ANALYSIS OF FACTORS
INFLUENCING RETAIL SALES

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ABSTRACT

ANALYSIS OF FACTORS
INFLUENCING RETAIL SALES

by Charles E. Van Tassel

This study involves determining what social and economic

variables significantly influence the demand for various categories

of retail commodities. An attempt is made to quantify the nature

of the relationships between retail sales and the relevant indepen-

dent variables, and to observe the changes in the relationships over

time. These underlying relationships provide the base for more

definitive analysis of particular retail goods, or certain types of

retail outlets, or retail activity in selected market areas.

The approach taken here is essentially a macroeconomic one.

Sales data are analyzed for all of the Continental United States and

the District of Columbia, for each commodity class of retail business

establishment, for each of four time periods covering a sixteen-year

time span. The primary source of sales data is the Census of Business,

Retail Trade. This Census has been collected four times since World

War II, in 1948, 1954, 1958 and 1963. Retail sales, serving as the

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dependent variables, are grouped into ten basic "Kind of Business" classifications. They are: 1) Lumber, Building Materials, Hardware, and Farm Equipment Dealers; 2) General Merchandise Group Stores; 3) Food Stores; 4) Automotive Dealers; 5) Gasoline Service Stations; 6) Apparel and Accessory Stores; 7) Furniture, Home Furnishings, and Equipment Stores; 8) Eating and Drinking Places; 9) Drug Stores and Proprietary Stores; and 10) Nonstore Retailers.

The independent variables considered are: state population, per capita personal income, urban-nonurban population ratios, white-nonwhite population ratios, male-female population ratios, agricultural-nonagricultural population ratios, median years of school completed, median age, unemployment levels, automobile registrations per one thousand persons, population densities, and the number of retail business establishments per capita. Retail sales in each state have been divided by the respective state population figures. Thus, the dependent variable is established as per capita retail sales.

The methodology used to establish the nature and trend of the functional relationships between the dependent and the independent variables was multiple correlation and regression analysis. Cross-section techniques were employed. A Fortran computer program, termed EFFEST (for Efficient Estimators), was used in analyzing the data. The primary outputs of the program are the simple correlation

coefficients, the multiple coefficients of determination, the co-efficients of regression, "t" statistics, and the elasticities of the independent variables.

The variables, per capita personal income and the proportion of total employment active in nonagricultural occupations are the ones established as being significantly related to per capita sales of the various retail categories. The relative importance of these factors varies from retail category to retail category and from time period to time period. However, these two variables generally appear to explain a large proportion of the variance in per capita retail sales.

The nature of the relationships between the variables, established through the quantitative analysis, is supplemented by discussion and explanation, in qualitative terms, for each retail sales group.

ANALYSIS OF FACTORS

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By

Charles E. Van Tassel

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CHAPTER I

THE SCOPE OF THE STUDY

Introduction

The general area of retail trade has undoubtedly been one

of the most popular fields for business research in the period since

World War II. The shift in emphasis from production to marketing,

intensified competition, and rising consumer discretionary income

are among the many factors responsible for concentration of research

interest at the retail level. Though studies in this area represent

a wide variety of approaches, interests, and purposes, most may be

conveniently categorized as basically microeconomic or macroeconomic

in nature.

In general terms, microeconomic analysis involves an inves-

tigation of a part of the whole of some activity. "It is concerned

with specific economic units and a detailed consideration of the

behavior of these individual units."[1] Studies of this sort might

involve, for example, subject areas such as the demand for a parti-

cular type of commodity, or the sales of a particular type of retail

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[1]Campbell R. McConnell, **Economics: Principles, Problems, and Policies,** (New York: McGraw-Hill Book Company, Inc., 2nd edition, 1963), p. 16.

outlet, or certain types of retail activity within a limited geographic region.

Most research of this nature, however, when undertaken for the purpose of intermediate- or long-range planning, requires, as a first step, a certain amount of macroeconomic analysis. Macroeconomic research may be defined as that type of research which is concerned with the economy as a whole or some basic subdivision of the economy.[1] Insight into the whole of some activity often provides a base or point of departure for more specialized study.

A food chain, in establishing a five-year marketing program for its regional operation, for instance, might well be interested in learning of national trends regarding such factors as personal income, per capita food consumption, changing retail structure and product offerings, and so on. Such information would prove helpful in providing a framework for collecting and analyzing data relevant to local market conditions.

It is this initial step, macroeconomic analysis, toward which this particular research is directed. The study involves an examination of recent retail sales trends and the social and economic variables

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[1] Ibid.

which significantly influence these sales. An analysis is made of the

demand for product offerings of all types of retail trade outlets for

the Continental United States and the District of Columbia, covering

a sixteen-year period. Particular emphasis is placed upon determining

what specific factors bear significant correlations with the sales of

these outlets. Once these sales variables have been identified and

their relative importance determined, a useful rationale may be

established for understanding and interpreting retail sales patterns

relative to observed socio-economic developments and changes. Analy-

sis of historical relationships existing between sales and the relevant

sales variables should also allow for more accurate indications of

future retail sales trends.

Consumer Demand Theory

In analyzing the trends in sales of retail commodities and

the variables which importantly influence these sales, it is useful

to first consider the basic elements of consumer demand theory.

Demand is generally defined as the various quantities of goods

which will be taken off the market by consumers at all possible prices,

other things being equal.[1] Modern economic theory assumes that the

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[1] Richard H. Leftwich, The Price System and Resource Alloca-
tion, (New York: Holt, Rinehart, and Winston, 1961), p. 27.

consumer derives a certain amount of satisfaction or "utility" from
the goods purchased. Utility is, in fact, conceived of as being a func-
tion of the total quantity of goods consumed.[1] But, of course, one is
ordinarily confronted with a rather wide range of consumption alterna-
tives from which to choose that particular combination of goods which
will ultimately maximize total utility. The situation is further com-
plicated by the fact that these goods are not generally free. The
problem is, therefore, one of allocating expenditures among the vast
number of possibilities such that the income spent will yield the maxi-
mum attainable total utility.

In choosing among consumption alternatives, there are numer-
ous factors which bear upon the decision to purchase certain quantities
of various types of retail commodities. The amounts which individual
consumers will demand are affected by such variables as the price of
the good, consumer's tastes and preferences, consumer's income, prices
of other goods, and the range of alternatives available.[2] When groups
of consumers are involved, such as in this study, there are additional
variables to consider which influence the total demand for goods. These

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[1]J. R. Hicks, Value and Capital (Oxford, London: Oxford
University Press, 2nd edition, 1946), p. 11.

[2]Leftwich, loc. cit.

are such characteristics as age distribution, geographical population distribution, educational levels, levels of unemployment, distribution by types of employment, extent of urbanization, etc. All of these types of variables must necessarily be taken into consideration in any study which attempts to explain the nature of the relationships between retail sales and the factors which significantly influence these sales.

These basic elements of consumer demand theory, though, apply specifically to individual commodities. Taking all of these factors into consideration, for example, it is possible to determine, with considerable accuracy, the nature of the demand schedule for an item such as men's sport coats. In this particular study, however, demand analysis is considered for all types of retail goods available to the consumer. Obviously, they cannot all be dealt with individually within the constraints of this research. It is necessary, therefore, to aggregate commodities into a few relatively homogeneous or common categories. As will be explained in detail at a later point, there are ten groupings of retail products which are analyzed in this study. One of the categories is wearing apparel. Of course, men's sport coats are only one of a wide variety of items which are sold through this type of retail outlet. And it is reasonable to assume that the demand for ladies' summer dresses, for example, differs somewhat from that for men's sport coats. For the purposes of this particular study, however, they must be treated alike. This may be accomplished, and remain consistent with

established demand theory as described above, by assuming relative prices for all retail goods contained in any one group to be the same. In this way, each category of retail commodities is treated as if it were a single commodity. An analysis and application of all of those factors which cause people to consume as they do may thus be applied within the established framework of economic analysis. While it is recognized that each retail sales category is composed of many individual items, this approach allows for a realistic appraisal of the nature of demand for all goods available in the retail market.

These underlying tenets of consumer demand provide the conceptual base and the theoretical justification for this type of research effort.

Statement of the Problem

The central problem in this study is to determine what social and economic variables are significantly related to the demand for categories of retail goods, and to discover the nature of and the changes in the relationships over time.

Limitations of the Study

There are certain limitations in this research which should be set forth at this time.

First, it must be recognized that the retail sales figures

used in this analysis are taken from the Census of Business[1] and represent sales not for particular types of merchandise as such, but rather for the sales of particular kinds of retail business establishments. Sales of "Food Stores," for example, include the sales of certain non-food items. It should be clearly understood, therefore, that retail sales analysis will not be developed for types of goods, but for types of outlets for the goods. In a very real sense, this is not so much a limitation of the study as it is a clarification.

Second, there have been certain changes between the 1948, 1954, 1958 and 1963 Census publications regarding the structure and definitions of the various categories of business establishments. Certain changes have occurred in the composition of the types of merchandise offered by each type of outlet, and also in the classifications of the outlets themselves. For the most part, however, these changes have been reconciled for each of the Census periods and the data are generally comparable.[2]

Third, the data for some of the retail sales variables used

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[1]U. S. Bureau of the Census, "U. S. Census of Business: 1948 1954, 1958, 1963," Retail Trade, U. S. Government Printing Office, Washington, D.C. This reference will hereafter be referred to as the "Census," or the "Census of Business."

[2]Major changes which have occurred between each of the Census periods are enumerated in the Appendix.

in the study are not available for the same time periods as the retail sales figures themselves. This does not represent a serious problem and is overcome, for the most part, through linear extrapolation, making the data for the sales and the variables comparable in time.

Fourth, limitations of some of the variables selected are evident. For example, one of the obvious retail sales variables, income, is used in the form, "per capita personal income." Ideally, "per capita disposable personal income" would be used. The latter data are not available, though, for the purpose of this study. Price is another variable which certainly is related to retail sales. The use of this variable, though, is limited in this analysis since retail sales price indexes are not available for the various types of retail outlets considered. Price indexes are available for individual commodities, but as pointed out previously, most of the categories of retail sales analyzed in this study are comprised of more than one type of commodity.

Fifth, there are limitations regarding the amount of data available for analysis within the scope of this study and the conclusions which may be drawn. As stated earlier, the Census has been published four times in the post-War period. While it is felt that the number of time periods, and the interval between each period, are adequate to describe trends representative of the entire sixteen-year span,

the limitation of available data should be kept in mind. The extent of this limitation is a matter for individual judgment.

Sixth, some mention should be made regarding the four Census periods which serve as the sources for the retail sales data. The periods, 1948, 1954, 1958 and 1963, were representative of rather diverse eras of economic activity. The United States was experiencing a post-War boom when the 1948 Census of Business was taken. A slight recession was in progress at the end of the Korean conflict when the 1954 Census was taken. The most serious recession of recent time occurred during the 1958 Census. And the 1963 Census was completed in a year of vigorous economic activity. Thus, the timing of the availability of the retail sales data may be somewhat unfortunate especially for comparative purposes. On the other hand, a positive factor may be noted in that the data is not strongly biased favorably or unfavorably, but rather is representative of economic activity over the long-run.

Seventh, the data for retail sales and the independent variables involved are collected on a state-by-state basis. It is possible, however, that all retail sales for a particular state are not made only to residents of that state from which the data for the independent variables are derived. Residents of other geographic regions could well account for some of the sales volume. It is assumed, though, that the

sales of a particular state which are made to non-residents are a relatively small proportion of total retail sales. It is also assumed that the characteristics of these persons do not differ substantially from those of the inhabitants of the state under consideration.

CHAPTER II

RESEARCH METHODOLOGY

In analyzing the relationships between varying quantities, dependent and independent variables are usually established. When a change in the value of one variable corresponds to a change in the value of the other variable, a functional relationship is said to exist.[1] In this study, the sales of retail establishments will serve as the dependent variable and those factors which correspond significantly to changes in retail sales will serve as the independent variables. Explanations of the statistical techniques employed in analyzing the functional relationships between the dependent and independent variables will follow a brief discussion of the sources from which the raw data were derived.

Dependent Variables

All of the retail sales data were collected from the Census of Business publications for the years 1948, 1954, 1958 and 1963, for each of the Continental United States and the District of Columbia.[2]

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[1]Milton H. Spencer, Colin G. Clark and Peter W. Hoguet, Business and Economic Forecasting: An Econometric Approach, (Homewood, Illinois: Richard D. Irwin, Inc., 1961), pp. 40-41.

[2]Sales are defined by the Census of Business to include total receipts from customers after deductions of refunds or

There are, therefore, forty-nine observations in each of the four time periods. These data represent dollar sales figures for each of the ten[1] "Kind of Business" classifications as defined by the Census and listed below.[2]

    1. Lumber, Building Materials, Hardware, Farm Equipment Dealers

    2. General Merchandise Group Stores

    3. Food Stores

    4. Automotive Dealers

    5. Gasoline Service Stations

    6. Apparel and Accessory Stores

    7. Furniture, Home Furnishings, Equipment Stores

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allowances for merchandise returned by customers. Sales include receipts from repairs and from other services to customers, as well as the sales of merchandise, but exclude amounts other than those received from customers, such as income from investments. They include the amount of local and state sales taxes or federal excise taxes. Excise taxes which are paid by the manufacturer or wholesaler and passed along to the retailer are also included. The sales figures, therefore, represent total sales and receipts of all establishments primarily engaged in retail trade. They do not include retail sales of manufacturing, wholesale, and service establishments whose primary activity is other than retail trade. They do, however, include receipts other than from the sales of merchandise at retail by establishments primarily engaged in retail trade.

[1]There are actually eleven "Kind of Business" retail sales classifications. For the purpose of this analysis, however, one category, "Other Retail Stores," is not included. The wide variety of types of retail commodities included in this category precludes substantive and useful analysis.

[2]Complete descriptions of each of these ten categories and the definitional changes over time are presented in later sections.

8. Eating, Drinking Places

9. Drug Stores, Proprietary Stores

10. Nonstore Retailers

The first time period used in the analysis is 1948. The Census of Business was taken in certain preceding years, but these data were excluded from the research due primarily to problems of noncomparability of the "Kind of Business" categories prior to 1948. Significant changes were made in the 1948 Census regarding the number and definitions of the retail sales categories and the types of retail outlets included within each category. Problems of noncomparability between 1948, 1954, 1958 and 1963, though, have been minimized such that the data are, for the most part, comparable. In addition to this reason for beginning the analysis with the 1948 Census, it may also be said that the implications of such phenomena as the Depression and World War II, causing substantial economic disruptions, are avoided by excluding prior data. Certainly, the post-War period has been characterized by dynamic change, but the change has been more evolutionary than revolutionary.

Independent Variables

Since one of the most important features of this study involves discovering certain functional relationships existing between the dependent variable (retail sales) and independent variables which are significantly related to sales, it was necessary to

establish a procedure for selecting which independent variables were to be observed in relation to the dependent variable.

The first step in this process involved compiling a detailed list of all quantifiable independent variables which might normally be expected to have some appreciable influence upon the sales of all types of retail establishments. This was intended primarily to avoid omitting any relevant variables. Examples of some of the independent variables initially selected are: state population, per capita personal income, urban-nonurban population ratios, white-nonwhite population ratios, male-female population ratios, median years of school completed, unemployment levels, agricultural-nonagricultural employment ratios, median age, per capita automobile registrations, and population densities. As in the case of the dependent variables, these data were collected in each of the four time periods, for each of the Continental United States and the District of Columbia. The first independent variable mentioned, population, is obviously closely related to total retail sales for any particular state. The population factor was, therefore, most easily accounted for by dividing the retail sales figure for each of the ten "Kind of Business" categories, for each state, by the respective population figure. The dependent variable for 1948, 1954, 1958 and 1963 was thereby established as "per capita retail sales."

With the exception of only one category, per capita personal income and the per cent of total employment active in nonagricultural

occupations are the independent variables included in the final analy-
sis. The one exception is "Automotive Dealers," where the variable,
motor vehicle registrations per one thousand persons, is substituted
for the proportion of nonagricultural employment. It will be noted
throughout the study that the employment variable is not always accepted
as statistically significant in each time period. Since the variable
is pertinent to so many of the retail sales categories, however, it
was deemed advisable to include it in the analysis of all categories.

Multiple Correlation and Regression Analysis

In analyzing the functional relationships between the depen-
dent and the independent variables, multiple correlation and regression
techniques were employed. The data for each of the forty-nine obser-
vations were analyzed, at each of the four points in time, through
cross-section analysis. Time series analysis was not considered because
the number of time periods involved was judged to be too few.

The particular regression technique used in this study differs
somewhat from the single equation least-squares approach and warrants
some explanation at this point.

Efficient Estimators

In order to fit a regression line through a series of ob-
servations, several approaches are available. The most often used
method is that of least-squares. By this process, one regression line

is derived which best represents all of the individual observations

in the data. This procedure is termed least-squares because:

> . . . (It) yields those estimates of the para-
> meters which minimize for that form of regression
> equation the sum of the squares of the deviations
> of the observations from the regression line, i.e.,
> from the value that observation would have if it
> had coincided with the regression line. This sum
> reflects the variance of the observations about
> the regression equation, or the variance in the
> dependent variable that remains unexplained after
> the effect of the independent variable has been
> taken into account.[1]

Though by the principle of least-squares regression analy-

sis, the "line of best fit" is derived:

> It is only under special conditions . . . that
> classical least-squares applied equation-by-
> equation yields efficient coefficient estimators.
> For conditions generally encountered (there is)
> an estimation procedure which yields coefficient
> estimators at least asymptotically more efficient
> than single-equation least-squares estimators.
> In this procedure, regression coefficients in all
> equations are estimated simultaneously by applying
> Aitken's generalized least-squares to the whole
> system of equations. To construct such Aitken es-
> timators, we employ estimates of the disturbance
> terms' variances and covariances based on the resi-
> duals derived from an equation-by-equation applica-
> tion of least-squares.[2]

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[1]Robert Ferber and P. J. Verdoorn, Research Methods in Economics and Business (New York: The Macmillan Company, 1962), p. 86.

[2]Arnold Zellner, Journal of the American Statistical Association, "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias" (Washington, D.C.: American Statistical Association, June, 1962), pp. 348-349.

Essentially, this method allows the use of preceding and succeeding data in estimating the regression coefficient for any one period. In the interest of simplification, it may be assumed that there are two equations to be estimated, one in each of two time periods. The equations may be expressed as:

$$Y_{it_1} = a + b_{it_1} X_{it_1} + U_{it_1}$$

and

$$Y_{it_2} = a + b_{it_2} X_{it_2} + U_{it_2}$$

where:

Y = dependent variable
a = constant term
X = independent variable
U = residual term
i = number of observations
t_1 = first time period
t_2 = second time period

The cross-section regression coefficients are first esti-mated by single-equation least-squares analysis for each of the two time periods. Implicit here is the assumption that:

$$E \left(U_{i_1 t_1} / U_{i_2 t_1} \right) = 0$$

That is, the expected value of the residual terms for each of the observations in any one time period are assumed to be zero. These residuals are then used to derive estimates of the disturbance terms'

variances and covariances. The regression coefficients for both equations are then estimated simultaneously. Here, it is assumed that:

$$E \ (U_{i_1 t_1} \ / \ U_{i_1 t_2}) \ne 0$$

That is, if the value of the residual was not equal to zero in the first period, the expected value of the residual in the second period will not be equal to zero. It is assumed that they will be related to one another in some manner. Thus, the regression coefficient for time period 1 is not ultimately derived independent of the experience in time period 2. Rather, the coefficients are estimated simultaneously such that the equation for any one is influenced by the other.

A fortran computer program, termed EFFEST, for applying this technique in estimating the regression coefficients has been developed recently and was used for analysis of the data in this research.[1]

After the dependent and independent variables were established and analyzed by means of a linear arithmetic program, the same variables were analyzed once again in linear logarithmic terms. The regression equations for each period are thus represented as:

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[1]The "EFFEST" (efficient estimators) program was run on the CDC-3600 computer installation on the campus of Michigan State University, East Lansing, Michigan. The program was developed by Professor Arnold Zellner of the University of Wisconsin.

$$\text{Log } Y_{it} = a + b_{it_1}(\text{Log } X_{it_1}) + a + b_{it_2}(\text{Log } X_{it_2}) +$$

$$\ldots + b_{it_n}(\text{Log } X_{it_n})$$

The equation states, in effect, that a given change in the logarithm of X will be accompanied by a change of b times as much in the logarithm of Y. An absolute change in the logarithm of any number always, of course, represents a constant percentage change in the actual value of the number. The changes in the measurements of the extent of correlation between the dependent and independent variables were judged to be substantial enough to warrant the use of logarithms in the analysis, with the exception of one kind of retail business establishment, "Lumber, Building Materials, Hardware, Farm Equipment Dealers." The relationship in this case appears to be best represented by an arithmetic analysis.

Explanation of the Derived Statistics

This EFFEST computer program yields for each category of "Kind of Business" establishment, for each time period, these statistics.

Coefficient of Determination which measures the extent of the relationship between the dependent and independent variables.[1]
". . . This measure is simply the proportion of the original variance

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[1]Ferber and Verdoorn, op. cit., p. 87.

in the dependent variable explained by the independent variable."[1]
The coefficients of determination are computed from the least-squares
regression analysis and are not related to the EFFEST program output
data.

Coefficient of Regression which indicates the nature of
the change in the dependent variable in response to a change in the
independent variable.

Standard Error of the Estimate which measures the closeness
with which values of the independent variables may be used to esti-
mate the value of the independent variable. The standard error of
the estimate indicates the extent of the deviation between the com-
puted regression line and the actual values of the observations.

Income Elasticity which measures the change in retail sales
of a particular "Kind of Business" establishment in response to a one-
unit change in per capita personal income.[2] It should be noted here
that the procedure used for computing income elasticities in this study
differs somewhat from the usual method. Ordinarily, income elasticity
is derived to express the change in sales relative to a change in in-
come, measured from one period in time to the next. The formula
generally used in computing the elasticity is:

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[1]Ibid.

[2]Though it is not commonly done, the elasticities of the
other independent variables are also computed. The effect upon per
capita sales of a one-unit change in the percentage of nonagricul-
tural employment, for example, is included in the analysis.

$$e = \frac{\dfrac{\Delta\, RS}{RS}}{\dfrac{\Delta\, Y}{Y}}$$

where:

Δ RS = the change in retail sales between period I and period II

RS = the level of retail sales in period I

Δ Y = the change in income between period I and period II

Y = the level of income in period I

In the case of cross-section elasticity, however, only one period in time is considered. An income elasticity computed for 1963, then, relates what would happen to the retail sales in Texas, for example, if the income in Texas were to change and conform to that of some other state. It is defined specifically as " . . . the percentage difference in expenditures associated with a one per cent difference in income . . ."[1] Thus, cross-section elasticity concerns the nature of the relationship between retail sales and the independent variable involved, given changes in the variable at a particular point in time, as opposed to changes from one period to the next.

The computation used to derive the cross-section elasticities for each time period involves multiplying the coefficient of regression

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[1] Ferber and Verdoorn, op. cit., p. 150.

by the product of the mean per capita personal income divided by the
mean per capita retail sales for that period. The formula may be
expressed as:

$$e = b \ x \ \frac{Y_m}{RS_m}$$

where:

b   = coefficient of regression
Y_m = mean per capita personal income
RS_m = mean per capita retail sales

The components of this formula are derived from the EFFEST
program calculated in arithmetic terms. Fortunately the computational
procedures are minimized when the inputs to the regression analysis
are in logarithmic form. In a logarithmic regression, the regression
coefficient represents a proportionate, and not absolute, change in
the relationship between sales and income. Therefore, the regression
coefficient is, in fact, the measure of the cross-section income elas-
ticity. Elasticities are derived separately by the above formula only
for the category, "Lumber, Building Materials, Hardware, Farm Equipment
Dealers," since this is the only one where logarithms are not used.

"t" Statistic which is used to judge the probability of the
occurrence of a correlation between the dependent and independent
variables by chance. The value of "t" is derived by dividing the
coefficient of regression by the standard error of the estimate, and

indicates whether or not the computed correlations are a valid indi-

cation of a correlation in excess of zero.[1] The formula for "t,"

then, is:

$$t = \frac{b}{S}$$

where:

b = coefficient of regression
S = standard error of the estimate

Using a one-tail "t" distribution to test the significance

of the correlation, at the 5 per cent level of confidence, with 50

degrees of freedom, "t" must be equal to or greater than 1.67 for the

correlation to be significantly different from zero. There are actually

46 degrees of freedom in the analysis of each of the categories of re-

tail sales, but 50 degrees are used for convenience in reading the

table of "t" values. The difference is unimportant since the number

of degrees of freedom is so large that the "t" distribution approximates

the properties of the normal curve.

All of the above types of information are used in combination

in analyzing and interpreting the observed relationships.

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[1] B. J. Winer, _Statistical Principles in Experimental Design_
(New York: McGraw-Hill Book Company, Inc., 1962), p. 641.

CHAPTER III

LUMBER, BUILDING MATERIALS,
HARDWARE AND FARM EQUIPMENT DEALERS

This "Kind of Business" classification[1] includes the sales

of: 1) Lumber Yards; 2) Building Materials Dealers; 3) Heating and

Plumbing Equipment Dealers; 4) Paint, Glass and Wallpaper Stores;

and 7) Farm Equipment Dealers.[2]

The EFFEST analysis has established per capita personal in-

come and the per cent of nonagriculturally employed as significant

variables in relation to the sales of Lumber outlets. The correlation

coefficients between per capita Lumber sales and certain other indepen-

dent variables initially considered are: white-nonwhite population

ratio (.1025), male-female population ratio (-.1388), median years

of school completed (.0876), median age (-.0531), and number of

Lumber establishments per capita (-.1360).

A detailed analysis of the variables will follow a brief

introduction of the general nature of the underlying relationships.

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[1]This classification will from here on be referred to as
"Lumber."

[2]A complete breakdown of the sales of each of these types
of outlets is presented in the Appendix.

The Variables

The total sales volume of this particular classification of retail outlet for each period is shown below.

Sales Volume for Lumber, Building
Materials, Hardware, and Farm Equipment
Dealers in the United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$11,142,980	$13,116,938	$14,309,206	$14,470,538

The per cent of total employment active in nonagricultural occupations was 83.4 per cent in 1948, 86.5 per cent in 1954, 90.5 per cent in 1958, and 92.4 per cent in 1963.

The data in the next table describe the per capita sales of these Lumber establishments in each period and their relationship to per capita sales of all categories of retail establishments.

Mean Per Capita Sales of Lumber Dealers in Absolute
Terms and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita Sales of Lumber Dealers	Mean Per Capita Sales of Lumber Dealers as a Per Cent of Mean Per Capita Total Retail Sales
1948	$90.57	10.15%
1954	91.64	8.75
1958	95.25	8.35
1963	92.71	7.22

These figures are evidence of a moderate rise in per capita

sales of Lumber outlets through 1958 and then a fall in 1963. This
is the only category of retail sales which declines in absolute per
capita terms in any period. Sales of Lumber Dealers also decline con-
sistently as a percentage of per capita total retail sales.

The next table relates per capita Lumber establishment sales
to per capita personal income.

Mean Per Capita Personal Income and
Mean Per Capita Sales of Lumber Dealers as
a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Sales of Lumber Dealers as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	6.72%
1954	1,656	5.53
1958	1,939	4.91
1963	2,313	4.01

Not only have per capita sales of Lumber Dealers fallen as
a per cent of the sales of all types of retail outlets, but they have
also declined as a per cent of per capita personal income from 1948
through 1963.

Correlation Coefficients

The coefficient of determination for the sales of Lumber
Dealers and both independent variables was .7440 in 1948, .7047 in
1954, .8169 in 1958, and .8502 in 1963. The pattern of the

coefficients is not consistent, as a slight drop occurred between 1948 and 1954; there was a rise from 1954 to 1958; and then another slight increase between 1958 and 1963.

A look at the simple correlation coefficients between sales of Lumber establishments and each of the independent variables separately also shows evidence of diverse trends.

Coefficients of Correlation Between Mean Per Capita
Sales of Lumber Dealers and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.2278	-0.5612
1954	0.0358	-0.5924
1958	-0.0476	-0.7957
1963	-0.1802	-0.8885

The correlation between per capita sales of Lumber Dealers and per capita personal income is very low and negative in the last two time periods. The correlation between sales and nonagricultural employment, however, is rather high and shows a substantial increase between 1948 and 1963 with most of the gain coming between 1954 and 1958. The coefficient has a negative sign in each period. As the per cent of nonagricultural employment rises, per capita sales of the Lumber category would be expected to fall.

Additional discussion of the effects of these variables will follow a consideration of the regression analysis and the elasticities.

Efficient Estimators

In a previous section, it was noted that in this Lumber category the relationship between the dependent and independent variables was best represented not by a logarithmic regression, but rather by an arithmetic one.

Included in the table below are the regression coefficients, the standard errors of the estimates, in parentheses, and the "t" statistics.

Regression Coefficients (b), Standard
Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	0.0973 (0.0117)	8.35	-3.722 (0.3705)	-10.05
1954	0.0680 (0.0089)	7.63	-4.028 (0.4101)	-9.82
1958	0.0423 (0.0065)	6.53	-5.519 (0.4077)	-13.53
1963	0.0200 (0.0052)	3.87	-6.163 (0.4164)	-14.80

As is the case with each of the other categories of retail sales, "t" with a 5 per cent confidence level, forty-six degrees of

freedom, and a one-tail distribution must be equal to or greater than 1.67 for the correlation between the dependent and independent variables to be accepted as significantly different from zero.

Per capita personal income is, therefore, a significant variable. It is interesting to note, however, that the level of significance declines substantially over time.

In the case of the nonagricultural employment variable, the "t's" are also greater than 1.67 by substantial amounts in each period. Unlike income, however, the sign is negative.

Elasticities

The elasticities of income and nonagricultural employment are reported in the table below. As stated earlier, the regression coefficients in an arithmetic analysis are not the elasticities of the independent variables. They are computed separately and shown below.

Elasticities of Mean Per Capita Personal
Income and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	1.4429	-3.5665
1954	1.2150	-3.9417
1958	0.8354	-5.4213
1963	0.4988	-6.1410

The elasticity of per capita personal income is greater than one in the sales of Lumber, Building Materials, Hardware, and Farm Equipment Dealers in 1948 and 1954, and less than one in the final two periods. The decline in the elasticity during the entire sixteen-year period is consistent. A one per cent change in income is associated with a 1.4429 per cent change in sales in 1948, a 1.2150 change in 1954, an .8354 per cent change in 1958, and a .4988 change in 1963.

The elasticity of the per cent of nonagricultural employment follows quite a different pattern. It is much larger and increases in magnitude in each period. The elasticities are also accompanied by a negative sign, signifying an inverse relationship between changes in per capita personal income and the proportion of nonagricultural employment.

Analysis

Sales and Per Capita Personal Income

It is evident that there is a declining responsiveness of sales in this Lumber category to changes in income, over time. Per capita sales of Lumber Dealers have declined as a proportion of total per capita retail sales and of per capita personal income. While per capita sales of all types of retail goods rose 17.24 per cent between 1948 and 1954, 9.03 per cent between 1954 and 1958, and 12.59 per cent from 1958 through 1963; and per capita personal income showed gains of 22.85 per cent, 17.09 per cent, and 19.29 per cent in the same

periods, per capita Lumber sales rose only 1.18 per cent, 3.94 per cent, and then fell 2.67 per cent respectively. Part of the explanation of this deteriorating relationship can likely be found in shifting consumption patterns over time as incomes rise. It is reasonable to assume that when per capita personal income rises, especially in urban areas, per capita consumption of services also rises. One likely result of this trend is a fall in consumption of commodities of a "do-it-yourself" nature such as those included in this category.

Another factor which probably accounts, at least in part, for the successively smaller income correlation coefficients and elasticities between 1948 and 1963 in this category is the widening of merchandise lines in other types of retail establishments. Such items as heating and air conditioning equipment, paint, wallpaper, lighting fixtures, hardware and cutlery, for instance, are no longer sold only through Lumber Dealers, et al., but also by such outlets as drug stores, food stores, and general merchandise establishments. Thus, not only do consumers normally tend to purchase proportionately less of these types of goods as incomes rise, but there are also more alternatives available regarding types of retail businesses where the products may be purchased.

Sales and the Proportion of Nonagricultural Employment

The per cent of employed persons active in nonagricultural occupations is significantly related to the sales of Lumber, Building

Materials, Hardware, and Farm Equipment Dealers. There are many pos-
sible explanations for the relative importance of the nonagricultural
employment variable, particularly the inverse relationship with Lumber
sales. Two factors, however, probably stand out as most important.

First, it is very likely that those persons who are active
in agricultural pursuits are simply greater demanders of the commodi-
ties included in this category than are those who are otherwise em-
ployed. Agricultural workers certainly have more need for such items
as farm tractors, reapers, mowers, plows, wagons, and the like, dis-
tributed by these "Kind of Business" establishments. It should be
noted at this point that the types of commodities cited here comprise
the bulk of total sales of Lumber Dealers, et al. Below is a breakdown
of the relative importance of the sales of the various types of stores
included in this retail sales classification.

Total United States Sales of Each Type
of Retail Outlet Included in Lumber, Building Materials,
Hardware, and Farm Equipment Dealers and as a Per Cent of Total[1]
(000)

Types of Retail Outlets	1954		1958	
	Sales	Per Cent Total	Sales	Per Cent Total
Lumber, Building Materials Dealers	$6,502,861	49.58%	$7,122,631	49.78%

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[1] Data for 1948 are omitted due to lack of comparability with
succeeding Census periods. Data for 1963 are not included since they
were not available in detail in time for this analysis.

Heating, Plumbing, Electrical Stores	$514,156	3.92%	$544,072	3.80%
Paint, Glass, Wallpaper Stores	601,041	4.58	739,625	5.17
Hardware Stores	2,694,348	20.54	2,717,163	18.99
Farm Equipment Dealers	2,804,532	21.38	3,185,715	22.26
Total	$13,116,938	100.00%	$14,309,206	100.00%

The types of stores which are usually more heavily patronized by agricultural or rural segments of the population, i.e., Lumber and Building Materials Dealers; Hardware Stores; and Farm Equipment Dealers accounted for 91.50 per cent and 91.03 per cent of total category sales in 1954 and 1958 respectively. Shifts toward nonagricultural employment, therefore, have profound effects upon the total sales of this "Kind of Business."

The second factor relates to probable economies of scale in the building trades in nonagricultural areas. Assuming that most agricultural activity takes place in rural areas which typically have relatively low population densities, it is realistic to assume that fewer economies of scale would exist in building and related activities, causing higher per capita expenditures. Thus, as the trends away from agricultural occupations and toward increased urbanization continue, economies of scale may be anticipated in such activities, resulting in a decline in per capita sales of Lumber and related business establishments.

Summary

Per capita sales of Lumber, Building Materials, Hardware, and Farm Equipment Dealers rose nominally through 1958 and then fell in 1963. And they have consistently declined as a per cent of sales of all types of retail outlets and of per capita personal income.

The pattern of the multiple coefficient of determination has not been consistent since 1948. A slight drop in the r^2 occurred between 1948 and 1954 from .7440 to .7047. There was a substantial rise from 1954 to 1958 to .8169, and then a nominal increase between 1958 and 1963 to .8502.

A marked decline in the simple correlation coefficients between sales and income has occurred over time, falling from a high of .2278 in 1948 to a low of -.1802 in 1963. The coefficient of correlation between sales and nonagricultural employment has a negative sign implying an inverse relationship, and has increased in magnitude in each succeeding period. The increase between 1948 and 1954 was slight, from -.5612 to -.5924. The coefficient was up to -.7957 in 1958 and -.8885 in 1963.

Per capita personal income is a significant variable in each time period, but the "t" values decline consistently from 8.35 in 1948 to 3.87 in 1963. The per cent of nonagricultural employment is also highly significant, with the "t" value falling between -9.82 and -14.80.

The income variable has an elasticity of greater than one in 1948 and 1954, and less than one in 1958 and 1963. The fact that higher incomes are generally associated with higher per capita purchases of services accounts, in part, for the proportionate sales decline as income rises. Broadening of merchandise lines in other types of retail establishments to include many goods traditionally purchased through Lumber and related dealers probably also contributes to the falling elasticity.

The per cent of non-agricultural employment is considerably greater than one in each period and has a negative sign. As the proportion of persons active in nonagricultural occupations rises, per capita sales will fall. Probable reasons for this relationship are that agriculturally-employed persons have greater need for the products included in the sales of this "Kind of Business," and economies of scale exist in building trades in urban areas, resulting in lower per capita sales as the percentage of nonagricultural employment rises.

CHAPTER IV

GENERAL MERCHANDISE GROUP STORES

This "Kind of Business" classification includes the sales

of: 1) Department Stores, and 2) Limited Price Variety Stores.[1]

It should be noted at this point that the sales of Department Stores

alone account for approximately 60 per cent of total category sales

in each time period.

In addition to per capita personal income and the per cent

of nonagricultural employment, these variables and their correlations

with per capita General Merchandise sales were initially considered:

white-nonwhite population ratio (.0149), male-female population ratio

(-.1185), median years of school completed (.0492), median age (-.0313),

and the number of General Merchandise establishments per capita (-.1184).

The underlying trends and the basic relationships between

the variables are presented in the next section.

The Variables

Total sales volume in the United States of General Merchan-

dise Group Stores in each period is shown below.

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[1] A complete breakdown of the sales of each of these outlets
is presented in the Appendix.

Sales Volume of General Merchandise Stores
in the United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$15,796,141	$17,872,386	$21,879,106	$29,854,013

Mean per capita sales of general merchandise in dollar terms and as a per cent of per capita total retail sales are shown in the next table.

Mean Per Capita Sales of General
Merchandise Group Stores in Absolute Terms
and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita General Merchandise Sales	Mean Per Capita General Merchandise Sales as a Per Cent of Mean Per Capita Total Retail Sales
1948	$106.70	11.95%
1954	110.10	10.52
1958	122.00	10.69
1963	148.40	11.56

It is apparent from the data in the table above that while per capita General Merchandise sales increased since 1948 in absolute amounts, they have not increased as a proportion of per capita total retail sales. In fact, the percentage figure in 1963 is slightly lower than in 1948. It is interesting to note, however, that with the exception of the Nonstore category, General Merchandise is the only one which shows successively greater percentage increases in per

capita sales from 1948 through 1963. There was a 3.19 per cent rise between 1948 and 1954, 15.36 per cent between 1954 and 1958, and 21.64 per cent from 1958 through 1963.

The next table contains the relationship, over time, between per capita General Merchandise sales and per capita personal income.

Mean Per Capita Personal Income
and Mean Per Capita General Merchandise Sales
As a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita General Merchandise Sales as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	7.92%
1954	1,656	6.65
1958	1,939	6.29
1963	2,313	6.42

Not only have per capita sales of general merchandise retailers tended to fall as a proportion of total retail sales, but they have also experienced a downward trend as a per cent of per capita personal income.

Correlation Coefficients

The multiple coefficient of determination between the dependent and independent variables was .2360 in 1948, .3805 in 1954, .4828 in 1958, and .8051 in 1963. No other retail sales category has experienced such a sharp rise in the r^2 over time. The figure for the

first time period is virtually negligible, while the figure for the

last year is among the highest for any retail category at any time.

The table below contains the simple correlation coefficients

between per capita sales of general merchandise outlets and each of

the independent variables, during all four time periods.

Coefficients of Correlation Between
Mean Per Capita Sales of General Merchandise
Group Stores and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	.4829	.2144
1954	.6167	.4003
1958	.6737	.4705
1963	.8705	.5627

The same general pattern has been followed in the correla-

tions for income and nonagricultural employment. The trend has been

consistently upward, rising from .4829 to .8705 between 1948 and 1963

for income, and from .2144 to .5627 during the same period for the per

cent of nonagricultural employment.

Efficient Estimators

Below are shown the coefficients of regression, the standard

errors of the estimates, in parentheses, and the "t" statistics for

both independent variables, from 1948 through 1963.

Regression Coefficients (b), Standard
Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	0.5480 (0.1351)	4.06	-0.1835 (0.2442)	-0.75
1954	0.5763 (0.1012)	5.69	-0.2113 (0.2233)	-0.95
1958	0.5021 (0.0859)	5.85	0.3116 (0.2339)	1.33
1963	0.8569 (0.0745)	11.50	0.7275 (0.2200)	3.31

From this table, it may be seen that per capita personal income is a very significant variable in relation to per capita sales of General Merchandise Group Stores. The "t" values rise substantially over time from 4.06 in 1948 to 11.50 in 1963. The importance of the per cent of nonagricultural employment also rises over time. This variable, with a "t" value of -.75 in 1948, is obviously not significant. By 1963, however, "t" is 3.31 and nonagricultural employment is considered very significant. If a slightly lower confidence level was accepted, this variable would also be significant in 1958.

Elasticities

The elasticities for General Merchandise sales of per capita personal income and the per cent of nonagricultural employment are shown below.

Elasticities of Mean Per Capita Personal Income
and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.5480	-0.1835
1954	0.5763	-0.2113
1958	0.5021	0.3116
1963	0.8569	0.7275

The income elasticity remains fairly stable from 1948 through 1958 at approximately .5 or a little over. There is a rather large increase in 1963 to .8569. The pattern is quite different for the per cent of nonagricultural employment. The elasticity is practically negligible in the early periods and is accompanied by a negative sign. Over time, however, the magnitude of the elasticity increases to a substantial .7275 in 1963 and is positive.

Analysis

Sales and Per Capita Personal Income

Any specific discussion of retail sales trends and relationships in this category should be preceded with a few words of caution. While, for the most part, the other retail sales categories are associated with one type of commodity or a relatively small group of generally homogeneous goods, the General Merchandise Group Stores classification includes the sales of practically an unlimited variety of items. It is difficult, therefore, to draw many very definitive

conclusions from the data generated in the analysis. The nature of
the types of goods included is so broad and varied that it is subjec-
tive at best to attribute changes in the relationships between General
Merchandise sales and the independent variables to any specific factors.
With this limitation in mind, the relationships may be explored. The
correlation coefficient rises over time from .4829 in 1948 to .8705
in 1963. Income is highly significant in each period. And the income
elasticity increases substantially from a low of .5480 in 1948 to a
high of .8569 in 1963. From each of these measures, it is apparent
that the relationship between General Merchandise sales and income has
been strengthened over time, with much of the effect taking place during
the period between 1958 and 1963. There are a number of factors which
might be offered in explanation.

For one thing, it is probably safe to assume that the demand
for most of the types of goods offered for sale by department stores
is responsive to changes in income. And, over time, there has been a
gradual upgrading, in terms of price and quality, of department store
merchandise which has likely increased the sensitivity to income.
Another factor not to be overlooked is the practice of scrambled mer-
chandising and proliferation of product lines in recent years. Not
only have existing product assortments been broadened, but new and dif-
ferent items have been added. And many of these new lines are of the
non-necessity type which are basically responsive to changes in income.

Another more specific explanation can be considered, making
use of the data developed in this study for certain other categories
of retail sales. Certainly, General Merchandise retailers offer many
of the same goods for sale as do Apparel Stores, Furniture Dealers,
and Drug outlets. It is significant that in each of these three cate-
gories, the coefficients of correlation have been maintained, over
time, at relatively high levels; the income elasticity is also sub-
stantial and even increasing in certain cases from 1948 through 1963;
and the "t" values are all considerably in excess of the required mini-
mum of 1.67 in each time period. The improvement in the sales-income
relationship between 1958 and 1963 could well be at least partially
a result of the development of the discount house operations. Cer-
tainly much of the growth in these types of outlets occurred since
1958. Of course, the total retail offering of General Merchandise out-
lets extends far beyond these boundaries. These examples simply serve
to help develop tentative explanations and hypotheses regarding the
sales-income relationships experienced in the demand for general mer-
chandise in recent times.

Sales and the Proportion of Nonagricultural Employment

It can be said that the trends observed since 1948 regarding
the relationship between per capita General Merchandise sales and the
proportion of total employment active in nonagricultural occupations
generally parallels that which exists between sales and income. The
simple correlation coefficients are successively larger, the independent

variable becomes significant over time, and the elasticity of the per cent of nonagricultural employment consistently rises.

At least two factors are likely responsible for these trends. First, there undoubtedly exist certain economies of scale for General Merchandise retailers by virtue of operating primarily in nonagricultural, urban areas. These economies often allow relatively lower prices for many of the merchandise offerings. Demand for these goods, then, may be expected to be higher in nonagricultural than in agricultural sectors of the population. A positive relationship between sales and the proportion of nonagricultural employment would, therefore, be expected. A second reason could well relate to greater product availability in urban versus rural areas. General Merchandise Stores, as stated above, tend to be located in areas of high population density. It may be, therefore, that a general lack of availability in the agricultural areas of these types of retail outlets is a contributing factor.

Summary

Mean per capita sales of General Merchandise Group Stores have increased, since 1948, in absolute amounts, but have not increased as a per cent of total retail sales. They have followed a declining pattern as a proportion of per capita personal income.

The r^2 figures have shown significant increases, rising from

a low of .2360 in 1948 to a high of .8051 in 1963. The simple cor-
relation coefficients between sales and income, and between sales and
nonagricultural employment have also risen substantially. The former
increased from .4829 to .8705 between 1948 and 1963, and the latter
from .2144 to .5627 over the same time period.

Income is a very significant variable in each year. The "t"
values range from 4.06 in 1948 to 11.50 in 1963. The per cent of non-
agricultural employment is a significant independent variable only in
the last time period.

The income elasticity is fairly stable at somewhat over .5
during the first three periods, and then jumps to .8569 in 1963.
The elasticity of the proportion of nonagricultural employment has
been rising steadily from -.1835 in 1948 to .7275 in the last year.

A note of caution is set forth in this analysis due to the
wide variety and general lack of homogeneity among the goods sold
through General Merchandise outlets. Precise interpretation of the
derived relationships among the variables is hindered by this condi-
tion. Nonetheless, the strong relationship between sales and income
may be explained, in part, by the fact that many of the goods sold
through these outlets are responsive to income differences, by the
gradual upgrading and broadening of many merchandise lines in recent
years, and by the fact that the correlation coefficients, "t" values,

and income elasticities of certain other retail categories which offer
many of the same items as General Merchandise Group Stores have been
maintained, over time, at relatively high levels.

CHAPTER V

FOOD STORES

This "Kind of Business" classification includes the sales

of: 1) Grocery Stores and Delicatessens; 2) Meat Markets; 3) Fish

Markets; 4) Fruit Stores and Vegetable Markets; 5) Candy, Nut and

Confectionery Stores, and Retail Bakeries.[1]

Per capita personal income and the per cent of nonagricul-

tural employment have been established as the two independent variables

which most significantly affect per capita sales of Food Stores. Ex-

amples of the correlations of Food sales with certain other variables

are: white-nonwhite population (.0149), male-female (-.1185), median

years of school completed (.0492), median age (-.0313), and the number

of food establishments per capita (.1183).

The Variables

Total dollar volume of sales of Food Stores is shown below.

Sales Volume of Food Stores in the
United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$29,207,864	$39,762,213	$49,022,333	$56,817,717

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[1] A complete breakdown of the sales of each of these types
of outlets is presented in the Appendix.

The next table shows per capita Food sales in absolute figures and as a per cent of per capita total retail sales.

Mean Per Capita Sales of Food Stores in Absolute
Terms and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita Sales of Food Stores	Mean Per Capita Sales of Food Stores as a Per Cent of Mean Per Capita Total Retail Sales
1948	$193.60	21.68%
1954	234.40	22.39
1958	270.40	23.70
1963	292.20	22.76

Per capita sales of Food Stores account for the largest share of per capita total retail sales. The only other category which rivals Food as a percentage of total sales is Automotive Dealers, whose per capita sales accounted for approximately 19 per cent of total sales in 1963. Per capita sales of no other category account for as much as 12 per cent of the total.

Food expenditures have maintained a fairly stable relationship with total sales over time. There was a slight rise in per capita total sales in succeeding periods through 1958, and then a slight fall in 1963. Over the sixteen-year period, Food sales have accounted for roughly 22-23 per cent of the total. The rate of growth of per capita Food sales has slowed down, however. The increase from 1948 through 1954 was 21.07 per cent, 15.36 per cent between 1954 and 1958, and 8.06

per cent between 1958 and 1963. The comparable rates of increase for

per capita sales of all retail commodities were 17.24, 9.03 and 12.59

respectively.

The next table shows per capita personal income for each

period and per capita sales of Food retailers as a per cent of income.

Mean Per Capita Personal Income and Mean Per Capita
Food Store Sales as a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Food Store Sales as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	14.36%
1954	1,656	14.15
1958	1,939	13.95
1963	2,313	12.63

In addition to accounting for a larger proportion of per

capita total retail sales than any other category, per capita Food

sales also account for the largest per cent of per capita personal

income. The trend over time declines slightly, with the total fall

from 1948 through 1963 being less than two percentage points.

Correlation Coefficients

The multiple coefficient of determination between per capita

Food sales and the two independent variables was .7941 in 1948, .8166

in 1954, .8024 in 1958, and .6510 in 1963. There was relatively little

change in the r^2 between 1948 and 1958, but the figure for 1963 is considerably lower.

The table below contains the simple correlation coefficients between per capita sales of Food Stores and each of the variables.

Coefficients of Correlation Between Mean Per Capita Sales of Food Stores and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.8630	0.6499
1954	0.8923	0.6998
1958	0.8804	0.5705
1963	0.7874	0.4900

The correlation coefficient for income remains fairly stable during the first three time periods at slightly less than .9 and falls to just under .8 in 1963. The correlation coefficient for the per cent of nonagricultural employment is at the same approximate level in the first two periods, but drops to .5705 in 1958 and .4900 in 1963.

Efficient Estimators

The next table contains the regression coefficients, the standard errors of the estimates, in parentheses, and the "t" values in each of the four time periods.

Regression Coefficients (b), Standard
Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	0.6232 (0.0605)	10.31	0.3779 (0.1144)	3.30
1954	0.5846 (0.0558)	10.47	0.2981 (0.1272)	2.34
1958	0.5859 (0.0489)	11.97	0.3678 (0.1384)	2.66
1963	0.4692 (0.0589)	7.97	0.4473 (0.1816)	2.46

Per capita personal income is obviously a highly significant independent variable in relation to per capita sales of Food Stores. Eating and Drinking is the only other category where the "t" values are consistently as high.

The per cent of nonagricultural employment is also a significant variable, but not to the same degree as income.

The elasticities of each of the variables relative to Food sales also provide valuable insights into the nature and extent of the relationships over time.

Elasticities

The elasticities for Food sales of per capita personal income and the per cent of nonagricultural employment, are shown below.

Elasticities of Mean Per Capita Personal
Income and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.6232	0.3779
1954	0.5846	0.2981
1958	0.5859	0.3678
1963	0.4692	0.4473

The elasticity of income is fairly stable during the first

three periods at approximately .6, and declines to a little under .5

in 1963. The pattern of the elasticities of the per cent of nonagri-

cultural employment is slightly more erratic, falling from .3779 in

1948 to .2981 in 1954, rising in 1958 to approximately the 1948 level,

and increasing to .4473 in 1963.

Analysis

Sales and Per Capita Personal Income

The fact that per capita Food sales have been maintained as

a relatively stable proportion of per capita total retail sales, have

maintained the same approximate percentage relationship with per capita

personal income, and have been characterized by a relatively stable

income elasticity over time, with the exception of 1963, would appear

to be contradictory to established economic theory. Engel, for example,

discovered that as incomes rose, proportionately less was spent for food.[1] There are acceptable explanations, however.

First, it must be remembered that the data analyzed in this study are not sales figures for food alone, but rather all sales of Food Stores. Total Food Store sales have included, over time, a larger and larger amount of non-food sales. "In 1950, (supermarkets) did $200 million in non-food goods. Ten years later, the non-food volume had increased to $2 billion."[2] Not only has the non-food volume been rising rapidly, but the composition of these items has also been changing.

> The supers, after initially slow moves into drugs and notions and housewares, began taking fairly large chunks out of store space for non-food merchandise. The accent was on home goods and variety store merchandise. Recently, soft goods have become important.[3]

There can be little doubt that the changing product mix of Food Stores to include an ever-widening variety of non-food items has allowed per capita sales of Food outlets to remain as a significant

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[1]Paul A. Samuelson, _Economics: An Introductory Analysis_ (New York: McGraw-Hill Book Company, Inc., 2nd edition, 1951), p. 209.

[2]Ed Gold, _The Dynamics of Retailing: Major Trends That Shape the Future_ (New York: Fairchild Publications, Inc., 1963), p. 40.

[3]_Ibid_.

proportion of per capita total retail sales and of per capita personal income.

Second, there have apparently been some changes taking place regarding consumer preferences for certain types of foods. Patterns of food consumption have been undergoing some rather basic changes during the past ten or fifteen years. There have been trends in the national diet away from relatively inexpensive grains and starchy foods to more expensive meats and vegetables.[1] Accompanying these changes in consumer preferences is a marked increase in the availability of certain types of foods, the demand for which is undoubtedly sensitive to changes in the variables considered here. The rapid advances in jet aircraft transportation, for example, have made it possible for persons in Michigan to dine on Maine lobster fresh daily. Such developments, of course, may be expected to lead to higher per capita outlays for food even if the total quantity purchased does not rise.[2]

Third, and perhaps most important of all, is the increased demand for service and convenience accompanying many food purchases. Expenditures on food items are no longer entirely for food alone, but

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[1] Benjamin S. Loeb, "The Use of Engel's Laws As a Basis for Predicting Consumer Expenditures," The Journal of Marketing, Vol. XX, No. 1 (July, 1955), p. 23.

[2] Ibid.

also for a wide variety of types of consumer-convenience. One study

shows that as incomes rise:

> . . . consumers begin to spend their food dollars
> differently. They eat better food . . . but what
> is (more) significant . . . is that they also begin
> to demand a lot of processing in their food . . .
> They want not only good food, but convenience built
> into the food as well; and they are prepared to pay
> for whatever services the food industry can provide.[1]

Therefore, when consumers buy certain food items, they are

paying not only for the food itself, but also for such conveniences as

packaging, semi-prepared mixes, easy-to-open tops, and the like. In

addition, more expensive packaging can be attributed to increased em-

phasis on decorative and reusable containers.

> The relentless pursuit of convenience items has
> been, in many ways the most dramatic change in the
> food market.[2]

Certainly, all of these developments have helped to sustain

the relationship between Food sales, sales of other commodities, and

consumer income.

While it is too early to draw any specific conclusions, the

recent downturn, even though rather slight, in the simple correlation

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[1]"The Fabulous Market for Food," Fortune, October, 1953,
p. 139.

[2]Ibid., p. 271.

coefficients between Food sales and income, and in the income elasti-
city, may be an indication that income will become less and less impor-
tant as an independent variable in relation to food consumption. As
additional data become available, more definitive analysis may be under-
taken in this respect.

Sales and the Proportion of Nonagricultural Employment

The effect of the proportion of nonagricultural employment
on per capita Food sales, while not as significant as that of per capita
personal income, is still meaningful. The fact that changes in the per
cent of nonagricultural employment are positively associated with per
capita increases in the sales of Food Stores can be examined in two
respects.

First, the relationship between type of employment and con-
sumption of home-produced foods is important. One study has shown that
food consumed per capita by agricultural families is much less elastic
with income than that for nonagricultural families. Much of this dif-
ference is attributed to a much greater use of farm-produced foods by
agricultural families. In addition, the use of freezing facilities
has greatly increased the home production and consumption of certain
foods by farm families.[1] Thus, as the proportion of nonagricultural

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[1]Marguerite C. Burk, "Some Aspects of Income-Food Relation-
ships," Journal of the American Statistical Association, Published by
the American Statistical Association, Menasha, Wisconsin, Vol. 53, No.
284, 1958, p. 918.

employment increases, per capita sales of Food Stores would be expected to increase.

Second, it is reasonable to assume that patterns of consumption of food products would differ somewhat between the agriculturally and nonagriculturally employed sectors of the population. Nonagricultural families probably are relatively greater demanders of and take greater advantage of the service, convenience, and processing features of modern-day Food sales. If the nonagriculturally employed do, in fact, consume ready cake mixes, instant mashed potatoes, canned beef stew, and TV dinners, then it is logical that their food expenditures per capita would be higher than the agriculturally employed who buy more of the basic food components and do their own "processing." Thus, a positive relationship between the proportion of nonagricultural employment and per capita sales of Food Stores would be expected.

Summary

Per capita sales of Food Stores have risen since 1948 in absolute terms and have maintained a fairly stable proportion of per capita total retail sales. They declined slightly as a percentage of per capita personal income.

The multiple coefficient of determination experienced little change between 1948 and 1958 at around .8, but fell to under .7 in 1963. The coefficient of correlation between Food sales and income was fairly

stable at slightly less than .9 through 1958, and fell to just under

.8 in 1963. The coefficient of correlation between sales of Food Stores

and the per cent of nonagricultural employment has declined from .6499

in 1948 to .4900 in 1963.

Per capita personal income is a highly significant indepen-

dent variable. The "t" values are greater than 7 in each time period.

The per cent of nonagricultural employment is also significant, but

at a lower level of "t."

The elasticity of the income variable for Food sales was

fairly stable through 1958 at approximately .6, but dropped to under

.5 by 1963. The elasticity of the employment variable is also rela-

tively constant at just under .4.

The close and sustained relationship between per capita

Food sales and per capita personal income has been explained in terms

of the inclusion, over time, of more and more non-food items in the

total offering of Food Stores, the rise in food prices relative to

those of other commodities, changes in the national diet, and the ever-

increasing demand for service and convenience in food purchases. The

relative importance of income does appear to be declining somewhat,

however, in this category.

The association between per capita sales of Food Stores

and the proportion of nonagricultural employment has been examined

in light of the consumption of home-produced foods by agricultural

families, and the differences in the nature of food purchases between

the agriculturally and the nonagriculturally employed.

CHAPTER VI

AUTOMOTIVE DEALERS

This "Kind of Business" classification includes the sales
of: 1) Passenger Car Dealers, Franchised; 2) Passenger Car Dealers,
Nonfranchised; 3) Tire, Battery, Accessory Dealers; and 4) Miscel-
laneous Aircraft, Marine, and Automotive Dealers.[1] It should be
recognized at this point that the sales of Franchised and Nonfran-
chised Passenger Car Dealers account, in each period, for approxi-
mately 90 per cent of total category sales.

Both mean per capita personal income and the mean per cent
of nonagricultural employment have been established as significant
independent variables in relation to per capita sales of Automotive
Dealers since 1948. Other variables considered, and their correla-
tions with Automotive sales, were: white-nonwhite population ratio
(.0246), median years of school completed (.0742), median age (-.0399),
and number of Automotive establishments per capita (.1244).

Total and per capita Automotive sales, and their relation-
ship with per capita total retail sales and per capita personal income
are shown below.

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[1]A complete breakdown of the sales of each of these types
of outlets is presented in the Appendix.

The Variables

The total volume of sales of automotive dealers in the United States is presented below.

Sales Volume of Automotive Dealers
in the United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$20,100,456	$29,914,997	$31,807,877	$45,199,250

Mean per capita Automotive sales, and the relation to per capita total retail sales are shown in the table below.

Mean Per Capita Sales of Automotive Dealers in Absolute
Terms and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita Automotive Sales	Mean Per Capita Automotive Sales as a Per Cent of Mean Per Capita Total Retail Sales
1948	$147.30	16.49%
1954	191.11	18.25
1958	191.60	16.79
1963	244.50	19.04

Per capita sales of Automotive Dealers are second in size only to per capita Food sales. The percentage increase in per capita Automotive sales was a substantial 29.74 per cent between 1948 and 1954, a minor .26 per cent between 1954 and 1958, and 27.61 per cent from 1958 through 1963.

Automotive sales increased from around 16 per cent in 1948 to approximately 18 per cent of per capita total retail sales in 1954, returned to the 1948 level in 1958, and accounted for about 19 per cent in 1963.

The relationship between per capita sales of Automotive Dealers and per capita personal income is shown in the table below.

Mean Per Capita Personal Income and Mean Per Capita
Automotive Sales as a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Automotive Sales as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	10.93%
1954	1,656	11.54
1958	1,939	9.88
1963	2,313	10.57

The trend of the association of Automotive sales with income is much the same as with per capita total retail sales. The proportion of income allocated to per capita Automotive sales rises approximately one-half of one per cent between the first two periods, falls a little less than two per cent by 1958, and then rises in the last time period to approximately the level in 1948.

Correlation Coefficients

The multiple coefficient of determination between the dependent and independent variables was .5764 in 1948, .4950 in 1954, .4097

in 1958, and .2858 in 1963.

The coefficient of correlation between Automotive sales and income, and between Automotive sales and nonagricultural employment appears in the next table.

Coefficients of Correlation Between Mean Per
Capita Automotive Sales and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.5925	-0.7530
1954	0.5760	0.0654
1958	0.4890	-0.1245
1963	0.4720	-0.0296

The correlation between per capita sales of Automotive Dealers and per capita personal income has declined consistently in each period from .5925 to .4720 in 1963. The correlation between sales and the per cent of nonagricultural employment is erratic and confusing. The coefficient is relatively high in 1948 and has a negative sign. In 1954, 1958 and 1963, though, the correlation is negligible.

The results of the EFFEST program give a little better idea of the relative importance of the two variables in relation to Automotive sales.

Efficient Estimators

The table below contains the regression coefficients, the standard errors of the estimates, in parentheses, and the "t" values of each of the four time periods.

Regression Coefficients (b), Standard
Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	0.8852 (0.0920)	9.62	-0.8782 (0.1705)	-5.15
1954	0.6826 (0.0841)	8.12	-0.8101 (0.1885)	-4.30
1958	0.5584 (0.0833)	6.70	-0.9160 (0.2326)	-3.94
1963	0.4096 (0.0775)	5.28	-0.4851 (0.2390)	-2.03

Per capita personal income is obviously a highly significant independent variable. The "t" values range from a high of 9.62 in 1948 to a low of 5.28 in 1963. The per cent of nonagricultural employment is also a significant independent variable. But it is related inversely to per capita Automotive sales. The "t" values range from a high of -5.15 to a low of -2.03.

Elasticities

The elasticities for Automotive sales in each of the periods of per capita personal income and the per cent of nonagricultural

employment are shown in the table below.

Elasticities of Mean Per Capita Personal
Income and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.8852	-0.8782
1954	0.6826	-0.8101
1958	0.5584	-0.9160
1963	0.4096	-0.4851

The income elasticity falls consistently in subsequent periods from .8852 in 1948 to .4096 in 1963. The total decline is nearly five percentage points.

The elasticities of the per cent of nonagricultural employment are much larger than for income and have a negative sign. This means that there is an inverse relationship between per capita Automotive sales and the per cent of nonagricultural employment. The elasticity is fairly stable during the first three time periods, but drops substantially in 1963.

Analysis

Sales and Per Capita Personal Income

The most serious recession in the economy since World War II occurred in 1958. One of the industries which suffered most was the automobile industry. Trends of per capita Automotive sales in

absolute terms and as a proportion of total retail sales and income

reflect this general economic downturn. Between 1954 and 1958, per

capita sales of Automotive Dealers rose only 49 cents, and fell ap-

proximately one and one-half per cent as a proportion of per capita

total retail sales, and as a proportion of per capita personal income.

Aside from the specific effects of the recession on the automobile

market, though, there are some interesting trends which have developed

since 1948 between Automotive sales and income.

The coefficient of correlation has fallen consistently, the

level of the significance of the relationship has steadily declined,

and the elasticity of income has decreased in succeeding periods. Thus,

while income is clearly and importantly associated with Automotive sales

over the entire sixteen-year period, the strength of the relationship

has deteriorated somewhat.

Actually this situation is probably not too surprising for

a number of reasons. For one thing, while it is reasonable to assume

that at fairly low levels of income the responsiveness of automobile

consumption to increases in income would be relatively high, it is not

necessarily plausible to assume the same at higher levels of income.

Once income has risen to a level sufficient to satisfy the initial de-

mand for an automobile, it is not likely that subsequent increases in

income would bring about proportionate increases in per capita Automo-

tive sales. Once a person owns one or two cars, future increases in

income will more than likely be diverted to alternative forms of consumption. In addition, it is the belief of many that the relative importance of automobile ownership as a symbol of status and affluence has been declining. There may be more emphasis, for example, being placed upon the home and its surroundings in this respect. Another factor has undoubtedly been the expansion of credit facilities. Income per se is no longer quite so important in measuring the present capacity to consume, especially for items of relatively high unit value such as automobiles.

Sales and the Proportion of Nonagricultural Employment

Perhaps the most interesting result of this analysis is the nature of the relationship between per capita Automotive sales and the per cent of nonagricultural employment. These two variables are inversely related. The "t" values, which are significant in each period, have a negative sign, as do the elasticities. Thus, as the proportion of total employment active in agricultural pursuits changes, per capita sales of Automotive Dealers would be expected to change in the opposite direction.

One likely explanation of this relationship concerns the sheer number of motor vehicles required in agricultural versus nonagricultural employment activities. Sales of Automotive Dealers, of course, include sales of certain trucks and related farm vehicles such as tractors. It is reasonable to assume that an agriculturally-employed person would

have greater demand for more motor vehicles at any point in time. In addition to an automobile, he would probably own a truck of some sort and a tractor. If he were to shift to some form of nonagricultural employment, he would very likely keep the car but not the truck or tractor. His consumption of motor vehicles would decline by two-thirds. Thus, as the percentage of nonagricultural employment rises, the quantity of motor vehicles consumed per capita would be expected to decline.

Another factor involves the availability of public transportation facilities in urban, nonagricultural areas. While it is true that expenditures per consumer unit on public transportation declined approximately 16.2 per cent between 1950 and 1960,[1] the fact that such transportation is generally available in urban and not in agricultural areas could well affect the demand for automobiles. Related to this is the relatively higher cost of owning and operating a car in the city. While the expense and inconvenience of having an automobile, especially in the congested major metropolitan areas such as New York City, Chicago, Los Angeles, and similar cities, may not cause a person to refrain completely from automobile ownership, it might well cause one to invest less in this type of transportation than would be the case in a rural area.

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[1]Arnold E. Chase, "Changing Patterns of Consumer Expenditures, 1950-1960," American Statistical Association, 1963 Proceedings of the Business and Economic Statistics Section, Washington, 1963, p. 67.

This section should be concluded with a note of caution. In considering the statistical relationships developed and the supporting analysis, particular attention should be given to the periods of time involved. For example, the elasticity in 1958 of the per cent of nonagricultural employment was approximately -.9. Under normal economic conditions, the figure would probably not have been this large. But 1958 was a bad year for the economy as a whole and the automobile industry in particular. Thus, the relationship between an increasing proportion of nonagricultural employment and per capita Automotive sales is overstated. In the same way, the correlation of approximately -.5 in 1963 is probably somewhat understated since this was one of the most profitable years in automotive history. This is not to say that the relationships between automobile sales and the independent variables should be discarded. Rather, they should be accepted with their magnitude discounted somewhat due to external developments in the economy.

Summary

Per capita sales of Automotive Dealers increased in absolute terms in each period from 1948 through 1963 and as a proportion of per capita total retail sales, with the exception of 1958. The relationship in 1958 is undoubtedly strongly influenced by the let-down in the economy in general and the poor sales record for the automobile industry in particular. Automotive sales as a proportion of income have

fluctuated slightly above and below 11 per cent, again, with the exception of 1958.

The r^2 has dropped significantly in each period since 1948. The total decline was from .5764 in the first period to .2858 in 1963. The simple coefficients of correlation between sales and income have also declined over the sixteen-year period from .5925 to .4720. The correlation between sales and the per cent of nonagricultural employment has not followed a consistent pattern, fluctuating from a substantial -.7530 in 1948 to a negligible .0654 in 1954. The coefficients in the last two periods were also very small.

Both of the independent variables are significantly related to Automotive sales according to the "t" test. The "t" values for income range from 9.62 in 1948 to 5.28 in 1963. The "t" statistics for the proportion of nonagricultural employment have a negative sign and range between -5.15 in the first period and -2.03 in the last period.

The income elasticity declines markedly, over time, from .8852 in 1948 to .4096 in 1963. The elasticity of the per cent of nonagricultural employment also follows a downward trend, falling from -.8782 to -.4851 during the same time span.

Any analysis of trends in Automotive sales in recent years must necessarily take total economic activity into consideration. The automotive industry accounts for a relatively large segment of the

Gross National Product, and, therefore, traditionally follows rather closely general fluctuations in the economy.

Nevertheless, the relationship between sales and income, measured by the correlation coefficients, the "t" values, and the elasticities, has diminished over time. These developments have been attributed, in part, to a diversion of expenditures to alternative forms of consumption as income increases once the basic demand for automobile transportation has been satisfied; to a probable decline in the relative importance of the automobile as a symbol of status and affluence; and to the increased availability of credit, reducing, to some extent, dependence upon current income and wealth as requirements for automobile consumption.

The inverse relationship between sales and the per cent of nonagricultural employment is perhaps the most interesting aspect of this particular retail category. This can most likely be explained by the fact that the agricultural sector of the population probably consumes more motor vehicles (including farm vehicles such as trucks and tractors) per capita than the nonagricultural sector; by the fact that public transportation facilities are more readily available in urban, nonagricultural areas; and by the fact that problems involved in owning and operating an automobile in congested metropolitan areas may result in relatively lower per capita expenditures in the city than in agricultural areas.

CHAPTER VII

GASOLINE SERVICE STATIONS

This particular "Kind of Business" classification[1] includes the sales of establishments primarily selling gasoline and other automotive petroleum products. Businesses called garages but deriving the larger part of receipts from gasoline and oil sales are included.

Per capita personal income and the number of motor vehicle registrations per thousand persons[2] were found to be independent variables which are significantly related to Gasoline sales. Correlation coefficients between per capita Gasoline sales and certain other independent variables are: white-nonwhite population ratio (.0280), male-female population ratio (-.1247), median years of school completed (.0870), per cent of total employment in nonagricultural activities (.2013), median age (-.0472), and number of Gasoline establishments per capita (-.1276).

An analysis of the nature of the relationships will follow a presentation of the magnitudes of the variables involved.

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[1]A complete breakdown of the sales of each of these types of outlets is presented in the Appendix.

[2]This variable will sometimes be referred to as the "motor vehicle registration ratio."

The Variables

The total volume of Gasoline Service Station sales in the United States is shown below for each period.

Sales Volume of Gasoline Service Stations in the United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$6,470,153	$10,743,812	$14,178,203	$17,685,763

The data in the next table represent per capita Gasoline sales in dollar terms and as a per cent of per capita total retail sales.

Mean Per Capita Sales of Gasoline Service Stations in Absolute Terms and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita Sales of Gasoline Service Stations	Mean Per Capita Sales of Gasoline Service Stations as a Per Cent of Mean Per Capita Total Retail Sales
1948	$50.01	5.60%
1954	72.27	6.90
1958	87.53	7.67
1963	100.20	7.80

Per capita sales of Gasoline retailers have increased at a faster rate than per capita sales of any of the other retail sales categories. The percentage increases were 44.52 per cent between 1948 and 1954, 21.12 per cent between 1954 and 1958, and 14.48 per cent between 1958 and 1963. It is also true that the sales of only two other retail

sales categories steadily increased as a proportion of per capita total sales. And neither of these two increased at as fast a rate as Gasoline sales.

In the next table, sales of Gasoline outlets are shown as a per cent of per capita personal income.

Mean Per Capita Personal Income
and Mean Per Capita Sales of Gasoline Service
Stations as a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Sales of Gasoline Service Stations as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	3.71%
1954	1,656	4.36
1958	1,939	4.51
1963	2,313	4.63

Not only are per capita Gasoline sales accounting for a larger and larger share of per capita total retail sales, but they also represent an increasing proportion of per capita personal income. This is the only "Kind of Business" classification which consistently accounts for an increase in the share of income.

The other independent variable involved is motor vehicle registrations. The number of motor vehicles registered,[1] per thousand

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[1] These data include registrations for automobiles, trucks, and buses.

persons, in 1948, 1954, 1958 and 1963 was 282, 363, 392 and 439 respec-
tively.[1]

Correlation Coefficients

The multiple coefficient of determination between Gasoline sales and the two independent variables was .8260 in 1948, .7240 in 1954, .7025 in 1958, and .7129 in 1963. The decline in 1954 was approximately one percentage point, with succeeding periods remaining at about that same level.

The table below shows the simple correlation coefficients between Gasoline sales and each of the independent variables.

Coefficients of Correlation Between Mean Per Capita Sales of
Gasoline Service Stations and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Motor Vehicle Registration Per Thousand Persons
1948	0.5124	0.9097
1954	0.4073	0.8320
1958	0.3979	0.7949
1963	0.2923	0.8092

The correlation between sales and income is positive in each

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[1] Highway Statistics, U. S. Department of Commerce, Bureau of Public Roads: Annual Report, 1948, 1954, 1958, and 1963, U. S. Government Printing Office, Washington, D. C.

period and declines steadily from a high of .5124 in 1948 to a low of .2923 in 1963.

The correlation between sales and automobile registrations is also positive and declines consistently through 1958. But the co-efficients are considerably higher than for sales and income. The high is .9097 in 1948 and the low is .7949 in 1958.

Efficient Estimators

The table below contains the regression coefficients, the standard errors of the estimates, in parentheses, and the "t" values.

Regression Coefficients (b), Standard Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Motor Vehicle Registration Per Thousand Persons	
	b	t	b	t
1948	0.1672 (0.0832)	2.01	1.0010 (0.0793)	12.63
1954	0.2662 (0.0660)	4.03	0.6791 (0.0735)	9.23
1958	0.3272 (0.0640)	5.11	0.6699 (0.0725)	9.24
1963	0.2667 (0.0609)	4.38	0.7003 (0.0693)	10.11

With a required minimum "t" value of 1.67 necessary to accept an independent variable as significant in relation to Gasoline sales, per capita personal income obviously qualifies in each period. And

the trend over time is generally upward.

The "t" statistics for the automobile registration ratio suggest an even stronger relationship with Gasoline sales than is the case with per capita personal income. Motor vehicle registrations per thousand persons is a highly significant independent variable with the "t's" ranging from 9.23 to 12.63.

Elasticities

The elasticities for Gasoline sales of per capita personal income and the motor vehicle registration ratio are shown for each period in the next table.

Elasticities of Mean Per Capita Personal Income and Motor Vehicle Registrations Per Thousand Persons

Year	Mean Per Capita Personal Income	Motor Vehicle Registration Per Thousand Persons
1948	0.1672	1.0010
1954	0.2662	0.6791
1958	0.3272	0.6699
1963	0.2667	0.7003

While a one per cent difference in per capita personal income would have resulted in only a .1695 per cent change in per capita Gasoline sales in 1948, the same difference in income in 1954 would have resulted in a .2662 per cent change, .3272 in 1958 and .2667 in 1963. There is no doubt that Gasoline sales have become considerably more

income sensitive over time.

The reverse of the income relationship is found in an analysis of the elasticity of motor vehicle registrations since 1948. The elasticity in the first period was slightly greater than one. There was a marked decline to a little under .7 by 1954, and it remained at that approximate level through 1963. Thus, while the income variable has increased in importance, the significance of the motor vehicle registration ratio appears to have declined.

Analysis

Before the two primary variables of motor vehicle registrations and income are analyzed in relation to Gasoline sales, a comment regarding price trends is in order. According to the Consumer Price Index,[1] prices of Gasoline have risen at a faster rate over time than for all commodities as a group. While it is true that increases in gasoline prices in recent years have not been significantly greater than for all retail goods, some portion of the growth in per capita sales can probably be attributed to this factor.

The relationship of Gasoline sales with motor vehicle registrations per thousand persons is obvious. The relationship with per

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[1] Consumer Price Index: Price Indexes for Selected Items and Groups, U. S. Department of Labor, Bureau of Labor Statistics, Washington, D. C., pp. 4-13.

capita personal income, and the changing importance of both of these variables over time may not be so obvious.

Sales and Automobile Registrations

As one would normally expect, the correlation coefficient between sales and the automobile registration ratio is high in each time period. It is also true, however, that the coefficients decline steadily over time from .9097 in 1948 to .7949 in 1958 and .8092 in 1963. In the same manner, while the "t" values designate vehicle registrations as very highly significant, they are also somewhat lower in later periods. And finally, the elasticity of this variable, while being greater than one in 1948, falls to approximately .7 in 1963. From these data, the conclusion may be drawn that while the registration ratio has been and still is an important independent variable in relation to sales of Gasoline Service Stations, it is probably of declining importance. The reason for this declining importance presents an interesting question. There are at least two factors which may be cited in answer.

One possible factor applies to the nature of the ratio between automobile ownership and gasoline consumption, and the change in the relationship over time. In the past, such as in 1948, when motor vehicle registrations were relatively low, one would normally expect gasoline sales to be rather highly sensitive to changes in the number of registrations. For when a family which did not previously own an

automobile suddenly purchased one, gasoline sales were immediately and

significantly affected. Consumption would obviously rise from zero

to some positive number. Today, however, when approximately forty per

cent of the people in the United States own an automobile, and when

the automobile manufacturers are giving serious attention to the two-

and three-car family, gasoline sales might be expected to be relatively

less affected by increases in registrations. The family which buys

an automobile now very likely already owns one or two. If they increase

their ownership from one to two, it is not very likely that they will

also double the number of miles driven in a given period of time.

Therefore, while the number of automobiles registered by that family

has doubled, the quantity of gasoline purchased has less than doubled.

The ratio, then, between automobile purchases and gasoline purchases

is presumed not to be a constant one.

By this line of reasoning, as per capita automobile ownership

rises, the strength of the relationship with per capita gasoline sales

will weaken, and vehicle registrations will become less and less of

a dependable indicator of gasoline consumption. While this analysis

seems intuitively plausible, it is offered only as a tentative explana-

tion or hypothesis unsupported by factual evidence.

It should also be noted that one problem inherent in this

analysis is that the dependent variable, per capita sales of Gasoline

Service Stations, is expressed in dollar terms, while the independent

variable, motor vehicle registrations per one thousand persons, is expressed in units of physical volume. An alternative would have been to use per capita vehicle sales as the independent variable. But, of course, this would have presented the serious limitation of accounting for only new and used vehicle sales in each period and not the total stock of motor vehicles. The latter seemed to be the better indicator of the demand for gasoline.

Since per capita gasoline sales have made substantial gains since 1948, and have consistently represented a larger and larger share of per capita total retail sales and per capita personal income, it is reasonable to assume that there might be some other variable whose influence is becoming more and more significant relative to gasoline sales. One such variable appears to be per capita personal income.

Sales and Per Capita Personal Income

In 1948, per capita personal income was barely a significant independent variable, with a "t" value of 2.01. By 1954, the "t" had risen to 4.03. The values for 1958 and 1963 were 5.11 and 4.38 respectively. The trend of these figures leaves no doubt that the importance of this variable, in relation to gasoline demand, has risen considerably. Though the significance of this variable has increased in recent years, measured by the "t" statistics and the elasticity, which has risen to a level approximately fifty per cent higher than in 1948, it should be noted at this point that the total impact of income on the demand

for gasoline remains relatively minor. The magnitudes of the simple
correlation coefficients and the elasticities are relatively small.
Nevertheless, the association between income and gasoline sales needs
to be explored if for no other reason than to hypothesize trends
which might possibly be expected to develop in the future.

The very close interdependency between income, motor vehicle
consumption, and Gasoline sales should be mentioned at this point.
The two independent variables cannot realistically be separated in
terms of their effect upon Gasoline retailers. Per capita personal
income is obviously an important variable in any time period relative
to Gasoline sales. For, as seen in the preceding chapter, income is
a prime determinant of per capita automobile sales, which, in turn,
is a highly significant factor in Gasoline sales. Therefore, when it
is stated that in certain periods vehicle registrations are much more
highly influential in the sales of Gasoline Service Stations than in-
come, it must be remembered that the number of registrations is highly
dependent upon the level of per capita personal income. An attempt
is made here to assess the relative importance of income in addition
to the effect of motor vehicle registrations upon Gasoline sales.

It is entirely possible that the increasing importance of
per capita personal income is, in large part, a reflection of an in-
crease in leisure time, increased emphasis on recreational activities,
a rising interest in travel, and development of state highway programs

and complementary facilities such as state parks, roadway rest stops, etc. Apparently, once the level of income exceeds that required to satisfy the need for one or more automobiles, it begins to emerge as a significant separate determinant of per capita Gasoline sales, over and above the obvious relationship with automobile consumption. As earnings become higher and work weeks shorter, persons find heretofore unavailable or unattainable consumption alternatives open to them. There is adequate time and money to result in increased demand, for example, for travel and recreation. In response, many states have allocated increased effort toward improving their highway systems and related facilities to accommodate the driving public. These trends will very likely continue to have a significant effect upon Gasoline consumption.

Summary

Per capita sales of Gasoline Service Stations have consistently increased in absolute terms, as a per cent of per capita retail sales, and as a proportion of per capita personal income since 1948. In fact, this category has experienced greater relative gains than any of the other "Kind of Business" classifications.

The r^2 dropped from about .8 in 1948 to around .7 in the last three periods. The coefficient of correlation between sales and per capita personal income is considerably less than that between sales and automobile registrations, though they both follow a declining

pattern over time.

While per capita personal income is a significant variable in each time period, the level of significance rises substantially from 1948. The variable, motor vehicle registrations per thousand persons, is considered as highly significant in each period.

The elasticity of per capita personal income rises steadily from a low of .1672 in 1948 to .3272 in 1958 and then falls slightly to .2667 in 1963. By contrast, the elasticity of the registration ratio falls from a high of 1.001 in 1948 to around .7 in 1963.

A comparison of the price indexes over time shows that the price of gasoline has risen at a faster rate than the average of all commodities as a group. Increases since 1954, however, have not been significantly greater for the Gasoline category.

Reasons cited for the strong relationship between Gasoline sales and vehicle registrations in early periods and a subsequent decline in the association in succeeding years are an increasing ratio between population and registrations over time and the likelihood that multiple car ownership is not accompanied by a proportionate increase in gasoline consumption.

The rise in per capita personal income beyond the levels required to satisfy the demand for automobiles, the increase in leisure time, and the accompanying rise in demand for leisure-type

consumption such as travel are very likely responsible for the closer relationship during the past few years between Gasoline sales and per capita personal income.

CHAPTER VIII

APPAREL AND ACCESSORY STORES

This "Kind of Business" classification[1] includes the sales
of: 1) Men's and Boys' Clothing Stores; 2) Men's and Boys' Furnish-
ings Stores; 3) Women's Clothing and Specialty Stores; 4) Women's
Ready-to-Wear Stores; 5) Family Clothing Stores; 6) Shoe Stores; and
7) Children's and Infants' Wear Stores.

Through the EFFEST analysis, two independent variables, per
capita personal income and the proportion of total employment active
in nonagricultural occupations, were established as being the most sig-
nificant in relation to per capita sales of Apparel Stores. The cor-
relation of Apparel sales with certain other independent variables
initially considered are: white-nonwhite population ratio (.0183),
male-female population ratio (-.1001), median years of school completed
(.0561), median age (-.0025), and number of Apparel Stores per capita
(-.0948).

A brief presentation of the magnitude and the underlying
trends of the variables between 1948 and 1963 precedes a more specific

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[1] A complete breakdown of the sales of each of these types
of outlets is presented in the Appendix.

treatment of the relationships.

The Variables

The total volume of Apparel Store sales is shown in the table below during each time period.

Sales Volume of Apparel and Accessory
Stores in the United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$9,716,795	$11,078,209	$12,525,451	$14,161,590

Mean per capita Apparel sales for the forty-nine states, and their relationship, over time, to per capita sales of all types of retail outlets are shown below.

Mean Per Capita Sales of Apparel Stores in Absolute
Terms and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita Apparel Store Sales	Mean Per Capita Apparel Store Sales as a Per Cent of Mean Per Capita Total Retail Sales
1948	$59.16	6.62%
1954	61.28	5.85
1958	66.16	5.80
1963	69.25	5.39

The figures in the table above are evidence of a rather slow increase in per capita Apparel sales in dollar terms, and a steady decline as a share of per capita total retail sales. The percentage fall

is not substantial over the sixteen-year time span, but is consistent nevertheless.

The next table includes per capita personal income data during each period, and shows the relationship between Apparel sales and income.

Mean Per Capita Personal Income and Mean Per Capita Sales
of Apparel Stores as a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Apparel Sales as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	4.39%
1954	1,656	3.70
1958	1,939	3.41
1963	2,313	2.99

Per capita Apparel sales bear about the same relationship to income as to per capita total retail sales. The share of per capita personal income allocated to per capita sales of Apparel Stores has declined in each succeeding time period since 1948. Whereas Apparel sales accounted for over four per cent of income in the first period, the figure fell to slightly less than three per cent by 1963.

Correlation Coefficients

The coefficient of determination between per capita Apparel sales and the two independent variables was .7519 in 1948, .6855 in

1954, .5997 in 1958, and .5746 in 1963. While these figures represent-

ing the association between the variables are relatively large, it is

also apparent that they consistently decline in magnitude from 1948

through 1963.

The table below contains the simple correlation coefficients

between Apparel sales and each of the independent variables.

Coefficients of Correlation Between Mean Per
Capita Sales of Apparel Stores and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.7959	0.7171
1954	0.8088	0.6696
1958	0.7624	0.4880
1963	0.7519	0.4032

The correlation between sales and income remains fairly con-

stant over time, at a little under .8. The relationship between sales

and the proportion of nonagricultural employment is quite different,

however. The correlation coefficients decline markedly from a high

of approximately .7 in 1948 to a low of around .4 in 1963. While the

strength of the association between sales and income has been maintained,

the same cannot be said for sales and nonagricultural employment.

Efficient Estimators

Below are shown the coefficients of regression, the standard

errors of the estimates, in parentheses, and the "t" statistics for each of the independent variables, from 1948 through 1963.

Regression Coefficients (b), Standard
Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	0.7193 (0.0848)	8.48	0.8910 (0.1653)	5.39
1954	0.7440 (0.0942)	7.90	0.5823 (0.2219)	2.63
1958	0.7587 (0.0940)	8.08	0.4721 (0.2734)	1.73
1963	0.6696 (0.0847)	7.90	0.3396 (0.2673)	1.27

Per capita personal income is obviously a highly significant independent variable in relation to Apparel sales. The "t" values remain at approximately eight, over time. The proportion of nonagricultural employment is also an important variable, but only in the first two time periods. The "t" statistics decline steadily until they fall below the required 1.67 in 1963.

Elasticities

The next table contains the elasticity of income and the per cent of nonagricultural employment in each period.

Elasticities of Mean Per Capita Personal
Income and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.7913	0.8910
1954	0.7440	0.5823
1958	0.7587	0.4721
1963	0.6696	0.3396

The income elasticity remains relatively stable from 1948 through 1958 at somewhat above .7, and then drops to slightly below .7 in 1963. The pattern of the elasticity of the per cent of nonagricultural employment, however, is more dramatic. The figure was a substantial .8910 in the first time period, but fell in each succeeding period to a low of .3396 by 1963. Thus, while the relationship, in terms of elasticity, is fairly constant, over time, between sales and income, it follows a deteriorating trend for sales and the proportion of nonagricultural employment.

Analysis

Sales and Per Capita Personal Income

The association between per capita sales of Apparel Stores and per capita personal income has generally been stable over the time span analyzed. Although proportionately less personal income has been allocated for Apparel expenditures, the simple correlation coefficient has not declined, the "t" values are consistently large, and the

elasticity has not fallen substantially. Actually, although the total

decline in the income elasticity was from .7913 to .6696, it should

be recognized that most of this fall occurred between the last two time

periods. This may, however, be an indication of marked reductions in

the elasticity of the future.

A recent study by Arnold E. Chase of the Bureau of Labor

Statistics notes only a moderate rise in absolute consumer expendi-

tures for clothing from 1950 to 1960.[1] Another study by Benjamin S.

Loeb reports a proportional decline in clothing expenditures.[2]

The data used in these studies are not strictly comparable

with that in this research, but are consistent enough to be applicable.

The Chase and Loeb analyses are concerned with consumer expenditures

for wearing apparel, while this research involves all the sales of Ap-

parel Stores. The approaches, however, may be considered sufficiently

alike to warrant comparison. An analysis of per capita sales of Apparel

Stores supports the finding that sales of apparel have risen only mod-

erately in recent years. The increase in apparel sales was 3.58 per

cent between 1948 and 1954, 7.96 per cent between 1954 and 1958, and

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[1] Chase, loc. cit.

[2] Loeb, op. cit., p. 20.

4.67 per cent from 1958 through 1963. Per capita sales increases for all retail goods during the same time periods were 17.24 per cent, 9.03 per cent, and 12.59 per cent respectively.

The data contained in the first two tables of this chapter tend to support the Loeb thesis of a proportional decline in clothing expenditures, with per capita sales of Apparel Stores accounting for a smaller per cent of per capita total retail sales and a reduced share of per capita personal income in each succeeding period. One possible cause for this proportional decline in clothing expenditures may be due to an apparent trend toward informality in dress which tends to reduce the demand for costlier types of clothing.[1] Another factor could be the introduction in recent years of new and improved fabrics which replace more expensive silks and wools.[2] An additional possibility involves the higher proportion of infants and oldsters in the population with relatively smaller clothing needs.[3]

It is interesting to note that though proportionate apparel expenditures have fallen, the income elasticity has been relatively stable over time. One might expect that once the basic clothing needs

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[1]Ibid., p.23

[2]Ibid.

[3]Ibid.

are satisfied, plus a certain amount of spending beyond that which is

absolutely necessary, not only would proportional apparel expenditures

be lower, but the income elasticity might decline somewhat as well.

One reason for the stability of the elasticity may be the importance

attached to wearing apparel as a symbol of status and well-being.

Another might be the significance of style and fashion trends influenc-

ing the discretionary dollar. As has been pointed out, there has been

an apparent trend in recent years toward informality of dress. But

the types of clothing items which are involved in this trend could well

be ones which are relatively more sensitive to income changes. Another

likely related factor is the improved merchandising efforts and effec-

tiveness of apparel retailers. And finally, while it is true that there

are more infants and oldsters in the population, there also has been

some degree of change in the age and income distribution in favor of

the teen-age group where clothes-consciousness is particularly acute.

Sales and the Proportion of Nonagricultural Employment

It must be realized that while income is an important vari-

able, it alone will not suffice in understanding and explaining con-

sumption trends. Most marketing analysts agree that:

> . . . it is clear that the swiftness and fundamental
> character of social and economic changes have often
> more than counterbalanced the effect of changed in-
> come on expenditures.[1]

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[1] Ibid., p. 24.

One such change, whether classified as social or economic or both, which has been identified as being importantly related to per capita sales of Apparel Stores is the increase in the proportion of nonagricultural employment. It is interesting to note, however, that this variable appears to be of declining importance over time. The coefficient of correlation with sales has fallen consistently, the "t" values fall until they become not significant, and the elasticity declines steadily from 1948 through 1963.

There are probably many factors which have influenced this pattern. Two possibilities are presented here. The first involves changes in buying habits over time, and the second relates to product availability.

It is entirely possible, even likely, that persons employed in agricultural occupations have, over time, experienced gradual changes in their buying habits for many types of goods, including clothing. In the early stages of this analysis, the late nineteen forties, the differences in apparel consumption patterns between agriculturally and nonagriculturally employed persons were probably considerably more marked than they are today. Farmers very likely limited the bulk of their clothing purchases to the basic essentials required to carry out their work activities. These would include such items as overalls, boots, work pants, gloves, etc., which were relatively inexpensive and for which there was little variety. The nature and amount of social

activity was limited such that other types of dress were not required.
Over time, however, the dichotomy between the urban and rural segments
of society has probably tended to become less clear. Social differences
have been reduced and common interests and activities have emerged.

In effect, it might be argued that the agriculturally employed
have become more urbanized in certain respects. Their interests have
broadened and their tastes have changed to coincide more and more with
their nonagricultural counterpart. If this has in fact been the case,
it is reasonable to assume that consuming habits for apparel have like-
wise been altered. Rural segments of the population tend to purchase
more suits, ties, dress shirts and shoes, etc., today than in the past.
Whereas distinct lines could likely have been drawn in previous years
regarding clothing expenditure patterns for agriculturally versus non-
agriculturally employed persons, the same is not so true today. These
two sectors have, in effect, become much more similar in this respect.
The division between these two types of employment has, therefore, be-
come less meaningful and less reliable as an independent variable in
relation to per capita apparel sales.

While percentage increases in favor of nonagricultural employ-
ment were significantly related to sales of Apparel Stores in the past,
the relative importance has declined considerably over time. It is
hypothesized that the increased degree of commonness between these two
groups is, in part, responsible for this development. Included here

is the fact that in previous times most of the clothing purchases by agriculturally employed persons were probably made at the nearby general store, which usually offered limited product lines in terms of price, variety, styles, etc. Today, however, this situation has changed significantly. Department store and clothing store operations have expanded their outlets to rural areas such that a much greater product choice is available to the local buyers. Shifts to nonagricultural urban areas are, therefore, no longer accompanied by a new and different set of consumption alternatives for clothing. In addition, it may also be that improved transportation facilities have allowed an extension of the market area which may be practically reached by the agricultural sector. The net result of these developments is that while the trend toward nonagricultural forms of employment continues, its effect on clothing expenditures is negligible.

Summary

Mean per capita sales of Apparel Stores have risen rather slowly in absolute terms and have fallen in relation to mean per capita total retail sales and mean per capita personal income from 1948 through 1963.

The r^2 figures have fallen consistently over time from .7519 in 1948 to .5746 in 1963.

The simple correlation coefficients between sales and income have remained relatively stable since 1948, fluctuating around .8.

The r for sales and the per cent of nonagricultural employment has

steadily declined from a high of .7171 in 1948 to a low of .4032 in

1963.

Income is a highly significant independent variable in re-

lation to sales of apparel, with the "t" values fluctuating in a nar-

row range above and below eight. The proportion of nonagricultural

employment is a significant variable in 1948, 1954, and 1958. The

"t" statistics are 5.39, 2.63, and 1.73 respectively. The variable

is not significant in 1963.

The income elasticity is fairly stable through 1958 at

slightly less than .8. The figure for 1963 is .6696. The elasticity

of the per cent of nonagricultural employment follows quite a differ-

ent pattern, declining in succeeding time periods from .8910 in 1948

to .3396 in 1963.

Data generated in this analysis support the findings of

other studies citing a moderate rise in absolute terms and a propor-

tional decline in clothing expenditures. Some of the factors which

could be responsible for the trends observed are a movement toward

informal dress, introduction of new, less expensive fabrics, and a

larger proportion of very young and very old persons in the population.

The fact that income, in terms of correlation coefficients, "t" values,

and elasticity remains strongly associated with the demand for wearing

apparel may be a result of the importance of clothing as a symbol of affluence and well-being, the impact of style and fashion trends, the income sensitivity of many informal types of apparel, improved merchandising effectiveness in recent years, and the influence of the teen-age population.

The per cent of nonagricultural employment is a significant independent variable in the first two time periods but not in the last two. The diminished importance of this variable in relation to apparel sales may be attributed, in part, to the increased similarity of agricultural and nonagricultural buying patterns, over time. The trend toward nonagricultural occupations no longer has a meaningful effect on the demand for clothing. In addition, expansion of merchandise outlets to rural areas and improved transportation facilities into urban shopping locations have undoubtedly increased the availability of a wide variety of clothing items to agriculturally employed persons, further minimizing the distinction between the employment sectors.

CHAPTER IX

FURNITURE, HOME FURNISHINGS, AND EQUIPMENT STORES

This "Kind of Business" category includes the sales of: 1) Furniture and Home Furnishings Stores; 2) Household Appliance Stores; 3) Radio and Television Stores; and 4) Music Stores.[1]

In this particular retail sales classification, per capita personal income and the proportion of those employed in nonagricultural occupations are considered as independent variables in relation to the sales of Furniture retailers. Examples of the correlation coefficients of Furniture sales with other variables which are not considered as important are: white-nonwhite population ratio (.1025), male-female population ratio (-.1388), median years of school completed (.0876), median age (-.0531), and number of Furniture establishments per capita (-.1360).

The Variables

The total sales volume of all Furniture establishments in the United States in each time period is contained in the table below.

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[1]A complete breakdown of the sales of each of these types of outlets is presented in the Appendix.

Sales Volume for Furniture, Home Furnishings, and
Equipment Stores in the United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$6,592,378	$8,994,332	$10,074,227	$10,882,475

Per capita Furniture sales and their relationship to per

capita sales of all types of retail goods are presented in the next

table.

Mean Per Capita Sales of Furniture Outlets in Absolute
Terms and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita Sales of Furniture Outlets	Mean Per Capita Sales of Furniture Outlets as a Per Cent of Mean Per Capita Total Retail Sales
1948	$43.96	4.92%
1954	52.04	4.97
1958	54.62	4.79
1963	55.28	4.31

Per capita sales of Furniture retailers rose rather sharply

from 1948 to 1954 and have risen at a moderate rate since then. As

a proportion of total retail sales, Furniture has maintained a fairly

steady relationship at slightly less than 5 per cent.

The next table depicts the proportions of per capita personal

income allocated to Furniture sales in each of the four time periods.

Mean Per Capita Personal Income and Mean Per Capita Sales of
Furniture Outlets as a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Sales of Furniture Outlets as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	3.26%
1954	1,656	3.14
1958	1,939	2.82
1963	2,313	2.39

The data show that even though per capita Furniture sales
are a relatively constant percentage of total retail sales, they are
a declining proportion of per capita personal income, falling from
3.26 per cent in 1948 to 2.39 per cent in 1963.

Correlation Coefficients

The coefficient of determination for the sales of Furniture
establishments and both of the independent variables combined was .6838
in 1948, .7586 in 1954, .6943 in 1958, and .6221 in 1963. The trend
is not consistent, having risen in 1954, fallen almost to the 1948
level in 1958, and declined slightly again in 1963.

The table below contains the simple correlation coefficients
between Furniture sales and per capita personal income, and Furniture
sales and the per cent of nonagricultural employment.

Coefficients of Correlation Between Mean Per Capita
Sales of Furniture Stores and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.8170	0.5454
1954	0.8686	0.6248
1958	0.8325	0.4337
1963	0.7840	0.4075

The correlation between per capita sales of Furniture dealers and per capita personal income is positive, relatively high, and fluctuates somewhat over time at around .8. The correlation between Furniture sales and the proportion of nonagricultural employment is also positive, but the coefficients are lower and not so stable. The range is from a high of .6248 in 1954 to a low of .4075 in 1963.

Efficient Estimators

In addition to the multiple coefficients of determination and the simple correlation coefficients, the EFFEST analysis provides useful information in understanding the relationships between the variables.

The next table shows the regression coefficients, the standard errors of the estimates, in parentheses, and the "t" statistics.

Regression Coefficients (b), Standard
Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	0.7350 (0.0832)	8.83	0.2633 (0.1481)	1.78
1954	0.8363 (0.0833)	10.04	0.1780 (0.1830)	.97
1958	0.8855 (0.0854)	10.37	0.1169 (0.2341)	.50
1963	0.7780 (0.0869)	8.95	0.2468 (0.2652)	.94

The value of "t," for per capita personal income, exceeds

the required 1.67 for the correlation to be significant by a substan-

tial amount in each period.

The proportion of nonagricultural employment is barely a

significant variable in relation to the sales of Furniture retailers

in 1948, but not in the last three periods. The "t" values ranged from

a high of 1.78 in 1948 to a low of .50 in 1958. While the employment

variable was significant at the 5 per cent confidence level in the first

period, it is apparent that from 1954 on, the regression coefficients

fell and the standard errors of the estimates rose such that "t" became

almost infinitely small.

Elasticities

The income and employment elasticities for Furniture sales

for each time period are shown in the next table.

Elasticities of Mean Per Capita Personal
Income and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.7350	0.2633
1954	0.8363	0.1780
1958	0.8855	0.1169
1963	0.7780	0.2468

The elasticity of income is positive and relatively large in each period. There was a rather substantial increase between 1948 and 1954, however, from .7350 to .8363. From 1954 on, the elasticity leveled off, and even fell a little to slightly below .8 in 1963. Accompanying the significant increase in the income elasticity between 1948 and 1954 was an 18.4 per cent rise in per capita expenditures for Furniture, et al. The increase in per capita total retail sales during the same time period was approximately 17 per cent.

The elasticity of the per cent of nonagricultural employment follows quite a different pattern. The figures are all positive, but are relatively small and fluctuate from a low of .1169 in 1958 to a high of .2633 in 1948.

There are several factors which may help to explain these developments.

Analysis

Sales and Per Capita Personal Income

First, the marked change from 1948 to 1954 may be partly a result of the housing shortage after the War. This short supply was particularly acute for higher priced homes, the consumption of which may be expected to lead to the purchase of many Furniture and Home Furnishing items having a relatively high income elasticity. This housing shortage was overcome by 1954, and could well be a factor causing the sales-income relationship to be substantially higher in 1954 than in the previous period.

Second, it may be argued that there has been, in recent years, increased interest in and emphasis upon furniture and other home furnishings as visible symbols of affluence. The home itself has apparently been gaining in importance as a symbol of status and success, and complementary retail goods have thus been able to maintain a relatively strong association with income.

In addition to the importance attached to the home, the increase in the number of homes has undoubtedly affected the sales of Furniture and related items. The number of households in the United States increased 23.30 per cent between 1950 and 1960.[1]

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[1] *U. S. Statistical Abstract: 1961*, U. S. Department of Commerce, U. S. Government Printing Office, Washington, D. C., p. 40.

Third, the kinds of retail outlets included in this parti-
cular sales category have consistently expanded their product lines
to include such types of goods as household appliances, radio and tele-
vision equipment, music store items, etc. In addition, there has been
a consistent stream of technological developments producing such com-
modities as air conditioning units, home freezers, disposals, color
television sets, and the like, sold by Furniture retailers.

Fourth, the fact that sales of Furniture outlets showed sig-
nificant gains in terms of income elasticities, "t" values, and cor-
relation coefficients in the early stages can be explained, in part,
by the fact that:

> . . . purchases of such items probably were
> abnormally high in 1950, both because of pent-
> up demand accumulated during WW II, and scare-
> buying set off by the outbreak of the Korean
> conflict.[1]

And the leveling off in these respects of per capita sales
and income elasticity in the later periods is partially a result of:

> . . . the trend in recent years toward more builder-
> installation of equipment in new houses. . . While
> the total demand for such equipment may not be changed
> by this development, or it may even increase; it shows

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[1]Chase, loc. cit.

up in the purchase price of houses, or in rents, rather than in direct consumer purchases . . .[1]

Finally, it should be pointed out that:

Nearly stable prices for house-furnishings and equipment, while prices for nearly everything else were rising substantially, helped to reduce their share of consumption expenditures.[2]

Total sales figures for any type of retail establishment are, of course, influenced by price changes. Higher sales figures in succeeding time periods do not necessarily imply higher levels of per capita consumption, but may be solely a result of rising prices. In this Furniture category, it is apparent that the leveling off of per capita sales in recent years is, in part, a function of relatively stable prices for household furnishings and related equipment.

Sales and the Proportion of Nonagricultural Employment

The variable, the proportion of total employment nonagriculturally employed, is significantly related to the sales of this "Kind of Business" classification only in 1948. The "t" values are all less than the required 1.67 in 1954, 1958 and 1963. There is probably no reason to expect otherwise. The sales of Furniture Stores are not

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[1] Ibid.

[2] Ibid., p. 68.

employment elastic, and the coefficient of correlation is much lower between sales and nonagricultural employment than between sales and per capita personal income. It seems unlikely that the demand for most of the goods included in this category would differ substantially among various types of employment. While the nonagriculturally employed urban population may well have relatively greater demand for certain commodities offered through radio, television and music stores, all of which are included in the sales of this Furniture category, they account for a small proportion of aggregate sales. It is unlikely, therefore, that significant differences would show up among employment groups regarding the sales of Furniture retailers.

<u>Summary</u>

Per capita sales of Furniture, Home Furnishings, and Equipment Stores rose 18.38 per cent between 1948 and 1954, and have continued to increase at a moderate rate in succeeding years. They have declined only slightly as a proportion of all retail sales over time, but have fallen rather substantially as a per cent of per capita personal income.

The trend in the multiple coefficients of determination has been inconsistent, varying from a low of .6221 in 1963 to a high of .7586 in 1954.

The correlation coefficient of Furniture sales and per capita

personal income has remained relatively stable since 1948, fluctuating
within a fairly narrow range above and below .8.

The correlation coefficients of Furniture sales and the per
cent of nonagricultural employment are positive in each period and not
so stable. There was a rise in r from .5454 to .6248 between 1948 and
1954; a fall to .4337 in 1958; and a fall to .4075 in 1963.

The variable, per capita personal income, is significant,
with "t" being greater than eight in all four periods. The per cent
of nonagricultural employment is a significant variable in relation
to Furniture sales only in 1948. The "t" value falls from 1.78 in 1948
to .97, .50, and .94 in the last three periods.

Major factors cited as likely affecting the importance of
income in relation to per capita Furniture sales, especially in the
early periods, are the housing shortage after World War II, increased
emphasis upon the home and home furnishings as visible signs of affluence,
the increased number of homes, expansion of product lines of Furniture
retailers, technological developments responsible for many new products,
abnormally high purchases around 1950 due to pent-up demand accumulated
from the War, and scare-buying prompted by the Korean conflict. The
leveling off of sales in the later periods is partially a result of
the trend to builder-installation of equipment in new homes.

The per cent of nonagricultural employment is barely above
the minimum level of significance of 1.67 in 1948. The variable is
judged not significant in the final three time periods. It is as-
sumed that there is really no reason to expect that the demand for
Furniture and related items would differ substantially among types
of employment.

CHAPTER X

EATING AND DRINKING PLACES

This "Kind of Business" classification includes the sales
of: 1) Restaurants, Lunchrooms, and Cafeterias; 2) Refreshment
Stands; and 3) Drinking Places (alcoholic beverages.)[1]

Per capita personal income has been determined to be a
highly significant variable in relation to the sales of Eating and
Drinking Places. The per cent of nonagricultural employment, with
the exception of the period 1954, is not a significant independent
variable. The correlation coefficients between per capita Eating and
Drinking sales and certain other independent variables initially con-
sidered are: white-nonwhite population ratio (.0730), male-female
population ratio (-.1003), median years of school completed (.1299),
median age (-.0333), and the number of Eating and Drinking Establish-
ments per capita (-.1263).

Sales volume data, for each of the four time periods, in
total and per capita form, and their relationship with per capita to-
tal retail sales and per capita personal income are presented below.

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[1] A complete breakdown of the sales of each of these types
of outlets is presented in the Appendix.

The Variables

        Total dollar sales figures for Eating and Drinking establishments are shown below.

<div align="center">

Sales Volume of Eating and Drinking Places
in the United States in 1948, 1954, 1958, 1963
(000)

</div>

1948	1954	1958	1963
$10,645,417	$13,101,051	$12,210,481	$18,286,478

        Per capita Eating and Drinking sales in dollar amounts and as a per cent of per capita total retail sales are shown in the next table.

<div align="center">

Mean Per Capita Sales of Eating and
Drinking Places in Absolute Terms and as
a Per Cent of Mean Per Capita Total Retail Sales

</div>

Year	Mean Per Capita Sales of Eating and Drinking Places	Mean Per Capita Sales of Eating and Drinking Places as a Per Cent of Mean Per Capita Total Retail Sales
1948	$69.39	7.77%
1954	76.49	7.31
1958	80.62	7.07
1963	90.25	7.03

        There has been an upward trend in per capita sales since 1948. The gain was 10.23 per cent between 1948 and 1954, 5.40 per cent between 1954 and 1958, and 11.94 per cent between 1958 and 1963. In common with most of the other types of retail establishments, per capita sales of

Eating and Drinking Places have been declining slightly as a proportion of per capita total retail sales.

The data in the next table represent per capita Eating and Drinking sales as a per cent of per capita personal income over time.

Mean Per Capita Personal Income and Mean
Per Capita Sales of Eating and Drinking Places
as a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Sales of Eating and Drinking Places as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	5.15%
1954	1,656	4.62
1958	1,939	4.16
1963	2,313	3.90

As is the case in relation to total sales, per capita sales of Eating and Drinking Places have consistently fallen as a percentage of per capita personal income. This trend is in common with most of the other retail categories.

Correlation Coefficients

The multiple coefficients of determination were .7769, .7581, .7842 and .7780 in 1948, 1954, 1958 and 1963 respectively. There is very little fluctuation in the coefficient over time, which remains at approximately .78.

The correlation coefficients between sales and each of the variables individually are presented below.

Coefficients of Correlation Between Mean Per Capita Eating and Drinking Sales and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.8800	0.4296
1954	0.8414	0.3914
1958	0.8698	0.2761
1963	0.8643	0.2032

The correlation between Eating and Drinking sales and per capita personal income is relatively high and stable between 1948 and 1963 at slightly less than .9. The correlation between sales and the per cent of nonagricultural employment, however, has fallen substantially over time from .4296 in 1948 to .2032 in 1963.

Efficient Estimators

The significance of the variables used in this analysis was measured through the use of the logarithmic EFFEST program, and the results are shown in the table below.

Regression Coefficients (b), Standard Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	1.304 (0.1218)	10.71	-0.0964 (0.2381)	-0.39

1954	1.328 (0.1226)	10.84	-0.7570 (0.2892)	-2.62
1958	1.213 (0.0992)	12.23	-0.4418 (0.2901)	-1.52
1963	1.265 (0.1024)	12.35	-0.5632 (0.3241)	-1.74

The "t" values of per capita personal income are among the highest recorded for any of the retail categories, indicating the high degree of significance of this variable in relation to the per capita sales of Eating and Drinking Places.

The significance of the per cent of nonagricultural employment is not nearly so substantial or stable as income. In fact, this variable, according to the "t" test, is significant only in 1954 and 1963. The most interesting feature here is the negative sign attached to the "t" values, indicating an inverse relationship between sales of Eating and Drinking establishments and the per cent of nonagricultural employment.

Elasticities

A brief presentation and discussion of the elasticities of these variables and their change in succeeding time periods will enhance an understanding of the underlying relationships between sales and the independent variables.

The income and nonagricultural employment elasticities for Eating and Drinking sales are shown below.

Elasticities of Mean Per Capita Personal
Income and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	1.304	-0.0940
1954	1.328	-0.7570
1958	1.213	-0.4418
1963	1.265	-0.5632

With the exception of the Lumber, Building Materials, Hardware, and Farm Equipment Dealers category in 1948 and 1954, this is the only retail "Kind of Business" classification with an income elasticity of greater than one. It is the only category where the elasticity exceeds one in all four time periods. The elasticities are also relatively stable at around 1.3 over time.

The elasticity of the per cent of nonagricultural employment follows quite a different pattern. The elasticity jumps from less than .1 in 1948 to a minus .7570 in 1954; to -.4418 in 1958, and -.5632 in 1963.

Analysis

Sales and Per Capita Personal Income

It is somewhat surprising to note the rather meager increase in per capita sales of Eating and Drinking Places during the past sixteen years. Relative to many other types of consumer retail sales,

Eating and Drinking sales have enjoyed relatively small percentage
increases in succeeding periods since 1948, which is ". . . contrary
to the general impression that people are eating out more."[1]

The percentage increases in per capita sales of Eating and
Drinking Establishments are compared with selected other types of re-
tail outlets below.

<div align="center">

Percentage Increases in Mean Per Capita
Sales of Eating and Drinking Places Compared
With Selected Other Types of Retail Establishments

</div>

Type of Establishment	1948--1954 % Increase	1954--1958 % Increase	1958--1963 % Increase
Eating and Drinking Places	10.23%	5.40%	11.94%
Gasoline Service Stations	44.52	21.12	14.48
Food Stores	21.07	15.36	8.06
Automotive Dealers	29.74	.26	27.61
Drug Stores	19.01	18.41	15.29

Each of these categories, with the exception of Food Stores
between 1958 and 1963 and Automotive Dealers between 1954 and 1958,
experienced substantially greater percentage gains over time than is
the case with Eating and Drinking Places. The percentage increases
for all retail sales categories as an aggregate were 17.24 per cent

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[1]Loeb, op. cit., p. 23.

between 1948 and 1954, 9.03 per cent between 1954 and 1958, and 12.59

per cent between 1958 and 1963. In addition to this evidence, it has

been established that the sales of this category have been declining

consistently both as a proportion of per capita total retail sales and

as a proportion of per capita personal income.

There are a number of factors which might be recognized as

contributing to this relatively slow rate of growth in Eating and

Drinking sales.

First, it is quite possible that the trend in recent times

to less formal suburban living with more emphasis placed upon outdoor

barbecues and home entertaining has, in part, acted as a substitute

for restaurants and drinking places. The home and its location are more

and more becoming a symbol of status and affluence, and may well be rec-

ognized with increasing popularity as a center for entertainment and

for family and friends.

Second, the modest increase in consumption of food and bever-

ages away from home may be due, to some extent, to the:

> . . . expansion of the school lunch program, and
> special luncheon provisions by employers for in-
> dustrial workers . . .[1]

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[1]Ibid.

Third, and related somewhat to the above, per capita sales
of Eating and Drinking establishments have probably been affected, to
some extent, by the inclusion of food facilities in other types of
retail outlets in recent years. Drug stores and bowling alleys, for
instance, offer food services which may frequently serve as an accept-
able alternative to Eating and Drinking Places.

Fourth, the location of many of these restaurants and drink-
ing places may be an inhibiting factor in their sales growth. Undoubt-
edly, a large proportion of these establishments are located in
downtown areas. And like many other types of retailers, their sales
may have been adversely affected by the many problems of accessibility
and traffic congestion.

Sales and the Proportion of Nonagricultural Employment

The relationship between sales of Eating and Drinking Places
and the proportion of total employment active in nonagricultural pur-
suits is more difficult to analyze, and the statistics, in some cases,
may defy logical explanation.

The decline in the simple correlation coefficient from 1948
through 1963 is probably not entirely unexpected as, over time, the
level of affluence of the agriculturally employed tends to rise; as
heretofore strictly rural areas become more and more urbanized, espe-
cially in terms of the availability of retail establishments such as

Eating and Drinking Places; and as other sociological and economic differences between the agriculturally and nonagriculturally employed tend to be lessened.

The fact that the level of significance, measured by the "t" test, rises so sharply in the last three time periods is difficult to explain. This same general pattern is followed by the elasticity of the per cent of nonagricultural employment. The elasticity is -.0940 in 1948, -.7570 in 1954, -.4418 in 1958 and -.5632 in 1963. There have been no major changes in the composition or definition of the Eating and Drinking category to distort the statistical analysis, nor were there any features pertinent to the economy in 1954 which would be expected to cause a significant deviation in the relationship from that of the other time periods. Of course, most difficult of all to understand is the negative sign attached to the "t" values and to the elasticities, implying an inverse relationship between sales and the proportion of nonagricultural employment. If anything were to be anticipated, it would likely be the reverse. Speculation at this time as to possible underlying causes would probably be more dangerous than helpful. Further research is undoubtedly needed.

Summary

Per capita sales of Eating and Drinking Places have risen moderately since 1948 and have declined both as a percentage of per capita total retail sales and of per capita personal income.

The multiple coefficient of determination has remained rela-
tively stable over time at slightly less than .8. The simple correla-
tion coefficient between sales and income has also been fairly constant
at a little under .9. The correlation coefficient between sales and the
per cent of nonagricultural employment, however, has steadily declined
from .4296 in 1948 to .2032 in 1963.

Per capita personal income is a highly significant variable
in relation to Eating and Drinking sales, with the "t" values exceed-
ing 10 in each time period. The per cent of nonagricultural employment
is significant at the 5 per cent level, in 1954 and 1963.

Unlike any other of the retail sales categories, the income
elasticity for the Eating and Drinking category exceeds one in each
period. This strong relationship is to be expected. The elasticity
of the per cent of nonagricultural employment, however, does not follow
the expected pattern, rising from -.0940 in 1948 to -.7570 in 1954,
and then falling to -.4418 in 1958 and -.5632 in 1963.

The modest increase in per capita sales of Eating and Drink-
ing Places may be accounted for, in part, by increased attention to
the home and its facilities as a substitute for restaurants and drink-
ing establishments, to the recent expansion of lunchroom facilities
for students and workers, to increased competition from other types
of retail outlets, and to problems plaguing downtown locations.

Many of the statistical results of the EFFEST program regarding the relationship between sales and the per cent of nonagricultural employment are contrary to what might normally be expected. The decline in the correlation coefficient from 1948 through 1963 is not surprising, but the fact that this variable is significant at the 5 per cent confidence level only in 1954 and 1963, and negatively so at that, is difficult to understand. The elasticities are equally perplexing, following the same approximate pattern as the "t" values and having a negative sign.

CHAPTER XI

DRUG STORES AND PROPRIETARY STORES

This "Kind of Business" classification includes the sales
of: 1) Drug Stores; and 2) Proprietary Stores.[1]

In this particular category of retail sales, per capita per-
sonal income has been established as a significant independent variable,
while the per cent of nonagricultural employment is not significant.

Examples of the correlation of certain other variables with
per capita Drug sales are: white-nonwhite population ratio (.0213),
male-female population ratio (-.1236), median years of school completed
(.1009), median age (-.0333), and the number of Drug establishments
per capita (-.1263).

Total and per capita Drug sales data and their relationship
with total per capita retail sales and per capita personal income are
presented in the tables below.

The Variables

Total dollar sales figures for retail Drug establishments
are shown below.

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[1]A complete breakdown of the sales of each of these types
of outlets is presented in the Appendix.

Sales Volume of Drug Stores and Proprietary
Stores in the United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$4,011,509	$5,251,791	$6,778,926	$8,446,936

Per capita Drug sales in absolute terms and as a per cent of the sales of all types of retail outlets are shown in the next table.

Mean Per Capita Sales of Drug Outlets in Absolute
Terms and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita Sales of Drug Outlets	Mean Per Capita Sales of Drug Outlets as a Per Cent of Mean Per Capita Total Retail Sales
1948	$28.35	3.17%
1954	33.74	3.22
1958	39.95	3.50
1963	46.06	3.59

Per capita sales of Drug outlets have increased at a fairly constant rate since 1948. And Drug sales as a proportion of total retail sales have also risen slightly. This category is one of the few which has shown consistent gains in each period in relation to aggregate per capita retail sales.

The next table shows the relationships in each of the four time periods between per capita Drug sales and per capita personal income.

Mean Per Capita Personal Income and Mean Per Capita Sales of
Drug Establishments as a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Sales of Drug Establishments as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	2.10%
1954	1,656	2.04
1958	1,939	2.06
1963	2,313	2.00

The proportion of per capita personal income accounted for
by Drug purchases has remained stable since 1948 at approximately two
per cent. This is one of the few instances in which the per capita
sales of a particular retail category have not declined in relation
to income.

Correlation Coefficients

The multiple coefficient of determination between per capita
Drug sales and the two independent variables, per capita personal in-
come and the per cent of nonagricultural employment was .4952 in 1948,
.5331 in 1954, .5122 in 1958, and .4515 in 1963.

The table below contains the simple correlation coefficients
in each period between Drug sales and each of the independent variables.

Coefficients of Correlation Between Mean Per
Capita Drug Sales and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.6999	0.4372
1954	0.7343	0.3999
1958	0.7101	0.2656
1963	0.6584	0.1550

The correlation between per capita Drug sales and per capita personal income is positive in each period and relatively stable at around .7. The correlation between per capita Drug sales and the per cent of nonagricultural employment is also positive, but declines rather sharply in each succeeding period from a high of .4372 in 1948 to a low of .1550 in 1963.

Efficient Estimators

The regression coefficients, the standard errors of the estimates, in parentheses, and the "t" values, developed through the EFFEST logarithmic program, are presented in the next table.

Regression Coefficients (b), Standard
Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	0.5604 (0.1064)	5.63	0.3088 (0.2194)	1.41

1954	0.6673 (0.1032)	6.47	-0.0950 (0.2511)	-0.38
1958	0.5841 (0.0929)	6.29	-0.0488 (0.2777)	-0.18
1963	0.5757 (0.1130)	5.09	-0.2735 (0.3543)	-0.77

The "t" values for the per cent of nonagricultural employment approaches significance at 1.41 in 1948, but is considerably lower in the next three periods. This variable is, therefore, considered to be not significant in relation to per capita sales of Drug retailers.

The "t" values for per capita personal income are all large enough such that the variable can be considered highly significant in each period.

Elasticities

The elasticities for Drug sales of per capita personal income and the proportion of nonagricultural employment are contained below.

Elasticities of Mean Per Capita Personal
Income and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.5604	0.3088
1954	0.6673	-0.0950
1958	0.5841	-0.0488
1963	0.5757	-0.2735

The elasticity of per capita personal income in Drug sales is less than one in all periods. There were minor changes during the sixteen-year period, with the elasticity fluctuating around .6.

The elasticity of the per cent of nonagricultural employment has followed quite a different pattern from that of income. The elasticity is considerably smaller and has a negative sign in the latter three periods. The negative sign implies an inverse relationship between changes in the proportion of nonagricultural employment and Drug sales. But the magnitude of the elasticity is so small as to preclude serious consideration of the nature of the relationship.

<u>Analysis</u>

Sales and Per Capita Personal Income

Not only has the income elasticity been maintained since the War and the proportion of per capita personal income allocated to Drug sales remained stable, but per capita sales of Drug establishments have shown substantially greater percentage gains in succeeding periods than is the case with per capita sales of all types of retail goods. The percentage increases of Drug sales were 19.01 between 1948 and 1954, 18.41 per cent between 1954 and 1958, and 15.29 per cent from 1958 through 1963. Gains for all retail sales were 17.24 per cent, 9.03 per cent, and 12.59 per cent for the same time periods.

A recent study by the Bureau of Labor Statistics notes that:

. . . expenditures for medical care,[1] though up
substantially in current dollars, increased only
a little more than the rise in real incomes after
adjustment for the advance in prices of medical
care. In other words, medical care appeared to
take about the same share of after-tax incomes
in 1960 as it had in 1950, on the average.[2]

Even so, it should be noted that relative to total per capita
retail sales and the proportion of income spent on other types of re-
tail goods, this Drug category has been gaining in recent years. Of
course, it must be remembered that the Bureau of Labor Statistics study
deals with consumer expenditures, while this research is concerned with
analysis of the sales of a particular type of retail outlet for items
related to medical care.

In line with this consideration, one probable reason for the
showing in Drug sales is the proliferation of Drug items offered in
recent years specifically, and another is the expansion of the total
merchandise lines of Drug and Proprietary Stores generally. Scientific
and technological advances in the area of medicine since the War have
made available a much wider assortment of drugs and cures. In addition,
these types of retail outlets have expanded their total product offerings

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[1] "Medical care" includes more than the sales of Drug and Pro-
prietary Stores, but the same basic reasoning is assumed to be applicable
here.

[2] Chase, loc. cit., p. 67.

to include many commodities heretofore unavailable. Both of these

factors have very likely contributed to higher per capita sales and

stable income elasticities of Drug retailers.

It is also tenable to assume that in addition to a greater

number and variety of Drug items being made available for consumption,

persons tend to devote more attention to their ills as incomes rise.

They may become more responsive, in terms of drug purchases, to their

ailments under conditions of increasing affluence. It is also quite

possible that sales of Drug establishments have risen even less rapidly

than might otherwise have been expected in that:

> Rapid growth in medical care plans which are paid
> for wholly or partially by employers undoubtedly has
> helped to hold down direct medical outlays by con-
> sumers themselves.[1]

Sales and the Proportion of Nonagricultural Employment

The correlation coefficients, "t" values, and elasticities

all indicate that the variable, the per cent of nonagricultural employ-

ment, is not too importantly related to the sales of Drug outlets.

This relationship between the dependent and independent variables is

not unexpected, since there is little reason to assume that demand for

Drug retailers' products would differ substantially between the

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[1]Ibid.

agriculturally and nonagriculturally employed.

Summary

Per capita sales of Drug and Proprietary Stores have been rising consistently since 1948 in absolute terms and as a proportion of the total per capita sales of all retail establishments. And they have maintained a stable share of per capita personal income over time.

The multiple coefficient of determination has remained fairly stable over time at around .5. The coefficient of correlation between Drug sales and per capita personal income has also been relatively constant at approximately .7. The coefficient of correlation between Drug sales and the per cent of nonagricultural employment was .4372 in 1948 and has fallen steadily in succeeding periods to .1550 in 1963.

Per capita personal income is significantly related to the sales of Drug establishments, with "t" being greater than 1.67 in each period. The per cent of nonagricultural employment is not a significant variable in any period.

The income elasticity remained relatively stable between 1948 and 1963, fluctuating around .6. The elasticity of the per cent of nonagricultural employment follows quite a different pattern, falling from around .3 in 1948 to -.2735 in 1963.

The gains in Drug sales in absolute terms and as a per cent

of total retail sales, the maintaining of Drug sales as a proportion

of income and the stability of the income elasticity may be accounted

for, in part, by the wider variety of drugs available in recent years,

the broadening of general merchandise lines of Drug and Proprietary

Stores, and the likelihood that persons tend to devote more attention

to health and drug needs as incomes rise.

The proportion of nonagricultural employment is apparently

not an important independent variable in relation to Drug sales, and

this is not necessarily contrary to what might normally be expected.

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CHAPTER XII

NONSTORE RETAILERS

This "Kind of Business" classification includes the sales of: 1) Mail Order Houses; 2) Merchandise Vending Machine Operators; and 3) Direct Selling (House-to-House) Organizations.[1]

The two variables, per capita personal income and the per cent of nonagricultural employment, were found to be significantly related to the sales of Nonstore Retailers. To give an idea of the relative unimportance of certain of the other factors considered, the correlations between Nonstore sales and some of the independent variables were: white-nonwhite population ratio (.0499); automobile registrations per one thousand persons (-.1133); the number of Nonstore establishments per capita (-.0889); and median age (-.0043). Most of the other independent variables examined had a correlation with per capita Nonstore sales of approximately the same magnitude.

Sales volume, in total and per capita, for each time period, is shown below in dollar terms and as a per cent of per capita total retail sales and per capita personal income.

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[1] A complete breakdown of the sales of each of these types of outlets is presented in the Appendix.

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The Variables

The total volume of sales generated in the United States through Nonstore retail establishments in each of the four periods is shown below.

Sales Volume of Nonstore Retailers in the United States in 1948, 1954, 1958, 1963
(000)

1948	1954	1958	1963
$2,310,960	$4,513,875	$5,401,313	$6,176,460

The data in the next table represent per capita Nonstore sales in absolute terms and as a proportion of per capita total retail sales.

Mean Per Capita Sales of Nonstore Retailers in Absolute Terms and as a Per Cent of Mean Per Capita Total Retail Sales

Year	Mean Per Capita Sales of Nonstore Retailers	Mean Per Capita Sales of Nonstore Retailers as a Per Cent of Mean Per Capita Total Retail Sales
1948	$11.50	1.29%
1954	20.99	2.00
1958	23.62	2.07
1963	28.10	2.19

It is obvious that per capita sales of this category have been increasing both in dollar terms and as a per cent of per capita total retail sales. There was a significant rise from 1948 to 1954,

and moderate increases from that point through 1963.

The next table shows the relationship, over time, between per capita sales of Nonstore Retailers and per capita personal income.

Mean Per Capita Personal Income and Mean Per Capita
Nonstore Sales as a Per Cent of Mean Per Capita Personal Income

Year	Mean Per Capita Personal Income	Mean Per Capita Nonstore Sales as a Per Cent of Mean Per Capita Personal Income
1948	$1,348	.85%
1954	1,656	1.27%
1958	1,939	1.22
1963	2,313	1.21

The same general pattern holds true here as in the previous table. The share of income allocated to Nonstore sales is substantially larger in 1954 and succeeding periods than in 1948. The significant increase in 1954 in both cases may be attributed, in large part, to the change in the method of data collection by the Census. This change will be elaborated upon at a later point.

Correlation Coefficients

The multiple coefficient of determination between the dependent and independent variables was .3157 in 1948, .5199 in 1954, .4565 in 1958, and .4884 in 1963. There was a significant rise in r^2 in 1954, and then a fall to lower levels in 1958 and 1963.

The simple coefficients of correlation between sales and income and sales and nonagricultural employment are contained in the next table.

Coefficients of Correlation Between Mean Per
Capita Nonstore Sales and Each of the Independent Variables

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.3271	0.5610
1954	0.6498	0.6652
1958	0.5326	0.6217
1963	0.6489	0.5080

The correlation between per capita sales of Nonstore retailers and per capita personal income increases substantially in 1954, falls about one percentage point in 1954, and then rises in 1963 back to the 1954 level.

The correlation between sales and the per cent of nonagricultural employment follows a little different pattern, rising from .5610 in 1948 to .6652 in 1954; and then falling in each of the next two periods to .5080 in 1963.

Efficient Estimators

The data in the table below represent the multiple regression coefficients, the standard errors of the estimates, in parentheses, and the "t" values for the variables in each period.

Regression Coefficients (b), Standard
Errors of the Estimates, and the "t" Values

Year	Mean Per Capita Personal Income		Mean Per Cent of Nonagricultural Employment	
	b	t	b	t
1948	0.3042 (0.6215)	0.49	3.729 (1.095)	3.41
1954	1.097 (0.3227)	3.40	1.990 (0.6887)	2.85
1958	0.8349 (0.2918)	2.86	2.941 (0.7876)	2.86
1963	1.001 (0.2204)	4.51	1.591 (0.6528)	2.43

Per capita personal income is a significant independent variable in relation to Nonstore sales in 1954, 1958 and 1963, but not in 1948. The per cent of nonagricultural employment is consistently a significant variable with "t" comfortably in excess of 1.67 in each period.

Elasticities

The elasticities for Nonstore sales of per capita personal income and the per cent of nonagricultural employment are presented in the next table.

Elasticities of Mean Per Capita Personal
Income and the Mean Per Cent of Nonagricultural Employment

Year	Mean Per Capita Personal Income	Mean Per Cent of Nonagricultural Employment
1948	0.3042	3.729

1954	1.097	1.990
1958	0.8349	2.941
1963	1.001	1.591

The pattern of the income elasticities over time is much the same as that of the "t" values and the simple correlation coefficients for income. The elasticity is relatively low in 1948 at .3042, but rises considerably to 1.097 in 1954. There is a slight drop in 1958 to .8349, and the figure for 1963 is 1.001.

The elasticities for the per cent of nonagricultural employment are very high, and comparable in magnitude to those in the Lumber category, though the latter have a negative sign. The range in the sixteen-year period is from 1.591 to 3.729, with some fluctuation in succeeding years.

Analysis

Prior to a discussion of the nature of the relationships between the variables, it should be mentioned that analysis of this particular retail sales classification, as is the case with the category, "Other Retail Stores," is restricted by the composition of the category and changes in the methods of data collection by the Bureau of the Census. Some of the results of the statistical analyses are, as a result, strongly biased and preclude definitive explanation.

Sales and Per Capita Personal Income

In considering, from 1948 to 1954, the substantial growth
in per capita sales of Nonstore Retailers in absolute terms; sales as
a per cent of per capita total retail sales and as a per cent of per
capita personal income; the rise in the correlation coefficient; the
increase in the level of significance of income; and the higher income
elasticity, one is led to believe that there must be a common factor
responsible for this close relationship, measured in so many different
ways, between Nonstore sales and income. There is an acceptable ex-
planation, but it is not an economic or social one.

The Nonstore classification was not adopted in the Census
until 1954. It is true that the 1948 data were reclassified so that
they would be comparable with the 1954 figures. In the same year, how-
ever, the mail canvass system of data collection was adopted, making
it feasible to extend the coverage of the Census to "nonrecognizable"
business establishments. In the 1948 Census, coverage was limited to
places which were "recognizable" as business operations to the enumera-
tors. The use of mailing lists and records in 1954 eliminated this
restriction. Thus, while the data for the two time periods are basically
comparable, there were many more retail establishments included in 1954
than in 1948, affecting primarily the Nonstore category. While per
capita personal income rose 22.85 per cent between 1948 and 1954, per
capita sales of Nonstore retailers increased 95.32 per cent during the

same period. The effect of the addition of the heretofore "nonrecog-
nizable" businesses thus accounts for much of the substantial rise
in per capita sales relative to per capita personal income in 1954.

While the change in the relationship between sales and income
in 1954 can likely be explained, for the most part, by these changes
in methodology, there may be other contributing factors.

First, however, it may be helpful to describe the composition
of Nonstore sales. The data in the table below show the sales of each
of the types of Nonstore Retailers and the percentage of total sales.
The period 1948 is not included due to the fact that there was no
breakdown reported in the category in that Census period. Data for
1963 are excluded since they were not available in detail in time for
this analysis.

<div align="center">

Sales of Each of the Types of Nonstore
Retailers in Absolute Terms and as a Per Cent of Total Sales
(000)

</div>

Types of Nonstore Retailers	1954	% Total	1958	% Total
Mail Order Houses	$1,604,939	35.6%	$1,986,168	36.8%
Merchandise Vending Machine Operators	636,096	14.1	841,523	15.6
Direct Selling Operations	2,272,840	50.3	2,573,622	47.6
Total	$4,513,875	100.0%	$5,401,313	100.0%

As seen in this table, the sales of Direct Selling Operations, that is, house-to-house sales, account for around one-half of the total category sales in each period. The sales of Mail Order Houses are slightly greater than one-third of the total. Merchandise Vending Machine Operators account for the remaining 15 per cent.

One reason for the relatively low cross-section elasticity of income in 1948 may be attributed to the nature of the types of commodities sold through the mail order catalogues and by house-to-house salesmen. Most of these items, at that time, could be categorized as relatively low-priced convenience goods. They were not usually necessity-type commodities with a relatively low degree of income sensitivity. If they had been "shopping" goods, it is not likely that they would have been purchased by mail or that the seller would have come to the buyer as in house-to-house sales calls. There is simply little reason to assume that the sales of these retailers would be very responsive to changes in personal income.

The more substantial relationship between sales and income in the later periods may be explained, in part, by the general upgrading in the quality, variety, and price of the commodities offered for sale by Nonstore Retailers. In mail order sales, for example, there has been a trend toward more non-necessity and even some luxury items. A recent mail catalogue of a large national retail organization includes ladies' coats priced in excess of $600, certain jewelry items selling

for up to $3,000, expensive stereophonic phonograph equipment, and high quality power tools for home use. Certainly goods of this sort would not account for a very large proportion of total mail order sales. Nevertheless, their inclusion has probably contributed to the rising importance of income over time.

The most important reason, though, for the strong relationship between Nonstore sales and income, does lie in the fact that the sales of more and more of these types of outlets have been included in recent Censuses.

Sales and the Proportion of Nonagricultural Employment

The per cent of nonagricultural employment has been strongly and consistently related to the sales of Nonstore Retailers since 1948. The coefficient of correlation has been above .5 and fairly stable. The "t" values have exceeded 1.67 by a comfortable margin in each time period. And the elasticity has been substantially greater than one and experienced relatively little fluctuation over time.

Unfortunately, a precise analysis of the effect of changes in the proportion of nonagricultural employment upon per capita sales of Nonstore Retailers is marred, not only as a result of the changes in data collection in 1954, but also due to the method of reporting sales of Mail Order Houses. Sales data are usually not recorded at the point of purchase, but rather at the point of distribution. When

an agriculturally-employed person, living in a rural community, orders
an item from a mail catalogue, the sale is not generally recorded in
that community, but in Chicago or New York or some other major metro-
politan area where most mail order operations are located. Thus, a
sale in an agricultural area is actually recorded and reported in a
nonagricultural area. It is only natural to expect, therefore, that
there would be a strong positive relationship between Nonstore sales
and the per cent of nonagricultural employment, since mail order sales
account for over one-third of total Nonstore sales. The two variables
move in the same direction, but the relationship is not of a cause-and-
effect nature.

In addition, the nature of house-to-house selling operations
is a contributing factor. It is obvious that the door-to-door method
of selling is practical only in urban, nonagricultural areas where
population density is high. Direct sales in agricultural areas would
certainly account for only a small proportion of total sales. Thus,
shifts to nonagricultural employment and increases in per capita sales
of Direct Selling Operations would be positively related. And since
direct sales account for around one-half of total sales, it is reason-
able to assume that aggregate Nonstore sales would be affected accord-
ingly.

Sales of Vending Machine Operators amount to only a small
proportion of total Nonstore sales, but their relationship with

nonagricultural employment is consistent with that of Direct Selling

Operations. Certainly most vending machine sales would take place in

areas of high population density, traffic, and retail sales concen-

tration, that is, in areas characteristic of nonagricultural employ-

ment and urbanization. Availability of vending machine items would

be scarce in agricultural areas. Thus rising vending machine sales

would likely parallel increases in the proportion of nonagricultural

employment.

It may be concluded, then, that per capita sales of Nonstore

Retailers are significantly related to changes in the per cent of non-

agricultural employment due, first, to the manner in which sales figures

of mail order houses are reported, and, second, to the nature of econo-

mies of scale in the selling activity of Merchandise Vending Machine

Operators and Direct Selling Operations.

Summary

Mean per capita sales of Nonstore Retailers rose substantially

between 1948 and 1954, and have increased at a modest rate since then.

They have also increased as a proportion of per capita total retail

sales and as a per cent of per capita personal income.

The r^2 figure rose substantially between 1948 and 1954 and

then tapered off to somewhat lower levels during the last two periods.

The r between Nonstore sales and income also rose considerably in 1954,

fell in 1958, but then regained the 1954 level in the last year. The correlation coefficient between Nonstore sales and the per cent of non-agricultural employment fluctuated during the four periods between .5080 and .6652.

The "t" values for per capita personal income designate this variable as significant in the latter three time periods, but not in 1948. The per cent of nonagricultural employment is accepted as a significant independent variable in each of the four time periods.

The elasticity of per capita personal income was very low in 1948 at .3042, but increased to 1.097 by 1954. There was a little decline in 1958 to .8349, and a rise back to approximately one in 1963. The trend of the elasticity of the per cent of nonagricultural employ-ment is somewhat different, falling from 3.729 in 1948 to 1.990 in 1954, rising to 2.941 in 1954, and then declining to 1.591 in 1963.

It has been pointed out that precise analysis of the relation-ships between the dependent and the independent variables is restricted due to the fact that there was no Nonstore category in 1948 and the mail canvass system was implemented in 1954. The inclusion of the sales figures of previously "nonrecognizable" business establishments is pri-marily responsible for the strengthening of the association between Nonstore sales and income in 1954. In addition, the relatively low relationship between sales and income in 1948 may be due, in part, to

the convenience and necessity types of goods sold through mail order houses and by house-to-house salesmen. The higher relationship in later years may be a result, aside from the change in data collection, of a general upgrading of quality and price of these items, and the inclusion of many more smaller retailers in the mail order field, selling non-necessity and even luxury goods.

The relationship between per capita Nonstore sales and the per cent of nonagricultural employment has been somewhat more significant and consistent over time. The most important factors underlying this relationship are the recording of a large proportion of mail order sales in nonagricultural locations, and the fact that Direct Selling Operations and Vending Machine activities are economically feasible only in areas of high population concentration and sales traffic, which are generally characterized by a large percentage of nonagricultural employment.

CHAPTER XIII

SUMMARY

The purpose of this chapter is to present, briefly and con-
cisely, a summary of the relationships, over time, between sales of
each of the retail categories and the relevant independent variables.
The simple correlation coefficients and the "t" values for income are
presented in the first table. The same data for nonagricultural employ-
ment appears in the second table. The third and fourth tables contain
the elasticities, from 1948 through 1963, of per capita personal income
and the proportion of nonagricultural employment respectively. An at-
tempt is made, after each of the first two tables, to relate the relative
significance of each independent variable to per capita consumption of
each sales group. And after each of the last two tables, a general
ranking is presented regarding the sensitivity of each retail sales
category to income and nonagricultural employment.

The table below summarizes the simple coefficients of correla-
tion and the test of significance for each of the ten retail sales
categories for the income variables.

TABLE I

Summary of Correlation Coefficients and
"t" Values for Mean Per Capita Personal Income
and Each of the "Kind of Business" Classifications

Year	Lumber		Gen. Mdse.		Food	
	r	t	r	t	r	t
1948	0.2278	8.35	0.4829	4.06	0.8630	10.31
1954	0.0358	7.63	0.6167	5.69	0.8923	10.47
1958	-0.0476	6.53	0.6737	5.85	0.8804	11.97
1963	-0.1802	3.87	0.8705	11.50	0.7874	7.97

Year	Auto		Gasoline		Apparel	
	r	t	r	t	r	t
1948	0.5925	9.62	0.5124	2.01	0.7959	8.48
1954	0.5760	8.12	0.4073	4.03	0.8008	7.90
1958	0.4890	6.70	0.3979	5.11	0.7624	8.08
1963	0.4720	5.28	0.2923	4.38	0.7519	7.90

Year	Furniture		Eating & Drinking		Drug	
	r	t	r	t	r	t
1948	0.8170	8.83	0.8800	10.71	0.6999	5.63
1954	0.8686	10.04	0.8414	10.84	0.7343	6.47
1958	0.8325	10.37	0.8698	12.23	0.7101	6.29
1963	0.7840	8.95	0.8643	12.35	0.6584	5.09

Year	Nonstore	
	r	t
1948	0.3271	.49
1954	0.6498	3.40
1958	0.5326	2.86
1963	0.6489	4.51

It is possible here to rank or classify each of these ten sales categories according to the significance of their correlation, over time, with per capita personal income. The scale is admittedly developed in an arbitrary fashion, but the general purpose is served.

The sales-income relationships are classified as either Highly Significant, Significant, or Not Significant.

Highly Significant: Furniture, Home Furnishings, and Equipment Stores; Food Stores; Eating and Drinking Places; Apparel and Accessory Stores. In each of these three categories, the correlation coefficients are relatively large, and the "t" test designates them as highly significant.

Significant: Nonstore Retailers; Gasoline Service Stations; General Merchandise Group Stores; Automotive Dealers; and Drug Stores and Proprietary Stores. In each of these categories, the correlation coefficients are sufficiently large and are accompanied by "t" values of such magnitude that they may be termed as significant.

<u>Not Significant</u>: Lumber, Building Materials, Hardware,

Farm Equipment Dealers. In this category the coefficients are so small

that the relationship with income is recognized as not significant.

The next table summarizes the correlation coefficients and

the "t" values for each sales classification for the nonagricultural

employment variable.

TABLE II

Summary of Correlation Coefficients and
"t" Values for the Mean Per Cent of Nonagricultural
<u>Employment and Each of the "Kind of Business" Classifications</u>

<u>Year</u>	<u>Lumber</u>		<u>Gen. Mdse.</u>		<u>Food</u>	
	<u>r</u>	<u>t</u>	<u>r</u>	<u>t</u>	<u>r</u>	<u>t</u>
1948	-0.5612	-10.05	0.2144	-.75	0.6499	3.30
1954	-0.5924	-9.82	0.4003	-.95	0.6998	2.34
1958	-0.7957	-13.53	0.4705	1.33	0.5705	2.66
1963	-0.8885	-14.80	0.5627	3.31	0.4900	2.46

Year	Auto		Gasoline[1]		Apparel	
	_r_	_t_	_r_	_t_	_r_	_t_
1948	-0.7530	-5.15	0.9097	12.63	0.7171	5.39
1954	0.0654	-4.30	0.8320	9.23	0.6696	2.63
1958	-0.1245	-3.94	0.7949	9.24	0.4880	1.73
1963	-0.0296	-2.03	0.8092	10.11	0.4032	1.27

Year	Furniture		Eating & Drinking		Drug	
	_r_	_t_	_r_	_t_	_r_	_t_
1948	0.5454	1.78	0.4296	-.39	0.4372	1.41
1954	0.6248	.97	0.3914	-2.62	0.3999	-.38
1958	0.4337	.50	0.2761	-1.52	0.2656	-.18
1963	0.4075	.94	0.2032	-1.74	0.1550	-.77

Year	Nonstore	
	_r_	_t_
1948	0.5610	3.41
1954	0.6652	2.85
1958	0.6217	2.86
·1963	0.5080	2.43

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[1]Automobile registrations per thousand persons is substituted for the mean per cent of nonagricultural employment in the Gasoline category.

The sales-nonagricultural employment relationships are categorized as either Highly Significant, Significant, or Not Significant.

Highly Significant: Lumber, Building Materials, Hardware, and Farm Equipment Dealers (inverse relationship); Gasoline Service Stations. In each of these groups, the correlations are relatively high and the "t" values very strong.

Significant: Food Stores; Nonstore Retailers; Eating and Drinking Places (inverse); Apparel and Accessory Stores. The correlation coefficients and the "t" statistics are of large enough magnitude in these categories such that the relationships between the variables may be judged as substantial. In Eating and Drinking and Apparel and Accessory, however, it is true that the "t's" are below 1.67 in certain instances.

Not Significant: Furniture, Home Furnishings, and Equipment Stores; Drug Stores and Proprietary Stores; General Merchandise Group Stores; and Automotive Dealers. Some of the relationships are inverse. In the first three retail classifications, the "t" values are so low, and in the latter, the correlation coefficients so small, that the relationships between sales and the proportion of nonagricultural employment are considered to be not significant.

The table below summarizes the income elasticities for each of the ten "Kind of Business" classifications from 1948 through 1963.

TABLE III

Summary of Income Elasticities for
Each of the "Kind of Business" Classifications

Year	Lumber	Gen. Mdse.	Food	Auto	Gasoline
1948	1.4429	0.5480	0.6232	0.8852	0.1672
1954	1.2150	0.5763	0.5846	0.6826	0.2262
1958	.8354	0.5021	0.5859	0.5584	0.3272
1963	.4988	0.8569	0.4692	0.4096	0.2667

Year	Apparel	Furniture	Eating and Drinking	Drug	Nonstore
1948	0.7913	0.7350	1.304	0.5604	0.3042
1954	0.7440	0.8363	1.328	0.6673	1.097
1958	0.7587	0.8855	1.213	0.5841	0.8349
1963	0.6696	0.7780	1.265	0.5757	1.001

The retail categories are grouped below according to their degree of sensitivity to income differences.

High Sensitive: Lumber, Building Materials, Hardware, Farm Equipment Dealers; Nonstore Retailers; Eating and Drinking Places. In all three cases, the income elasticities are high in each time period and even exceed one in certain periods.

Medium Sensitive: Furniture, Home Furnishings, and Equipment Stores; Drug Stores and Proprietary Stores; Food Stores; Apparel and Accessory Stores; General Merchandise Group Stores; Automotive Dealers.

While per capita consumption of these types of commodities apparently
does not react as much to income changes as those mentioned above, they
are affected to a meaningful degree.

Low Sensitive: Gasoline Service Stations. There is only one
category with income elasticities in each period so low that per capita
sales may be considered relatively insensitive to per capita personal
income.

The next table summarizes the elasticities of the per cent
of nonagricultural employment for each retail sales category.

TABLE IV

Summary of Nonagricultural Employment
Elasticities for Each of the "Kind of Business" Classifications

Year	Lumber	Gen. Mdse.	Food	Auto	Gasoline
1948	-3.5665	-0.1835	0.3779	-0.8782	1.0010
1954	-3.9417	-0.2113	0.2981	-0.8101	.6791
1958	-5.4213	.3116	0.3678	-0.9160	.6699
1963	-6.1410	.7275	0.4473	-0.4851	.7003

Year	Apparel	Furniture	Eating and Drinking	Drug	Nonstore
1948	0.8910	0.2633	-0.0940	0.3088	3.729
1954	0.5823	0.1780	-0.7570	-0.0950	1.990
1958	0.4721	0.1179	-0.4418	-0.0488	2.941
1963	0.3396	0.2468	-0.5632	-0.2735	1.591

The sales classifications below are ranked according to their sensitivity to differences in the proportion of nonagricultural employment.

High Sensitive: Lumber, Building Materials, Hardware, and Farm Equipment Dealers (inverse relationship); Nonstore Retailers. The nonagricultural employment elasticities in these two categories are, by comparison, very large. They are all larger than one, and even range as high as -6 in the Lumber group.

Medium Sensitive: Eating and Drinking Places (inverse relationship); Apparel and Accessory Stores; Gasoline Service Stations; Automotive Dealers (inverse); Food Stores. Sales of these retail outlets, while not affected as much by nonagricultural employment differences as those outlets listed above, are, nevertheless, importantly related to this variable.

Low Sensitive: Furniture, Home Furnishings, and Equipment Dealers; General Merchandise Group Stores; Drug Stores and Proprietary Stores. Some of the relationships are inverse. Sales of these categories are apparently not significantly affected by the percentage of nonagricultural employment.

APPENDIX

APPENDIX

This Appendix is divided into two major parts. First, a complete breakdown of the types of retail outlets included in each major category is presented. Second, a comparison is made of the relevant changes which occurred between each of the four Census periods which might have some effect on the comparability of the data.

Each of the "Kind of Business" classifications analyzed in this study is composed of more than one specific type of retail outlet. A broad breakdown was shown at the beginning of each chapter for each type of retail establishment. A more detailed description is shown here, including the major retail outlets involved in each of the ten "Kind of Business" categories. The accompanying Standard Industrial Classification code numbers are also shown. The definitions are based upon the 1963 Census.

Lumber, Building Materials, Hardware, Farm Equipment Dealers (SIC Major Group 52)

    Lumber yards (Part of SIC 521)
    Building materials dealers (Part of SIC 521)
    Heating, plumbing equipment dealers (SIC 522)
    Paint, glass, wallpaper stores (SIC 523)
    Electrical supply stores (SIC 524)
    Hardware stores (SIC 5251)
    Farm equipment dealers (SIC 5252)

<u>General Merchandise Stores</u> (SIC Major Group 53, Except for "Nonstore
      Retailers")

        Department stores (SIC 531)
        Limited price variety stores (SIC 533)
        General merchandise stores (Part of SIC 539)
        Dry goods stores (Part of SIC 539)
        Sewing, needlework stores (Part of SIC 539)

<u>Food Stores</u> (SIC Major Group 54)

        Grocery stores, including delicatessens (SIC 541)
        Meat markets (Part of SIC 542)
        Fish (seafood) markets (Part of SIC 542)
        Fruit stores, vegetable markets (SIC 543)
        Candy, nut confectionery stores (SIC 544)
        Dairy products stores (SIC 545)
        Retail bakeries, manufacturing (SIC 5462)
        Retail bakeries, manufacturing (SIC 5463)
        Egg and poultry dealers (Part of SIC 549)
        Other (Part of SIC 549)

<u>Automotive Dealers</u> (SIC Major Group 55, Except 554)

        Passenger car dealers, franchised (SIC 551)
        Passenger car dealers, nonfranchised (SIC 552)
        Tire, battery, accessory dealers (Part of SIC 553)
        Home and auto supply stores (Part of SIC 553)
        Aircraft, motorcycle dealers (Part of SIC 559)
        Household trailer dealers (Part of SIC 559)
        Boat dealers (Part of SIC 559)
        Other automotive dealers (Part of SIC 559)

<u>Gasoline Service Stations</u> (SIC 554)

<u>Apparel and Accessories Stores</u> (SIC Major Group 56)

        Men's, boys' clothing and furnishings stores (SIC 561)
        Custom tailors (SIC 567)
        Women's ready-to-wear stores (SIC 562)
        Bridal shops (Part of SIC 562)
        Maternity shops (Part of SIC 562)

Millinery stores (Part of SIC 563)
Corset, lingerie stores (Part of SIC 563)
Hosiery stores (Part of SIC 563)
Apparel, accessory, other specialty stores (Part of SIC 563)
Furriers, fur shops (SIC 568)
Children's, infants' wear stores (SIC 564)
Family clothing stores (SIC 565)
Men's shoe stores (Part of SIC 566)
Women's shoe stores (Part of SIC 566)
Children's, juveniles' shoe stores (Part of SIC 566)
Family shoe stores (Part of SIC 566)
Miscellaneous apparel, accessory stores (SIC 569)

Furniture, Home Furnishings, and Equipment Stores (SIC Major Group 57)

Furniture stores (SIC 5712)
Floor coverings stores (SIC 5713)
Drapery, curtain, upholstery stores (SIC 5714)
China, glassware, metalware stores (SIC 5715)
Miscellaneous home furnishings stores (SIC 5719)
Household appliance stores (SIC 572)
Radio and television stores (SIC 5732)
Record shops (Part of SIC 5733)
Musical instrument stores (Part of SIC 5733)

Eating and Drinking Places (SIC Major Group 58)

Restaurants, lunchrooms (Part of SIC 5812)
Cafeterias (Part of SIC 5812)
Refreshment places (Part of SIC 5812)
Caterers (Part of SIC 5812)
Drinking places (alcoholic beverages) (SIC 5813)

Drug Stores and Proprietary Stores (SIC 591)

Drug stores (Part of SIC 591)
Proprietary stores (Part of SIC 591)
Liquor stores (SIC 592), also government operated liquor
  stores (Part of SIC major groups 92 and 93)
Antique stores (SIC 5932)
Secondhand stores (SIC 5933)
Book stores (SIC 5942)
Stationery stores (SIC 5943)
Sporting goods stores (SIC 5952)

Bicycle shops (SIC 5953)
Hay, grain, feed stores (SIC 5962)
Other farm supply stores (Part of SIC 5969)
Garden supply stores (Part of SIC 5969)
Jewelry stores (SIC 597)
Coal and wood dealers (Part of SIC 5982)
Ice dealers (Part of SIC 5982)
Fuel oil dealers (SIC 5983)
Liquefied petroleum (LP) gas dealers (SIC 5984)
Florists (SIC 5992)
Cigar stores, stands (SIC 5993)
News dealers, newsstands (SIC 5994)
Camera, photographic supply stores (SIC 5996)
Gift, novelty, souvenir shops (SIC 5997)
Optical goods stores (SIC 5998)
Typewriter stores (Part of SIC 5999)
Luggage, leather goods stores (Part of SIC 5999)
Hobby, toy, game shops (Part of SIC 5999)
Religious goods stores (Part of SIC 5999)
Pet shops (Part of SIC 5999)
Other (Part of SIC 5999)

Nonstore Retailers (Part of SIC Major Group 53)

Mail-order houses (SIC 532)
Merchandise vending machine operators (SIC 534)
Direct selling (house-to-house) organizations (SIC 535)

The Business Census differ in certain respects from one period to the next. Sometimes these differences are important to a particular analysis and sometimes not. A summary of the variations which might affect the comparability of data between the Census periods is presented here.

Comparison of 1948 and 1954 Censuses

The more important differences are as follows:

(1) The adoption of a "Nonstore" retail category importantly differenced the 1954 Census from previous Censuses and resulted in some differences in the

figures by kind of business. In the publications
issued in connection with the 1948 and previous
Business Censuses, the "nonstore" retailers were
not separately classified, as in 1954, but were
included with "stores" in each kind of business.
However, the 1948 Census figures shown in this
and other 1954 Census of Business publications
have been revised to show the "nonstore" retailers
on the same basis as they are shown in the 1954
tables.

(2) The 1954 Business Census excludes those estab-
lishments with no paid employment in 1954 which had
a sales volume of less than $2,500 in that year.
Previously published results of the 1948 Census ex-
cluded extablishments which operated the entire year
but which had a sales volume of under $500. However,
the 1948 figures have been revised to the same dollar
cutoff as used in 1954.

(3) The adoption of the mail canvass method in 1954
made it possible to extend the coverage of the Census
to "nonrecognizable" establishments. Most of the
"Nonrecognizable" cases in the 1954 Census are clas-
sified in the "Nonstore" category. The 1948 figures
have been revised to show figures for the "Nonstore"
retailers separate from the "store" type retailers.
It is believed that the inclusion of "nonrecognizable"
establishments has had a greater effect on the count
of establishments than on the volume of retail sales.

(4) The change in the method of enumeration also re-
sulted in the inclusion in the 1954 Census of a num-
ber of establishments which were in business a part
of 1954 but not at the end of 1954. In the 1948
Census, the coverage of establishments was substan-
tially limited to places which, at the end of the
year, were still in business. In the 1954 Census,
however, the inclusion of establishments not in busi-
ness at the end of the year was possible to the extent
that such establishments were included in the active
files of the Internal Revenue Service used for mail-
ing list purposes or to the extent that they were

identified in the records used for the "nonemployer" universe. In both 1954 and previous Censuses, the count of establishments is limited to those in business at the end of the year.

(5) Comparability of 1948 and 1954 Business Census data is also affected by differences in the items of information collected for "Kind of Business" classification purposes and in the classification techniques.

(6) A factor which in some cases may importantly affect "Kind of Business" comparisons was the change made from the 1948 Census practice of con-solidating leased departments with the stores in which they were located. In 1954, each leased de-partment was treated as a separate establishment and was classified in accordance with the type of business it conducted. The 1948 figures contained in the 1954 Census have not been adjusted to the 1954 basis for leased departments.

(7) In the 1948 Census, sales and excise taxes were not included in the total sales and receipts of retail establishments, whereas they were included in 1954. The effect of the change varies from state to state.

Comparison of 1954 and 1958 Censuses

(1) Whereas in the 1954 Census, "Leased departments" were counted as separate establishments and separately classified by kind of business, in the 1958 Census they have been combined with the retail business in which they are located.

(2) Revisions made in the 1957 edition of the SIC Manual have necessitated these changes:

(a) Musical instrument stores and music and record shops have been shifted to the "Kind of

Business" group, "Furniture, Home Furnishings, Equipment Stores," from the group, "Other Retail Stores."

(b) Antique stores have been shifted to the group "Other Retail Stores" from the group, "Furniture, Home Furnishings, Equipment Stores."

Comparison of the 1958 and 1963 Censuses

In all major respects, the 1958 and 1963 Censuses were conducted under similar conditions and procedures. The data are, therefore, comparable for the two periods.

BIBLIOGRAPHY

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Books

Ferber, Robert and Verdoorn, P. J.   Research Methods in Economics and
      and Business. New York: The Macmillan Company, 1962.

Gold, Ed.   The Dynamics of Retailing: Major Trends That Shape the
      Future. New York: Fairchild Publications, Inc., 1963.

Hicks, J. R. Value and Capital. Oxford: Oxford University Press,
      1946.

McConnell, Campbell R.   Economics: Principles, Problems and Policies.
      New York: McGraw-Hill Book Company, Inc., 1963.

Samuelson, Paul A.   Economics: An Introductory Analysis.   New York:
      McGraw-Hill Book Company, Inc., 1951.

Schreier, Fred T.   Modern Marketing Research: A Behavioral Science
      Approach. Belmont, California: Wadsworth Publishing Com-
      pany, Inc., 1963.

Spencer, Milton H., Clark, Colin G., and Hoguet, Peter W.   Business
      and Economic Forecasting: An Econometric Approach.   Home-
      wood, Illinois: Richard D. Irwin, Inc., 1961.

Vaile, Roland S., Grether, E. T., and Cox, Reavis. Marketing in the
      American Economy. New York: The Ronald Press Company, 1951.

Wasson, Chester R. The Strategy of Marketing Research. New York:
      Appleton-Century-Crofts, 1964.

Winer, B. J. Statistical Principles in Experimental Design. New York:
      McGraw-Hill Book Company, Inc., 1962.

Government Publications

U. S. Department of Commerce. Bureau of the Census. Retail Trade. Washington, D. C. U. S. Government Printing Office, 1948, 1954, 1958, 1963.

U. S. Department of Commerce. Bureau of the Census. Statistical Abstract of the United States. Washington, D. C., U. S. Government Printing Office, 1950, 1958, 1960, 1961, 1962.

U. S. Department of Commerce. Bureau of Public Roads. Highway Statistics. Annual Report. Washington, D. C. U. S. Government Printing Office, 1948, 1954, 1958, 1963.

U. S. Department of Labor. Bureau of Labor Statistics. Consumer Price Index: Price Indexes for Selected Items and Groups. Washington, D. C., U. S. Government Printing Office, 1961 and 1964.

U. S. Department of Commerce. Bureau of the Census. General Social and Economic Characteristics. Washington, D. C. U. S. Government Printing Office, 1950 and 1960.

Periodicals

Burk, Marguerite C. "Some Aspects of Income-Food Relationships." Journal of the American Statistical Association. Vol. 53, December, 1958.

Chase, Arnold E. "Changing Patterns of Consumer Expenditures, 1950-1960." American Statistical Association, 1963 Proceedings of the Business and Economic Statistics Section.

Fortune. "The Fabulous Market for Food." October, 1953.

Loeb, Benjamin S. "The Use of Engel's Laws As a Basis for Predicting Consumer Expenditures." The Journal of Marketing. Vol. XX, July, 1955.

Nerlove, Marc. "The Implications of Friedman's Permanent Income
        Hypothesis for Demand Analysis." Agricultural Economics
        Research. Vol. X. January, 1958.

Zellner, Arnold. "An Efficient Method of Estimating Seemingly Unre-
        lated Regressions and Tests for Aggregation Bias." Journal
        of the American Statistical Association, June, 1962.