13.562	7,8,10,15, 18,22,24, 27,28,34, 41,43
10,000-49,999	$Y = 56.274 + 2.085X - 0.015X^2 - 14.222\ 1/X$	0.688	14.672	4,5,13,16, 17,20,23, 29,30,32, 35,36,37, 38,39,40,42, 44,46,50
50,000-250,000	$Y = 61.877 + 1.320X - 25.424\ 1/X$	0.672	17.473	2,11,14, 21,25,26, 31,45,52, 53
Over 250,000	$Y = 55.699 + 2.958X - 0.059X^2 + 0.00047X^3$	0.629	13.294	1,3,6,9,12, 19,33,47, 48,49,51, 54

FIGURE G

PHARMACY GROWTH CURVES BY COMMUNITY SIZE



comprise each group are given in Table XI (pages 61-62).

The following analyses are based on the computed values from the one equation that best represented the pharmacies located in that particular size community group.

The pharmacies in communities of 50,000 to 250,000 population experienced the greatest five year growth with a 102.880 absolute change and a 1.714 average monthly change. Pharmacies in communities of 10,000 to 49,999 population had the second highest rate, with a total five year absolute change of 83.014 and an average monthly change of 1.383. Small town pharmacies were third with an absolute five year increase of 62.594 and an average monthly change of 1.043. Pharmacies located in communities of over 250,000 population experienced the lowest growth rate, with an absolute five year change of 57.938 and slope of 0.965.

One possible reason for the low growth of pharmacies in small towns could be that, generally, these pharmacies have rather distinct trading areas, and the potential of the community is more rigidly fixed. Therefore, these pharmacies attain their potential more rapidly, and thus experience a lower rate of growth shortly after their initial opening. One explanation for the low growth rate exhibited by pharmacies located in communities of over 250,000 could be that these pharmacies are in a much more competitive environment with smaller normal trading areas. This tends to be reinforced by the observation that the average metropolitan pharmacy serves fewer consumers. In 1960, for example,

Table XI

PHARMACY GROWTH VALUES BY COMMUNITY SIZE

Community Size	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Under 10,000	25.045	41.0	2.087	10.809	12.5	0.900	Mean	63.002	325.0	1.049
	Third Year			Fourth Year			Median	58.278	92.0	0.971
	9.241	9.5	0.770	8.833	8.3	0.736	Range	6.514+ 167.136	6.9+ 2706.6	0.108+ 2.785
	Fifth Year			Five Year Total						
	8.666	7.5	0.722	62.594	102.6	1.043	Sample Size		12	

	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
10,000-49,999	33.826	76.6	2.818	19.133	24.5	1.594	Mean	81.532	282.1	1.358
	Third Year			Fourth Year			Median	90.671	200.9	1.511
	14.417	14.8	1.201	9.999	8.9	0.833	Range	-14.261+ 164.728	-14.1+ 860.9	-0.237+ 2.745
	Fifth Year			Five Year Total						
	5.639	4.6	0.469	83.014	188.1	1.383	Sample Size		20	

Table XI - Cont.

Community Size	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
50,000-250,000	37.825	100.1	3.152	16.899	22.3	1.408	Mean	104.884	632.9	1.747
	Third Year			Fourth Year			Median	104.046	274.5	1.733
	16.193	17.5	1.349	16.017	14.7	1.334	Range	59.133+ 168.976	102.4+ 3845.4	0.985+ 2.816
	Fifth Year			Five Year Total						
	15.946	12.7	1.328	102.880	272.3	1.714	Sample Size		10	

	First Year			Second Year						
	Absolute	%	Slope	Absolute	%	Slope		Absolute	%	Slope
Over 250,000	18.722	29.6	1.560	16.284	19.8	1.357	Mean	65.993	227.0	1.099
	Third Year			Fourth Year			Median	59.441	98.1	0.990
	11.964	12.1	0.997	7.644	6.9	0.637	Range	-29.871+ 120.383	-27.0+ 1072.3	-0.497+ 2.006
	Fifth Year			Five Year Total						
	3.324	2.8	0.277	57.938	91.7	0.965	Sample Size		12	

the average small town pharmacy served the needs of 4,765 people as compared to the pharmacy (both chain and independent) located in a metropolitan area, which served an average of 2,848 people.[13] It may be that once a new pharmacy opens in a very competitive market and experiences substantial growth, other outlets will move in and thus tend to limit the pharmacy's growth potential. This explanation could be applied to any size community, but in general, competition tends to increase as the community size increases.

All four groups of pharmacies experienced a decline in the growth rate over the five year period. Pharmacies in communities of 10,000 to 49,999 and 50,000 to 250,000 experienced the greatest growth during the first year. Pharmacies in the former group had an absolute increase of 33.826 and a slope of 2.818. Pharmacies in the latter, a 37.825 absolute increase and a 3.152 slope. Both groups of pharmacies had greater yearly absolute changes and slopes for each of the remaining four years than did the other two groups with one exception. This exception occurred during the fifth year when pharmacies in communities of 10,000 to 49,999 experienced a large drop in growth rate, and were succeeded by the pharmacies in communities of under 10,000.

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13. Dan Rennick, "Small Town Pharmacies Today Almost Parallel Their Big Town Brothers," American Druggist, 149:9 (April 27, 1964) p. 63.

Based on the median criterion value of 0.568, it is concluded that pharmacies in communities of 10,000 to 49,999 and over 250,000 population obtained their potential in the fifth year, whereas the other two groups of pharmacies had not obtained their full potential by the end of this year.

Prescription versus Traditional

The prescription department is the basic difference between a pharmacy and some other consumer goods and service outlets. Every community practitioner knows the importance of the prescription department, for, in many cases, the success or failure of the pharmacy is determined by this department. From 1955 through 1965, with the exception of 1961, the percentage of prescription sales to total sales for the average pharmacy increased.[14] Between 1955 through 1965, this percent increased from 23.5%[15] to 31.3%.[16]

Each pharmacy was classified as either a prescription or traditional type pharmacy to study the influence of

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14. For example, see Robert A. Leibson, "12.7% Rise in Rx Volume Won by Independents," Drug Topics, 110:6 (March 21, 1966) p. 41, and the following previous issues: 108:7 (April 6, 1964) p. 80; 106:7 (March 26, 1962) p. 41; 104:7 (March 28, 1960) p. 2; 102:7 (March 31, 1958) p. 2; and 101:5 (March 4, 1957) p. 2.

15. "Rx Sales Skyrocket 15.4% Above 1954," Drug Topics, 100:5 (March 5, 1956) p. 1.

16. Robert A. Leibson, "12.7% Rise in Rx Volume Won by Independents," Drug Topics, 110:6 (March 21, 1966) p. 41.

prescription volume on pharmacy growth. If the percentage of prescription sales to total sales was 60% or greater, the pharmacy was classified as a prescription type, and if less than 60%, as a traditional pharmacy.

Of the 54 usable returns, 47 owners provided percentage of prescription sales to total sales data. Two claimed they had no record, and five claimed it was against their policy to disclose this information.

As anticipated, all thirteen medical center pharmacies were included in the prescription type pharmacy group, plus four other pharmacies. The five chain pharmacies were considered as traditional type pharmacies, bringing this group to a total of 35 pharmacies.

Analyses of Prescription Data

For the 47 pharmacies, the mean percentage of prescription sales to total sales was 50.5%, and the median value was 39.0%. The lowest value reported for any year was 1.5%, and the highest value, 99.0%. Twenty-nine of these pharmacies experienced an increasing percentage of prescription volume to total volume over the five year period; seven a decreasing percentage; and eleven respondents reported a constant percentage.

These 47 sets of data were separated by type of location. Of the twelve downtown pharmacy owners who provided data, ten reported an increasing percentage over time; one, a decreasing percentage; and one, a constant percentage.

The mean percentage of prescription volume to total volume for downtown pharmacies was 39.3%, and the median value was 37.0%.* The lowest yearly value reported was 8.0%, and the highest, 87.0%.

Eight of the thirteen neighborhood pharmacy owners providing data reported an increasing percentage of prescription volume over time; three, a decreasing; and two, a constant. The mean percentage of prescription volume was 41.0%, and the median value, 35.0%. The lowest yearly value reported was 1.5%, and the highest, 95.0%.

Eight of the nine shopping center owners who provided data reported an increasing percentage of prescription volume over time, and one, a decreasing. The mean percentage of prescription volume was 22.6%, and the median value, 22.0%. The lowest yearly value reported was 14.3%, and the highest, 55.0%.

The mean percentage of prescription volume calculated from the thirteen medical center pharmacies' data was 89.7%, and the median value was 95.0%. Of the thirteen, eight recorded a constant percentage; three, an increasing; and two, a decreasing percentage. The lowest yearly value reported was 63.9%, and the highest, 99.0%.

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* For any even number of pharmacies in a subclassification, the median value was determined by averaging the two middle values.

Equation Analyses

The best exponential equation calculated for each group of pharmacies explained almost the same amount of total variation--66.3% for the traditional pharmacies, and 66.2% for the prescription pharmacies. Table XII shows the best exponential equation, coefficient of multiple determination, and standard error of estimate for each group (page 68). Again, the only similarity between the two equations is the presence of a linear X term in each. Figure H shows the graphic representation of each equation (page 69).

The mathematical data computed from each equation, and the data computed from the pharmacies comprising each group, are given in Table XIII (page 70).

As anticipated, since the majority of the prescription pharmacies are medical center pharmacies, they had the greatest total five year growth and yearly growth, except for the second year. The prescription pharmacy group experienced a total five year absolute change of 96.229, whereas the traditional pharmacy group had a five year absolute change of 69.821. The former group has a declining rate of growth over the entire period, and the latter over the first four years.

Since the traditional pharmacies' initial sales value was about 17 indexed sales units above the prescription pharmacies' value of 39, the prescription pharmacy equation

Table XII

PHARMACY GROWTH EQUATIONS FOR TRADITIONAL AND PRESCRIPTION PHARMACIES

Type of Pharmacy	Best Exponential Equation	Coefficient of Multiple Determination	Standard Error of Estimate
Traditional Pharmacy	$Y = 53.367 + 2.891X - 0.052X^2 + 0.0004X^3$	0.663	13.530
Prescription Pharmacy	$Y = 71.417 + 1.086X - 69.116\ 1/X + 35.819\ 1/X^2$	0.662	16.508

FIGURE H

PHARMACY GROWTH CURVES FOR TRADITIONAL AND PRESCRIPTION PHARMACIES

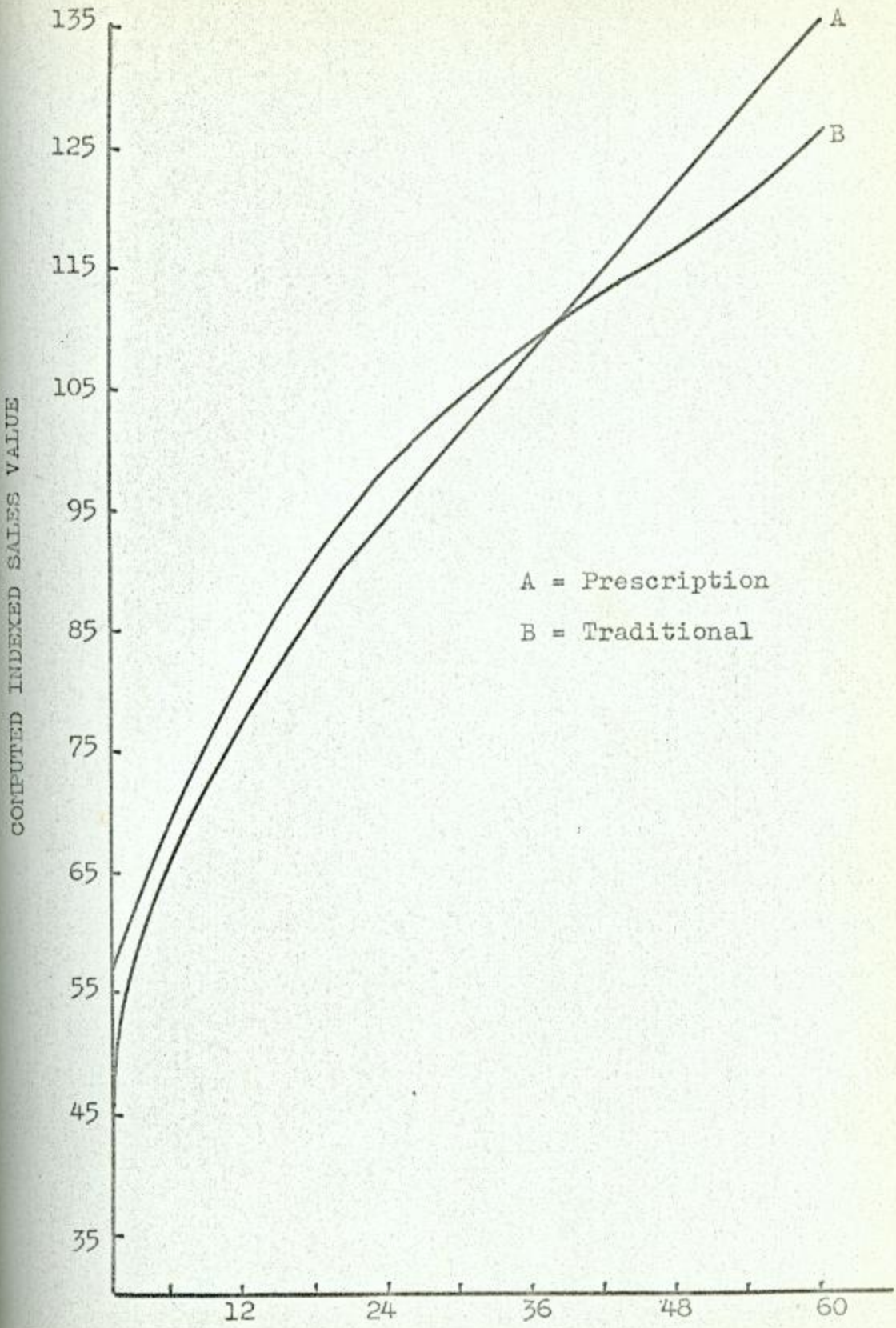

Table XIII

PHARMACY GROWTH VALUES FOR TRADITIONAL AND PRESCRIPTION PHARMACIES

Type of Pharmacy	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Traditional Pharmacy	25.056	44.6	2.088	17.066	21.0	1.422	Mean	71.607	225.5	1.193
	Third Year			Fourth Year			Median	68.437	119.7	1.140
	10.385	11.0	0.865	7.850	7.2	0.654	Range	-14.261+ 168.976	-14.1+ 1072.5	-0.237+ 2.816
	Fifth Year			Five Year Total						
	9.464	8.12	0.789	69.821	124.2	1.164	Sample Size		35	
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Prescription Pharmacy	39.732	101.3	3.311	15.725	19.9	1.310	Mean	96.378	616.2	1.606
	Third Year			Fourth Year			Median	101.121	300.0	1.685
	13.957	14.7	1.163	13.500	12.4	1.125	Range	30.024+ 167.136	32.4+ 3845.4	0.500+ 2.785
	Fifth Year			Five Year Total						
	13.315	10.9	1.110	96.229	245.4	1.604	Sample Size		17	

did not attain the same value as the traditional pharmacy equation until about the 36th month. After that time, the prescription pharmacies' value continued to exceed the traditional pharmacies, and at the end of the fifth year, was about 9.5 indexed sales units above the traditional pharmacy value. Although the prescription pharmacies' value exceeded the traditional pharmacies' at the end of the fifth year, both were still experiencing high rates of growth, and, based on the median criterion value, neither had obtained their full potential.

Chain versus Independent

The success of chain versus independent pharmacies has been a controversy for many years. Both types have recorded growth over the past years. Between 1954 and 1965, total sales for the average independent increased from $78,458[17] to $150,804,[18] or a 92.2% increase. For the average chain pharmacy, total sales increased from $255,862[19] in 1954 to $486,085[20] in 1965, or a 90.0% increase.

Prescription sales for each type of pharmacy also have increased. Between 1954 and 1965, prescription sales for

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17. Computed from data in "Rx Sales Skyrocket 15.4% Above 1954," Drug Topics, 100:5 (March 5, 1956) p. 1.

18. Robert A. Leibson, "12.7% Rise in Rx Volume Won by Independents," Drug Topics, 110:6 (March 21, 1966) p. 41.

19. "Rx Sales Skyrocket 15.4% Above 1954," loc. cit.

20. Leibson, loc. cit.

the average independent increased from $19,918[21] to $57,588,[22] or a 189.1% increase. Actually, prescription sales as a percent of total sales increased from 25.4%[23] in 1954 to 38.2%[24] in 1965. The average chain pharmacy had an increase in prescription sales of from $22,989[25] in 1954 to $65,270[26] in 1965, or an increase of 185.0%. Prescription sales as a percentage of total sales increased over this period, from 9.0%[27] in 1954 to 13.4%[28] in 1965.

Each year since 1958, chain pharmacies have obtained a greater share of total community pharmacy sales.[29] In 1965, chains claimed 27.9% of total pharmacy sales, but represented only 10.7% of all community pharmacies.[30] Since 1960, chains have opened 600 or more new community pharmacies yearly.[31]

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21. "Rx Sales Skyrocket 15.4% Above 1954," loc. cit.
22. Leibson, loc. cit.
23. "Rx Sales Skyrocket 15.4% Above 1954," loc. cit.
24. Leibson, loc. cit.
25. "Rx Sales Skyrocket 15.4% Above 1954," loc. cit.
26. Leibson, loc. cit.
27. "Rx Sales Skyrocket 15.4% Above 1954," loc. cit.
28. Leibson, loc. cit.
29. Leibson, loc. cit.; also, 109:1 (January 1, 1965) p. 8; and 104:7 (March 28, 1960) p. 2.
30. Leibson, "12.7% Rise in Rx Volume Won by Independents," loc. cit.
31. S. O. Kaylin, "Chain Construction, Modernization Expenditures to Rise 8.1% in 1965," Chain Store Age, Drug Exec. Ed., 41:1 (January, 1965) pp. E16; and the following previous issues: 39:1 (January, 1963) pp. E18; 38:1 (January, 1962) pp. 44.

Although only five usable replies represent chain pharmacies, one of the study's objectives is to determine whether chain and independent pharmacies have different growth patterns. The independent pharmacy group of 36 excludes the thirteen medical center pharmacies for a more realistic comparison.

Equation Analyses

The best exponential equation calculated for the chain pharmacies explained 78.2% of total variation, whereas the best exponential equation for the independent pharmacies explained 62.5%. Table XIV shows the best exponential equation, coefficient of multiple determination, and standard error of estimate for each group of pharmacies (page 74). Each equation was similar in that both had a linear X term and a third degree X term. Figure I shows the graphic representation of each equation (page 75).

The mathematical data computed from each equation, and the data computed from the pharmacies comprising each group, are given in Table XV (page 76).

The independent pharmacy group experienced the greatest growth over the entire five year period, with an absolute change of 75.062, whereas the chain pharmacies a change of 60.139. Neither group experienced a declining rate of growth over the entire five years.

Independent pharmacies' initial sales value was about 10.5 indexed sales units below the chains, but within eleven

Table XIV

PHARMACY GROWTH EQUATIONS FOR CHAIN AND INDEPENDENT PHARMACIES

Type of Pharmacy	Best Exponential Equation	Coefficient of Multiple Determination	Standard Error of Estimate	Individual Pharmacies in Category
Chain Pharmacy	$Y = 62.653 + 1.422X - 0.00011X^3$	0.782	9.799	47,48,49, 50,51
Independent Pharmacy	$Y = 50.938 + 3.053X - 0.055X^2 + 0.00043X^3$	0.625	15.433	*

*All 54 pharmacies excluding the thirteen medical center and five chain pharmacies.

FIGURE I

PHARMACY GROWTH CURVES FOR CHAIN AND INDEPENDENT PHARMACIES

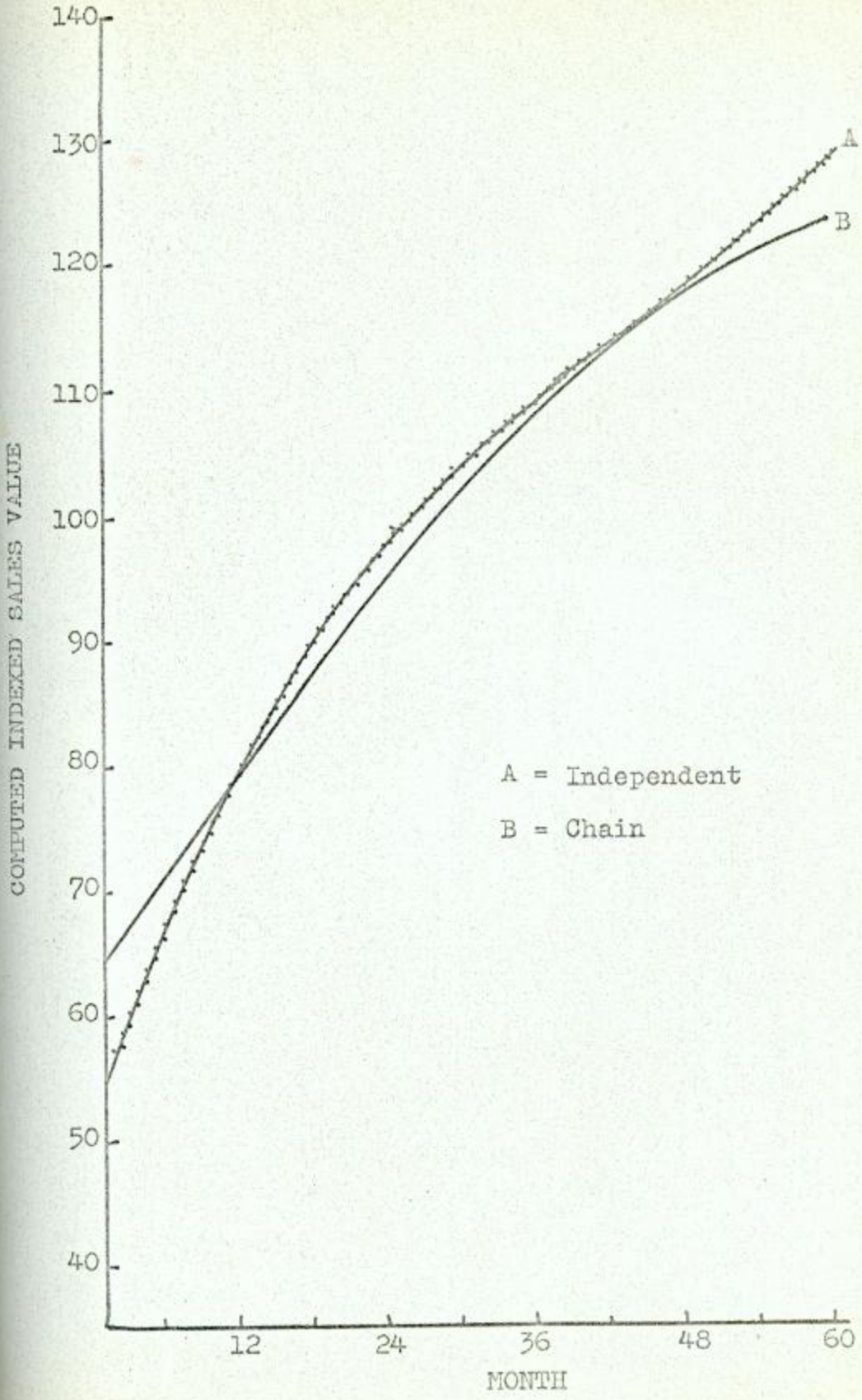

Table XV

PHARMACY GROWTH VALUES FOR CHAIN AND INDEPENDENT PHARMACIES

Type of Pharmacy	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Chain Pharmacy	15.452	24.1	1.287	15.734	19.7	1.311	Mean	56.440	88.9	0.940
	Third Year			Fourth Year			Median	58.832	93.3	0.980
	13.452	14.1	1.121	10.031	9.2	0.835	Range	-49.619+ 70.818	62.3+ 120.1	0.714+ 1.180
	Fifth Year			Five Year Totals						
	5.470	4.6	0.455	60.139	93.8	1.002	Sample Size		5	

	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Independent Pharmacy	26.461	49.0	2.205	18.077	22.4	1.506	Mean	76.236	314.1	1.270
	Third Year			Fourth Year			Median	77.215	142.1	1.286
	11.154	11.3	0.929	8.688	7.9	0.724	Range	-29.871+ 168.976	-27.0+ 2706.6	-0.497+ 2.816
	Fifth Year			Five Year Totals						
	10.682	9.0	0.890	75.062	139.1	1.251	Sample Size		36	

months, both had about the same indexed value. Independent pharmacies then exceeded the chain pharmacies' growth until about the 37th month, when both groups again experienced about the same indexed sales value. During the fourth year, both groups had similar rates of growth. The independent pharmacies then had an increase in growth rate, whereas the chain pharmacies continued to experience a decrease in growth rate.

At the end of the fifth year, the independent pharmacies exceeded the chain pharmacies by about 4.5 indexed sales units. Based on the median criterion value, during the fifth year the chain pharmacies obtained their potential, whereas the independent pharmacies still continued to exceed normal economic growth.

Agency versus Nonagency

Some pharmacy owners have agency agreements with such firms as Rexall, Walgreen and Ford-Hopkins. Under such an arrangement, the owner is entitled to use the agency name plus sell products distributed exclusively by the firm. National promotion such as the Rexall 1¢ Sale also can be beneficial.

Although there were only seven usable returns representing agency pharmacies, it is the hope of this analysis to determine whether agency pharmacies have a characteristically different growth pattern. There were 29 nonagency

pharmacies. The thirteen medical center and five chain pharmacies were excluded to obtain a better comparison.

Equation Analyses

The best exponential equation computed for each group of pharmacies explained almost the same amount of total variation; 62.5% for the nonagency pharmacies, and 64.0% for the agency pharmacies. The best exponential equation, coefficient of multiple determination, and standard error of estimate for each group are shown in Table XVI (page 79). Each equation was similar in that both had a linear X term and a second degree X term. Figure J shows the graphic representation of each equation (page 80).

The mathematical data computed from each equation, and the data computed from the pharmacies comprising each group are given in Table XVII (page 81).

The agency pharmacies experienced the greatest growth over the entire five year period, and for each year, except the fifth. Agency pharmacies had a total five year absolute change of 91.499, whereas the nonagency pharmacies had a change of 72.738. The former group had a declining rate of growth over the entire five year period, and the latter group over the first four years.

At the end of the fifth year, the agency pharmacies still exceeded the nonagency pharmacies by about 3.5 indexed sales units. Although both groups of pharmacies exceed the median criterion value for each year, during the fifth year,

Table XVI

PHARMACY GROWTH EQUATIONS FOR AGENCY AND NONAGENCY PHARMACIES

Type of Pharmacy	Best Exponential Equation	Coefficient of Multiple Determination	Standard Error of Estimate	Individual Pharmacies in Category
Agency Pharmacy	$Y = 57.353 + 2.028X - 0.013X^2 - 18.950\ 1/X$	0.640	17.142	3,13,17,21, 27,28,29
Nonagency Pharmacy	$Y = 52.349 + 2.977X - 0.055X^2 + 0.00044X^3$	0.625	14.932	*

*All 54 pharmacies excluding the thirteen medical center, five chain, and seven agency pharmacies.

FIGURE J

PHARMACY GROWTH CURVES FOR AGENCY AND NONAGENCY PHARMACIES

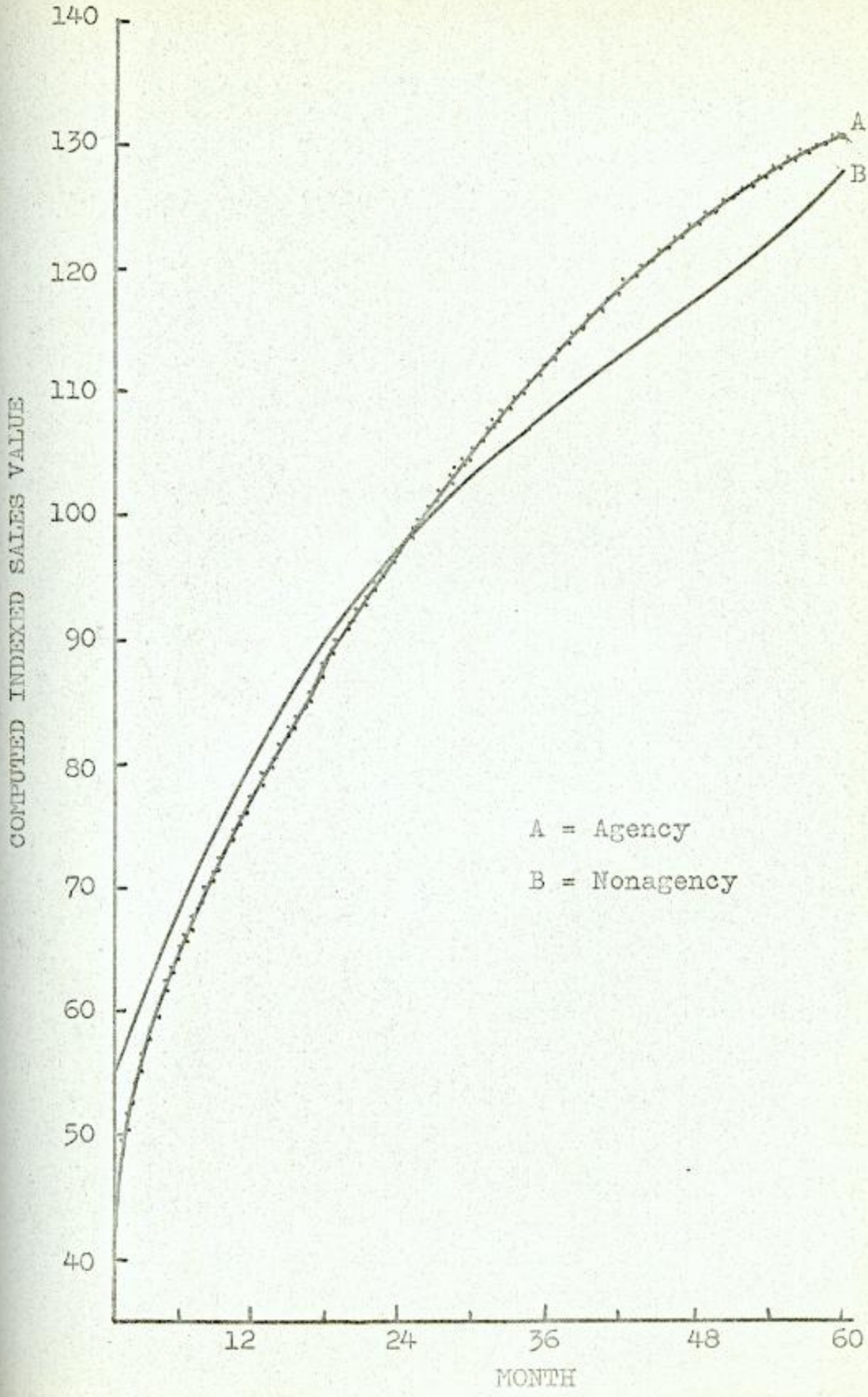

Table XVII

PHARMACY GROWTH VALUES FOR AGENCY AND NONAGENCY PHARMACIES

Type of Pharmacy	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Agency	37.819	93.5	3.151	19.510	24.9	1.625	Mean	90.955	300.7	1.515
	Third Year			Fourth Year			Median	86.344	256.4	1.439
	15.239	15.5	1.269	11.364	10.0	0.947	Range	45.956+ 164.728	63.3+ 856.0	0.765+ 2.745
	Fifth Year			Five Year Total						
	7.567	6.0	0.630	91.499	226.3	1.524	Sample Size		7	

	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Nonagency	25.642	46.3	2.136	17.286	21.3	1.440	Mean	72.683	317.3	1.211
	Third Year			Fourth Year			Median	69.242	122.0	1.154
	10.570	10.7	0.880	8.416	7.7	0.701	Range	-29.871+ 168.976	-27.0+ 2706.6	-0.497+ 2.816
	Fifth Year			Five Year Total						
	10.824	9.2	0.902	72.738	131.6	1.212	Sample Size		29	

the agency pharmacies' slope value was only 0.062 units above this median value.

Pharmacy Size

It is difficult to determine the optimal size which will prove most beneficial for a new pharmacy. Factors such as type of operation, number of departments, and depth of merchandise all play a key role in determining the space required.

Related Studies of Interest

From the annual pharmacy surveys reported in American Druggist, the average total floor space for an independent with a fountain in 1955 was 1,579 sq. ft.,[32] whereas in 1964, this figure had increased to 2,098 sq. ft.,[33] or an increase of 32.9%. Over this same period, the average total floor space for an independent without a fountain increased from 1,197 sq. ft.[34] to 1,621 sq. ft.,[35] or an increase of

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32. "Average Drug Store's Selling Area Jumps 11.4% Since 1952; Chain Increase is 17%," American Druggist, 133:13 (June 18, 1956) p. 6.

33. "Cosmetic and Better Living Depts. Show Biggest Rise in Floor Space, Study Finds," American Druggist, 151:13 (June 21, 1965) p. 57.

34. "Average Drug Store's Selling Area Jumps 11.4% Since 1952; Chain Increase is 17%," loc. cit.

35. "Cosmetic and Better Living Depts. Show Biggest Rise in Floor Space," loc. cit.

35.4%. The average total floor space for a chain pharmacy over this period increased from 3,180 sq. ft.[36] to 4,963 sq. ft.,[37] or an increase of 56.1%.

One of the main reasons for this increase in each category is that new pharmacies are generally larger than established ones. One study of new pharmacies opened between October 1961 and August 1962 reported that the average size of a new pharmacy opened in a separate premise was 5,116 sq. ft., whereas the average size of all pharmacies located in a separate premise was only 1,911 sq. ft.[38]

In a new pharmacy survey reported in Drug Topics, the average "selling and display area" for new pharmacies opened in 1964 was 2,568 sq. ft. This compares to the previous years' average of 2,427 sq. ft.,[39] or an increase of 5.8% in one year.

A. C. Nielsen and Co. reported in their 1965 Annual Review that the average "selling Area" for a pharmacy opened

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36. "Average Drug Store's Selling Area Jumps 11.4% Since 1952; Chain Increase is 17%," loc. cit.

37. "Cosmetic and Better Living Depts. Show Biggest Rise in Floor Space," loc. cit.

38. "Supers House 3.2% of New Pharmacies," American Druggist, 146:6 (September 17, 1962) p. 63.

39. Robert A. Leibson, "1963 Record is Broken as 2,295 New Pharmacies Open Their Doors in '64," Drug Topics, 109:8 (April 19, 1965) p. 44.

in 1964 was 4,600 sq. ft. Based on type of location, the average "selling area" for a new pharmacy opened in a separate location in 1964 was 4,800 sq. ft.; for a new pharmacy located in a shopping center it was 7,100 sq. ft.; and for a prescription pharmacy it was 720 sq. ft. Data also were reported by different geographical regions of the country. For the central district in which Wisconsin is included, the average "selling area" for a new pharmacy located in a separate location was 4,250 sq. ft.; for a new pharmacy located in a shopping center it was 6,350 sq. ft.; and for a prescription pharmacy it was 650 sq. ft.[40]

Analyses of Floor Space Data

The total floor space (excluding storage areas) was reported on each of the usable returns. The mean pharmacy size for all 54 pharmacies was 1,751 sq. ft., and the median value, 1,200 sq. ft. The 54 pharmacies ranged in size from 128 to 7,000 sq. ft.

The mean pharmacy size for the twelve downtown pharmacies was 1,365 sq. ft., and the median value was 1,150 sq. ft. These pharmacies ranged in size from 400 to 3,310 sq. ft. The sixteen neighborhood pharmacies had a mean size of 1,808 sq. ft., and a median value of 1,400 sq. ft. They

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40. Thirty-first Annual Nielsen Review of Retail Drug Store Trends, A. C. Nielsen Company, Chicago, Illinois, 1965, p. 23.

ranged in size from 290 to 6,580 sq. ft. As anticipated, shopping center pharmacies had the largest mean and median size, with the former being 3,396 sq. ft., and the latter, 3,100 sq. ft. These pharmacies ranged in size from 816 to 7,000 sq. ft. Medical center pharmacies' mean size was 392 sq. ft., and their median value, 200 sq. ft. Their range was from 128 to 1,066 sq. ft.

The medical center pharmacies are the smallest type pharmacy, and the size of a pharmacy increases as we move away from the central business district.

Equation Analyses

The best exponential equation calculated for each group of pharmacies varied from explaining 54.0% of total variation for pharmacies of under 500 sq. ft., to explaining 80.3% for pharmacies of over 5,000 sq. ft. The best exponential equation, coefficient of multiple determination, and standard error of estimate for each group are shown in Table XVIII (page 86). The identification numbers of the pharmacies in each group also are shown. Of the five equations, the only similarity is the appearance of a linear X term in each. The graphic representation of each equation is given in Figure K (page 87).

The mathematical data computed from each of these equations, and the data computed from the pharmacies which comprise each group are shown in Table XIX (pages 88-89).

Table XVIII

PHARMACY GROWTH EQUATIONS BY PHARMACY SIZE

Pharmacy Size	Best Exponential Equation	Coefficient of Multiple Determination	Standard Error of Estimate	Individual Pharmacies in Category
Under 500 sq. ft.	$Y = 74.490 + 0.918X - 29.690\ 1/X$	0.540	17.138	2,4,5,12, 15,20,23,26, 27,42
500-999 sq. ft.	$Y = 69.291 + 1.168X - 80.134\ 1/X + 53.414\ 1/X^2$	0.650	18.001	6,9,19,25, 28,37,38, 41,45,46, 51,53
1000-1999 sq. ft.	$Y = 55.899 + 2.945X - 0.054X^2 + 0.00039X^3 - 11.130\ 1/X$	0.754	10.430	1,7,8,11, 16,17,18, 22,24,29, 32,35,39, 40,43,48
2000-5000 sq. ft.	$Y = 59.701 + 1.828X - 0.012X^2$	0.615	15.060	3,10,13,14, 21,30,31, 33,34,36, 44,52,54
Over 5000 sq. ft.	$Y = 56.024 + 1.670X - 0.00013X^3$	0.803	10.826	47,49,53

FIGURE K

PHARMACY GROWTH CURVES BY PHARMACY SIZE

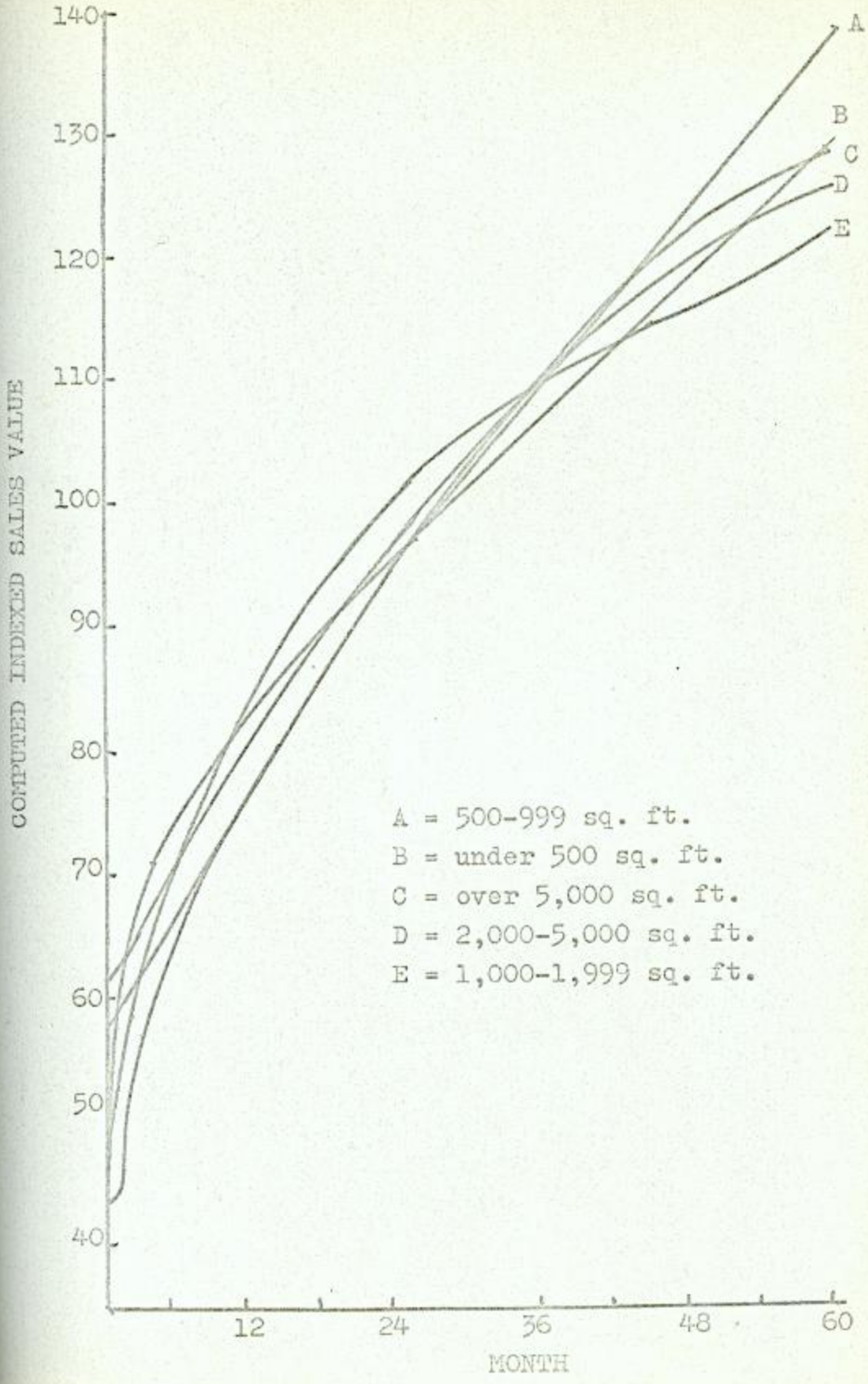

Table XIX

PHARMACY GROWTH VALUES BY PHARMACY SIZE

Pharmacy Size	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Under 500 sq. ft.	37.313	81.6	3.109	12.253	14.7	1.021	Mean	82.297	222.8	1.371
	Third Year			Fourth Year			Median	81.101	202.0	1.351
	11.429	11.9	0.952	11.222	10.5	0.935	Range	30.024+ 135.172	32.4+ 517.9	0.500+ 2.252
	Fifth Year			Five Year Total						
	11.140	9.4	0.928	83.357	182.3	1.389	Sample Size		10	
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
500-999 sq. ft.	33.261	76.0	2.771	17.076	22.1	1.423	Mean	96.413	760.1	1.606
	Third Year			Fourth Year			Median	96.857	294.0	1.614
	15.078	16.0	1.256	14.554	13.3	1.212	Range	-14.261+ 168.976	-14.1+ 3845.4	-0.237+ 2.816
	Fifth Year			Five Year Total						
	14.342	11.5	1.195	94.311	215.6	1.571	Sample Size		12	
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
1000-1999 sq. ft.	35.549	74.5	2.962	17.193	20.6	1.432	Mean	70.650	277.0	1.177
	Third Year			Fourth Year			Median	65.783	117.8	1.096
	9.419	9.3	0.784	5.921	5.3	0.493	Range	6.514+ 120.383	6.9+ 1072.3	0.108+ 2.006
	Fifth Year			Five Year Total						
	6.511	5.6	0.542	74.593	156.5	1.243	Sample Size		16	

Table XIX - Cont.

Pharmacy Size	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
2000-5000 sq. ft.	18.392	29.8	1.532	16.752	20.9	1.396	Mean	72.141	194.2	1.202
	Third Year			Fourth Year			Median	81.648	125.7	1.355
	13.296	13.7	1.108	9.840	8.9	0.820	Range	-29.871+ 164.728	-27.0+ 856.0	-0.497+ 2.745
	Fifth Year			Five Year Total						
	6.384	5.3	0.532	64.664	105.1	1.077	Sample Size		13	

	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Over 5000 sq. ft.	18.146	31.4	1.512	18.467	24.3	1.538	Mean	59.756	96.3	0.995
	Third Year			Fourth Year			Median	58.832	103.0	0.980
	15.772	16.7	1.314	11.729	10.6	0.977	Range	49.619+ 70.818	66.0+ 120.1	0.826+ 1.180
	Fifth Year			Five Year Total						
	6.337	5.2	0.528	70.451	122.1	1.174	Sample Size		3	

The pharmacies of 500 to 999 sq. ft. had the greatest five year growth, with a 94.311 absolute change and a 1.571 average monthly change. Pharmacies of under 500 sq. ft. had the second highest rate, with a total five year absolute change of 83.357 and a slope of 1.389. Pharmacies of 1,000 to 1,999 sq. ft. were third with an absolute five year change of 74.593 and slope of 1.243. Fourth were pharmacies of over 5,000 sq. ft., with an absolute change of 70.451 and slope of 1.174. The pharmacies of 2,000 to 5,000 sq. ft. had the lowest growth rate with an absolute change of 64.664 and slope of 1.077. One reason for the high rate of growth for pharmacies under 500 sq. ft. is that eight of the ten pharmacies in this group are medical center pharmacies. From the overall analysis of the total five year growth for each group of pharmacy, there appeared to be no definite relationship, either direct or inverse, between pharmacy size and growth.

In studying the yearly growth measures, several interesting points were noted. Only three pharmacy groups had a yearly decline in their growth rate over the entire five year period. As anticipated, the pharmacies of under 500 sq. ft. experienced a low initial sales value, second only to pharmacies of 500 to 999 sq. ft. This could be attributed to the previous conclusion that initially a medical center has few practitioners and the pharmacy's volume increases as the number of prescribing physicians and their practices increase.

Based on the median criterion value of 0.568, pharmacies of 1,000 to 1,999 sq. ft. obtained their potential during the fourth year, and pharmacies of 2,000 to 5,000 and over 5,000 sq. ft., during the fifth. The two smaller pharmacy size groups at the end of the fifth year still were experiencing a greater than normal economic growth, and therefore, had not obtained their full potential.

Number of Practicing Physicians Within the Area

There appears to be no question of the importance of prescribing physicians near a new pharmacy. From the many different statements about factors which helped or hindered the pharmacy's growth, two general ideas seemed to prevail. Ten of the thirty-two respondents who reported factors which helped their pharmacies' growth mentioned nearness to physicians' offices or the number of physicians in the area. On the other side, of the sixteen respondents who mentioned factors which hindered their growth, five reported dispensing physicians within the area. To obtain some indication of the influence physicians have on a new community pharmacy's growth, the number of practicing physicians within a three-quarter mile radius of the pharmacy from whom the pharmacist received prescription orders was requested.

Related Study of Interest

Goodness conducted a survey of prescription orders in 250 Massachusetts pharmacies to determine the average number

of physicians whose orders appeared in these pharmacies. He reported that the average pharmacy had prescription orders from 51 different physicians, but 28.1% of these orders were from just two physicians. Almost one-half (49.7%) of all prescription orders were received from only six physicians.[41]

Analyses of Physician Data

The mean number of practicing physicians within a three-quarter mile radius from whom respondent pharmacists received prescription orders was 10.8 physicians, and the median value was 4.5. Of the 54 usable returns, five reported receiving no prescription orders from a practicing physician within this radius. The highest number of physicians reported was 100.

The mean number of practicing physicians within a three-quarter mile radius from whom pharmacists in a downtown location received prescription orders was 14.0, and the median value, 2.5. This big difference in values is reflected in the wide range of from zero to one hundred that was reported. The mean value for pharmacists in neighborhood pharmacies was 5.7 practicing physicians, and the median value, 3.0. These values ranged from zero to

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41. "6 Doctors Write 50% of a Store's Rxs," American Druggist, 131:12 (June 6, 1955) p. 25.

25 practicing physicians. The mean value for shopping center pharmacies was 8.5, and the median value, 4.0. Forty practicing physicians was the largest value reported by these pharmacists. The pharmacists in medical centers reported values ranging from two through forty. The mean value was 16.5 practicing physicians, and the median value was 14.0.

Equation Analyses

The best exponential equation computed for each pharmacy group varied from explaining 59.6% of the total variation for pharmacists with two or three practicing physicians within the area, to explaining 79.8% of the variation for pharmacists with over twenty practicing physicians. Table XX shows the best exponential equation, coefficient of multiple determination, and standard error of estimate for each group (page 94). The identification numbers of the pharmacies in each group also are shown. Of the five equations, the only similarity is the appearance of a linear X term in each equation. Four of the equations have a second degree X term. The graphic representation of each equation is given in Figure L (page 95).

The mathematical data computed from each of these equations, plus the data computed from the pharmacies which comprise each group are shown in Table XXI (pages 96-97).

Pharmacies where prescription orders were received from over twenty practicing physicians within this radius had the

Table XX

PHARMACY GROWTH EQUATIONS BY NUMBER OF PRACTICING PHYSICIANS

Number of Physicians	Best Exponential Equation	Coefficient of Multiple Determination	Standard Error of Estimate	Individual Pharmacies in Category
0-1	$Y = 49.243 + 2.109X - 0.010X^2$	0.650	18.777	7,30,38,50, 53, 3,13, 28,31,34,41
2-3	$Y = 59.693 + 2.669X - 0.054X^2 + 0.00045X^3$	0.596	13.039	8,9,10,11, 15,16,18, 20,22,23, 24,27,33, 39,52
4-10	$Y = 53.998 + 3.173X - 0.064X^2 + 0.0005X^3$	0.660	12.207	1,17,35,36, 37,42,43, 46,47,48, 49,54
11-20	$Y = 70.117 + 1.049X - 25.448\ 1/X$	0.633	15.525	2,12,14,19, 21,26,40, 51
Over 20	$Y = 58.107 + 1.869X - 0.010X^2 - 32.612\ 1/X$	0.798	12.522	4,5,6,25, 29,32,44, 45

FIGURE L

PHARMACY GROWTH CURVES BY NUMBER OF PRACTICING PHYSICIANS

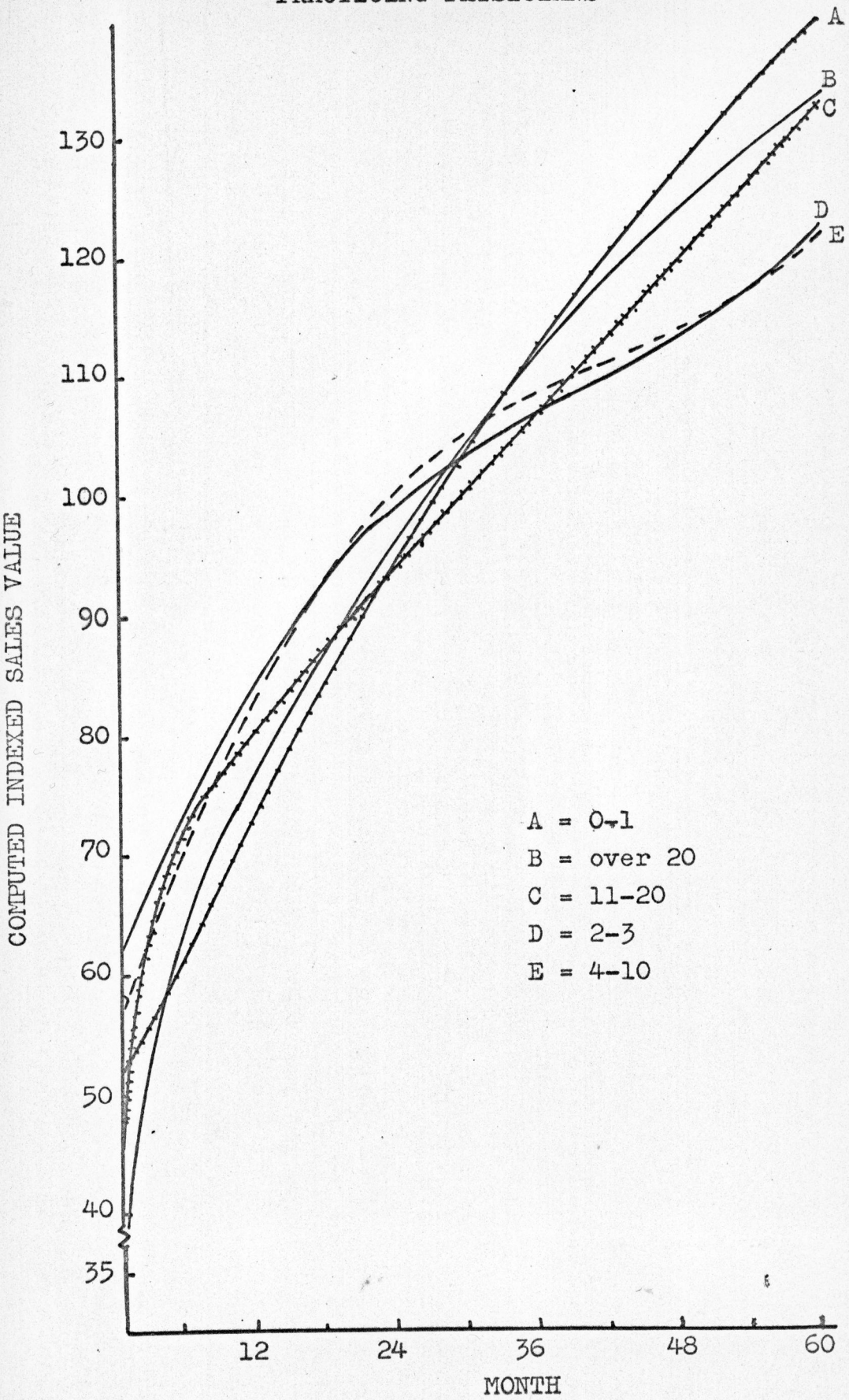

Table XXI

PHARMACY GROWTH VALUES BY NUMBER OF PRACTICING PHYSICIANS

Number of Physicians	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
0-1	21.769	42.3	1.814	20.988	28.7	1.749	Mean	97.760	506.7	1.628
	Third Year			Fourth Year			Median	86.344	209.6	1.439
	18.108	19.2	1.509	15.228	13.5	1.269	Range	6.514+ 168.976	6.9+ 2706.6	0.108+ 2.816
	Fifth Year			Five Year Total			Sample Size		11	
	12.348	9.6	1.029	88.441	172.2	1.474				
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
2-3	22.414	35.9	1.867	14.143	16.6	1.178	Mean	56.347	128.9	0.948
	Third Year			Fourth Year			Median	58.747	97.4	0.979
	7.923	8.0	0.660	6.367	5.9	0.530	Range	-29.871+ 114.132	-27.0+ 483.8	-0.497+ 1.902
	Fifth Year			Five Year Total			Sample Size		15	
	9.478	8.3	0.789	60.325	96.8	1.005				
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
4-10	26.615	46.6	2.217	16.476	19.6	1.373	Mean	63.563	214.6	1.059
	Third Year			Fourth Year			Median	57.397	115.3	0.956
	8.412	8.3	0.701	5.532	5.0	0.461	Range	-14.261+ 120.383	-14.1+ 1072.3	-0.237+ 2.006
	Fifth Year			Five Year Total			Sample Size		12	
	7.836	6.8	0.653	64.871	113.5	1.081				

Table XXI - Cont.

Number of Physicians	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
11-20	34.866	76.2	2.905	13.648	16.9	1.137	Mean	85.449	211.8	1.423
	Third Year			Fourth Year			Median	89.473	209.5	1.491
	12.942	13.7	1.078	12.764	11.9	1.063	Range	38.118+ 115.947	49.1+ 379.1	0.635+ 1.932
	Fifth Year			Five Year Total						
	12.694	10.5	1.057	86.914	190.1	1.448	Sample Size		8	

	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Over 20	49.023	179.2	4.085	19.467	25.4	1.622	Mean	106.439	852.1	1.773
	Third Year			Fourth Year			Median	112.819	480.8	1.880
	15.681	16.3	1.306	12.574	11.2	1.047	Range	43.890+ 144.588	53.7+ 3845.4	0.731+ 2.409
	Fifth Year			Five Year Total						
	9.604	7.7	0.800	106.349	388.7	1.772	Sample Size		8	

greatest total five year growth with a 106.349 absolute change, and a 1.772 average monthly change. The pharmacies with none or one physician within the area had the second highest rate, with a total five year absolute change of 88.441 and a slope of 1.369. Pharmacies with eleven to twenty practicing physicians were third with an absolute change of 86.914 and a slope of 1.448. Pharmacies where prescription orders were received from four to ten, and two or three practicing physicians experienced the lowest total five year growth. The former had a five year absolute change of 64.871 and slope of 1.081; and the latter, a 60.325 absolute change and slope of 1.005.

Excluding the pharmacies with none or one practicing physician, there appears to be a direct relationship between the number of practicing physicians and the pharmacy's total five year growth rate; that is, as the number of practicing physicians increased within this three-quarter mile radius, the growth rate of the pharmacy increased.

Only three pharmacy groups had a decline in growth rate over the entire five year period. There was no constant relationship between the five groups' growth rates on a yearly basis. During the first year, pharmacies with over twenty practicing physicians experienced the greatest growth rate, following in descending order pharmacies with eleven through twenty; four through ten; two or three; and none or one. These first year growth rates support the conclusion that as the number of practicing physicians within a three-quarter

mile radius from whom the pharmacist received prescription orders increased, so did the growth rate of the pharmacy.

During any one year there was no similar growth rate. It may be noted that pharmacies with two or three, and four through ten practicing physicians tended to experience the same yearly growth rate after the first year and for the entire five year period.

Pharmacies where prescription orders were received from two or three, and four through ten practicing physicians obtained their potential during the fourth year, but during the fifth, experienced greater than normal economic growth.

Although the growth rates vary over the five year period, and one group is an exception, it is concluded that, in general, as the number of practicing physicians within a three-quarter mile radius from whom the pharmacist received prescription orders increased, so did the pharmacy's total five year growth rate.

Number of Pharmacies Within the Area

Community pharmacies have been exposed to all kinds of competition over the years, from the pine-board outlets of the past to non-pharmacy competition from the supermarkets and discount houses of today. Competition is not confined to other types of outlets, for pharmacists compete with one another. The success of a new community pharmacy, therefore, depends to a large degree on the kind and intensity of competition.

From the individual replies which gave factors which hindered the new pharmacies' growth, nine out of the sixteen mentioned some form of competition, either from community pharmacies or other type outlets.

To determine the influence competing community pharmacies have on a new pharmacy's growth, each owner was asked to record the number of other community pharmacies located within a three-quarter mile radius. Of the 54 usable returns, only a downtown pharmacy owner failed to answer this question.

Analyses of Pharmacy Data

The mean number of community pharmacies located within this radius for the 53 pharmacies was 3.2, and the median value, 2.0. Ten owners reported having no other community pharmacies within a three-quarter mile radius. The highest number reported was twelve.

The mean number of community pharmacies located within a three-quarter mile radius of a downtown pharmacy was 3.5, and the median value, 2.0. The range was identical to the 53 pharmacies' range. Neighborhood pharmacies had increased competition, with a mean value of 3.6, and a median value of 2.5. The range again was identical to the 53 pharmacies' range. The mean value for shopping center pharmacies was 1.3, and the median value, 1.0. Their upper range limit was reduced to four, and the lower limit remained at zero. Medical center pharmacies had a mean value of 4.7 and a

median value of 4.0. No medical center pharmacy was without other community pharmacy competition: the range reported was from one through nine.

Equation Analyses

The best exponential equation computed for each pharmacy group varied from explaining 54.7% of the total variation for pharmacies with three, four, or five other community pharmacies within the area, to explaining 72.1% of the total variation for pharmacies with one other community pharmacy. The best exponential equation, coefficient of multiple determination, and standard error of estimate for each group are shown in Table XXII (page 102). The identification numbers of the pharmacies which comprised each category are included. Of the five equations, the only similar term is the appearance of a linear X term in each equation. Four of the equations have a second degree X term. Figure M gives a graphic representation of each equation (page 103).

The mathematical data computed from each of these equations, and the data from the pharmacies comprising each group are shown in Table XXIII (pages 104-105).

Pharmacies with six or more other community pharmacies within this radius had the greatest five year growth, with an absolute change of 88.318 and a 1.471 slope. Pharmacies with one other community pharmacy in the area experienced the second highest growth rate, with a five year absolute

Table XXII

PHARMACY GROWTH EQUATIONS BY NUMBER OF COMMUNITY PHARMACIES

Number of Pharmacies	Best Exponential Equation	Coefficient of Multiple Determination	Standard Error of Estimate	Individual Pharmacies in Category
Zero	$Y = 55.745 + 2.455X - 0.037X^2 + 0.00027X^3$	0.671	13.423	7,10,16,22, 28,30,38, 39,50,52
One	$Y = 60.475 + 1.789X - 0.010X^2 - 18.376\ 1/X$	0.721	13.694	3,13,18,34, 35,43,51
Two	$Y = 57.021 + 1.936X - 0.013X^2$	0.607	16.150	2,11,15,17, 21,24,31, 36,40,41, 44,49
Three-Five	$Y = 52.566 + 2.962X - 0.056X^2 + 0.00048X^3$	0.547	17.790	12,14,19, 20,25,26, 27,33,37, 46,53,54
Six or more	$Y = 79.377 + 0.861X - 90.271\ 1/X + 51.261\ 1/X^2$	0.690	13.736	1,4,5,6,9, 23,29,32, 42,45,47, 48

FIGURE M

PHARMACY GROWTH CURVES BY NUMBER OF COMMUNITY PHARMACIES

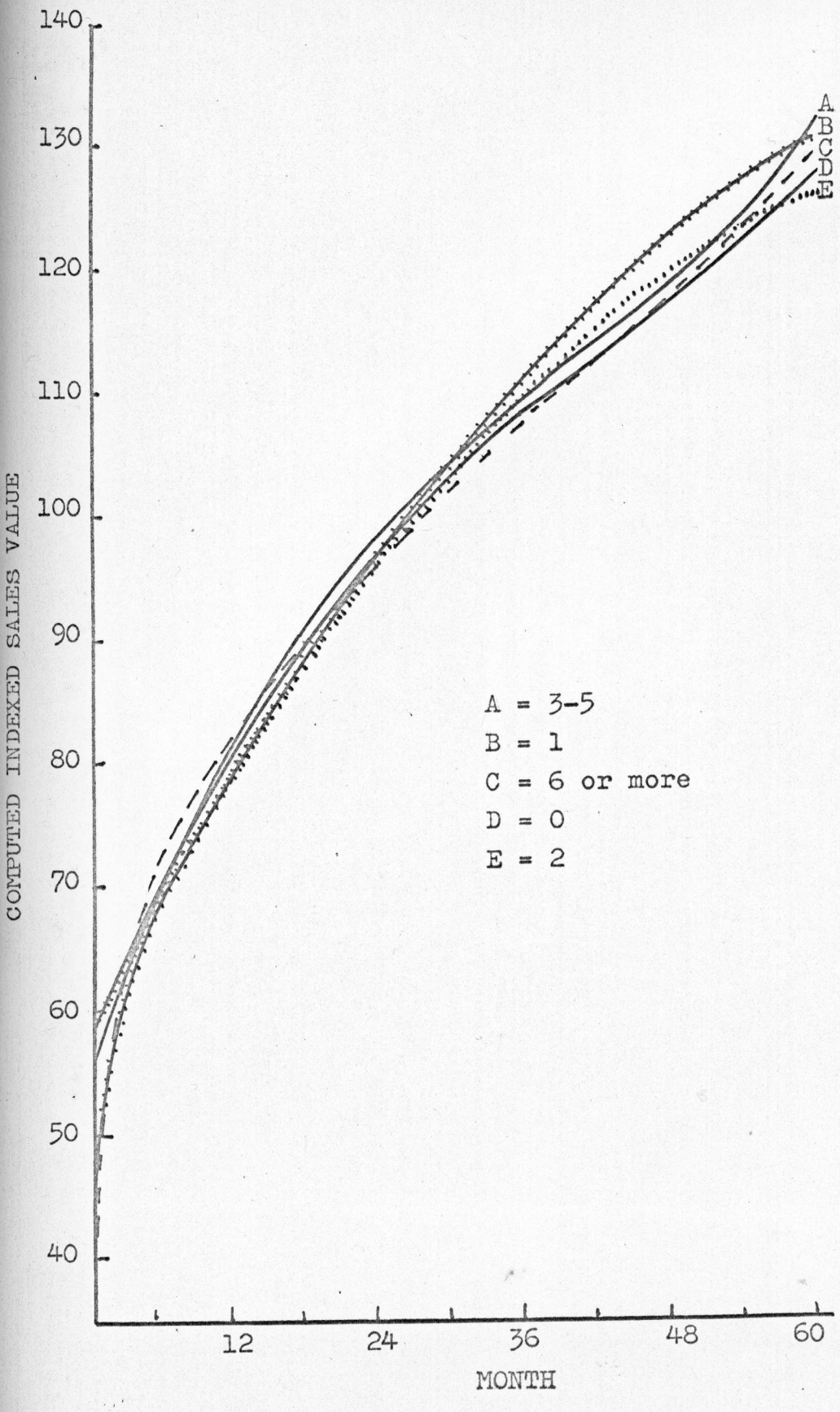

Table XXIII

PHARMACY GROWTH VALUES BY NUMBER OF COMMUNITY PHARMACIES

Number of Pharmacies	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Zero	22.180	38.1	1.848	16.742	20.8	1.395	Mean	66.670	165.1	1.110
	Third Year			Fourth Year			Median	76.233	122.9	1.270
	11.685	12.0	0.973	9.426	8.6	0.785	Range	6.514+ 98.460	6.9+ 403.5	0.108+ 1.641
	Fifth Year			Five Year Total						
	9.969	8.4	0.830	70.002	120.3	1.166	Sample Size		10	
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
One	35.093	79.9	2.924	17.914	22.6	1.492	Mean	90.030	293.5	1.500
	Third Year			Fourth Year			Median	73.128	158.5	1.218
	14.523	14.9	1.210	11.516	10.3	0.959	Range	58.747+ 164.728	93.3+ 856.0	0.979+ 2.745
	Fifth Year			Five Year Total						
	8.584	6.9	0.715	87.630	199.7	1.460	Sample Size		7	
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Two	19.437	32.9	1.619	17.616	22.4	1.468	Mean	78.661	353.7	1.311
	Third Year			Fourth Year			Median	64.486	102.7	1.074
	13.872	14.4	1.156	10.128	9.2	0.844	Range	38.118+ 167.136	49.1+ 2706.6	0.635+ 2.785
	Fifth Year			Five Year Total						
	6.384	5.3	0.532	67.437	114.4	1.123	Sample Size		12	

Table XXIII - Cont.

Number of Pharmacies	Equation Values						Five Year Totals from Individual Pharmacies			
	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Three-Five	25.403	45.7	2.116	17.158	21.2	1.429	Mean	74.644	215.4	1.244
	Third Year			Fourth Year			Median	84.717	159.0	1.703
	10.983	11.2	0.915	9.786	8.9	0.815	Range	-29.871+ 168.976	-27.0+ 603.2	-0.497+ 2.816
	Fifth Year			Five Year Total			Sample Size		12	
	13.564	11.4	1.130	76.894	138.6	1.281				

	First Year			Second Year				Absolute	%	Slope
	Absolute	%	Slope	Absolute	%	Slope				
Six or more	41.314	100.2	3.442	13.826	16.7	1.152	Mean	86.090	663.5	1.434
	Third Year			Fourth Year			Median	91.594	400.3	1.526
	11.537	11.9	0.961	10.941	10.1	0.911	Range	30.024+ 144.588	32.4+ 3845.4	0.500+ 2.409
	Fifth Year			Five Year Total			Sample Size		12	
	10.700	9.0	0.891	88.318	214.2	1.471				

change of 87.630 and a slope of 1.460. Pharmacies with three through five other community pharmacies were third, with an absolute change of 76.894 and a slope of 1.281. Pharmacies which had no other community pharmacy competition, and ones with two other community pharmacies within this radius had the lowest growth rate. The former had an absolute five year change of 70.002 and slope of 1.166; and the latter, a 67.437 absolute change and slope of 1.123. Over the total five years, there appeared to be no definite relationship between the growth rates and the number of other community pharmacies within the area. Although the five year absolute change and slope varied slightly among the different groups of pharmacies, it is concluded that, in general, all groups of pharmacies experienced approximately the same growth rate over the entire five year period.

Based on the median criterion value, it is concluded that pharmacies with two other community pharmacies within this radius obtained their potential during the fifth year, whereas the other four groups had not obtained their full potential at the end of this year.

Although no definite relationship seemed to prevail among the five groups of pharmacies on a yearly basis, it was shown that, in general, the yearly growth rates after the first year were similar. From these analyses it can be concluded that, although competition plays an important role in determining success, the number of other community

pharmacies within the area had comparatively little influence on the new pharmacies' growth rates.

The total number of pharmacies and the number in each of the 29 groups which had obtained their potential during each of the five years and the cumulative percentage for each year are shown in Table XXIV (pages 108-109). These results are based on comparing each pharmacy's yearly growth to the median criterion value of 0.568.

Other Growth Influences

Many other factors not considered in this study, such as managerial ability, operating policies, and financial control, have a marked influence on a new pharmacy's growth. Further, of the thirty-two pharmacy owners who mentioned factors which helped their growth, sixteen mentioned nearness to prescribers' office or number of physicians in the area; nine, personal service; four, location; and four, professional promotion to and consultation with both customers and medical personnel. Each of the following factors were mentioned three times: population growth, delivery and charge service, and creating a professional image. Adequate parking and institutional advertising each were mentioned twice. Only one respondent cited price competition as a key to success. One pharmacy owner summed up his reply with the following statement--"You must know the area, the people, get to know the doctors and other health people in the area, and above all know what you want."

Table XXIV

NUMBER OF PHARMACIES WHICH OBTAINED THEIR POTENTIAL FOR EACH YEAR

AND CUMULATIVE PERCENTAGE BY YEAR

Classification	Number of Pharmacies	Year 1st	2nd	3rd	4th	5th	Cumulative Percentage by Year 1st	2nd	3rd	4th	5th
All Pharmacies	54	8	4	9	10	6	14.8	22.2	38.9	57.4	68.5
Type of Location											
Downtown	12	1	1	1	3	5	8.3	16.7	25.0	50.0	91.7
Neighborhood	16	4	1	4	2	-	25.0	31.3	56.3	68.8	68.8
Shopping Center	13	1	-	3	3	-	7.7	7.7	30.8	53.8	53.8
Medical Center	13	2	2	1	2	1	15.4	30.8	38.5	53.8	61.5
Community Size											
Under 10,000	12	2	1	2	3	1	16.7	25.0	41.7	66.7	75.0
10,000-49,999	20	5	1	3	4	3	25.0	30.0	45.0	65.0	80.0
50,000-250,000	10	-	1	2	-	1	--	10.0	30.0	30.0	40.0
Over 250,000	12	1	1	2	3	1	8.3	16.7	33.3	58.3	66.7
Prescription versus Traditional											
Prescription	17	2	3	1	2	3	11.8	29.4	35.3	47.1	64.7
Traditional	35	5	1	8	8	3	14.3	17.1	40.0	62.9	71.4
Chain versus Independent											
Chain	5	1	-	-	2	-	20.0	20.0	20.0	60.0	60.0
Independent	36	5	2	8	6	5	13.9	19.4	41.7	58.3	72.2

Table XXIV - Cont.

Classification	Number of Pharmacies	Year 1st	2nd	3rd	4th	5th	Cumulative Percentage by Year 1st	2nd	3rd	4th	5th
Agency versus Nonagency											
Agency	7	-	1	1	1	1	--	14.3	28.6	42.9	57.1
Nonagency	29	5	1	7	5	4	17.2	20.7	44.8	62.1	75.9
Pharmacy Size											
Under 500 sq. ft.	10	1	3	-	2	1	10.0	40.0	40.0	60.0	70.0
500-999 sq. ft.	12	2	1	2	-	1	16.6	25.0	41.7	41.7	50.0
1,000-1,999 sq. ft.	16	2	-	5	5	4	12.5	12.5	43.8	75.0	100.0
2,000-5,000 sq. ft.	13	2	-	2	2	-	15.4	15.4	30.8	46.2	46.2
Over 5,000 sq. ft.	3	1	-	-	1	-	33.3	33.3	33.3	66.6	66.6
Number of Physicians in Area											
0-1	11	2	-	2	1	-	18.2	18.2	36.4	45.5	45.5
2-3	15	3	1	3	4	2	20.0	26.7	46.7	73.3	86.7
4-10	12	2	1	2	4	2	16.7	25.0	41.7	75.0	91.7
11-20	8	1	1	1	-	1	12.5	25.0	37.5	37.5	50.0
Over 20	8	-	1	1	1	1	--	12.5	25.0	37.5	50.0
Number of Community Pharmacies in Area											
0	10	3	-	2	2	1	30.0	30.0	50.0	70.0	80.0
1	7	-	-	-	2	1	--	--	--	28.6	42.9
2	12	1	1	4	1	1	8.3	16.7	50.0	58.3	66.7
3-5	12	3	1	1	2	1	25.0	33.3	41.7	58.3	66.6
6 or more	12	1	2	2	2	2	8.3	25.0	41.7	58.3	75.0

Of the sixteen owners who mentioned factors which hindered their growth, five mentioned dispensing physicians within the area, and four, "competition." The following respondents were more specific--four cited discount houses, and two, union pharmacy competition. The following factors were cited once: slow development of the shopping center, supermarket promotion, poor location, low income area, and lack of professional promotion to physicians.

Chapter IV

SUMMARY

The 54 pharmacies experienced a wide range of growth, from an actual decline over the five year period to more than a 3,845% increase. It was concluded that twenty-one pharmacies had obtained their potential by the end of the third year, thirty-one by the end of the fourth, and thirty-seven by the end of the fifth. On a percentage basis this is 38.9%, 57.4% and 68.5%, respectively.

As a group, all 54 pharmacies had more than a 150% increase in growth over the total five year period. Each year they had an increase in absolute growth, but excluding the fifth year, at a decreasing rate. Based on the previous conclusion and the growth rate experienced for all 54 pharmacies taken together, the expectation that a pharmacy tends to obtain its potential within the third or fourth year was not supported.

Medical center pharmacies experienced the greatest growth over the entire five year period, followed in descending order by shopping center, downtown, and neighborhood pharmacies. The latter two's lower rates were anticipated since their trading areas are more likely to be well-established and comparatively stable. Each group of pharmacies experienced yearly declines in growth rate over the five year period, but to varying degrees.

Medical center pharmacies had the lowest initial sales value. This and their high growth rate were attributed to the condition that such pharmacies are generally one of the first occupants of the center. Therefore, as the number of prescribing practitioners and their practices increase, so does the pharmacy's economic growth.

The low growth rate of shopping center pharmacies during the first year was attributed to the fact that, generally, a center is built in a developing residential area, and as the area grows, so does the pharmacy's economic growth. This premise was supported, for shopping center pharmacies had a higher growth rate during the second and third years than did the other groups of pharmacies.

Based on the median criterion value, it was concluded that by the end of the fifth year, both downtown and shopping center pharmacies had obtained their potential, whereas the other two groups still were experiencing greater than normal economic growth.

Pharmacies in communities of 50,000 to 250,000 population had the greatest growth over the entire five year period. Following in descending order were pharmacies in cities of 10,000 to 49,999; under 10,000; and over 250,000 population. The low growth rate of small town pharmacies was attributed to the communities' probably rather fixed potential and distinct trading area. The low growth rate of pharmacies located in cities of over 250,000 population was attributed to a high level of competition from other

outlets. Each group experienced yearly declines in growth rate, but to varying degrees. Pharmacies located in communities of 10,000 to 49,999, and 50,000 to 250,000 population experienced greater yearly growth for each year than did the other two groups of pharmacies, with one exception during the fifth year. The group of pharmacies in communities of 10,000 to 49,999, and over 250,000 population obtained their potential in the fifth year.

The mean percentage of prescription volume to total volume for 47 pharmacies was 50.5%. Twenty-nine of these pharmacies had an increasing percentage of prescription volume to total volume over the five year period; seven, a decreasing; and eleven, a constant percentage. The mean value for twelve downtown pharmacies was 39.3%; thirteen neighborhood, 41.0%; nine shopping center, 22.6%; and thirteen medical center, 89.7%.

The prescription pharmacy group had the greatest growth rate over the entire five year period and yearly, except for the second year. This was attributed to the observation that thirteen of the seventeen prescription pharmacies were medical center pharmacies. At the end of the fifth year, neither the prescription nor traditional pharmacy group had obtained their full potential, as evidenced by their monthly slope values exceeding the median criterion value.

When independent pharmacies were compared with chain pharmacies, the former group had the greatest five year

growth. Neither group had a yearly declining growth rate over the entire five year period. The group of chain pharmacies had the highest initial sales value, lower five year growth rate, and had reached their potential at the end of the fifth year.

The agency pharmacy group experienced a greater growth rate over the entire five year period and for each year, except for the fifth, than did the nonagency group of pharmacies. The agency pharmacies' growth rate declined over the entire five year period, whereas nonagency pharmacies declined only over the first four. Agency pharmacies started with a lower initial sales value, but by the end of the fifth year had surpassed the nonagency pharmacy group by 3.5 indexed sales units. Both groups exceeded the median criterion value for each year, and therefore, neither had obtained their full potential by the end of the fifth year. Agency pharmacies' slope value during the fifth year, however, was only 0.062 indexed sales units above this median value.

The median pharmacy size for all 54 pharmacies was 1,200 sq. ft.* The median value for downtown pharmacies was 1,150 sq. ft.; neighborhood pharmacies, 1,400 sq. ft.; shopping center, 3,100 sq. ft.; and for medical centers, 200 sq. ft.

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* A median value was determined for an even group of values by averaging the two middle values.

The pharmacies with 500 to 999 sq. ft. had the largest five year growth. Following in declining order were pharmacies of under 500 sq. ft.; 1,000 to 1,999 sq. ft.; over 5,000 sq. ft.; and 2,000 to 5,000 sq. ft. No definite relationship between pharmacy size and yearly or total five year growth was shown. Based on the median criterion value, it was concluded that the pharmacy group of 2,000 to 5,000 and over 5,000 sq. ft. obtained their potential during the fifth year, and the pharmacy group of 1,000 to 1,999 sq. ft., during the fourth year. The two smaller pharmacy groups (under 500 and 500 to 999 sq. ft.) had not obtained their full economic potential by the end of the fifth year.

The median number of practicing physicians within a three-quarter mile radius from whom the 54 pharmacists received prescription orders was 4.5. The median value for pharmacists in a downtown location was 2.5; neighborhood, 3.0; shopping center, 4.0; and medical center, 14.0. Pharmacies where prescription orders were received from over twenty practicing physicians within this radius experienced the greatest five year growth. Following in declining order were pharmacies with none or one; eleven to twenty; four to ten; and two or three practicing physicians.

Excluding those pharmacies with none or one practicing physician, a direct relationship between the number of practicing physicians and the pharmacy's total five year growth rate was evident. During the first year all groups of pharmacies adhered to this direct relationship.

Pharmacies with two or three, and four to ten practicing physicians from whom the pharmacist received prescription orders tended to experience the same yearly growth rate after the first year and for the entire five year period. These pharmacies obtained their potential during the fourth year, yet during the fifth year experienced greater than normal economic growth.

The median number of community pharmacies located within a three-quarter mile radius for 53 pharmacies was 2.0. Ten owners reported having no other community pharmacies within this distance. The median value for eleven downtown pharmacies was 2.0. Neighborhood pharmacies' median value was 2.5; whereas shopping center and medical center pharmacies' values were 1.0 and 4.0, respectively.

Pharmacies with six or more other community pharmacies within this radius had the greatest five year growth. Pharmacies with one, three to five, no other, and two other community pharmacies followed in declining order. Over the total five year period there was no definite relationship between a pharmacy group's growth rate and the number of other community pharmacies within the radius.

Although pharmacies with six or more, and one other community pharmacy experienced the lowest initial sales values, at the end of the fifth year all groups had similar sales values, and the range between the two extremes was only about six indexed sales units. Pharmacies with two other community pharmacies within this distance obtained

their potential during the fifth year, whereas the other four groups of pharmacies had not obtained their full potential at the end of this year. Since these five groups of pharmacies had approximately the same growth rate over the entire five year period, the number of other community pharmacies within this distance apparently had little influence on the new pharmacies' growth rates.

THE UNIVERSITY OF WISCONSIN
MADISON 6

OL OF PHARMACY

Appendix A October 2, 1965

SAMPLE OF INITIAL MAILING

Dear Mr.

Your help is needed to determine the growth patterns of successful pharmacies originally opened in Wisconsin during the last ten years. [Name of pharmacy] is included in this research project as one of these successful pharmacies.

This study will determine both community pharmacies' growth cycles and how variables such as type of location, size of pharmacy, and number of practicing physicians influence these cycles. Your experience is requested since only a small number of successful pharmacies opened during this period and a high return is needed for statistical analysis.

The information is for research purposes only, and will be used only in combination with similar data. It will be held confidential; at no time will your name, the pharmacy's name or address, or any other individual information be revealed.

The requested sales data will be converted to index numbers and used to compute growth curves. The short questionnaire is necessary to determine what, if any, common variables affect pharmacies' growth patterns.

We will send you an individual comparative analysis of [name of pharmacy] growth pattern upon completion of this study.

Please take a few minutes this week to send your data in the self-addressed envelope. Your cooperation is necessary for this study's success.

Sincerely,

Ronald L. Taylor

Ron Taylor, who graduated from Ohio State University College of Pharmacy and is a registered pharmacist, is one of our graduate students in pharmacy administration. The requested data are for his master's research project.

R. W. Hammel
Assoc. Professor of
Pharmacy Administration

Encl. (3)

Please reply on the basis of the first sixty complete calendar months the pharmacy was open.

1. On what date did the pharmacy open? _____

2. Was _____ an agency outlet during this time?

   Yes _____ No _____

   If yes, please specify:

   Rexall _____

   Walgreen _____

   Other _____
   (please specify)

3. What was the pharmacy's approximate total floor space, excluding storage space?

   _____ Square Feet

4. During this first five year period, did the pharmacy change location?

   Yes _____ No _____

   If yes, please specify:

   Date of change _____

   Distance involved, in miles or parts of miles _____

5. Which type of location best describes the pharmacy?

   Downtown _____(located in the central business district, usually one of the oldest parts of the community)

   Neighborhood _____(located in a predominately residential area, either by itself or with several other outlets)

   Shopping Center _____(located in an area developed according to an overall plan, under unified ownership or control, and with planned free parking)

   Other _____
   (please describe)

6. How many physicians from whom you received prescription orders practiced within a 3/4 mile radius of the pharmacy?

_____

7. How many other pharmacies (nonhospital) were located within a 3/4 mile radius of the pharmacy?

_____

8. What was the percentage of prescription volume to total sales volume for each of these five years?

	Percentage
1st year	_____
2nd year	_____
3rd year	_____
4th year	_____
5th year	_____

9. What events or factors do you believe influenced--either helped or hindered--the pharmacy's growth?

Please record total monthly sales figures (including customer charges) for the first sixty complete calendar months that the pharmacy was open. Please round total sales to the nearest $100.

First Yr.	Total Sales	Third Yr.	Total Sales	Fifth Yr.	Total Sales
1st mo.		25th mo.		49th mo.	
2nd mo.		26th mo.		50th mo.	
3rd mo.		27th mo.		51st mo.	
4th mo.		28th mo.		52nd mo.	
5th mo.		29th mo.		53rd mo.	
6th mo.		30th mo.		54th mo.	
7th mo.		31st mo.		55th mo.	
8th mo.		32nd mo.		56th mo.	
9th mo.		33rd mo.		57th mo.	
10th mo.		34th mo.		58th mo.	
11th mo.		35th mo.		59th mo.	
12th mo.		36th mo.		60th mo.	

Second Yr.	Total Sales	Fourth Yr.	Total Sales
13th mo.		37th mo.	
14th mo.		38th mo.	
15th mo.		39th mo.	
16th mo.		40th mo.	
17th mo.		41st mo.	
18th mo.		42nd mo.	
19th mo.		43rd mo.	
20th mo.		44th mo.	
21st mo.		45th mo.	
22nd mo.		46th mo.	
23rd mo.		47th mo.	
24th mo.		48th mo.	

Thank you. Your help is appreciated!

THE UNIVERSITY OF WISCONSIN
MADISON 6

OOL OF PHARMACY

Appendix B October 16, 1965

SAMPLE OF FIRST FOLLOW-UP MAILING

Dear Mr.

Recently you received a letter requesting your help in a research project to determine the growth patterns of successful pharmacies originally opened in Wisconsin during the last ten years. Requested data have been received from a number of other pharmacists.

In the first letter we stated that the information would be held confidential and that monthly sales data would be indexed. If you would prefer sending indexed sales figures rather than your actual sales figures, please do so. Indexing involves simply dividing one number by another like the examples on the following sheet.

Please take a few minutes this week to send your data in the self-addressed envelope. Call Dr. R. W. Hammel, 262-2890, if you have any questions about the study. Your cooperation is necessary for this study's success.

Sincerely,

Ronald L. Taylor

Encls.

Please record indexed monthly sales figures, including customer charges, for the first sixty complete calendar months the pharmacy was open. To index the actual sales data, take the first month's figure as 100. Divide each of the other monthly figures, rounded to the nearest $100, by the first month's sales.* (If you prefer, we will convert your data to index form).

First Yr.	Index Value	Third Yr.	Index Value	Fifth Yr.	Index Value
1st mo.	_____	25th mo.	_____	49th mo.	_____
2nd mo.	_____	26th mo.	_____	50th mo.	_____
3rd mo.	_____	27th mo.	_____	51st mo.	_____
4th mo.	_____	28th mo.	_____	52nd mo.	_____
5th mo.	_____	29th mo.	_____	53rd mo.	_____
6th mo.	_____	30th mo.	_____	54th mo.	_____
7th mo.	_____	31st mo.	_____	55th mo.	_____
8th mo.	_____	32nd mo.	_____	56th mo.	_____
9th mo.	_____	33rd mo.	_____	57th mo.	_____
10th mo.	_____	34th mo.	_____	58th mo.	_____
11th mo.	_____	35th mo.	_____	59th mo.	_____
12th mo.	_____	36th mo.	_____	60th mo.	_____

Second Yr.	Index Value	Fourth Yr.	Index Value
13th mo.	_____	37th mo.	_____
14th mo.	_____	38th mo.	_____
15th mo.	_____	39th mo.	_____
16th mo.	_____	40th mo.	_____
17th mo.	_____	41st mo.	_____
18th mo.	_____	42nd mo.	_____
19th mo.	_____	43rd mo.	_____
20th mo.	_____	44th mo.	_____
21st mo.	_____	45th mo.	_____
22nd mo.	_____	46th mo.	_____
23rd mo.	_____	47th mo.	_____
24th mo.	_____	48th mo.	_____

*Sample Calculation

	Actual Sales	Index Value
1st mo.	$8,000	100
2nd mo.	$8,600*	107.5
3rd mo.	$9,000**	112.5

*$\frac{\$8,600}{\$8,000}$ X 100 = 107.5

**$\frac{\$9,000}{\$8,000}$ X 100 = 112.5

Please reply on the basis of the first sixty complete calendar months the pharmacy was open.

1. On what date did the pharmacy open? _____

2. Was _____ an agency outlet during this time?

   Yes _____ No _____

   If yes, please specify:

   Rexall _____

   Walgreen _____

   Other _____
   (please specify)

3. What was the pharmacy's approximate total floor space, excluding storage space?

   _____ Square Feet

4. During this first five year period, did the pharmacy change location?

   Yes _____ No _____

   If yes, please specify:

   Date of change _____

   Distance involved, in miles or parts of miles _____

5. Which type of location best describes the pharmacy?

   Downtown _____(located in the central business district, usually one of the oldest parts of the community)

   Neighborhood _____(located in a predominately residential area, either by itself or with several other outlets)

   Shopping Center _____(located in an area developed according to an overall plan, under unified ownership or control, and with planned free parking)

   Other _____
   (please describe)

6. How many physicians from whom you received prescription orders practiced within a 3/4 mile radius of the pharmacy? (Please indicate any change that occurred during this period).

_____

7. How many other pharmacies (nonhospital) were located within a 3/4 mile radius of the pharmacy? (Please indicate any change that occurred during this period).

_____

8. What was the percentage of prescription volume to total sales volume for each of these five years? (If data are not available, please estimate).

	Percentage
1st year	_____
2nd year	_____
3rd year	_____
4th year	_____
5th year	_____

9. What events or factors do you believe influenced--either a) helped or b) hindered--the pharmacy's growth?

Thank you. Your help is appreciated!

THE UNIVERSITY OF WISCONSIN
MADISON 6

OL OF PHARMACY

Appendix C October 30, 1965

SAMPLE OF SECOND FOLLOW-UP COVER LETTER

Dear Mr.

Your help recently was requested for the satisfactory completion of an academic research project. At the present time we have not received your data, and need your help.

Please send the requested monthly figures as either indexed or actual sales. Indexing involves simply dividing one number by another like the example on the following sheet. All data will be indexed, regardless of how the forms are completed.

Write or call Dr. R. W. Hammel, 262-2890, if you have any questions about this study. Your cooperation is necessary for the project's success.

Sincerely,

Ronald L. Taylor

Encls.

THE UNIVERSITY OF WISCONSIN
MADISON 6

OOL OF PHARMACY

Appendix D October 12, 1965

SAMPLE OF INITIAL CHAIN PHARMACY MAILING

Dear Mr.

Your help is needed to determine the growth patterns of successful pharmacies originally opened in Wisconsin during the last ten years. [Name of pharmacy] is included in this research project as one of these successful pharmacies.

This study will determine both community pharmacies' growth cycles and how variables such as type of location, size of pharmacy, and number of practicing physicians influence these cycles. Your cooperation is necessary due to the small number of successful pharmacies opened during this period and the need for a high return for statistical analysis.

The information is for research purposes only, and will be used only in combination with similar data. It will be held confidential; at no time will the pharmacy's name or address, or any other individual information be revealed.

The requested indexed sales data will be used to compute growth curves. The short questionnaire is necessary to determine what, if any, common variables affect pharmacies' growth patterns.

We will send you an individual comparative analysis of [name of pharmacy] growth pattern upon completion of this study.

Please send the requested data in the self-addressed envelope. Call Dr. R. W. Hammel, 262-2890, if you have any questions about the study. Your cooperation is necessary for this study's success.

Sincerely,

Ronald L. Taylor

Ron Taylor, who graduated from Ohio State University College of Pharmacy and is a registered pharmacist, is one of our graduate students in pharmacy administration. The requested data are for his master's research project.

R. W. Hammel
Assoc. Professor of
Pharmacy Administration

Encl. (3)

Please record indexed monthly sales figures, including customer charges, for the first sixty complete calendar months the pharmacy was open. To index the actual sales data, take the first month's figure as 100. Divide each of the other monthly figures, rounded to the nearest $100, by the first month's sales. (If you prefer, we will convert your data to index form).

First Yr.	Index Value	Third Yr.	Index Value	Fifth Yr.	Index Value
1st mo.	_____	25th mo.	_____	49th mo.	_____
2nd mo.	_____	26th mo.	_____	50th mo.	_____
3rd mo.	_____	27th mo.	_____	51st mo.	_____
4th mo.	_____	28th mo.	_____	52nd mo.	_____
5th mo.	_____	29th mo.	_____	53rd mo.	_____
6th mo.	_____	30th mo.	_____	54th mo.	_____
7th mo.	_____	31st mo.	_____	55th mo.	_____
8th mo.	_____	32nd mo.	_____	56th mo.	_____
9th mo.	_____	33rd mo.	_____	57th mo.	_____
10th mo.	_____	34th mo.	_____	58th mo.	_____
11th mo.	_____	35th mo.	_____	59th mo.	_____
12th mo.	_____	36th mo.	_____	60th mo.	_____

Second Yr.	Index Value	Fourth Yr.	Index Value
13th mo.	_____	37th mo.	_____
14th mo.	_____	38th mo.	_____
15th mo.	_____	39th mo.	_____
16th mo.	_____	40th mo.	_____
17th mo.	_____	41st mo.	_____
18th mo.	_____	42nd mo.	_____
19th mo.	_____	43rd mo.	_____
20th mo.	_____	44th mo.	_____
21st mo.	_____	45th mo.	_____
22nd mo.	_____	46th mo.	_____
23rd mo.	_____	47th mo.	_____
24th mo.	_____	48th mo.	_____

Please reply on the basis of the first sixty complete calendar months the pharmacy was open.

1. On what date did the pharmacy open? _____

2. What was the pharmacy's approximate total floor space, excluding storage space?

_____ Square Feet

3. During this first five year period, did the pharmacy change location?

Yes _____ No _____

If yes, please specify:

Date of change _____

Distance involved, in miles or parts of miles _____

4. Which type of location best describes the pharmacy?

Downtown _____(located in the central business district, usually one of the oldest parts of the community)

Neighborhood _____(located in a predominately residential area, either by itself or with several other outlets)

Shopping Center _____(located in an area developed according to an overall plan, under unified ownership or control, and with planned free parking)

Other _____
(please describe)

5. How many physicians from whom you received prescription orders practiced within a 3/4 mile radius of the pharmacy? (Please indicate any change that occurred during this period).

_____

6. How many other pharmacies (nonhospital) were located within a 3/4 mile radius of the pharmacy? (Please indicate any change that occurred during this period).

_____

7. What was the percentage of prescription volume to total sales volume for each of these five years? (If data are not available, please estimate).

	Percentage
1st year	_____
2nd year	_____
3rd year	_____
4th year	_____
5th year	_____

8. What events or factors do you believe influenced--either a) helped or b) hindered--the pharmacy's growth?

Thank you. Your help is appreciated!

Appendix E

EXPLANATION OF TWELVE MONTH CENTERED MOVING AVERAGE TECHNIQUE

"A 12-month moving average is a series of averages which embraces, first, the first 12 months of a series; next, the second to thirteenth months; then the third to fourteenth months; and so on"[1] until all 60 months' indexed sales are averaged. Each twelve month moving average falls between a pair of months, and since our original indexed data were considered centered at the middle of each month, it was necessary to adjust or center the data. This was accomplished by using a two-month moving average, that is, each of the computed twelve-month moving averages was centered by using this technique.

The next step in computing the seasonal index consisted of expressing each originally indexed sales value as a percentage of the corresponding centered indexed moving average. This step is noted on the sample output sheet as a ratio to moving average (Appendix F, page 133). The logic of this step is that since a twelve-month centered moving average is a rough estimate of the trend and cyclical component of a time series, if we divide the monthly indexed value by its

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1. Frederick E. Croxton and Dudley J. Cowden, Applied General Statistics, 2nd edition, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1955, p. 328.

twelve-month centered moving average, we will obtain an estimate of the seasonal and irregular movements combined.

These 48 ratios (four for each month) were then averaged to obtain the monthly seasonal index for each month. This step is noted on the sample output sheet as monthly indices. The second row under this heading was used in the next step, where the indexed sales values were divided by the corresponding monthly seasonal index to obtain that month's deseasonalized value for that particular pharmacy.

SAMPLE OF INDE

I

ORIG INPUT

1	.22000E 04	2	.35000E 04	3	.38000E 04	4	.39000E 04	5	.42000E 04	6	.49000E 04												
7	.55000E 04	8	.62000E 04	9	.76000E 04	10	.68000E 04	11	.70000E 04	12	.78000E 04												
13	.72000E 04	14	.67000E 04	15	.59000E 04	16	.65000E 04	17	.63000E 04	18	.71000E 04												
19	.74000E 04	20	.83000E 04	21	.87000E 04	22	.83000E 04	23	.84000E 04	24	.88000E 04												
25	.82000E 04	26	.91000E 04	27	.85000E 04	28	.80000E 04	29	.73000E 04	30	.71000E 04												
31	.79000E 04	32	.80000E 04	33	.85000E 04	34	.84000E 04	35	.85000E 04	36	.10400E 05												
37	.88000E 04	38	.98000E 04	39	.86000E 04	40	.81000E 04	41	.80000E 04	42	.81000E 04												
43	.91000E 04	44	.98000E 04	45	.10100E 05	46	.85000E 04	47	.94000E 04	48	.10200E 05												
49	.95000E 04	50	.84000E 04	51	.88000E 04	52	.87000E 04	53	.85000E 04	54	.82000E 04												
55	.95000E 04	56	.88000E 04	57	.10200E 05	58	.82000E 04	59	.10000E 05	60	.11000E 05												

INDEXED TO AVE 7853.333300

1	28.01	2	44.56	3	48.38	4	49.66	5	53.48	6	62.39	7	70.03	8	78.94	9	96.77	10	86.58	11	89.13	12	99.32
13	91.68	14	85.31	15	75.12	16	82.76	17	80.22	18	90.40	19	94.22	20	105.68	21	110.78	22	105.68	23	106.96	24	112.05
25	104.41	26	115.87	27	108.23	28	101.86	29	92.95	30	90.40	31	100.59	32	101.86	33	108.23	34	106.96	35	108.23	36	132.42
37	112.05	38	124.78	39	109.50	40	103.14	41	101.86	42	103.14	43	115.87	44	124.78	45	128.60	46	108.23	47	119.69	48	129.88
49	120.96	50	106.96	51	112.05	52	110.78	53	108.23	54	104.41	55	120.96	56	112.05	57	129.88	58	104.41	59	127.33	60	140.06

RATIO TO MOVING AVE

1	.0000	2	.0000	3	.0000	4	.0000	5	.0000	6	.0000	7	1.0099	8	1.0813	9	1.2782	10	1.1041	11	1.0973	12	1.1810
13	1.0549	14	.9509	15	.8218	16	.8934	17	.8494	18	.9456	19	.9731	20	1.0698	21	1.0983	22	1.0321	23	1.0359	24	1.0764
25	.9959	26	1.1008	27	1.0287	28	.9687	29	.8742	30	.8418	31	.9294	32	.9361	33	.9990	34	.9892	35	.9970	36	1.2034
37	.9995	38	1.0924	39	.9494	40	.8901	41	.8683	42	.8760	43	.9900	44	1.0729	45	1.1103	46	.9323	47	1.0282	48	1.1076
49	1.0265	50	.9072	51	.9569	52	.9477	53	.9131	54	.9162	55	.0000	56	.0000	57	.0000	58	.0000	59	.0000	60	.0000

MONTHLY INDICES

1	1.0192	2	1.0128	3	.9392	4	.9250	5	.8763	6	.8949	7	.9756	8	1.0400	9	1.1214	10	1.0144	11	1.0396	12	1.1421
1	1.0191	2	1.0127	3	.9391	4	.9249	5	.8762	6	.8948	7	.9755	8	1.0399	9	1.1213	10	1.0143	11	1.0395	12	1.1420

DE-SEAS DATA

1	27.48	2	44.00	3	51.52	4	53.69	5	61.03	6	69.72	7	71.78	8	75.91	9	86.29	10	85.36	11	85.74	12	86.96
13	89.95	14	84.23	15	79.99	16	89.48	17	91.55	18	101.02	19	96.58	20	101.62	21	98.78	22	104.18	23	102.89	24	98.11
25	102.45	26	114.41	27	115.24	28	110.13	29	106.08	30	101.02	31	103.11	32	97.95	33	96.51	34	105.44	35	104.11	36	115.95
37	109.94	38	123.21	39	116.60	40	111.51	41	116.25	42	115.25	43	118.77	44	119.98	45	114.68	46	106.70	47	115.13	48	113.72
49	118.69	50	105.61	51	119.31	52	119.77	53	123.52	54	116.68	55	124.00	56	107.74	57	115.82	58	102.93	59	122.48	60	122.64

DATE 66052

RON TAYLOR- MONTHLY SALES EQUATIONS

STORE NO 04

EXPONENTIAL

9

STEP 4, 5 VARIABLES, 60 OBSERVATIONS, 55 DEGREES OF FREEDOM

VARIABLE 1, M. SALES IS THE DEPENDENT, VARIABLE CHANGED 6, F-LEVEL 5.201

		UNBIASED
COEFFICIENT OF MULTIPLE CORRELATION	.962	.959
COEFFICIENT OF MULTIPLE DETERMINATION	.926	.921

CONSTANT TERM
79.87423431

STANDARD ERROR OF ESTIMATE
5.91731653

VARIABLE NAME-NUMBER-ORDER			COEFFICIENT OF VARIABLE	STD. ERROR OF COEFFICIENT	T-VALUE	PARTIAL CORREL.	STANDARD COEF.	REMAINING VARIANCE	NORMAL COVARIANCE
M. SALES	1	0						.07342	.07342
TIME-1ST	2	1	1.440269	.353502	4.0742	.4814	1.1929		
TIME-2ND	3	3	-.013320	.004609	-2.8899	-.3630	-.6943		
TIME-3RD	4	0						.00153	.00080
TIME-1/1ST	5	2	-120.256471	33.408771	-3.5995	-.4366	-.8346		
TIME-1/2ND	6	4	67.139626	29.169328	2.3017	.2964	.4223		

RON TAYLOR- LOG MONTHLY SALES EQUATIONS
STORE NO 04
LOG

STEP 3, 4 VARIABLES, 59 OBSERVATIONS, 55 DEGREES OF FREEDOM

VARIABLE 1, M. LOG S. IS THE DEPENDENT, VARIABLE CHANGED 4, F-LEVEL 30.924

		UNBIASED
COEFFICIENT OF MULTIPLE CORRELATION	.951	.948
COEFFICIENT OF MULTIPLE DETERMINATION	.904	.899

CONSTANT TERM 3.82764408

STANDARD ERROR OF ESTIMATE .07097995

VARIABLE NAME-NUMBER-ORDER			COEFFICIENT OF VARIABLE	STD. ERROR OF COEFFICIENT	T-VALUE	PARTIAL CORREL.	STANDARD COEF.	REMAINING VARIANCE	NORMAL COVARIANCE
M. LOG S.	1	0						.09511	.09511
TIME-1ST	2	1	.066009	.006075	10.8653	.8259	5.0585		
TIME-2ND	3	2	-.001630	.000224	-7.2558	-.6993	-7.9770		
27.4871	4	3	1.3388E-05	2.3856E-06	5.6121	.6034	3.7906		

Appendix I

CRITERION FOR DETERMINING POTENTIAL

Year	Average Sales per Pharmacy	Yearly Indexed Value	Yearly Indexed Change	Monthly Indexed Change
1955	$ 98,150	69.36	--	--
1956	102,142	77.12	7.76	0.647
1957	121,201	85.64	8.52	0.710
1958	123,184	87.05	1.41	0.118
1959	132,831	93.86	6.81	0.568
1960	142,460	100.67	6.81	0.568
1961	147,530	104.25	3.58	0.298
1962	157,670	111.42	7.17	0.598
1963	164,210	116.04	4.62	0.385
1964	173,490	122.59	6.55	0.546
1965	186,735	131.95	9.36	0.780
	$1,556,603			5.218
Mean	$ 141,509			0.522
Median				0.568

The yearly indexed values were based on the mean of the total sales values. This was done so that this indexing would be similar to the indexing of the individual pharmacy's data in the study. The median value was selected as more representative because of the two low values for 1958 and 1961, and the high value for 1965.

The average total sales values for 1960 through 1965 were obtained from Robert A. Leibson, "12.7% Rise in Rx Volume Won by Independents," Drug Topics, 110:6 (March 21, 1966) p. 41;

and Dr. Paul C. Olsen, "Drug Store Sales Reach New High of $9.2 Billion in 1964," Drug Topics, 109:1 (January 11, 1965) p. 8.

The values for 1955 through 1959 were computed from data in: Paul C. Olsen, "Rx Volume Shows Rise of 10.4% for All Stores," Drug Topics, 104:7 (March 28, 1960) p. 2; and the following previous issues: 102:7 (March 31, 1958) p. 2; and 101:5 (March 4, 1957) p. 2.

Appendix J

INDIVIDUAL PHARMACY EQUATIONS

Pharmacy	Best Exponential Equation	Coefficient of Multiple Determination
1	$Y = 36.124 + 6.160X - 0.196X^2 + 0.002X^3 - 30.864\ 1/X$	0.906
2	$Y = 130.403 - 2.360X + 0.0008X^3 - 82.410\ 1/X^2$	0.417
3	$Y = 95.323 + 0.798X - 180.362\ 1/X + 121.281\ 1/X^2$	0.955
4	$Y = 79.874 + 1.440X - 0.013X^2 - 120.256\ 1/X + 67.140\ 1/X^2$	0.921
5	$Y = 21.951 + 4.218X - 0.070X^2 + 0.00064X^3$	0.969
6	$Y = 93.898 + 0.00015X^3 - 41.095\ 1/X + 28.928\ 1/X^2$	0.945
7	$Y = 93.732 + 0.391X - 0.0046X^2$	0.661
8	$Y = 78.806 + 0.877X - 0.000069X^3 - 21.325\ 1/X$	0.912
9	$Y = 20.298 + 3.289X - 0.00037X^3$	0.967
10	$Y = 85.702 + 0.013X^2 - 51.437\ 1/X + 69.268\ 1/X^2$	0.914
11	$Y = -5.356 + 9.170X - 0.231X^2 + 0.0019X^3 + 52.497\ 1/X$	0.925
12	$Y = 32.560 + 3.029X - 0.020X^2$	0.940
13	$Y = 16.450 + 2.792X$	0.976
14	$Y = 53.792 + 2.825X - 0.049X^2 - 0.00039X^3 - 23.473\ 1/X$	0.959
15	$Y = 68.823 + 1.026X$	0.801
16	$Y = -20.391 + 10.838X - 0.279X^2 + 0.0023X^3 + 34.229\ 1/X$	0.932
17	$Y = 32.409 + 3.512X - 0.032X^2$	0.930
18	$Y = 88.904 + 0.523X - 76.614\ 1/X + 47.460\ 1/X^2$	0.901

Pharmacy	Best Exponential Equation	Coefficient of Multiple Determination
19	$Y = 101.663 + 0.322X - 195.735\ 1/X + 138.154\ 1/X^2$	0.838
20	$Y = 44.320 + 4.358X - 0.098X^2 - 0.00078X^3$	0.828
21	$Y = 48.775 + 2.293X - 0.015X^2$	0.833
22	$Y = 82.226 + 0.030X^2 - 0.00033X^3 - 14.243\ 1/X$	0.902
23	$Y = 92.397 + 0.00014X^3$	0.573
24	$Y = 59.597 + 3.426X - 0.083X^2 + 0.00069X^3$	0.828
25	$Y = 20.170 + 6.835X - 0.175X^2 + 0.0016X^3$	0.890
26	$Y = 25.575 + 3.580X - 0.028X^2$	0.952
27	$Y = 92.883 + 0.007X^2 - 20.383\ 1/X$	0.357
28	$Y = 112.219 - 185.447\ 1/X + 96.038\ 1/X^2$	0.369
29	$Y = 35.804 + 3.370X - 0.031X^2 - 25.990\ 1/X^2$	0.971
30	$Y = 38.504 + 4.043X - 0.070X^2 + 0.00044X^3$	0.929
31	$Y = 86.501 + 0.514X - 29.296\ 1/X$	0.809
32	$Y = 103.392 + 0.175X - 124.291\ 1/X + 38.669\ 1/X^2$	0.932
33	$Y = 110.288 - 0.008X^2$	0.794
34	$Y = 74.309 + 0.879X - 17.386\ 1/X^2$	0.748
35	$Y = 34.054 + 3.085X - 0.027X^2 + 97.181\ 1/X - 111.872\ 1/X^2$	0.894
36	$Y = 89.094 + 1.092X - 0.00027X^3 - 129.642\ 1/X + 96.453\ 1/X^2$	0.917
37	$Y = 62.781 + 0.042X^2 - 0.00026X^3$	0.983
38	$Y = 55.955 + 1.474X - 10.851\ 1/X$	0.964
39	$Y = 53.164 + 2.412X - 0.022X^2$	0.959

Pharmacy	Best Exponential Equation	Coefficient of Multiple Determination
40	$Y = 77.512 + 0.043X^2 - 0.00054X^3$	0.922
41	$Y = 0.691 + 5.577X - 0.093X^2 + 0.0008X^3$	0.959
42	$Y = 121.731 - 0.310X - 201.684\ 1/X + 124.105\ 1/X^2$	0.625
43	$Y = 42.267 + 3.923X - 0.071X^2 + 0.00045X^3$	0.983
44	$Y = 41.998 + 1.905X$	0.938
45	$Y = 38.572 + 2.620X - 0.013X^2 - 37.419\ 1/X$	0.975
46	$Y = 71.089 + 3.905X - 0.121X^2 + 0.001X^3 + 25.602\ 1/X$	0.640
47	$Y = 74.328 + 0.841X$	0.950
48	$Y = 87.992 + 0.029X^2 - 0.00037X^3 - 51.949\ 1/X + 32.664\ 1/X^2$	0.944
49	$Y = 55.169 + 1.949X - 0.00026X^3$	0.900
50	$Y = 60.396 - 1.604X + 0.148X^2 - 0.0017X^3$	0.935
51	$Y = 77.004 + 0.793X - 13.489\ 1/X$	0.876
52	$Y = 83.880 + 0.001X^2 + 0.00015X^3 - 76.057\ 1/X + 58.419\ 1/X^2$	0.973
53	$Y = 26.469 + 1.522X + 0.022X^2$	0.976
54	$Y = 64.540 + 1.863X - 0.017X^2$	0.923

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